Online Appendix

for

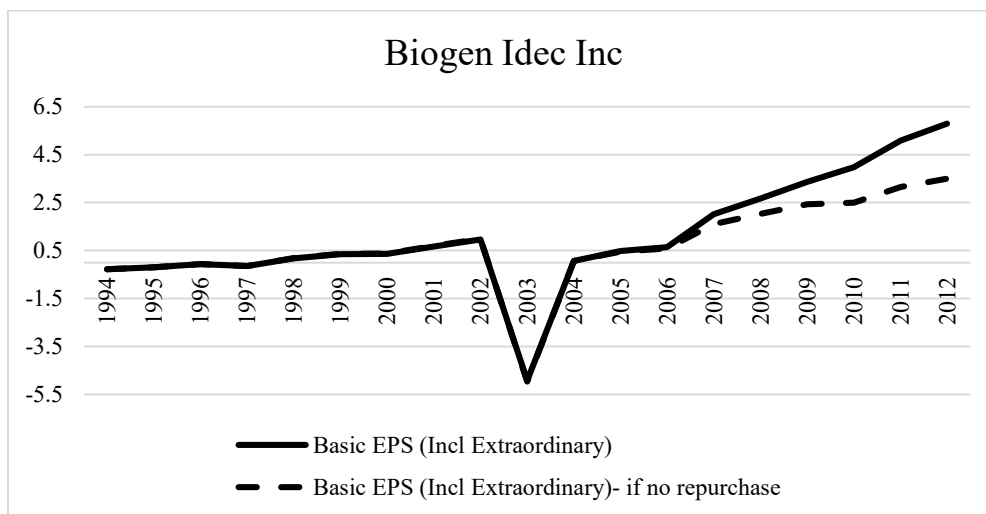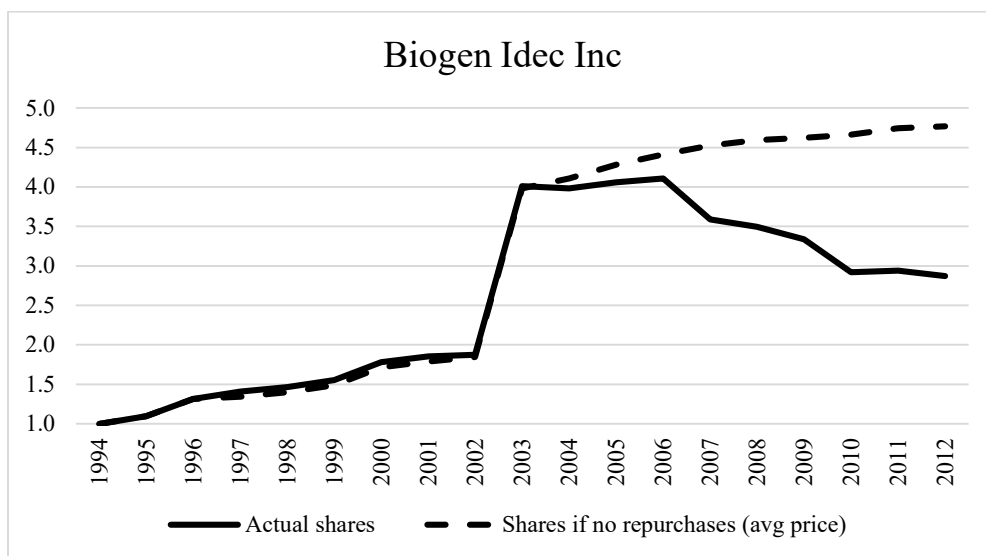**"Employee Compensation Still Impacts Payout Policy"**

Figure OA1. The impact of dilution on shares outstanding and EPS.
Description: This figure illustrates the impact of Biogen Idec's share repurchase activity on shares outstanding and EPS. The top graph shows the number of actual and hypothetical shares outstanding, adjusted for splits and stock dividends, for each share outstanding in 1994. Hypothetical shares outstanding are the number of shares outstanding that the company would have had in the absence of repurchases, calculated as actual shares outstanding plus cumulative annual shares repurchased (dollar value of annual repurchases/average monthly stock price). The bottom graph shows actual EPS (Compustat variable *EPSPI*) and hypothetical EPS in the absence of the repurchases.

Interpretation: Biogen Inc. merged with Idec Pharmaceuticals in 2003, following which they announced a 2004 share repurchase program. Subsequent repurchase programs were announced in 2006 and 2009. Over the course of these programs, Biogen Idec spent over $7.7 billion repurchasing over 150 million shares. Without these repurchases, Biogen's shares outstanding would have increased; instead, they decline. By

2012, the cumulative impact of these repurchase programs on the number of shares outstanding result in Biogen Idec's EPS being 66% higher than it would have been without the repurchases.
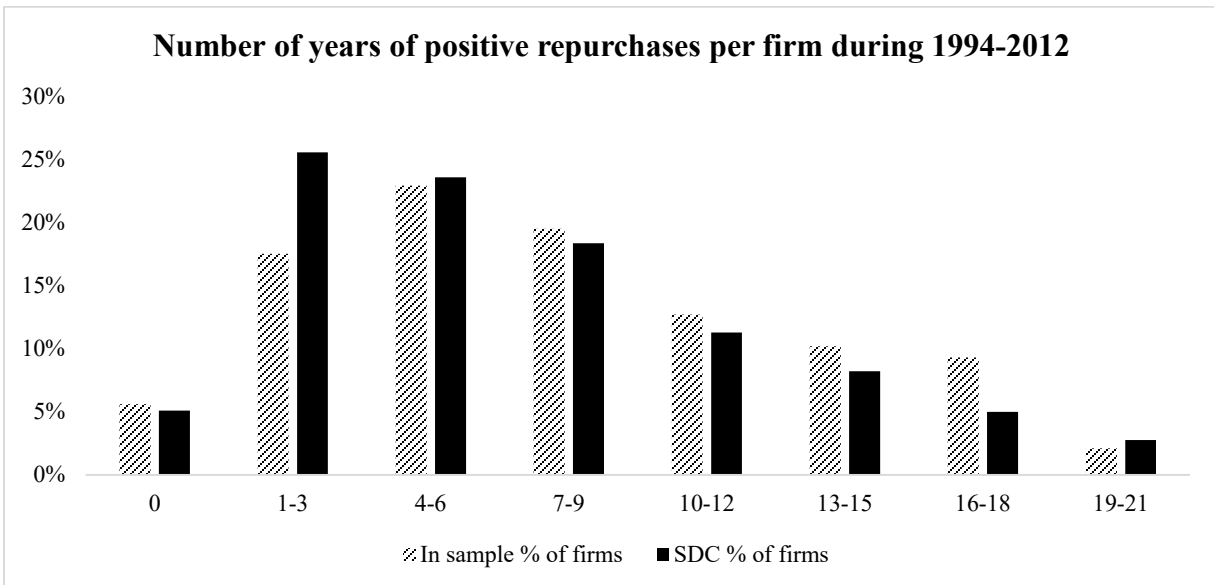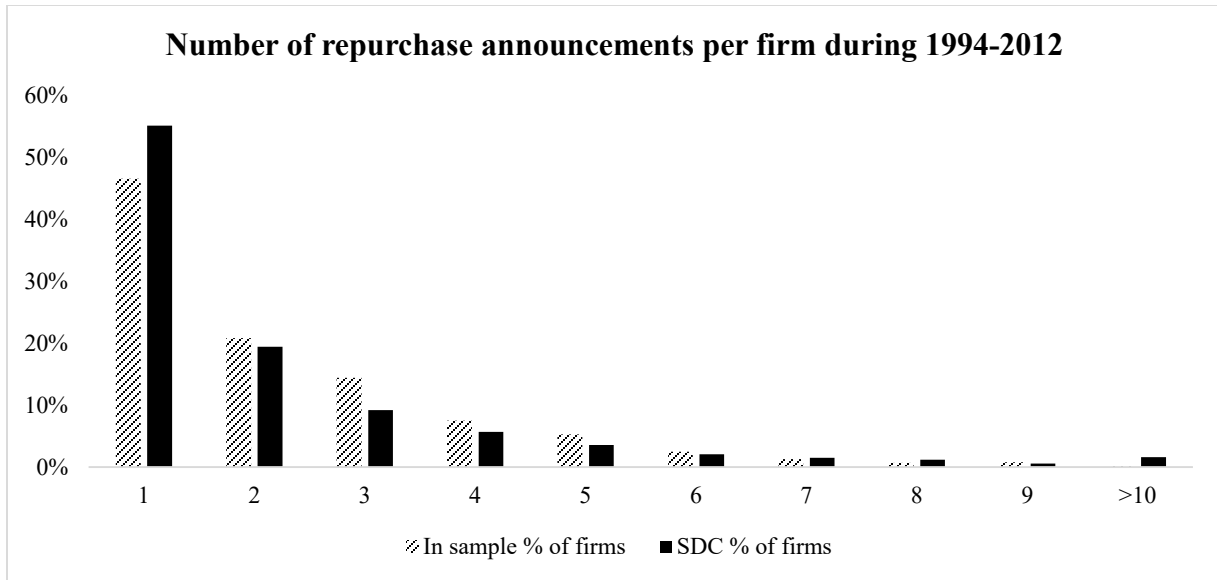
Number of repurchase announcements per firm during 1994-2012

(bar chart: In sample % of firms vs SDC % of firms, x-axis 1 through >10, y-axis 0%–60%)

Number of years of positive repurchases per firm during 1994-2012

(bar chart: In sample % of firms vs SDC % of firms, x-axis 0, 1-3, 4-6, 7-9, 10-12, 13-15, 16-18, 19-21, y-axis 0%–30%)

Figure OA2: In Sample vs SDC Sample
Description: This figure compares our random sample of 1,000 firms ("In sample") to the sample of 2,307 firms that announce a repurchase during our sample period, obtained from Securities Data Corporation ("SDC"). The top graph compares the distribution of the number of repurchase announcements per firm between our sample and the full SDC sample during our sample period. The bottom graph compares the distribution of the number of years with positive repurchases per firm between our sample and the full SDC sample.

Interpretation: Both the number of repurchase announcements per firm and the number of years with positive actual repurchases are similarly distributed across our random sample and the full sample of SDC firms.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

ISSUER PURCHASES OF EQUITY SECURITIES

Period	Total Number of Shares Purchased (1)		Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (2)
1/1/2014 - 1/31/2014	1,528,687	$	15.73	1,093,300	$87.6 million
2/1/2014 - 2/28/2014	1,079,319	$	13.82	906,700	$75.0 million
3/1/2014 - 3/31/2014	150,443	$	15.00	—	$75.0 million
Total	2,758,449	$	14.94	2,000,000	$75.0 million

(1) In addition to shares of Class A common stock repurchased as part of our publicly announced stock repurchase program, this column reflects 0.8 million shares withheld from employees to satisfy the withholding taxes associated with the vesting of RSUs during the three months ended March 31, 2014.

(2) On December 5, 2013, our board of directors approved an extension of our existing stock repurchase program to December 31, 2014. The program, originally announced in May 2010, was due to expire on December 31, 2013. Under the program, we are authorized to repurchase, from time to time through open market purchases or otherwise, shares of our outstanding common stock in an aggregate amount up to $200 million. As of March 31, 2014, we had $75.0 million available for potential repurchases under the program. We repurchased 2.0 million shares under the repurchase program for $29.5 million during the three months ended March 31, 2014.

(https://www.sec.gov/Archives/edgar/data/750004/000144530514002037/sgms331201410q.htm)

Figure OA3: Monthly Repurchase Table from Scientific Games Corporation 10-Q

Description: This figure provides an example of the reporting of monthly repurchases in quarterly filings.

Interpretation: Monthly repurchase data include the total number of shares repurchased each month, the average price per share paid each month, the total number of shares repurchased under an announced program each month, and the remaining shares of the announced program each month.

Table OA1. Correlation Coefficient Matrix for Our Random Sample of Repurchasing Firms

Description: This table reports a correlation coefficient matrix for our random sample of 1,000 firms that announce a repurchase in SDC between 1994-2012 and have data available on Compustat, CRSP, Execucomp, and electronic 10-Ks in Edgar. The sample consists of 14,464 firm-years between 1994 and 2012, 9,183 firm-years between 1994 and 2004, and 5,281 firm-years between 2005 and 2012. All compensation variables are expressed as a percentage of shares outstanding. Please refer to the Appendix for detailed variable definitions.

Interpretation: Most compensation variables are positively correlated with repurchases and with one another. As expected, we observe a strong correlation between executive options outstanding and executive options exercisable and similarly between restricted stock granted and restricted stock outstanding. Restricted stock is negatively correlated with both options outstanding and executive options outstanding.

	Repurchases	Options outstanding	Options exercised	Executive options outstanding	Executive options exercisable	Restricted stock granted	Restricted stock outstanding
Repurchases	1.00						
Options outstanding	0.11	1.00					
Options exercised	0.23	0.35	1.00				
Executive options outstanding	0.05	0.59	0.23	1.00			
Executive options exercisable	0.08	0.54	0.22	0.92	1.00		
Restricted stock granted	0.12	0.00	0.03	0.01	0.04	1.00	
Restricted stock outstanding	0.12	-0.05	0.02	-0.02	0.02	0.82	1.00

Table OA2. Robustness of Table 2 to Repurchases Scaled by Assets

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation where the dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, *and scaled by assets*. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: Our results do not depend on whether we express repurchases as a percentage of market capitalization (as in Table 2) or as a percentage of assets.

	Tobit				OLS Regression		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	0.105***	0.118***	0.041*	0.238***	0.070***	0.040***	0.181***
	(6.29)	(7.00)	(1.90)	(6.23)	(4.14)	(2.87)	(3.90)
Options exercised	0.356***	0.359***	0.262***	0.601***	0.298***	0.195***	0.492***
	(7.76)	(7.84)	(4.74)	(7.57)	(6.63)	(3.85)	(5.50)
Executive options outstanding	0.017	0.013	0.093**	0.006	-0.006	0.027	0.005
	(0.47)	(0.34)	(2.03)	(0.07)	(-0.16)	(0.70)	(0.07)
Restricted stock granted		0.737***	-0.155	0.853***	0.423***	-0.110	0.542***
		(4.79)	(-0.49)	(4.02)	(2.75)	(-0.68)	(2.75)
Number of Observations	14,286	14,286	9,083	5,203	14,286	9,083	5,203
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/ Adjusted R^2	10012***	10037***	6803***	5105***	0.186	0.122	0.204

Table OA3. Robustness of Table 2 to Separating Executive and Non-Executive Options

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation, separating executive and non-executive options outstanding. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: The sum of the coefficients on Options Outstanding and Executive Options Outstanding in Table 2 is exactly equal to the coefficient on Executive Options Outstanding in this table, indicating that the coefficient on executive options outstanding (in Table 2) represents the incremental effect of executive compensation.

	Tobit			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Non-Executive options outstanding	0.073***	0.023	0.165***	0.045***	0.022*	0.131***
	(6.06)	(1.48)	(6.08)	(4.28)	(1.96)	(4.40)
Executive options outstanding	0.119***	0.116***	0.149***	0.070***	0.069***	0.113**
	(5.00)	(3.66)	(2.82)	(3.24)	(2.64)	(2.14)
Options exercised	0.369***	0.278***	0.606***	0.305***	0.199***	0.514***
	(11.20)	(6.80)	(10.77)	(8.76)	(5.51)	(8.19)
Restricted stock granted	0.556***	0.019	0.697***	0.365***	0.030	0.473***
	(5.04)	(0.08)	(4.65)	(3.59)	(0.19)	(3.44)
Number of observations	14,286	9,083	5,203	14,286	9,083	5,203
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	8468***	5970***	4252***	0.184	0.116	0.200

Table OA4. Robustness of Table 2 to Excluding Repurchase Announcement Indicator

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation, excluding the control variable *Announcement Indicator*. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Other control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: The results in Table 2 are not affected by the exclusion of an indicator for repurchase announcements.

	Tobit			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	0.075***	0.028*	0.163***	0.045***	0.023**	0.128***
	(6.03)	(1.76)	(5.83)	(4.19)	(2.01)	(3.98)
Options exercised	0.367***	0.267***	0.613***	0.308***	0.198***	0.524***
	(10.83)	(6.38)	(10.58)	(8.72)	(5.40)	(8.20)
Executive options outstanding	0.043	0.075**	-0.004	0.025	0.043	-0.010
	(1.58)	(2.15)	(-0.06)	(1.04)	(1.49)	(-0.18)
Restricted stock granted	0.625***	0.053	0.762***	0.397***	0.040	0.501***
	(5.51)	(0.22)	(4.94)	(3.80)	(0.25)	(3.45)
Number of observations	14,286	9,083	5,203	14,286	9,083	5,203
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	7608***	5494***	3910***	0.147	0.083	0.155

Table OA5. Robustness of Table 2 to Excluding Years with Missing Restricted Stock Granted

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation, deleting firm-years with missing restricted stock granted. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: The Table 2 results are similar if we treat unreported restricted stock values as missing instead of assuming they are zero.

	Tobit			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	0.023	-0.036	0.131***	0.043**	-0.015	0.121***
	(1.34)	(-1.22)	(4.34)	(2.48)	(-0.69)	(3.67)
Options exercised	0.474***	0.351***	0.644***	0.410***	0.204***	0.533***
	(10.92)	(5.01)	(11.03)	(8.62)	(3.42)	(7.87)
Executive options outstanding	0.072*	0.114*	-0.021	-0.001	0.022	-0.055
	(1.70)	(1.68)	(-0.31)	(-0.03)	(0.42)	(-0.86)
Restricted stock granted	0.548***	-0.195	0.584***	0.310***	-0.166	0.437***
	(4.43)	(-0.76)	(3.75)	(3.06)	(-1.02)	(3.09)
Number of observations	8,421	3,756	4,665	8,421	3,756	4,665
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	5320	2630	3737	0.191	0.0984	0.203

Table OA6. Robustness of Table 2 to Alternative Pre/Post Cutoff

Description: FAS 123R was released in December 2004 and was initially to become effective for interim periods beginning after June 15, 2005. However, the SEC ultimately delayed its original effective date such that public companies were required to begin complying with FAS 123R for fiscal years (rather than interim periods) beginning after June 15, 2005 (i.e., the fiscal year beginning January 1, 2006 for calendar year companies). This table replicates Table 2 but includes the year 2005 in the pre period rather than the post-period. We present Tobit and ordinary least squares (OLS) regressions of repurchases on employee stock-based compensation, control variables, and firm and year fixed effects. Estimation periods span 1994-2005 or 2006-2012 only, as noted. The dependent variable is the dollar value of repurchases scaled by market capitalization. Repurchases are estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: Our results Table 2 are robust to including 2005 in the pre period rather than the post-period.

	Tobit			OLS	
	(1) 1994-2005	(2) 2006-2012		(3) 1994-2005	(4) 2006-2012
Options outstanding	0.043***	0.200***		0.030***	0.163***
	(2.85)	(6.20)		(2.76)	(4.17)
Options exercised	0.274***	0.689***		0.206***	0.602***
	(7.10)	(10.80)		(5.82)	(7.87)
Executive options outstanding	0.063*	-0.078		0.030	-0.086
	(1.96)	(-1.09)		(1.10)	(-1.13)
Restricted stock granted	0.076	0.595***		0.117	0.428***
	(0.37)	(3.64)		(0.73)	(2.83)
Number of observations	9,838	4,448		9,838	4,448
Controls	Yes	Yes		Yes	Yes
Firm and year fixed effects	Yes	Yes		Yes	Yes
Log likelihood/Adjusted R^2	6277	3822		0.126	0.208

Table OA7. The Evolution of the Relation Between Share Repurchases and Employee Compensation

Description: This table repeats the full sample Tobit and OLS regressions from Table 2 with the addition of an indicator variable equal to one for the 2005-2012 period. We also interact this indicator with our employee stock-based compensation variables as well as our control variables and firm fixed effects. Control variables are suppressed for brevity. All independent variables are defined in the Appendix. All specifications include both firm and year fixed effects. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: The coefficients on the interaction terms for options outstanding and exercised as well as restricted stock granted suggest the effects are significantly greater in the post-period. Dilution is a significant determinant of repurchases and its impact has strengthened over time, consistent with firms using repurchases to counteract dilution more often in recent years. In contrast, we find that the dividend protection channel is not a first order concern.

	Tobit	OLS
	(1)	(2)
	Full	Full
Options outstanding	0.023	0.022*
	(1.50)	(1.84)
Options outstanding * Post	0.142***	0.109***
	(4.49)	(3.22)
Options exercised	0.278***	0.199***
	(6.86)	(5.16)
Options exercised * Post	0.328***	0.315***
	(4.70)	(4.17)
Executive options outstanding	0.092***	0.047
	(2.73)	(1.59)
Executive options outstanding * Post	-0.109	-0.066
	(-1.59)	(-1.06)
Restricted stock granted	0.019	0.030
	(0.08)	(0.18)
Restricted stock granted * Post	0.680**	0.443**
	(2.48)	(1.99)
Post	0.031	0.024
	(0.66)	(0.52)
Number of observations	14,286	14,286
Firm and year fixed effects	Yes	Yes
Controls and post interaction with controls	Yes	Yes
Log likelihood/Adjusted R^2	10,751***	0.382

Table OA8. Robustness of Table 2 to Actual Share Repurchases

Description: This table presents Tobit and ordinary least squares (OLS) regressions of actual repurchases on employee stock-based compensation, control variables, and firm and year fixed effects. These data are available beginning in 2004, and our estimation period thus spans 2004-2012. Repurchases are the annual sum of the number of shares repurchased, as reported in quarterly (10-Q) and annual (10-K) filings, scaled by the number of shares outstanding. Control variables from Table 2 are included but omitted for brevity. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively. In 2003 the SEC amended Rule 10b-18, also known as the "safe harbor provision," to enhance transparency of issuer repurchases: "Under the proposed amendments, issuers would be required to disclose, among other things, the total number of shares repurchased during the past quarter, the average price paid per share, the number of shares that were purchased as part of a publicly announced repurchase plan, and the maximum number (or approximate dollar value) of shares that may yet be purchased under the plans or programs." (https://www.sec.gov/rules/final/33-8335.htm) Beginning in 2004, the SEC required companies to report the above information on a monthly basis in 10-Q reports under Item 2 (Changes in Securities and Small Business Issuer Purchases of Equity Securities) and in 10-K reports under Item 5 (Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities). To collect these data, we begin with a sample of all Compustat firm-quarters from 2004 to 2014. Compustat aggregates reported repurchase amounts and prices on a quarterly basis; we first require a non-missing/non-zero value for Compustat quarterly repurchases (cshopq). We further require that the firm have a non-missing value for total assets (atq) and a share code of 10 or 11. We require CIK to match firms to Edgar filings and therefore drop all observations with missing CIKs. We match this subsample of Compustat firm-quarters to 10-Q and 10-K records from Edgar using CIK and fiscal quarter. This process yields 39,312 firm-quarters. For each firm-quarter in our sample, we hand-collect the table located under Item 2 (Item 5) of the 10-Q (10-K). An example is shown in Figure OA3. This table includes the starting and ending date of each month, the total number of shares repurchased each month, the average price per share paid each month, the total number of shares repurchased under an announced program each month, and the remaining shares of the announced program each month. We also gather table footnotes, which often contain additional details. We use a combination of algorithms and hand-checking to clean the data. For example, formatting and units are not uniform across all firms, so we consistently format dates and use Compustat to verify if repurchases are reported in shares or dollars and to adjust for possible scaling (in thousands, hundred thousands, or millions). Again, we hand-check and correct all observations for which scaling and units cannot be identified. We also correct for cumulative reporting of shares repurchased. We use the values for average price and shares repurchased to check if the value remaining under the repurchase program is reported in shares or dollars. Through this process we feel confident in the accuracy of our data. The final sample of repurchases consists of 154,332 firm-months for 4,066 firms. Of that sample, 75,041 firm-months (48.6%) belonging to 3,313 firms (81.5%) have repurchases under an announced program.

Interpretation: Our Table 2 results are robust to a measure of actual repurchases available beginning in 2004, as opposed to an estimate of repurchases using Compustat variable prstkc.

Table OA8. Robustness of Table 2 to Actual Share Repurchases, *continued*

	Tobit		OLS	
	(1)	(2)	(3)	(4)
Options outstanding	0.207***	0.233***	0.147***	0.166***
	(6.85)	(7.64)	(4.79)	(5.46)
Options exercised	0.370***	0.374***	0.281***	0.282***
	(5.64)	(5.71)	(4.66)	(4.63)
Executive options outstanding	-0.010	-0.028	-0.018	-0.034
	(-0.15)	(-0.40)	(-0.35)	(-0.66)
Restricted stock granted		0.979***		0.624***
		(5.40)		(4.21)
Number of observations	5,501	5,501	5,501	5,501
Controls	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	4872***	4902***	0.185	0.190

Table OA9. Robustness of Table 2 to Excluding Firms with Non-dividend-protected Restricted Stock

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation, deleting firms with restricted stock that is not dividend-protected. To determine if restricted stock is dividend-protected, we read the proxy statement associated with the first year the firm issues restricted stock and mentions its dividend protection status. Zhang (2017) shows dividend protection to be sticky within firms; thus we assume that dividend protection status remains constant. The vast majority (91%) of firms with restricted stock grant it with dividend protection. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Our Table 2 results are robust to excluding firm with non-dividend-protected restricted stock.

	Tobit			OLS Regression		
	(1)	(2) 1994- 2004	(3) 2005- 2012	(4)	(5) 1994- 2004	(6) 2005- 2012
	Full			Full		
Options outstanding	0.077***	0.021	0.189***	0.049***	0.022*	0.148***
	(4.27)	(1.24)	(6.66)	(4.40)	(1.88)	(4.74)
Options exercised	0.387***	0.288***	0.643***	0.313***	0.198***	0.549***
	(7.12)	(6.58)	(10.87)	(8.57)	(5.37)	(8.21)
Executive options outstanding	0.039	0.092**	-0.026	0.022	0.043	-0.008
	(0.94)	(2.54)	(-0.43)	(0.90)	(1.48)	(-0.16)
Restricted stock granted	0.555***	-0.025	0.714***	0.348***	0.004	0.456***
	(3.34)	(-0.10)	(4.51)	(3.20)	(0.02)	(3.16)
Number of observations	12,993	8,315	4,678	12,993	8,315	4,678
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	7752***	5508***	3867***	0.182	0.116	0.203

Table OA10. Robustness of Table 2 to Including Industry-Year Fixed Effects

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation, replacing firm and year fixed effects with industry-year fixed effects. These fixed effects control for time-varying industry shocks that may affect compensation, payout, and earnings. Industry-year fixed effects are created for each Fama-French 48 industry for each sample year. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: Our Table 2 results are robust to including industry-year fixed effects to control for competition for labor within an industry.

	Tobit			OLS Regression		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	0.070***	0.057***	0.108***	0.047***	0.032***	0.087***
	(29.44)	(12.05)	(24.28)	(4.93)	(2.95)	(4.69)
Options exercised	0.512***	0.385***	0.724***	0.377***	0.257***	0.597***
	(53.74)	(19.57)	(44.91)	(10.50)	(6.86)	(8.82)
Executive options outstanding	0.070***	0.082***	0.035***	0.035	0.050**	0.005
	(12.17)	(7.27)	(3.17)	(1.62)	(2.08)	(0.13)
Restricted stock granted	0.625***	0.283***	0.780***	0.306***	0.124	0.494***
	(28.60)	(5.75)	(24.60)	(2.80)	(0.72)	(3.85)
Number of observations	14,286	9,083	5,203	14,286	9,083	5,203
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	5796***	3823***	2810***	0.236	0.176	0.286

Table OA11. Robustness of Table 2 within High Market-to-Book Firms

Description: This table replicates the Table 2 regressions of repurchases on employee stock-based compensation for a subset of firms that are unlikely to be undervalued (i.e., firms with above-median industry-industry adjusted market-to-book ratios in the prior year). Industry-adjusted market-to-book ratio is the firm's market-to-book ratio minus the median market-to-book ratio within the same Fama-French 48 industry. The dependent variable is repurchases, estimated from Compustat as the purchase of common and preferred stock minus any reduction in the value of preferred stock outstanding, and scaled by market capitalization. Control variables from Table 2 are included but omitted for brevity. All independent variables are defined in the Appendix. OLS standard errors are clustered by firm. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: Our Table 2 results are robust to examining firms with above-median industry adjusted market-to-book ratios in the prior year.

	Tobit			OLS Regression		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	0.050***	-0.008	0.096**	0.039**	0.006	0.085**
	(2.81)	(-0.34)	(2.54)	(2.43)	(0.44)	(2.03)
Options exercised	0.303***	0.275***	0.488***	0.265***	0.188***	0.429***
	(5.65)	(3.64)	(5.59)	(5.62)	(3.50)	(4.45)
Executive options outstanding	0.104***	0.125**	0.087	0.060**	0.058*	0.045
	(2.61)	(2.41)	(1.11)	(1.97)	(1.70)	(0.70)
Restricted stock granted	0.716***	0.084	0.503*	0.518***	0.174	0.543**
	(3.97)	(0.24)	(1.89)	(3.56)	(0.69)	(2.45)
Number of observations	7,150	4,547	2,603	7,150	4,547	2,603
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood/Adjusted R^2	7820***	4661***	3804***	0.190	0.108	0.172

Table OA12. Robustness of Table 3 to Excluding Simultaneous Dividend Increases and Repurchases

Description: This table presents logistic regressions of the likelihood of increasing dividends versus repurchasing on employee stock-based compensation and control variables, including year fixed effects. We exclude observations where the firm both increases dividends and repurchases. Models (1)-(3) examine the decision to increase dividends versus announce a repurchase program, while Models (4)-(6) examine the decision to increase dividends versus actually repurchase and Models (7)-(9) examine the decision to increase dividends versus increase repurchases. The dependent variable is set equal to one if dividends per share increase and zero otherwise. Estimation periods span the full 1994-2012 sample period, 1994-2004 only, or 2005-2012 only, as noted. All independent variables are defined in the Appendix. Control variables from Table 2 are included but omitted for brevity. Standard errors are clustered by firm. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Table 3 results are robust to excluding observations where the firm both increases its dividend and announces a repurchase program (or actually repurchases/increases repurchases).

	Dividend increase vs. repurchase announcement			Dividend increase vs. actual repurchase			Dividend increase vs. repurchase increase		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012	Full	1994-2004	2005-2012
Options outstanding	-7.250***	-7.966***	-5.302*	-12.212***	-10.691***	-17.150***	-7.644***	-9.218***	-3.412
	(-4.52)	(-4.93)	(-1.77)	(-6.36)	(-5.42)	(-4.60)	(-5.41)	(-6.08)	(-1.34)
Options exercised	-6.645	-8.076	-3.909	-8.060*	-10.929**	-3.820	-9.006**	-10.720**	-6.734
	(-1.52)	(-1.38)	(-0.60)	(-1.90)	(-2.02)	(-0.59)	(-2.40)	(-2.14)	(-1.09)
Executive options outstanding	-5.131	-7.127*	-3.917	-5.388	-7.616*	6.082	-1.873	-1.656	-4.904
	(-1.42)	(-1.75)	(-0.52)	(-1.29)	(-1.75)	(0.70)	(-0.61)	(-0.49)	(-0.79)
Restricted stock granted	-37.980***	23.011	-54.046***	-52.132***	-9.332	-76.546***	-29.536**	12.732	-47.312***
	(-2.62)	(0.83)	(-3.31)	(-2.83)	(-0.31)	(-3.69)	(-2.18)	(0.52)	(-3.29)
Number of observations	6,176	3,916	2,260	6,208	3,996	2,212	6,480	4,211	2,269
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.320	0.337	0.320	0.352	0.370	0.299	0.363	0.399	0.332

Table OA13. Robustness of Table 3 to Excluding Firms with Non-dividend-protected Restricted Stock

Description: This table presents logistic regressions of the likelihood of increasing dividends versus repurchasing on employee stock-based compensation and control variables, including year fixed effects. We exclude firms with restricted stock that is not dividend-protected. Dividend protection status is manually collected from proxy statements. Estimation periods span the full 1994-2012 sample period, 1994-2004 only, or 2005-2012 only, as noted. Models (1)-(3) examine the decision to increase dividends versus announce a repurchase program, while Models (4)-(6) examine the decision to increase dividends versus actually repurchase and Models (7)-(9) examine the decision to increase dividends versus increase repurchases.. The dependent variable is set equal to one if dividends per share increase and zero otherwise. All independent variables are defined in the Appendix. Control variables from Table 2 are included but omitted for brevity. Standard errors are clustered by firm. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Table 3 results are robust to excluding firms whose restricted stock is not dividend-protected.

	Dividend increase vs. repurchase announcement			Dividend increase vs. actual repurchase			Dividend increase vs. repurchase increase		
	(1)	(2) 1994-2004	(3)	(4)	(5) 1994-2004	(6)	(7)	(8) 1994-2004	(9)
	Full	2004	2005-2012	Full	2004	2005-2012	Full	2004	2005-2012
Options outstanding	-7.187***	-8.312***	-4.251	-7.184***	-8.505***	-4.262*	-7.140***	-8.958***	-2.133
	(-4.69)	(-5.20)	(-1.54)	(-5.49)	(-6.02)	(-1.89)	(-5.42)	(-6.52)	(-0.90)
Options exercised	-4.180	-4.192	-2.592	-3.051	-5.073	1.601	-4.069	-3.925	-3.170
	(-0.90)	(-0.68)	(-0.35)	(-0.97)	(-1.22)	(0.32)	(-1.14)	(-0.82)	(-0.54)
Executive options outstanding	-5.258	-5.862	-6.570	-5.752*	-6.409*	-5.462	-2.696	-1.797	-8.194
	(-1.48)	(-1.42)	(-0.90)	(-1.95)	(-1.89)	(-1.00)	(-0.92)	(-0.55)	(-1.44)
Restricted stock granted	-41.385***	3.176	-54.083***	-42.379***	-6.902	-54.311***	-39.107***	0.231	-53.887***
	(-2.91)	(0.12)	(-3.29)	(-3.84)	(-0.32)	(-4.37)	(-3.22)	(0.01)	(-4.06)
Number of observations	7,520	4,727	2,793	10,004	6,125	3,879	8,553	5,479	3,074
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.298	0.316	0.296	0.296	0.316	0.282	0.317	0.343	0.297

Table OA14. Robustness of Table 3 to Simultaneous Equation Model

Description: This table reports results of a simultaneous equation model for repurchases and dividends, both standardized by lagged market capitalization. We include all compensation variables and controls from Table 2 as exogenous variables with the exception of intangible assets as an explanatory variable when modeling repurchases, and asset tangibility when modeling dividends, which we exclude in order to have identification. Repurchases and dividends are included as endogenous variables. Coefficients on control variables are omitted for brevity. The model includes firm and year fixed effects. The estimation is based on seemingly unrelated regressions, which is a three stage least square method. Since we cannot include the same set of independent variables in the two equations, we exclude asset tangibility as an explanatory variable when modeling repurchases and announcement indicator when modeling dividends. All independent variables are defined in the Appendix. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Restricted stock is positively correlated with repurchases and negatively correlated with dividends for the full sample period, and positively correlated with repurchases in the 2005-2012 period. Additionally, repurchasing is negatively correlated with dividends for the full sample, but dividends have no effect on repurchases. Overall, these results are consistent with Table 3.

	Full		1994-2004		2005-2012	
	Repurchases	Dividends	Repurchases	Dividends	Repurchases	Dividends
	(1)	(2)	(3)	(4)	(5)	(6)
Repurchases		-0.027**		-0.017		-0.007
		(-2.18)		(-1.09)		(-0.40)
Dividends	-0.055		3.429		1.957	
	(-0.06)		(0.52)		(0.94)	
Options outstanding	0.045***	0.000	0.055	-0.009***	0.104***	0.015**
	(5.97)	(0.06)	(0.84)	(-3.80)	(2.75)	(2.40)
Options exercised	0.306***	0.030***	0.175***	0.010	0.419***	0.052***
	(10.91)	(3.85)	(3.02)	(1.41)	(3.74)	(3.43)
Executive options outstanding	0.024	-0.018***	0.094	-0.013**	-0.010	-0.004
	(1.08)	(-3.49)	(0.99)	(-2.46)	(-0.20)	(-0.36)
Restricted stock granted	0.360***	-0.084***	0.177	-0.042	0.492***	-0.006
	(3.31)	(-3.71)	(0.52)	(-1.14)	(3.80)	(-0.19)
Number of observations	14,286	14,286	9,083	9,083	5,203	5,203
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.372	0.745	0.204	0.844	0.306	0.771

Table OA15. Compensation Consultants and Options around Mandatory Option Expensing

Description: This table reports the first stage estimates of a regression of changes in options outstanding and options granted on the consultant indicator. This analysis includes all firm-years in our sample between 2003 and 2007. We create an indicator variable (Compensation consultant) equal to one if the firm hires a compensation consultant in 2006, the first year in which firms report compensation consultants. We then use this indicator to instrument for change in restricted stock granted from pre- to post-FAS 123R. This model includes Fama-French 48 industry fixed effects and changes in our standard control variables. The standard errors assume homoscedasticity as the Pagan-Hall test fails to reject the null of homoscedasticity. T-statistics are in parentheses; ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Interpretation: Changes in options outstanding and options granted around FAS 123R are not significantly associated with the indicator for the use of a compensation consultant. Therefore, firms with and without compensation consultants reduce option grants similarly after mandatory option expensing. Combined with the Table 4 results showing that firms with consultants increase restricted stock grants significantly more following mandatory option expensing than firms without consultant, we can infer that dilution increases more within firms with consultants than firms without consultants.

	Δ Options outstanding	Δ Options granted
Compensation Consultant	-0.002	-0.001
	(-0.78)	(-1.35)
Number of observations	744	744
Controls	Yes	Yes
Industry fixed effects	Yes	Yes
Adjusted R^2	0.211	0.194

Table OA16. Robustness of Table 6 to Excluding Firms that Accelerate Vesting

Description: This table reports OLS and 2SLS regression estimates of changes in repurchases around mandatory option expensing on equity-based compensation, excluding the 111 firms that accelerate vesting. This analysis includes all firm-years in our sample between 2003 and 2007. The dependent variable is the change in repurchases from pre-FAS 123R (2003-2004) to post-FAS 123R (2005-2007). We create an indicator variable (Compensation consultant) equal to one if the firm hires a compensation consultant in 2006, the first year in which firms report compensation consultants. We then use this indicator to instrument for change in restricted stock granted from pre- to post-FAS 123R. Model (1) presents reduced form OLS regression estimates. Model (2) presents the first stage estimates of a regression of change in restricted stock on the consultant indicator. Model (3) presents the second stage IV estimates. All models include Fama-French 48 industry fixed effects and changes in our standard control variables. The standard errors assume homoscedasticity as the Pagan-Hall test fails to reject the null of homoscedasticity. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Our IV analyses in Table 5 are robust to excluding the 111 firms in our sample that accelerated option vesting.

	Reduced Form OLS	Two-stage Least Squares	
		1st stage:	2nd stage:
	Δ Repurchases	Δ Restricted stock	Δ Repurchases
	(1)	(2)	(3)
Compensation Consultant	0.004*	0.001***	
	(1.76)	(2.93)	
Δ Restricted stock			4.787*
			(1.71)
Number of observations	629	629	629
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Adjusted R^2	0.200	0.219	
Cragg-Donald Wald F statistic		8.56	
Anderson LM statistic		9.29	
P-value		0.0023	
Confidence interval			0.035-24.806
P-value			0.0515

Table OA17. Payout Policy and Mandatory Option Expensing: Entropy Balancing

Description: This table shows the difference of the average of the covariates from Table 5 for the pre-period (2003-2004) between treated firms (hired a compensation consultant) and control firms before and after balancing using entropy weights. The difference in weighted mean is statistically insignificant for all covariates after balancing (Panel B). The entropy weights assigned to each control observation are then used in the regression analysis in Model (2) of Table 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Panel A shows significant pre-balancing differences in covariates. These differences disappear in Panel B, showing that we successfully balance our covariates using entropy weights.

Panel A: Before Entropy Balancing

	Treated		Control		Difference	
	Mean	Variance	Mean	Variance	Mean	Variance
Asset tangibility	0.852	0.023	0.848	0.030	0.003	-0.007
CAPEX	0.040	0.001	0.044	0.003	-0.004	-0.002
Cash holding	0.141	0.025	0.161	0.030	-0.02	-0.004
Leverage	0.227	0.029	0.195	0.027	0.032**	0.002
Log(Market capitalization)	7.683	2.410	7.195	2.277	0.488***	0.133
Market to book	1.519	1.274	1.731	1.791	-0.212**	-0.517
Operating income	0.120	0.008	0.139	0.011	-0.018**	-0.003
Log(age)	3.163	0.659	3.067	0.540	0.096*	0.119
Institutional ownership	0.713	0.034	0.695	0.037	0.018	-0.003
Prior returns	0.080	0.050	0.135	0.069	-0.055***	-0.019
Sales growth	0.073	0.025	0.082	0.028	-0.009	-0.003
Repatriation indicator	0.305	0.213	0.204	0.163	0.102***	0.050
Return volatility	0.027	0.000	0.028	0.000	-0.001	0.000

Panel B: After Entropy Balancing

	Treated		Control (weighted)		Difference	
	Mean	Variance	Mean	Variance	Mean	Variance
Asset tangibility	0.852	0.023	0.852	0.023	0.000	0.000
CAPEX	0.040	0.001	0.040	0.001	0.000	0.000
Cash holding	0.141	0.025	0.141	0.025	0.000	0.000
Leverage	0.227	0.029	0.227	0.029	0.000	0.000
Log(Market capitalization)	7.683	2.410	7.681	2.410	0.002	0.000
Market to book	1.519	1.274	1.520	1.276	-0.001	-0.002
Operating income	0.120	0.008	0.120	0.008	0.000	0.000
Log(age)	3.163	0.659	3.163	0.659	0.000	0.000
Institutional ownership	0.713	0.034	0.713	0.034	0.000	0.000
Prior returns	0.080	0.050	0.080	0.050	0.000	0.000
Sales growth	0.073	0.025	0.073	0.025	0.000	0.000
Repatriation indicator	0.305	0.213	0.305	0.213	0.001	0.000
Return volatility	0.027	0.000	0.027	0.000	0.000	0.000

Table OA18. Share Repurchase Volume Conditional on Frequency

Description: This table presents repurchase volume conditional on repurchase frequency for the subsample of 715 unique firms and 20,141 firm-months for which we have both hand-collected stock-based compensation data and hand-collected actual monthly repurchase data from quarterly (10-Q) and annual (10-K) filings between 2004 and 2012. We categorize firms as infrequent, moderate, and frequent repurchasers if they repurchase one to four months, five to eight months, or nine or more months during the year, respectively. Repurchases are the number of shares repurchased, as reported in quarterly (10-Q) and annual (10-K) filings, scaled by the number of shares outstanding. Average monthly repurchases are conditional on positive repurchases during the month. We calculate *t*-tests for the difference in means between frequent and infrequent repurchases and report associated p-values in parentheses. ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Frequent repurchasers buy significantly less than infrequent repurchasers in the months they repurchase. However, cumulative repurchases show that frequent repurchasers buy back almost twice as much as infrequent repurchasers (5.50% vs. 2.25%) on an annual basis.

	Average monthly repurchases (conditional on positive repurchases)	Average yearly repurchases
Infrequent	0.91%	2.25%
Moderate	0.73%	4.66%
Frequent	0.51%	5.50%
Frequent - Infrequent	-0.40%*** (0.00)	3.25%*** (0.00)

Table OA19. Monthly Repurchase Likelihood for Full Sample

Description: This table replicates Table 8 for all firms for which we have hand-collected data on actual monthly repurchases from quarterly (10-Q) and annual (10-K) filings between 2004 and 2012. The dependent variable equals one if the firm repurchased during the month. We categorize firms as infrequent, moderate, and frequent repurchasers if they repurchase stock in one to four months, five to eight months, or nine or more months during the year, respectively. Marginal effects are calculated at the mean. All independent variables are defined in the Appendix. Firm controls (log(market cap), market to book, operating income, cash holding, leverage, and CAPEX) are measured at the quarterly level. T-statistics are in parentheses; ***, ** and * denote significance at 1%, 5% and 10% respectively.

Interpretation: Table 8 results were estimated for the sample of the 715 firms for which we had both hand-collected stock-based compensation data and hand-collected actual monthly repurchase data from quarterly (10-Q) and annual (10-K) filings between 2004 and 2012. This table shows that results in Table 8 hold for the full sample of Compustat-CRSP firms. Firms are less likely to repurchase following positive stock returns. The interaction terms, however, indicate that the effect of prior returns on repurchase likelihood is mitigated for frequent repurchasers, such that prior returns do not significantly impact repurchase likelihood for frequent repurchasers.

	(1)		(2)		(3)	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Frequent	1.747***	0.406	1.606***	0.374	1.589***	0.154
	(60.69)		(60.76)		(59.40)	
Infrequent	-1.500***	-0.352	-1.425***	-0.325	-1.404***	-0.187
	(-119.13)		(-93.05)		(-90.21)	
Prior 3-month return	-0.714***	-0.176	-0.840***	-0.199	-0.903***	-0.116
	(-9.21)		(-9.72)		(-10.42)	
Concurrent return	-0.746***	-0.184	-0.868***	-0.205	-0.854***	-0.109
	(-6.81)		(-7.53)		(-7.30)	
Prior 3-month return *Frequent	0.477***	0.117	0.540***	0.128	0.558***	0.071
	(2.97)		(3.25)		(3.39)	
Prior 3-month return * Infrequent	-0.616***	-0.152	-0.739***	-0.175	-0.766***	-0.098
	(-6.44)		(-6.83)		(-7.00)	
Concurrent return *Frequent	0.125	0.031	0.167	0.038	0.224	0.028
	(0.55)		(0.73)		(0.98)	
Concurrent return * Infrequent	0.011	0.003	-0.075	-0.018	-0.058	-0.008
	(0.08)		(-0.51)		(-0.39)	
Number of observations	139,409		138,804		137,426	
Firm fixed effect	No		Yes		Yes	
Controls	No		No		Yes	
Pseudo R^2	0.225		0.242		0.245	