The Long-Term Consequences of Short-Term Incentives*

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Abstract

This paper shows that short-term stock price concerns induce CEOs to take value-reducing actions. Vesting equity, our measure of short-term concerns, is positively associated with the probability of a firm repurchasing shares, the amount of shares repurchased, and the probability of the firm announcing a merger or acquisition (M&A). When vesting equity increases, stock returns are more positive in the two quarters surrounding both repurchases and M&A, but more negative in the two years following repurchases and four years following M&A. A potential driver of the negative long-run returns to M&A is subsequent goodwill impairment. These results are inconsistent with CEOs buying underpriced stock or companies to maximize long-run shareholder value, but consistent with these actions being used to boost the short-term stock price and improve the conditions for CEO equity sales. CEOs sell their own stock shortly after using company money to buy the firm's stock, also inconsistent with repurchases being motivated by undervaluation.

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1. Introduction

The short-termism of executive incentives is a major problem alleged by academics, practitioners, and policymakers. A central concern in Bebchuk and Fried's (2004) influential critique of executive pay is that CEOs are rewarded for short-term stock price increases, and so their main reform proposal is to escrow the CEO's equity until the long-term (Bebchuk and Fried (2010)). In 2018, the UK's revised Corporate Governance Code increased the minimum vesting period of executive equity from three years to five years.

The concern with short-term incentives is that they lead the CEO to take myopic actions that boost the short-term stock price at the expense of long-run value. However, critics' allegations are rarely backed up by systematic evidence. Gathering such evidence is particularly challenging for two main reasons. First, it is difficult to demonstrate a causal effect of short-run horizons since the CEO's contract is endogenous. Second, even if one found that CEO incentives cause particular actions, it is difficult to show that such actions are myopic, i.e., erode long-term value.

Edmans, Fang, and Lewellen (2017, EFL) address the first challenge by introducing a new measure of CEO incentives: the amount of stock and options scheduled to vest in a given quarter. Vesting equity is highly correlated with equity sales, and so leads to short-term stock price concerns – analogous to the relevance criterion for a valid instrument.[1] It depends on the magnitude and vesting schedule of equity grants made several years ago, and so is unlikely driven by current economic conditions – analogous to the exclusion restriction for a valid instrument. EFL find that vesting equity is significantly correlated with reductions in investment growth. They study investment since it is arguably a firm's most important day-to-day decision. However, it is difficult to ascertain whether the scrapped investment would have been value-creating or value-destroying, and thus assess

[1] Vesting equity is also relevant because the vesting schedule is known to the CEO in advance, and so he is able to take actions to boost the short-term stock price in anticipation. In contrast, while unanticipated liquidity shocks might lead to equity sales, they are unlikely to affect corporate actions as they are unplanned.

whether short-term stock price concerns induce myopic or efficient behavior. While EFL conduct cross-sectional tests that are suggestive of the myopia interpretation, they cannot use long-run stock returns to study the long-term consequences of investment cuts, for two reasons. First, any association is unlikely to be causal, because long-run stock returns are likely affected by many firm decisions other than investment. Second, their sample period is relatively short (2006-11).

This paper studies two corporate actions whose long-term consequences can be more accurately measured, enabling us to assess the long-term consequences of short-term incentives. The first is stock repurchases. Like investment cuts, repurchases boost the short-term stock price (Ikenberry, Lakonishok, and Vermaelen (1995)) and so CEOs with short-term concerns might have incentives to undertake them. Also like investment cuts, repurchases can either be myopic (if financed by scrapping valuable projects or if they were of overvalued stock) or efficient (if financed by free cash and if they were of undervalued stock). Critically, unlike investment cuts, long-term stock returns diagnose the value implications of the repurchase even if they were not caused by it – they measure the return to the repurchase. If the firm was undervalued (overvalued) and so its future stock returns would have been positive (negative) anyway, the repurchase creates (destroys) value.

The second corporate action is M&A, which has different advantages to repurchases. First, M&A has an announcement date, enabling us to cleanly calculate short- and long-term returns. Second, M&A is a much more significant event than an investment cut (or repurchase) – it is arguably the most transformative corporate decision that a firm can undertake – and so it is likely that at least a significant portion of long-run stock return is attributable to the M&A. Indeed, prior research (e.g. Agrawal, Jaffe, and Mandelker (1992), Asquith (1983), Franks, Harris, and Titman (1991), and Rau and Vermaelen (1998)) uses long-run stock returns to assess the value implications of M&A.

Importantly, Agrawal, Jaffe, and Mandelker (1992) find a significantly negative relation between short- and long-term M&A returns, suggesting that certain acquisitions can boost short-term

performance at the expense of long-run value. As an example of how vesting equity might induce such an acquisition, Bazaarvoice acquired PowerReviews in June 2012, which led to its stock price soaring above $20. Bazaarvoice's officers and directors then sold $90 million of stock before the U.S. Department of Justice ("DoJ") commenced an antitrust lawsuit in January 2013, since PowerReviews was Bazaarvoice's closest competitor. The DoJ lawsuit forced Bazaarvoice to divest PowerReviews and led to its stock price falling below $7. In internal communications, Bazaarvoice executives stated that their motivation for the acquisition was "[e]limination of our primary competitor" to leave them with "literally, no other competitors." Thus, they likely knew that a DoJ lawsuit would be probable and that the long-term returns would be negative, but the acquisition inflated the stock price in the short-term.[2]

We study the relation between vesting equity and both repurchases and M&A announcements over 2006-2015, a longer sample period than prior literature that allows us to study long-term returns. A one standard deviation increase in vesting equity is associated with a 1.2% increase in a firm's likelihood of repurchasing shares in a given quarter (corresponding to an average increase in shares repurchased of $1.5m), controlling for the CEO's unvested equity, already-vested equity, other determinants of repurchase activity and year-quarter fixed effects. This increase compares with the unconditional repurchase probability of 37.5%. When focusing on sizable repurchases, i.e. ones that exceed the sample mean, the increase is 1.04% compared with an unconditional probability of 20%. These results are not driven by repurchases that result from investment cuts – instead, repurchases and investment cuts are independent channels that a CEO pursues to increase the stock price. We find similar results for M&A: a one standard deviation increase in vesting equity is associated with a

[2] The market did not foresee any antitrust risk. All of the analyst reports after the acquisition announcement were strongly positive, with only Morgan Stanley mentioning risks but only concerning integration rather than antitrust. In the two conference calls after the announcement but before the DoJ investigation, the acquisition was extensively discussed but none of the participants raised antitrust issues.

0.6% increase in a firm's likelihood of announcing an M&A in a given quarter, compared with the unconditional probability of 15.8%. The results continue to hold using vesting equity as an instrument for equity sales in a two-stage least squares (2SLS) analysis.

Our main results are the short- and long-term returns to repurchases and M&A. Again, we find a consistent picture across both corporate events: vesting equity increases short-term returns but reduces long-term returns, consistent with it inducing the CEO to take myopic actions with negative long-term consequences.[3] A one standard deviation increase in vesting equity is associated with an annualized 0.61% higher return over the two quarters surrounding a repurchase, but a 1.11% (0.75%) lower return during the first (second) year after the repurchase. The results are similar for M&A although the negative association with long-run returns persists for longer. A one standard deviation increase in vesting equity is associated with an annualized 1.47% higher return over the two quarters surrounding an M&A announcement, but a 0.79%, 0.37% (insignificant), 0.73%, and 0.62% lower return in the first, second, and third, and fourth subsequent years, respectively. We also show that vesting equity is significantly associated with future M&A goodwill impairment. This suggests that one channel through which vesting equity reduces long-run M&A returns is by inducing CEOs to overpay for acquisitions, generating goodwill that is subsequently written down.

Finally, we show that CEOs concentrate their equity sales in a short window after announcing repurchases, which is difficult to reconcile with common justifications for repurchases. If repurchases are motivated by the stock being undervalued, the CEO should not be selling equity at the same time. It is hard to think of a good reason why the CEO should be taking one action with the company's money and the opposite with his own money. Instead, the results are consistent with the CEO using repurchases to improve the conditions for his equity sales. If true, a potential remedy would be to

[3] These results are consistent with Graham, Harvey, and Rajgopal (2005). Their survey finds that 78% of executives would sacrifice long-term value to meet earnings targets, although they do not study equity incentives.

prohibit CEO equity sales for a short period after a repurchase. We also find that CEOs sell equity immediately after M&A, inconsistent with CEOs commonly justifying an M&A deal by its long-term value creation potential.

This paper is related to three literatures. The first studies the effects of short-term equity incentives. Several theories predict that short-term equity incentives induce CEOs to boost current returns at the expense of long-run value[4], but causal evidence has not yet been established. Recent empirical studies link CEO short-term incentives to several corporate outcomes, although not long-run value. In addition to EFL, Edmans et al. (2018) show that CEOs reallocate news toward months in which their equity vests and away from adjacent months. Ladika and Sautner (2016) find that the adoption of FAS 123R induced some firms to accelerate option vesting, which in turn led to a fall in investment, Gopalan, Huang, and Maharjan (2018) and Jochem, Ladika, and Sautner (2018) show that vesting equity leads to CEO turnover, and Van Alfen (2018) documents a negative effect of vesting equity on product market reputation. Our main contribution is to identify outcome variables (repurchases and M&A) whose long-term effects can be reasonably estimated. A contemporaneous and independent paper by Moore (2018) confirms the link between vesting equity and repurchases, but does not study long-run returns, M&A, or the concentration of equity sales after corporate events.

While our main contribution is to study the long-term effects of short-term incentives, our outcome variables are of independent interest as they relate the paper to the literatures on the

[4] Examples include Stein (1988, 1989), Bebchuk and Stole (1993), Bizjak, Brickley, and Coles (1993), Goldman and Slezak (2006), Benmelech, Kandel, and Veronesi (2010), Edmans et al. (2012), and Marinovic and Varas (2018).

determinants and consequences of M&A[5] and repurchases.[6] In particular, there are serious concerns that US companies are using repurchases to boost the short-term stock price at the expense of long-term value (e.g. Lazonick (2014)). In 2018, Democratic Senators Tammy Baldwin, Brian Schatz, and Elizabeth Warren proposed a bill that would "prohibit public companies from repurchasing their shares on the open market", based on Senator Warren's concern that "stock buybacks create a sugar high for the corporations." However, there is little causal evidence for these concerns. The closest evidence is Almeida, Fos, and Kronlund (2016), who show that repurchases undertaken to beat earnings per share (EPS) forecasts reduce employment, investment, and cash holdings (which could be either positive or negative for firm value), but not shareholder value or return on assets. A firm's motivation to beat EPS forecasts depends ex post on whether it would have been below the forecast without the repurchase. We identify an ex ante determinant of repurchase activity and link it to lower long-run firm value.

2. Data and Variable Measurement

2.1 Measuring short-term incentives

We use vesting equity as our measure of short-term incentives because executives are likely to sell equity upon vesting, either to diversify their risk or to finance the tax liability triggered by vesting. Even though many CEOs hold already-vested equity, they may face explicit or implicit constraints

[5] Firms are more likely to engage in acquisitions if they have overconfident CEOs (Malmendier and Tate (2008)), young CEOs (Yim (2013)), less debt-based CEO pay (Phan (2014)), and deviate from their target capital structure (Uysal (2013)). Turning to the consequences, the surveys of Jensen and Ruback (1983) and Andrade, Mitchell, and Stafford (2001) show that acquirers enjoy modestly positive short-term returns and significantly negative long-term returns. Short- and/or long-term returns are increasing in recent acquirer performance (Morck, Shleifer, and Vishny (1990)) and corporate governance (Masulis, Wang, and Xie (2007)), and decreasing in CEO overconfidence (Malmendier and Tate (2008)) and CEO debt-based pay (Phan (2014)).

[6] Dittmar (2000) analyzes the effect of various characteristics on repurchases; we show that they also depend on the CEO's horizon. Fenn and Liang (2001), Kahle (2002), and Bens, Nagar, and Wong (2002) investigate the effect of CEO options, which they acknowledge are endogenous. Turning to the consequences, Ikenberry, Lakonishok, and Vermaelen (1995, 2000) and Manconi, Peyer, and Vermaelen (2019) find positive long-term returns to the average repurchase.

on selling it, which new vesting relaxes. One constraint is ownership guidelines set by the board, which are typically satisfied only by vested equity (Core and Larcker (2002)), and so vesting allows the CEO to sell equity without violating the guidelines. Second, the CEO may hold vested equity voluntarily for control reasons. Since unvested equity does not provide voting rights, vesting allows additional sales without falling below the CEO's desired level of voting rights. Third, the CEO may hold a threshold level of vested equity to signal confidence in the firm. In addition to releasing constraints, vesting stock also imposes a tax charge on the CEO and so he may sell equity to pay the tax. EFL and Edmans et al. (2018) show that equity sales are strongly related to vesting equity, controlling for holdings of already-vested equity, and we confirm this in our sample in Section 5.2. Note that our identification does not require the CEO to sell his entire equity upon vesting, only that equity vesting is significantly correlated with equity sales.[7]

We calculate vesting equity using Equilar, which gathers grant-by-grant data on executives' vested and unvested equity awards for the Russell 3000. This wide coverage compares favorably with ExecuComp, which covers the S&P 1500, and Incentive Lab (used in Moore (2018)), which covers the 750 largest firms each year. Our initial sample contains the entire 48,856 firm-CEO-years for which Equilar collects compensation data from January 2006 to May 2016. We use the approach of EFL to calculate vesting equity, which is described in more detail in Appendix B. This procedure involves three steps. First, we use annual data from Equilar to infer the number of shares and options that vest, grant-by-grant, in a particular year. Second, we allocate this vesting equity to a particular quarter. This requires the vesting date of equity, which we infer for options using their expiry date and estimate for stock using EFL's algorithm. Third, we calculate the effective value of quarterly vesting equity. Doing so requires the delta of each individual vesting option, which we are able to

[7] An alternative plausibly exogenous driver of equity sales is sales preannounced through 10b5-1 plans. These are studied by Fich, Parrino, and Tran (2015) so we do not study them here.

calculate since the first step yields grant-by-grant vesting data.[8] The resulting measure reflects the dollar change in vesting equity for a 100% change in price, and we label it *VESTING*. We estimate *VESTING* for a sample of 150,914 firm-CEO-quarters, representing 6,122 unique firms and 9,623 unique CEOs.

2.2 Measuring stock returns to corporate actions

As discussed in the introduction, we link equity vesting to share repurchases and M&A, since we can assess their long-term value implications using long-run stock returns.

Our main analyses concern actual repurchases; in Section 5.1, we show that the results are robust when studying repurchase announcements. We focus on actual repurchases for a number of reasons. First, companies do not need to announce repurchases once they have disclosed a repurchase program, which could have taken place several years prior.[9] Second, as Banyi, Dyl, and Kahle (2008) show, even for repurchases that are announced, SDC's data coverage is incomprehensive and systematically misses announced repurchases for low growth firms; in contrast, it double counts other repurchases. Third, even for repurchase announcements that are accurately recorded, they are often not followed through. Stephens and Weisbach (1998) study the three-year period after an announcement and find that the average repurchase is not completed.

We measure actual repurchases using Compustat Quarterly.[10] This database takes advantage of the Securities and Exchange Commission's (SEC) enhanced disclosure requirements, which require

[8] Prior to 2006, disclosure requirements do not allow us to infer vesting options on a grant-by-grant level.
[9] Until 2004, share repurchases are regulated by the Securities Exchange Act of 1934. The 1934 Act requires firms to obtain board approval for establishing repurchase programs, but does not require firms to announce either their establishment or the subsequent actual repurchases. NYSE and NASDAQ require listed companies to disclose when they first establish repurchase programs but not the subsequent actual repurchases. Although the new Exchange Act of 2004 requires firms to disclose the total number of shares actually repurchased, the average price paid per share, the number of shares purchased as part of a publicly announced program, and the maximum number of shares (or approximate dollar value) that may yet be repurchased under the program, it still does not require disclosure of the actual repurchase dates.
[10] Banyi, Dyl, and Kahle (2008) find significant estimation errors in alternative data sources for actual repurchases, such as Securities Data Company Platinum and CRSP.

public companies to report the number of shares repurchased (CSHOPQ in Compustat Quarterly) and average price paid (PRCRAQ) in their quarterly filings for periods ending on or after March 15, 2004.[11] We first define a binary variable *REP* to denote the existence of a share repurchase, which equals one if the firm reports either CSHOPQ or PRCRAQ in a given quarter, and zero otherwise.[12] We also calculate *REP%*, the value of the shares repurchased (CSHOPQ × PRCRAQ) as a percentage of market capitalization at the end of the prior quarter.

We collect data for all M&A announced between January 2006 and May 2016 from Securities Data Company ("SDC") Platinum. We define *MA*, a binary variable that equals one if a firm announced an M&A in a quarter, and zero otherwise. Unlike repurchase announcements, 95% of M&A announcements (for which we know the eventual outcome) in our sample are eventually completed.[13]

To gauge the long-run value implications of share repurchases and M&A, we calculate the buy-and-hold abnormal returns (BHAR) surrounding these events. We calculate BHAR also at the quarterly level, from quarter *q-1* (the quarter prior to the event quarter *q*) to quarter *q+16*. We calculate a firm's quarterly BHAR by geometrically compounding its three-month raw return and then subtracting the geometrically-compounded return on one of three benchmarks – the CRSP value-weighted index, Fama-French 49 industry portfolio, and Daniel, Grinblatt, Titman, and Wermers (1997, DGTW) characteristic-based portfolio.

[11] Firms are also required to report repurchases at either the calendar month level or fiscal month level (e.g., May 16th to June 15th) in their 10-Q and 10-K filings but Compustat does not collect monthly repurchase data so quarterly is the highest frequency for which we have machine readable repurchase data. For a subsample of 750 firms every year, Moore (2018) manually collects monthly repurchase data and conducts an analysis by calendar month. To do so, he needs to assume that repurchases spanning two calendar months actually take place in a single calendar month based on the quarter-end date.

[12] In our sample, 1,002 (1.07%) firm-quarters report PRCRAQ but not CSHOPQ because Compustat Quarterly codes CSHOPQ as "Insignificant" if the number of reported shares outstanding is less than 500 shares. Our results are unaffected if we code *REP* as one only if the firm reports both CSHOPQ and PRCRAQ in a quarter.

[13] In our sample, 72% of M&A deals are completed, 4% are withdrawn, and the remaining 24% are either intended or pending and so the outcome is unknown within our sample period.

2.3 Controls

While vesting equity leads to equity sales, and thus may induce a CEO to be concerned with the short-term stock price, other aspects of his contract may mitigate such incentives. We thus control for *UNVESTED*, the CEO's unvested equity holdings, which may increase his concern for the firm's long-term value, as well as already-vested equity (*VESTED*), salary (*SALARY*), and bonus (*BONUS*), to isolate the incentives provided by vesting equity in particular. We also include the CEO's age, tenure, and a new CEO indicator (*AGE*, *TENURE*, and *NEWCEO*) to capture career concerns. *NEWCEO* is measured for the year to which quarter *q* belongs, while *UNVESTED*, *VESTED*, *SALARY*, *BONUS*, *AGE*, and *TENURE* are measured for the year before.

We follow Huang and Thakor (2013) to construct additional controls used in the repurchase analysis. These controls include the natural logarithm of quarterly sales (*SALES*), market-to-book ratio (*MB*), long-term debt-to-assets ratio (*BKLEV*), operating and nonoperating return-on-assets ratios (*ROA* and *NROA*), and market-adjusted stock returns (*RET*). They measure firm size, leverage, accounting performance (which affects excess capital) and stock performance (which affects undervaluation) – factors previously shown to affect repurchase activity (Dittmar (2000), Jagannathan, Stephens, and Weisbach (2000), Guay and Harford (2000)). We measure these controls either over quarter *q-1* or at the end of *q-1*.[14]

The additional controls used in the M&A analysis are mainly taken from Uysal (2011). We include market leverage, *MKLEV*, which Uysal (2011) shows is the primary driver of a firm's M&A decision; *SALES*, *MB*, *ROA*, and *RET* to proxy for firm size and performance; *MALIQ*, the sum of

[14] Another motivation for repurchases, sometimes proposed, is to undo dilution from executive or employee option exercises. This motivation is unlikely to explain our results on theoretical and empirical grounds. There is no theoretical reason for using repurchases to offset dilution. Whether a repurchase creates value depends on whether the firm's stock is undervalued (and, if capital is constrained, the attractiveness of investment opportunities that must be foregone to engage in the repurchase) – not the number of shares outstanding or whether this number has recently increased or decreased. Empirically, there is little support for the anti-dilution hypothesis. Although Bens, Nagar, Skinner, and Wong (2003) find supportive correlations, Gao and Kronlund's (2017) causal study finds no evidence.

M&A values in the firm's industry over a year to measure industry M&A liquidity; and *HFI*, the Herfindahl index of the firm's industry to measure product market concentration.

2.4 Sample and summary statistics

The sample that intersects vesting data with repurchase data and controls consists of 93,537 firm-CEO-quarters, and the sample that intersects vesting data with M&A data and controls consists of 94,362 firm-CEO-quarters. Table 1 reports summary statistics. Comparable to EFL, vesting equity has a mean of $786,877. In a given quarter, 37.5% of firms buy back stock and 15.8% announce at least one M&A. The average percentage of shares repurchased is 0.36% for all firms and 0.95% for firms that conducted repurchases.

3. Share Repurchases

3.1 Equity vesting and share repurchases

We study the relationship between vesting equity and repurchases by running the following panel regression:

$$REP_q\ (REP\%_q) = \alpha + \beta VESTING_q + \gamma CONTROLS1_{q-1} + \varepsilon_q. \qquad (1)$$

The dependent variable is either the repurchase indicator *REP* or the repurchase amount *REP%*. The independent variables include *VESTING* measured for the CEO during quarter q, as well as the controls discussed in Section 2.3. The sample is at the firm-CEO-quarter level, but we omit firm subscripts (and CEO subscripts if there are multiple CEOs for a firm in a quarter) for brevity. In all regressions henceforth, we cluster standard errors at the firm level.[15]

[15] The sample contains 93,537 firm-CEO-quarters, which correspond to 92,873 firm-quarters. Out of the 92,873 firm-quarters, only 652 (0.7%) have multiple CEOs (12 have 3 CEOs). The results are robust to replacing firm fixed effects with CEO fixed effects and clustering standard errors at the CEO level.

Column (1) of Table 2 reports the regression results of estimating equation (1) with *REP* as the dependent variable using a probit model, which ensures that the predicted values of *REP* are bounded within [0, 1] and allows for heteroscedasticity. We include year-quarter fixed effects to control for time variation in share repurchases induced by common shocks, such as macroeconomic conditions. Vesting equity is positively associated with a firm's likelihood of conducting a share repurchase in a given quarter at the 1% level. A one standard deviation increase in *VESTING* is associated with a 1.2% increase in the firm's likelihood of conducting repurchase in a quarter, compared with the unconditional probability of 37.5%. The economic significance increases if we focus on sizable repurchases. If we redefine *REP* to equal one only when the percentage of shares repurchased exceeds the sample average of 0.36%, a one standard deviation increase in *VESTING* is associated with a 1.04% increase in the firm's likelihood of undertaking such a repurchase, compared with the unconditional probability of 20%.

Column (2) reestimates equation (1) using a linear probability model (LPM). The coefficient on *REP* is similar in magnitude to that reported in column (1) and remains significantly positive at the 1% level. Compared to a probit model, an LPM assumes a homoscedastic error term and potentially gives unbounded predicted values of *REP*, but allows for non-normal errors and allows us to include firm fixed effects to control for firm-level heterogeneity in repurchase propensity. We do so in column (3); the coefficient on *REP* remains significantly positive at the 1% level.

Columns (4)-(5) of Table 2 report the ordinary least squares (OLS) regression results of estimating equation (1) with *REP%* as the dependent variable. We include year-quarter fixed effects in column (4) and add firm fixed effects in column (5). *VESTING* remains significantly positive at the 1% level. Based on the reported coefficient in column (4), a one standard deviation increase in *VESTING* is associated with a 0.03% increase in the amount of shares repurchased as a fraction of market capitalization, compared with the sample mean of 0.36%. Using the average market capitalization of

$5bn, this translates into $1.54m per quarter, or $6.16m annualized. This is a larger magnitude than that reported by EFL, who find that a one standard deviation increase in *VESTING* is associated with an annualized fall in investment of $1.8m. The magnitude is sizable but also plausible: too large a repurchase may prompt the board to step in and block it, if the repurchase is indeed myopic. In addition, unvested equity will limit the amount of myopic actions a rational CEO will undertake.

Turning to the controls, *UNVESTED* is significantly positive in all five specifications and *VESTED* is significantly negative in three. The coefficients on these two variables are difficult to interpret: the CEO's voluntary holdings of vested equity are endogenous. His holdings of unvested equity are also endogenous since they depend on recently-granted equity; moreover, unvested equity might mitigate or exacerbate myopia depending on whether it vests in the short-term or long-term. Repurchases are positively related to CEO salary and negatively related to CEO age. The coefficients on firm characteristics are generally consistent with prior literature – repurchases are more likely for firms that are large, low-value, less leveraged, more profitable, and recent stock market laggards.

The results in Table 2 do not control for investment, because EFL find that vesting equity leads to a reduction in investment. Thus, investment would be a "bad control," as it is a channel through which vesting equity could lead to repurchases. However, it remains important to check whether our results are robust to controlling for investment. If repurchases are financed by investment cuts, the positive correlation between *VESTING* and repurchases could be due to repurchases simply proxying for investment cuts. Table 3 thus adds contemporaneous R&D and capital expenditure (both scaled by total assets) as additional controls. While repurchases are indeed strongly negatively correlated with capital expenditure and weakly negatively correlated with R&D, the coefficients on *VESTING* are almost unchanged.[16] These results suggest that investment cuts and share repurchases are

[16] The results are also unaffected if we include changes in R&D and capital expenditure from the prior quarter (scaled by total assets) as additional controls.

independent channels that a CEO pursues to increase the stock price when his equity is vesting, rather than repurchases simply being financed by investment cuts.

Louis, Sun, and White (2010), Bonaimé and Ryngaert (2013), and Jackson (2018) also find that CEOs sell their own equity around the same time as they engage in share repurchases. However, this need not imply causality, i.e. that repurchases were conducted to improve the conditions for equity sales. It may be that the firm has poor investment opportunities (an omitted variable) which cause the CEO to sell his own shares. The same poor investment opportunities may also cause the CEO to cut investment which gives him surplus cash to repurchase equity,[17] or directly cause him to repurchase stock to falsely signal undervaluation and mask the firms' poor prospects. Alternatively, the correlation between repurchases and equity sales could result from reverse causality. If the company has surplus cash, repurchases may be the optimal action, particularly if the market is concerned about free cash flow problems. As a result of taking the optimal action, the stock price rises, and the CEO legitimately takes advantage of the high stock price by selling equity. These endogeneity concerns explain why we use vesting equity, rather than equity sales, to measure short-term incentives.

3.2 Equity vesting and BHAR surrounding share repurchase

As discussed in the introduction, the repurchases induced by vesting equity could be either efficient or myopic. Under both hypotheses, short-term returns to repurchases should be positive – even if a firm's stock is overvalued and so the repurchase is myopic, it may still boost the short-term stock price by (falsely) signaling undervaluation to the market. However, the two hypotheses have opposite predictions for long-run returns. The long-term return to the repurchase captures the value

[17] Holding the surplus cash may be undesirable given the market may discount the value of cash holdings (Dittmar and Mahrt-Smith (2007)); paying it out as dividends would commit the firm to a new, higher, dividend level.

created by it. Thus, if repurchases are myopic (efficient), long-run returns should be negative (positive).

We regress the BHAR surrounding repurchases on *VESTING*:

$$BHAR_t = \alpha + \beta VESTING_q + \varepsilon_q. \quad (2)$$

This regression approach follows Chen, Harford, and Li (2007). The dependent variable, BHAR, is calculated at the quarterly level from quarter *q-1*, the quarter prior to the event quarter, to quarter *q+16*, 16 quarters after, for all firms that engage in repurchases in quarter *q*. We require a firm to be traded at least two years following quarter *q* to be included in the sample, so that our sample size is relatively stable over time. We measure short-term returns by compounding BHAR over quarters *q-1* and *q* for two reasons. First, stock returns in these two quarters will have the most direct effect on the CEO's payoff from equity sales induced by equity vesting in quarter *q*. Second, expanding the window into quarter *q-1* helps capture market reaction if an announcement was made ahead of the actual repurchase. We measure long-run returns by annualizing BHAR over quarters *q+1* to *q+4*, *q+5* to *q+8*, *q+9* to *q+12*, and *q+13* to *q+16*, respectively.[18] We continue to include year-quarter fixed effects to control for time variation in the firm's returns induced by market conditions, and firm fixed effects to remove differences in firms' average returns such as those due to risk.

Columns (1)-(5) of Table 4 report the OLS regression results of estimating equation (2) with BHAR calculated over the short-run window and four long-run windows, respectively. In Panel A, BHAR is calculated relative to the returns on the CRSP value-weighted index. The coefficient on *VESTING* is significantly positive at the 5% level in column (1), which suggests that repurchases conducted by CEOs with more vesting equity generate higher short-term returns. A one standard

[18] We convert quarterly BHARs over the four years following repurchases into four annual BHARs instead of eight semi-annual BHARs for the ease of presentation. The results are consistent if we instead run the long-run stock return analyses using semi-annual BHARs. Separately, the results are also consistent if we include the list of controls from equation (1) when estimating equation (2).

deviation increase in *VESTING* is associated with a 0.3% increase in BHAR over quarters *q-1* to *q* (0.61% annualized). However, the pattern quickly reverses as the coefficients on *VESTING* turn significantly negative in columns (2) and (3), both at the 1% level. A one standard deviation increase in *VESTING* is associated with a 1.11% (0.75%) decrease in BHAR during the first (second) year following the repurchase.[19] The coefficients become insignificant in the third and fourth years. This result is consistent with vesting equity inducing CEOs to undertake repurchases even if the stock is not undervalued, or even if they need to sacrifice long-run investments to do so.

Panels B and C repeat the analyses in Panel A, but instead calculate BHAR relative to the returns on the Fama-French 49 industry portfolios and the DGTW characteristic-based portfolios, respectively. We observe a similar pattern: *VESTING* is positively related to BHAR over the two quarters surrounding repurchases but negatively related to BHAR over the next two years. We calculate the long-term returns to a portfolio of firms that engage in repurchases when *VESTING* is high (tabulated in Table OA1).

We find similar results with a portfolio approach. Specifically, we consider a subsample of firms that repurchase in a given quarter and have *VESTING* in the top quintile, where the quintile cutoff is defined either time-serially within the firm across all quarters, cross-sectionally for all firms in that quarter, or across all firm-quarters (i.e., the entire sample). For each firm within the subsample, we calculate its BHAR above the DGTW benchmark portfolio and then de-mean the BHAR to remove differences in average returns such as those due to risk. Under all three quintile definitions, we find significantly negative returns over quarters *q+1* to *q+4* and *q+5* to *q+8*; we also find significantly negative returns over *q+9* to *q+12* under the first two definitions.

[19] The sample size in the long-run return analysis changes between columns depending on the availability of BHAR. We report economic significance for each column using its reported coefficient on *VESTING* and the standard deviation of *VESTING* in the sample used to estimate the regression.

Overall, the results in Table 4 are more consistent with vesting equity inducing CEOs to undertake myopic repurchases that boost short-term returns at the expense of long-term value, rather than efficient repurchases that increase firm value in both the short- and long-term. The link between vesting equity and long-term returns suggests that the market does not take into account the short-term concerns that arise from vesting equity. This may be for two reasons. First, vesting schedules are difficult to construct. Some information may be unavailable before the firm files its proxy statement or needs to be manually collected from footnotes in Form 4 filings. Even when this information is available, mapping out the vesting schedule is complex and requires an algorithm to obtain it on a quarterly frequency. Second, the market may not recognize the importance of vesting schedules, given that most focus on CEO pay is on pay levels. Von Lilienfeld-Toal and Ruenzi (2014) find long-run abnormal returns to portfolios formed on the CEO's total equity holdings, which are much more salient than vesting schedules. Edmans et al. (2018) find that the market's reaction to discretionary news releases fails to take vesting equity into account. Indeed, the market's failure to take into account the CEO's vesting equity is consistent with its failure to predict negative long-run returns in many other settings, e.g. equity issues (Loughran and Ritter (1995)), accruals (Sloan (1996)), and indeed M&A (Agrawal, Jaffe, and Mandelker (1992)).

4. Mergers and Acquisitions

4.1 Equity vesting and M&A announcement

This section links vesting equity to another corporate action, M&A. Our hypothesis is that, similar to repurchases, vesting equity could induce a CEO to undertake M&A that boosts the short-term stock price at the expense of long-term returns. The survey paper by Betton, Eckbo, and Thorburn (2008) finds that bidders enjoy an average announcement return of 0.73% to an M&A deal. While modest, there is large variation in announcement returns and a high number of deals are greeted very positively

by the market. Indeed, the fact that M&A deals are common despite the small average bidder return suggests that many CEOs believe that they are able to create significant value through M&A even if the average bidder is not. Thus, a CEO wishing to boost the short-term stock price may wish to announce an M&A deal.

We run the following panel regression:

$$MA_q = \alpha + \beta VESTING_q + \gamma CONTROLS2_{q-1} + \varepsilon_q. \qquad (3)$$

The dependent variable is the M&A indicator *MA*, and the independent variables include *VESTING* and the controls discussed in Section 2.3. Unlike repurchases, the vast majority (95%) of announced M&A are completed, so we test this hypothesis by linking vesting equity to M&A announcements. As in the repurchase analyses, we build the sample at the firm-CEO-quarter level.

Table 5 reports the regression results of estimating equation (3) using a probit model in column (1) and an LPM in columns (2)-(3). We include year-quarter fixed effects in all three columns, and firm fixed effects in the last column. Vesting equity is positively associated with a firm's likelihood of announcing an M&A in a given quarter at the 5% level or lower. Based on the reported marginal effect in column (1), a one standard deviation increase in *VESTING* is associated with a 0.6% increase in the firm's likelihood of announcing an M&A in a quarter, compared with the unconditional probability of 15.8%.

When firm fixed effects are included in column (3), the controls for other CEO incentives and CEO characteristics are all insignificant except for unvested equity, which is significantly positive at the 10% level, and a new CEO indicator, which is significantly negative also at 10%. Turning to firm controls, market-to-book and the firm's accounting and stock performance are significantly positive. Market leverage is significantly negative, consistent with Uysal (2011).

Given the size of M&A, it is less likely that M&A (unlike repurchases) is financed by investment cuts. Nevertheless, we repeat the analysis in Table 5 controlling for contemporaneous R&D-to-assets and capital expenditures-to-assets. The results are reported in Table OA2 and remain robust.

4.2 Equity vesting and BHAR surrounding M&A announcement

We now evaluate the efficiency of vesting-induced M&A. As in the repurchase analyses, we regress the BHAR surrounding M&A announcements on *VESTING*:

$$BHAR_t = \alpha + \beta VESTING_q + \varepsilon_q. \quad (4)$$

Unlike repurchases, we do have the exact announcement dates for M&A so, for the calculation of BHAR, we redefine quarter q as the event quarter that starts with the M&A announcement date.[20] Again, we require a firm to continue trading at least two years following quarter q and include year-quarter and firm fixed effects.[21]

Table 6 reports the regression results of estimating equation (4) with BHAR calculated relative to the returns on the CRSP value-weighted index, Fama-French 49 industry portfolios, and DGTW characteristic-based portfolios in Panels A, B, and C, respectively. All three panels indicate a similar pattern to Table 4: *VESTING* is positively related to short-term returns but negatively related to long-term returns. The one difference is that the negative relation with long-term returns persists for up to four years, consistent with Agrawal, Jaffe, and Mandelker's (1992) finding of five-year negative long-term returns to M&A. Based on the coefficients reported in Panel A, a one standard deviation increase in *VESTING* is associated with an annualized 1.47% increase in BHAR over quarter *q-1* to *q*. However, it is also associated with a 0.79%, 0.37% (insignificant), 0.73%, and 0.62% decrease in BHAR in the first, second, and third, and fourth years after the M&A, respectively. We find similar

[20] Some firms announce multiple M&A in a given quarter. To avoid artificially inflating sample size, for the long-run BHAR analysis and the announcement return analysis, we retain the deal with the largest absolute market reaction.
[21] On average, each firm in our sample that has at least one M&A has an average of 4.3 quarters with M&A during our sample period.

(unreported) results when calculating the long-term returns to a portfolio of firms that engage in M&A when *VESTING* is high.

4.3 Equity vesting and M&A impairment loss

Section 4.2 documented that vesting equity is significantly negatively related to the long-run return to M&A deals. This section studies a potential channel through which the negative long-run returns transpire: M&A goodwill impairment. Goodwill is the difference between the purchase price of a target and the fair value of its net identifiable assets. Goodwill alone need not imply that the acquirer overpaid for the target (and thus need not lead to a negative short-term reaction), since it may be justified by the target's non-identifiable assets such as human capital and customer loyalty – indeed, Henning, Lewis, and Shaw (2000) find that the market values purchased goodwill. However, if the acquirer subsequently revises downwards its estimate of the fair value of the target, a goodwill impairment arises. This indicates that the acquirer likely overpaid and leads to a negative market reaction, as found by Li, Shroff, Venkataraman, and Zhang (2011).

We run the following regression:

$$IMPAIREDMA\%_t = \alpha + \beta VESTING_q + \gamma CONTROLS2_{q-1} + \varepsilon_q. \quad (5)$$

IMPAIREDMA% is the total amount of goodwill written down by the firm over window *t* scaled by its total M&A deal size in quarter *q*. We measure *t* over quarters *q+1* to *q+8*, *q+1* to *q+12*, and *q+1* to *q+16*, respectively, to measure the cumulative write-down of goodwill over a given period. To correct for possible truncation bias, we limit the sample to 2006-2011, thus allowing all sample firms to have up to four years to book goodwill impairment loss. We use the same controls as in Table 5, where the dependent variable is the M&A indicator.

The results are reported in Table 7 and show that vesting equity is significantly positively related to subsequent M&A impairment losses. A one standard deviation increase in *VESTING* is associated with a 0.28, 0.78, and 0.93 percentage point increase in M&A impairment losses over the next two,

three, and four years, respectively. The average two-, three-, and four-year impairment losses in our sample are 5.09%, 11.69%, and 16.76%, respectively. The results suggest that one channel through which vesting equity leads to lower long-term returns to M&A is that it induces CEOs to overpay for acquisitions, generating goodwill that is subsequently written down.

5. Additional Analyses and Robustness Tests

5.1 Equity sales surrounding repurchases and M&A

If vesting equity indeed induces the CEO to engage in repurchases and M&A to improve the conditions for his equity sales, we should see him selling equity after these events are announced. In Table 8, we investigate the extent to which the CEO's equity sales within a quarter are concentrated in a small window following these events, thus allowing him to benefit from them. First, for each repurchase announced in a quarter for which the CEO has equity vesting, we compute *EQUITYSOLD%* (the value of equity sales as a percentage of market capitalization 90 days before the announcement, as tracked by the Thomson Reuters Insider Filing) over window (0,2], (0,5], (0,10], (0,15], or (0,20], with 0 being the announcement date. We then compare these numbers to *EQUITYSOLD%* computed over window [-2,0), [-5,0), [-10,0), [-15,0), or [-20,0) and test their differences. As Panel A of Table 8 shows, the differences are statistically and economically significant: for example, 0.011% of the firm's equity is sold by the CEO within the two-day window immediately following a repurchase announcement, twice the amount sold immediately before of 0.005%.

Independently of our main research question to study the long-term consequences of vesting equity, these results are of interest in their own right as they contradict commonly-stated justifications for repurchases. One reason is that the stock is undervalued, but if so the CEO should not be selling his own equity at the same time. A second is that the firm has enough cash to take all value-increasing

investment opportunities and that repurchases are the next best use of cash. However, if the firm has been able to take all value-creating projects and is using cash wisely, the CEO should wish to remain invested in the firm. Instead, the results are consistent with the CEO using repurchases to falsely signal undervaluation to the market to improve the conditions for his equity sales. If true, a potential remedy would be to prohibit CEO equity sales for a short period after a repurchase.

Panel B of Table 8 repeats the analysis for M&A and similarly finds a concentration of equity sales after the announcement. This result is inconsistent with CEOs undertaking an acquisition because it is likely to create long-term value. However, cashing out is individually rational if the deal was conducted to boost short-term stock prices, or yield the CEO private benefits.

5.2 Robustness tests

This section describes the results of additional robustness tests. The first set of tests verifies robustness to alternative definitions of the dependent variables. Table OA3 studies the link between vesting equity and repurchase announcements. We do not use repurchase announcements in the core analyses for the reasons described earlier. However, since repurchase announcements can increase the short-term stock price even if not eventually executed, a CEO with short-term concerns may have incentives to undertake them.[22] The dependent variable is *REPANN*, an indicator for whether a firm announces a share repurchase program or actual share repurchase in a given quarter. Under both probit and LPM specifications, *VESTING* is significantly positive at the 1% level. For example, a

[22] Hypothetically, one might wish to link vesting equity to repurchase announcements that are eventually completed. Such a test is difficult to do due to several data issues. Although SDC Platinum compiles some repurchase announcements, it is not always clear whether a particular announcement is about the establishment of a new repurchase program, an amended program, or shares actually repurchased under existing programs. Therefore, even if we had the actual repurchase amounts from Compustat Quarterly, it is difficult to match them with SDC announcement data. SDC also does not provide comprehensive coverage of all firms that announce repurchase programs or that repurchase shares.

one standard deviation increase in *VESTING* is associated with a 0.4% increase in a firm's likelihood of announcing a repurchase in a given quarter, compared with the unconditional probability of 4.3%.

Table OA4 studies robustness to alternative definitions of the M&A dependent variable. The first alternative is *MANUM*, the number of acquisitions announced in a given quarter (while Table 5 used an indicator variable). Columns (1) and (2), without and with firm fixed effects respectively, show that *VESTING* is significantly positive at the 5% level or lower. The second alternative is *MASUM*, the aggregate value of all acquisitions made in a given quarter, scaled by the acquirer's market capitalization at the end of the previous quarter.[23] Since over half of the deals in our sample do not have their size recorded in SDC, *MASUM* is potentially underestimated. Despite this, columns (3) and (4), without and with firm fixed effects respectively, show that *VESTING* is significantly positive at the 1% and 10% levels. Panels A and B of Table OA5 repeat the results of Tables 5 and 6 (respectively) only considering M&A announcements that are subsequently completed. Despite the smaller sample, the results are similar to including all M&A announcements.

Table OA6 conducts the return analyses of Table 4 (for repurchases) and Table 6 (for M&A) studying long-term CAR rather than BHAR. While BHAR geometrically compounds a stock's raw return and then subtracts the geometrically-compounded benchmark return, the CAR first calculates a stock's benchmark-adjusted monthly (or daily) returns and then arithmetically compounds them over several months. Conrad and Kaul (1993) argue that the BHAR method is more accurate for statistical reasons, hence using it in the main analyses, but here we verify robustness to CAR. The inferences are unchanged: both repurchases and M&A lead to significantly positive short-term returns, but negative long-term returns over two years for repurchases and four years for M&A.

[23] We drop a firm-quarter if a firm announced at least one M&A but all deals have missing transaction size. If the firm announces at least one deal with non-missing transaction size, the firm-quarter is included, with missing transaction sizes set to zero. If the firm did not announce any acquisitions, *MASUM* is zero.

The next set of tables verifies robustness to alternative ways of calculating *VESTING*. One concern with *VESTING* is that an option's delta is increasing in the current stock price, which may be correlated with unobservable variables (such as growth opportunities) that also drive repurchase and M&A activity. While this might seem to work against our repurchase results (since higher growth opportunities would encourage investment rather than repurchases), it may explain our M&A results (since a higher stock price would make it easier to stock-finance M&A, or obtain board approval for M&A). Table OA7 recalculates *VESTING* assuming that all options are at-the-money. This still allows option deltas to vary with their maturity date and the volatility of the underlying stock, but removes their dependence on the strike price.

A related concern is that the current stock price may affect *VESTING* through triggering vesting. Our use of vesting equity is motivated by it being determined by equity grants made several years prior. While true for grants with time-based vesting, performance-based vesting is becoming more common. Bettis et al. (2010) find that 46% of performance-based vesting provisions are contingent on stock price thresholds, twice as frequent as the next category. If good investment opportunities increased the stock price, triggering vesting, and also reduced the cash available to undertake repurchases, this would lead to a negative correlation between *VESTING* and repurchases, the opposite of our finding. However, reverse causality may be a concern if vesting is contingent on accounting thresholds (23% of cases), since repurchases may increase earnings and trigger vesting. Table OA8 recalculates *VESTING* including only time-based vesting grants, and removes post-2006 grants labeled "performance-based," "contingent," or "accelerated," as well as post-2006 grants with unknown vesting schedules.

Table OA9 addresses the concern that an option's delta depends on its time-to-maturity, but if CEOs exercise their options shortly after they vest, their effective horizons are shorter. We thus recalculate *VESTING* using options' intrinsic values: we assign a delta of one to all in-the-money

options and zero to all out-of-the-money options, because only the former would be exercised immediately upon vesting. In Tables OA7-OA9, the inferences regarding both the frequency of and returns to repurchases and M&A are unchanged.

While column (1) of Table 6 studies stock returns in the two quarters around the M&A announcement, Table OA10 hones in on the [-1, +1], [-2, +2], and [-3, +3] windows, to more precisely measure how M&A boosts the short-term stock price. We hypothesize a positive relation between *VESTING* and *CAR*, i.e. vesting equity leads CEOs to announce deals that are perceived more positively by the market in the short-term. We run the following regression:

$$CAR_t = \alpha + \beta VESTING_q + \gamma CONTROLS3_{q-1} + \varepsilon_q. \quad (5)$$

As before, we control for other components of CEO pay, age, tenure, and a new CEO indicator, as well as size and the market-to-book ratio due to size and value effects in stock returns. Consistent with our hypothesis, a CEO's vesting equity is positively related to his firm's M&A announcement returns. Based on the reported coefficients, a one standard deviation increase in *VESTING* is associated with a 0.15% increase in three-day *CAR*, 0.19% increase in five-day *CAR*, and 0.21% increase in seven-day *CAR*. These results suggest that CEOs with high vesting equity undertake acquisitions that the market responds to positively in the short-term.

Finally, the main analysis uses vesting equity as the independent variable of interest, since boards and investors can estimate how much equity is vesting in a given quarter and so are interested in how repurchases and M&A relate to this magnitude. However, we can also use vesting equity as an instrument for equity sales in a 2SLS analysis. Doing so verifies our assumption that vesting equity leads to equity sales and thus short-term stock price concerns. EFL and Edmans et al. (2018) already document such a link for an earlier time period.

We first run the following 2SLS regressions to assess the relation between equity sales and repurchase activity:

$$EQUITYSOLD_q = \alpha_1 + \beta_1 VESTING_q + \gamma_1 CONTROLS1_{q-1} + \varepsilon_{1q}, \quad (6)$$

$$REP_q\ (REP\%_q) = \alpha_2 + \beta_2\, FIT\_EQUITYSOLD_q + \gamma_2 CONTROLS1_{q-1} + \varepsilon_{2q}. \quad (7)$$

REP_q ($REP\%_q$) are defined as before. $EQUITYSOLD_q$ is the multiplication of the number of shares that a CEO sold in a given quarter q and the firm's stock price at the end of quarter q-1. When estimating the relation between equity sales and M&A announcement, we replace the dependent variable in the second-stage with M&A indicator MA_q, and *CONTROLS1* with *CONTROLS2*.

Table OA11 presents the 2SLS results. Columns (1) and (3) report the first-stage results. As shown, the coefficients on *VESTING* are positive and significant at the 1% level. A one standard deviation increase in *VESTING* is associated with a rise in *EQUITYSOLD* by $370,229, 44% of the average level. This number becomes $273,077 (32% of the average level) when we include firm fixed effects. The underidentification test rejects the null of no correlation between *VESTING* and *EQUITYSOLD*: the Cragg-Donald F-statistics are significantly higher than the Stock and Yogo (2005) critical value for a 10% maximal bias of the instrumental variable estimator relative to OLS. Thus, consistent with EFL, we find that vesting equity is significantly correlated with same-quarter equity sales. Columns (2) and (4) report the second-stage results. The coefficients on the instrumented equity sales (*FIT_EQUITYSOLD*) are positive and significant at the 1% level in both columns, consistent with the reduced-form regressions in Table 2 and Table 5.

Table OA12 repeats the 2SLS results with *MA* as the dependent variable in the second-stage. Column (1) shows a positive association between equity sales and vesting equity, with an economic magnitude similar to that in Column (1) of Table OA11. Column (2) once again reports a positive coefficient on the instrumented equity sales (*FIT_EQUITYSOLD*).

6. Conclusion

This paper suggests that the impending vesting of equity leads CEOs to take myopic actions, that boost the short-term stock price at the expense of long-term value. An increase in vesting equity is associated with a greater frequency of stock repurchases and M&A announcements, and higher short-term returns and lower long-term returns surrounding these events. These results provide suggestive evidence of the negative causal effects of short-term CEO incentives on long-term firm value.

One potential practical implication is to extend the vesting periods of equity beyond a CEO's departure, to deter potentially value-destructive actions arising from equity that vests during his tenure. Indeed, the revised (July 2018) UK Corporate Governance Code states that "the remuneration committee should develop a formal policy for post-employment shareholding requirements." However, the implications for simply lengthening vesting periods (without them extending beyond a CEO's tenure) are unclear. While we have provided evidence of the potential costs of short-term incentives, there may also be costs of lengthening vesting periods, as suggested by some academics and practitioners. For example, longer vesting periods may subject the CEO to risk outside his control and lead to him demanding a risk premium, or avoiding value-creating risky projects as shown theoretically by Brisley (2006). Relatedly, the model of Laux (2012) demonstrates that, if equity is forfeited upon dismissal, long vesting periods may encourage the CEO to take short-term actions that reduce the risk of being fired.

Moreover, even long-vesting equity has to vest at some point, and when it does, the CEO has incentives to engage in myopic behavior. Instead, our results suggest that boards should particularly scrutinize a CEO's decisions at times where he has significant equity vesting. An alternative remedy would be to spread out the vesting of a large equity grant across different dates in a year, rather than it all vesting at the anniversary of the grant.

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Appendix A: Definition of variables

This appendix describes the calculation of variables used in the core analyses. Underlined variables refer to variable names within Compustat. *t* indexes the year to which quarter *q* belongs.

Variable	Definition
Outcome variables of interest	
REP_q	An indicator variable that equals one if a firm reports either the number of shares repurchased (CSHOPQ) or average repurchase price (PRCRAQ) in quarter *q*, and zero otherwise.
$REP\%_q$	The value of shares repurchased in quarter *q* (CSHOPQ× PRCRAQ) as a percentage of market capitalization (CSHOQ× PRCCQ)) at the end of quarter *q-1*, and zero if no repurchase is conducted.
MA_q	An indicator variable that equals one if a firm announced an M&A in quarter *q*, and zero otherwise.
$BHAR_{q-1\ to\ q}$	A firm's buy-and-hold abnormal return (BHAR) over quarter *q-1* and *q*, with quarter *q* being either the fiscal quarter in which a share repurchase occurred or the one quarter that follows an M&A announcement (with the first day of the quarter being the M&A announcement date). For repurchase events, BHAR is calculated as the firm's geometrically-compounded monthly raw returns minus a benchmark return geometrically compounded over the same period on: the CRSP value-weighted index, the Fama-French 49 industry portfolio (obtained from Kenneth French's website), or the DGTW (1997) characteristic-based portfolio (obtained from Russell Wermers' website). BHAR and benchmark returns for M&A events are calculatedly similarly as those for repurchase events, but use daily returns rather than monthly returns. $BHAR_{q+1\ to\ q+4}$, $BHAR_{q+5\ to\ q+8}$, $BHAR_{q+9\ to\ q+12}$, and $BHAR_{q+13\ to\ q+16}$ are analogously calculated as a given firm's BHAR for quarter *q+1* to *q+4*, *q+5* to *q+8*, *q+9* to *q+12*, and *q+13* to *q+16*, respectively.
CAR_q	Cumulative market-adjusted abnormal return surrounding an M&A announcement made by a firm during quarter *q*. It is calculated as the sum of the firm's daily abnormal returns over [-*n*, *n*]. The daily abnormal return is the firm's daily raw return minus the corresponding return on the CRSP value-weighted index, where day 0 is the announcement date and $n = 1, 2$, and 3 trading days.
$IMPAIREDMA\%_t$	Percentage of M&A impairment loss, calculated as the total absolute value of goodwill impairment loss booked by a firm (GDWLIPQ) over window *t* scaled by the sum of deal size for all M&A announced by the firm in quarter *q*. The variable is set to zero if a firm announced at least one M&A in quarter *q* but booked zero impairment loss over *t*. We measure *t* over quarter *q+1* to *q+8*, *q+1* to *q+12*, and *q+1* to *q+16*, respectively. The sum of deal size for M&A is obtained from SDC Platinum.
CEO's stock price sensitivity of his vesting equity	
$VESTING_q$	CEO's stock price sensitivity of his vesting equity in quarter *q*, calculated as the price sensitivity of vesting stock [number of vesting shares in quarter *q* × stock price at the end of quarter *q-1*] plus the price sensitivity of vesting options [aggregated delta of vesting options in quarter *q* × stock price at the end of quarter *q-1*]. Vesting options are assigned to quarter *q* based on expiry dates, and vesting stocks are assigned to quarter *q* based on grant dates. See EFL for details on the algorithm to estimate the vesting date of option and stock grants and details on the calculation of option delta.
Controls	
$EQUITYSOLD_q$	The value of the shares sold by the CEO in quarter *q*, calculated as the total number of shares sold during the quarter × stock price at the end of quarter *q-1*.

EQUITYSOLD%	The value of the shares sold by the CEO within a particular window defined in Table 8, as a percentage of the market capitalization 90 days before the repurchase announcement or the M&A announcement.
$UNVESTED_{q-1}$	CEO's stock price sensitivity of his unvested equity at the end of year *t-1*.
$VESTED_{q-1}$	CEO's stock price sensitivity of his already-vested equity at the end of year *t-1*.
$SALARY_{q-1}$	CEO's salary in year *t-1*.
$BONUS_{q-1}$	CEO's cash bonus in year *t-1*.
AGE_{q-1}	CEO's age in year *t-1*.
$TENURE_{q-1}$	CEO's tenure in year *t-1*.
$NEWCEO_q$	An indicator variable to denote new CEO in year *t* to which quarter *q* belongs.
$SALES_{q-1}$	Natural logarithm of total sales of quarter *q-1*.
MB_{q-1}	The ratio of market value of assets to book value of assets, calculated as [market capitalization plus book value of total debt (*DLTTQ*+*DLCQ*)] divided by total assets, both at the end of quarter *q-1*.
$BKLEV_{q-1}$	Long-term debt-to-asset ratio (*DLTTQ*/*AT*) of quarter *q-1*.
ROA_{q-1}	Operating income (*OIBDPQ*) in quarter *q-1* divided by the average of the total assets at the beginning and the end of quarter *q-1*.
$NROA_{q-1}$	Non-operating income (*NIPIQ*) in quarter *q-1* by the average of the total assets at the beginning and the end of quarter *q-1*.
RET_{q-1}	A firm's BHAR relative to the CRSP value-weighted index over quarter *q-1*.
$R\&D_q$	R&D (*XRDQ*) in quarter *q* divided by total assets at the end of quarter *q-1*, and set to zero if missing.
$CAPX_q$	Capital expenditure (inferred from *CAPXY*) in quarter *q* divided by total assets at the end of quarter *q-1*, and set to zero if missing.
$MKLEV_{q-1}$	Average quarterly market leverage over year *t-1*, calculated as book value of total debt divided by market value of total debt, where market value of total debt is the sum of book value of total debt, market capitalization, and preferred stock (*PSTKQ*) minus deferred taxes and investment tax credit (*TXDITCQ*).
$MALIQ_{q-1}$	Industry M&A liquidity is the total value of acquisitions made by all Compustat firms within the firm's three-digit SIC group during the year to which quarter *q-1* belongs, divided by the total assets of all firms in the same industry group and year.
HFI_{q-1}	Herfindahl index, calculated as the sum of the squares of the market shares of the Compustat firms within the same three-digit SIC group for the year to which quarter *q-1* belongs. Market share is the sales of the firm during the year divided by total sales in the firm's industry group of that year.
MV_{q-1}	Natural logarithm of market capitalization at the end of quarter *q-1*.

Appendix B: Calculation of Vesting Equity

This Appendix describes our calculation of vesting equity, which also follows EFL. First, we retrieve a CEO's number of vesting shares in a given year using Equilar's variable "Shares Acquired on Vesting of Stock," which includes shares vested from restricted stock plans, restricted stock unit plans, and long-term incentive plans. We then infer a CEO's number of vesting options in the year, grant-by-grant, from his unvested options at the beginning and the end of the year as well as his newly awarded options during the year. Option grants are sorted using their strike price and expiry date.

Second, we convert vesting equity from annual to quarterly basis by estimating the vesting date of equity. For options, this is simple. Options vest and expire on the anniversary of a grant (as assumed in the literature and as we verify in a random sample). For shares, there is no expiry date, and grant dates are only available for shares awarded after 2006 in Equilar, so we follow EFL's algorithm to assign them to a particular quarter. In the first step, a CEO's vesting shares in a given year are attributed to stock awards post 2006 for which we know the grant dates from Equilar. These include cliff-vesting grants, which vest at the end of the vesting period, and graded-vesting grants, which we assume to vest annually on a straight-line basis following Gopalan et al. (2014). In the second step, the remaining vesting shares are attributed to pre-2006 grants evenly across all the grant dates that we observe from post-2006 awards in Equilar.

For robustness, EFL propose two alternative algorithms to assign vesting shares. The first uses post-2006 cliff and graded[24] stock awards without performance provisions (as opposed to all post-2006 cliff and graded stock awards) in the first step. This addresses the concern that, for performance-vesting equity, the grant date anniversaries may not be a good guide to the vesting date. The second algorithm similarly uses post-2006 non-performance-vesting cliff and graded stock awards in the first step, but the second step uses only grant dates for performance-vesting stock - since non-performance-vesting stock was used in the first step, so the remaining unmatched shares are unlikely from this pool. Our results are unchanged under either alternative algorithm.

[24] Equilar classifies the vesting schedule into "cliff", "graded", "retirement", and "N/A". While "retirement" awards is less than 1% of the total, "N/A" comprises 10%.

Table 1: Summary statistics

Variable	N	5%	Mean	Median	95%	SD
Main outcome variables of interest						
REP_q	93,537	0	0.375	0	1	0.484
$REP\%_q$	93,537	0	0.356	0	2.226	0.900
MA_q	94,362	0	0.158	0	1	0.365
$IMPAIREDMA\%_{[q+1, q+8]}$	7,200	0	5.085	0	43.474	13.448
$IMPAIREDMA\%_{[q+1, q+12]}$	7,200	0	11.692	0	90.543	28.594
$IMPAIREDMA\%_{[q+1, q+16]}$	7,200	0	16.763	0	122.045	39.100
CEO incentives from vesting equity						
$VESTING_q$	93,537	0	786,877	0	4,479,960	2,625,736
Controls						
$UNVESTED_{q-1}$	93,537	0	4,960,488	1,044,682	24,200,443	10,147,570
$VESTED_{q-1}$	93,537	93,852	59,941,941	8,506,756	248,049,717	192,995,235
$SALARY_{q-1}$	93,537	173,698	614,490	534,449	1,250,000	352,698
$BONUS_{q-1}$	93,537	0	145,428	0	800,000	444,774
AGE_{q-1}	93,537	42	54	54	67	8
$TENURE_{q-1}$	93,537	1	8	6	24	7
$NEWCEO_q$	93,537	0	0.037	0	0	0.189
$SALES_{q-1}$	93,537	1.557	4.836	4.854	8.239	2.075
MB_{q-1}	93,537	0.204	1.493	1.084	4.28	1.384
$BKLEV_{q-1}$	93,537	0	0.174	0.113	0.575	0.196
ROA_{q-1}	93,537	-0.059	0.019	0.024	0.077	0.046
$NROA_{q-1}$	93,537	-0.003	0	0	0.008	0.005
RET_{q-1}	93,537	-0.313	0.007	-0.007	0.376	0.213
$R\&D_q$	93,537	0	0.01	0	0.056	0.025
$CAPX_q$	93,537	0	0.011	0.005	0.042	0.016
$MKLEV_{q-1}$	94,362	0	0.244	0.176	0.727	0.240
$MALIQ_{q-1}$	94,362	0	0.013	0	0.087	0.028
HFI_{q-1}	94,362	0.010	0.042	0.026	0.129	0.040
Other variables						
$EQUITYSOLD_q$	93,537	0	844,271	0	4,483,096	3,023,931

Summary statistics of our main variables. For variables that are included in both analyses, we calculate and report their summary statistics with the sample used in the repurchase analysis. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are in Appendix A.

Table 2: Repurchase and vesting equity

	(1)	(2)	(3)	(4)	(5)
	Probit	**LPM**		**OLS**	
Dependent Variables		REP_q		$REP\%_q$	
$VESTING_q$	**12.263*****	**4.354*****	**2.752*****	**11.888*****	**6.759*****
	(2.681)	(0.875)	(0.529)	(1.776)	(1.458)
	[4.583***]				
$UNVESTED_{q-1}$	12.392***	4.435***	2.047***	5.904***	3.997***
	(1.700)	(0.544)	(0.431)	(0.911)	(0.996)
$VESTED_{q-1}$	-0.214***	-0.071**	0.023	-0.072**	-0.005
	(0.083)	(0.029)	(0.033)	(0.036)	(0.085)
$SALARY_{q-1}$	0.383***	0.150***	0.053**	0.208***	0.094**
	(0.060)	(0.021)	(0.021)	(0.028)	(0.046)
$BONUS_{q-1}$	-0.001	-0.002	0.002	0.008	0.010
	(0.029)	(0.010)	(0.007)	(0.018)	(0.018)
AGE_{q-1}	-0.458**	-0.137**	-0.251***	-0.418***	-0.397**
	(0.203)	(0.067)	(0.095)	(0.087)	(0.170)
$TENURE_{q-1}$	0.443*	0.120	0.220**	0.134	0.297*
	(0.231)	(0.079)	(0.097)	(0.100)	(0.164)
$NEWCEO_q$	0.010	0.009	-0.001	0.040**	0.014
	(0.035)	(0.011)	(0.009)	(0.020)	(0.019)
$SALES_{q-1}$	0.133***	0.044***	0.038***	0.034***	0.030***
	(0.011)	(0.004)	(0.006)	(0.005)	(0.010)
MB_{q-1}	-0.023**	0.001	-0.013***	-0.004	-0.044***
	(0.011)	(0.003)	(0.003)	(0.004)	(0.006)
$BKLEV_{q-1}$	-0.723***	-0.234***	-0.152***	-0.344***	-0.431***
	(0.078)	(0.024)	(0.027)	(0.033)	(0.052)
ROA_{q-1}	4.077***	0.864***	-0.088	1.483***	0.329**
	(0.363)	(0.091)	(0.072)	(0.138)	(0.140)
$NROA_{q-1}$	-1.219	-0.318	0.242	1.624**	0.947**
	(1.669)	(0.450)	(0.232)	(0.715)	(0.463)
RET_{q-1}	-0.129***	-0.035***	-0.039***	-0.042***	-0.054***
	(0.021)	(0.006)	(0.006)	(0.011)	(0.012)
Year-Quarter Fixed Effects (FE)	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		Yes
Observations	93,537	93,537	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.113	0.137	0.507	0.0633	0.254

This table presents the regression results on the relation between share repurchases and the CEO's vesting equity. Variable definitions are in Appendix A. Column (1) estimates a probit model, columns (2)-(3) estimate a linear probability model (LPM), and columns (4)-(5) estimate an ordinary least squares (OLS) model. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. In column (1), the marginal effect for *VESTING* is displayed below the standard errors. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 3: Repurchase and vesting equity, controlling for investment

	(1)	(2)	(3)	(4)	(5)
	Probit	**LPM**		**OLS**	
Dependent Variables		REP_q		$REP\%_q$	
$VESTING_q$	**12.507*****	**4.375*****	**2.748*****	**11.787*****	**6.750*****
	(2.704)	(0.878)	(0.529)	(1.770)	(1.459)
	[4.667***]				
$UNVESTED_{q-1}$	12.272***	4.396***	2.047***	5.828***	3.995***
	(1.707)	(0.544)	(0.431)	(0.897)	(0.996)
$VESTED_{q-1}$	-0.206**	-0.068**	0.024	-0.062*	-0.005
	(0.082)	(0.029)	(0.034)	(0.036)	(0.086)
$SALARY_{q-1}$	0.369***	0.146***	0.052**	0.191***	0.093**
	(0.060)	(0.021)	(0.021)	(0.028)	(0.046)
$BONUS_{q-1}$	0.004	0.000	0.002	0.014	0.010
	(0.029)	(0.010)	(0.007)	(0.018)	(0.018)
AGE_{q-1}	-0.500**	-0.143**	-0.252***	-0.405***	-0.399**
	(0.202)	(0.066)	(0.095)	(0.087)	(0.170)
$TENURE_{q-1}$	0.440*	0.118	0.221**	0.126	0.299*
	(0.231)	(0.079)	(0.097)	(0.099)	(0.164)
$NEWCEO_q$	0.003	0.006	-0.001	0.035*	0.013
	(0.035)	(0.011)	(0.009)	(0.020)	(0.019)
$SALES_{q-1}$	0.133***	0.045***	0.038***	0.036***	0.030***
	(0.011)	(0.004)	(0.006)	(0.005)	(0.010)
MB_{q-1}	0.002	0.007**	-0.012***	-0.002	-0.043***
	(0.012)	(0.004)	(0.003)	(0.004)	(0.006)
$BKLEV_{q-1}$	-0.701***	-0.224***	-0.154***	-0.299***	-0.435***
	(0.077)	(0.024)	(0.027)	(0.033)	(0.052)
ROA_{q-1}	3.848***	0.809***	-0.091	1.860***	0.314**
	(0.398)	(0.102)	(0.073)	(0.160)	(0.140)
$NROA_{q-1}$	0.130	0.016	0.250	2.112***	0.964**
	(1.664)	(0.445)	(0.231)	(0.710)	(0.462)
RET_{q-1}	-0.120***	-0.033***	-0.038***	-0.048***	-0.053***
	(0.021)	(0.006)	(0.006)	(0.011)	(0.012)
$R\&D_q$	-2.866***	-0.507***	-0.085	0.646***	-0.251
	(0.766)	(0.177)	(0.184)	(0.247)	(0.349)
$CAPX_q$	-4.878***	-1.433***	-0.245	-3.543***	-0.444
	(0.957)	(0.289)	(0.171)	(0.325)	(0.362)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		Yes
Observations	93,537	93,537	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.116	0.140	0.507	0.067	0.254

This table presents the regression results on the relation between share repurchases and the CEO's vesting equity, controlling for contemporaneous investment. Variable definitions are in Appendix A. Column (1) estimates a probit model, columns (2)-(3) estimate an LPM, and columns (4)-(5) estimate an OLS model. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. In column (1), the marginal effect for *VESTING* is displayed below the standard errors. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 4: Stock returns surrounding repurchase and vesting equity

Panel A: BHAR over market portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
VESTING$_q$	**0.897****	**-3.288*****	**-2.214*****	**-0.401**	**-0.476**
	(0.422)	(0.553)	(0.586)	(0.558)	(0.484)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,535	28,479	28,360	27,171	23,458
Adjusted R^2	0.088	0.201	0.219	0.241	0.237

Panel B: BHAR over industry portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over Fama-French 49 industry portfolio return*				
VESTING$_q$	**0.722***	**-3.001*****	**-1.842*****	**-0.278**	**-0.722**
	(0.399)	(0.527)	(0.569)	(0.541)	(0.463)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,129	28,073	27,954	26,786	23,136
Adjusted R^2	0.072	0.189	0.200	0.228	0.231

Panel C: BHAR over characteristic-based portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over DGTW characteristic-based portfolio return*				
VESTING$_q$	**0.925****	**-2.884*****	**-1.913*****	**0.320**	**-0.038**
	(0.419)	(0.519)	(0.528)	(0.529)	(0.446)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	25,543	25,525	25,232	24,118	20,717
Adjusted R^2	0.079	0.215	0.234	0.225	0.219

This table presents the OLS regression results on the relation between buy-and-hold abnormal return (BHAR) over the period from one quarter prior to the quarter in which a share repurchase occurred to four years after the repurchase quarter and the CEO's vesting equity. BHAR is calculated over the value-weighted market index in Panel A, the Fama-French industry portfolio in Panel B, and the DGTW benchmark portfolio in Panel C. Variable definitions are in Appendix A. *VESTING* is in billions. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 5: M&A announcement and vesting equity

	(1)	(2)	(3)
	Probit	**LPM**	
Dependent Variables		MA_q	
$VESTING_q$	**10.029*****	**3.426*****	**1.478****
	(2.238)	(0.751)	(0.659)
	[2.244***]		
$UNVESTED_{q-1}$	4.303***	1.872***	0.585*
	(0.996)	(0.334)	(0.301)
$VESTED_{q-1}$	0.095*	0.041**	0.044*
	(0.056)	(0.019)	(0.026)
$SALARY_{q-1}$	-0.042	-0.005	0.020
	(0.041)	(0.011)	(0.013)
$BONUS_{q-1}$	0.053***	0.015***	0.003
	(0.018)	(0.006)	(0.005)
AGE_{q-1}	-0.919***	-0.178***	-0.036
	(0.134)	(0.029)	(0.052)
$TENURE_{q-1}$	0.344**	0.053	-0.057
	(0.150)	(0.033)	(0.055)
$NEWCEO_q$	-0.114***	-0.021***	-0.013*
	(0.032)	(0.007)	(0.007)
$MKLEV_{q-1}$	-0.566***	-0.118***	-0.264***
	(0.045)	(0.009)	(0.016)
$SALES_{q-1}$	0.151***	0.032***	-0.001
	(0.008)	(0.002)	(0.003)
MB_{q-1}	-0.022***	-0.003**	0.004**
	(0.007)	(0.001)	(0.002)
ROA_{q-1}	1.379***	0.103**	0.217***
	(0.237)	(0.044)	(0.047)
RET_{q-1}	0.106***	0.020***	0.024***
	(0.025)	(0.005)	(0.005)
$MALIQ_{q-1}$	2.246***	0.517***	0.042
	(0.312)	(0.074)	(0.076)
$HERFINDAHL_{q-1}$	0.505**	0.132**	-0.054
	(0.237)	(0.058)	(0.106)
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.069	0.059	0.159

This table presents the regression results on the relation between the likelihood of M&A announcement and the CEO's vesting equity. Variable definitions are in Appendix A. Column (1) estimates a probit model and columns (2)-(3) estimate an LPM. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. In column (1), the marginal effect for *VESTING* is displayed below the standard errors. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 6: Stock returns surrounding M&A announcement and vesting equity

Panel A: BHAR over market portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
VESTING$_q$	**2.056****	**-2.222****	**-1.033**	**-2.047****	**-1.727****
	(0.851)	(0.879)	(1.041)	(0.924)	(0.842)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,202	12,203	12,167	12,117	11,662
Adjusted R^2	0.178	0.211	0.217	0.254	0.250

Panel B: BHAR over industry portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over Fama-French 49 industry portfolio return*				
VESTING$_q$	**1.744****	**-1.410***	**-1.670***	**-2.015****	**-1.516***
	(0.780)	(0.827)	(0.971)	(0.904)	(0.804)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,102	12,104	12,068	12,018	11,565
Adjusted R^2	0.165	0.195	0.205	0.244	0.243

Panel C: BHAR over characteristic-based portfolio

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over DGTW characteristic-based portfolio return*				
VESTING$_q$	**1.773***	**-1.610***	**-0.157**	**-0.666**	**-1.734****
	(0.923)	(0.945)	(1.137)	(1.021)	(0.858)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	10,192	10,188	10,166	10,125	9,738
Adjusted R^2	0.169	0.217	0.238	0.229	0.234

This table presents the OLS regression results on the relation between BHAR over the period from one quarter prior to the M&A announcement date to four years after the announcement date and the CEO's vesting equity. BHAR is calculated over the value-weighted market index in Panel A, the Fama-French industry portfolio in Panel B, and the DGTW benchmark portfolio in Panel C. Variable definitions are in Appendix A. *VESTING* is in billions. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 7: M&A impairment loss and vesting equity

	(1)	(2)	(3)
	[q+1, q+8]	*[q+1, q+12]*	*[q+1, q+16]*
Dependent Variables		*IMPAIREDMA%*	
$VESTING_q$	**0.846***	**2.379****	**2.842***
	(0.497)	(1.081)	(1.538)
$UNVESTED_{q-1}$	-0.234	-0.648	-0.938
	(0.311)	(0.614)	(0.919)
$VESTED_{q-1}$	-0.028	-0.022	-0.007
	(0.033)	(0.066)	(0.092)
$SALARY_{q-1}$	0.006	-0.014	-0.020
	(0.032)	(0.081)	(0.105)
$BONUS_{q-1}$	0.002	0.001	0.012
	(0.007)	(0.012)	(0.016)
AGE_{q-1}	0.055	0.339	0.518
	(0.161)	(0.334)	(0.447)
$TENURE_{q-1}$	0.014	0.045	0.127
	(0.192)	(0.357)	(0.450)
$NEWCEO_q$	0.011	0.015	0.011
	(0.015)	(0.035)	(0.047)
$MKLEV_{q-1}$	-0.077	-0.231**	-0.261**
	(0.053)	(0.103)	(0.128)
$SALES_{q-1}$	0.036**	0.082***	0.123***
	(0.014)	(0.027)	(0.033)
MB_{q-1}	-0.012***	-0.023**	-0.031**
	(0.004)	(0.009)	(0.012)
ROA_{q-1}	-0.437***	-0.734**	-1.029**
	(0.168)	(0.313)	(0.427)
RET_{q-1}	-0.015	-0.034	-0.016
	(0.012)	(0.024)	(0.034)
$MALIQ_{q-1}$	0.106	0.424	0.473
	(0.150)	(0.322)	(0.444)
$HERFINDAHL_{q-1}$	0.002	0.016	-0.069
	(0.173)	(0.326)	(0.424)
Year-Qtr FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	7,200	7,200	7,200
Adjusted R^2	0.420	0.460	0.457

This table presents the OLS regression results on the relation between the extent of M&A impairment loss and the CEO's vesting equity. Variable definitions are in Appendix A. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 8: Equity sales surrounding repurchase and M&A announcement

Panel A: Equity sales post- vs. pre- repurchase announcement in vesting quarters

	(1)	(2)	(3)	(4)	(5)
Number of trading days post/pre an event	x=2	x=5	x=10	x=15	x=20
(a) *EQUITYSOLD%* over (0, +x]	0.011%	0.056%	0.158%	0.261 %	0.389%
(b) Benchmark *EQUITYSOLD%* over [-x, 0)	0.005%	0.021%	0.063%	0.132%	0.210%
t-stat of testing (a) = (b)	**6.61*****	**8.97*****	**8.45*****	**7.02*****	**6.32*****

Panel B: Equity sales post- vs. pre- M&A announcement in vesting quarters

	(1)	(2)	(3)	(4)	(5)
Number of trading days post/pre an event	x=2	x=5	x=10	x=15	x=20
(a) *EQUITYSOLD%* over (0, +x]	0.005%	0.026%	0.079%	0.151%	0.256%
(b) Benchmark *EQUITYSOLD%* over [-x, 0)	0.003%	0.015%	0.051%	0.110%	0.189%
t-stat of testing (a) = (b)	**8.04*****	**13.06*****	**11.61*****	**9.10*****	**8.50*****

Panel A reports (a) *EQUITYSOLD%*, the value of equity sold as a percentage of market capitalization 90 days before the repurchase announcement over window (0, x], with day 0 being the repurchase announcement date, and x being the 2nd, 5th, 10th, 15th, 20th trading days post the event, and how it compares to (2) a benchmark percentage calculated over [-x, 0). Variable definitions are in Appendix A. The last row reports the t-statistics of testing whether *EQUITYSOLD%* equals the corresponding benchmark. Panel B repeats the analysis with the event day 0 being the M&A announcement date. We limit the sample to vesting quarters with at least one repurchase announcement date for Panel A, and vesting quarters with at least one M&A announcement date for Panel B.

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Table OA1: Stock returns surrounding repurchase and vesting equity for high vesting firms

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Variables	*Demeaned BHAR over DGTW characteristic-based portfolio return*				
Top quintile vesting ranked	**0.17%**	**-2.36%*****	**-2.57%*****	**-1.35%*****	**-0.39%**
within the firm	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)
Top quintile vesting ranked	**-0.31%**	**-1.05%*****	**-1.37%*****	**-0.69%****	**-0.45%**
within the quarter	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Top quintile vesting ranked	**-0.14%**	**-0.84%*****	**-1.22%*****	**-0.45%**	**-0.50%**
across all firm-quarters	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)

This table presents the returns to a portfolio of firms that have VESTING in the top quintile in a quarter in which a share repurchase occurred. Quintile cutoff is defined either time-serially within the firm across all quarters, cross-sectionally for all firms in that quarter, or across-all firm-quarters. Return is the raw BHAR above the DGTW benchmark portfolio, de-meaned at the firm level. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA2: M&A announcement and vesting equity, controlling for investment

	(1)	(2)	(3)
	Probit	**LPM**	
Dependent Variables		MA_q	
$VESTING_q$	**10.028*****	**3.416*****	**1.480****
	(2.228)	(0.749)	(0.659)
	[2.238***]		
$UNVESTED_{q-1}$	4.130***	1.837***	0.583*
	(0.978)	(0.329)	(0.302)
$VESTED_{q-1}$	0.102*	0.044**	0.043
	(0.054)	(0.019)	(0.026)
$SALARY_{q-1}$	-0.050	-0.007	0.020
	(0.041)	(0.011)	(0.013)
$BONUS_{q-1}$	0.057***	0.016***	0.003
	(0.018)	(0.006)	(0.005)
AGE_{q-1}	-0.934***	-0.180***	-0.035
	(0.133)	(0.029)	(0.052)
$TENURE_{q-1}$	0.336**	0.051	-0.057
	(0.149)	(0.033)	(0.055)
$NEWCEO_q$	-0.118***	-0.022***	-0.013*
	(0.032)	(0.007)	(0.007)
$MKLEV_{q-1}$	-0.584***	-0.121***	-0.260***
	(0.046)	(0.009)	(0.016)
$SALES_{q-1}$	0.152***	0.032***	-0.001
	(0.008)	(0.002)	(0.003)
MB_{q-1}	-0.008	-0.000	0.004**
	(0.008)	(0.002)	(0.002)
ROA_{q-1}	1.339***	0.106**	0.206***
	(0.261)	(0.048)	(0.049)
RET_{q-1}	0.111***	0.021***	0.024***
	(0.026)	(0.005)	(0.005)
$MALIQ_{q-1}$	2.036***	0.457***	0.043
	(0.312)	(0.074)	(0.076)
$HERFINDAHL_{q-1}$	0.304	0.093	-0.054
	(0.237)	(0.058)	(0.106)
$R\&D_q$	-1.353***	-0.152*	-0.078
	(0.487)	(0.084)	(0.112)
$CAPX_q$	-3.918***	-0.891***	0.275**
	(0.588)	(0.116)	(0.129)
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.070	0.060	0.159

This table presents the regression results on the relation between the likelihood of M&A announcement and the CEO's vesting equity, controlling for contemporaneous investment. Variable definitions are in Appendix A. Column (1) estimates a probit model and columns (2)-(3) estimate a linear probability model (LPM). *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. In column (1), the marginal effect for *VESTING* is displayed below the standard errors. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA3: Repurchase announcement and vesting equity

	(1)	(2)	(3)
	Probit	**LPM**	
Dependent Variables		$REPANN_q$	
$VESTING_q$	**16.353*****	**2.181*****	**1.625*****
	(3.012)	(0.449)	(0.466)
	[1.342***]		
$UNVESTED_{q-1}$	3.037***	0.380***	0.175
	(0.994)	(0.124)	(0.149)
$VESTED_{q-1}$	-0.098*	-0.009*	-0.000
	(0.055)	(0.005)	(0.011)
$SALARY_{q-1}$	0.098**	0.011***	0.010*
	(0.040)	(0.004)	(0.006)
$BONUS_{q-1}$	0.006	0.001	0.004
	(0.020)	(0.002)	(0.003)
AGE_{q-1}	-0.439***	-0.033***	-0.056**
	(0.152)	(0.013)	(0.027)
$TENURE_{q-1}$	0.168	0.009	0.013
	(0.165)	(0.014)	(0.028)
$NEWCEO_q$	0.035	0.004	0.002
	(0.041)	(0.004)	(0.004)
$SALES_{q-1}$	0.028***	0.002***	0.005***
	(0.009)	(0.001)	(0.002)
MB_{q-1}	-0.052***	-0.002***	-0.004***
	(0.009)	(0.001)	(0.001)
$BKLEV_{q-1}$	-0.578***	-0.044***	-0.064***
	(0.058)	(0.004)	(0.009)
ROA_{q-1}	3.662***	0.179***	0.055**
	(0.289)	(0.018)	(0.027)
$NROA_{q-1}$	0.339	-0.015	0.122
	(1.504)	(0.100)	(0.097)
RET_{q-1}	-0.090**	-0.006**	-0.007**
	(0.038)	(0.003)	(0.003)
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.035	0.011	0.046

This table presents the regression results on the relation between the likelihood of repurchase announcement and the CEO's vesting equity. Variable definitions are in Appendix A and Table OA13. Column (1) estimates a probit model and columns (2)-(3) estimate an LPM. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. In column (1), the marginal effect for *VESTING* is displayed below the standard errors. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA4: Number and size of M&A and vesting equity

	(1)	(2)	(3)	(4)
Dependent Variables	$MANUM_q$		$MASUM_q$	
$VESTING_q$	**4.173*****	**2.678****	**0.291*****	**0.153***
	(1.488)	(1.161)	(0.084)	(0.087)
$UNVESTED_{q-1}$	3.463***	1.788*	0.045	0.033
	(0.809)	(0.964)	(0.028)	(0.038)
$VESTED_{q-1}$	0.146**	-0.099	-0.002	-0.010**
	(0.064)	(0.208)	(0.001)	(0.005)
$SALARY_{q-1}$	-0.055	0.038	-0.001	0.001
	(0.039)	(0.029)	(0.001)	(0.002)
$BONUS_{q-1}$	0.032**	0.024**	0.001**	-0.001
	(0.013)	(0.012)	(0.000)	(0.001)
AGE_{q-1}	-0.221***	0.031	-0.013***	0.004
	(0.062)	(0.146)	(0.003)	(0.008)
$TENURE_{q-1}$	0.179*	0.027	-0.003	-0.008
	(0.108)	(0.147)	(0.003)	(0.008)
$NEWCEO_q$	-0.022	-0.008	-0.002**	-0.001
	(0.013)	(0.011)	(0.001)	(0.001)
$MKLEV_{q-1}$	-0.155***	-0.354***	-0.005***	-0.037***
	(0.024)	(0.029)	(0.001)	(0.002)
$SALES_{q-1}$	0.062***	0.002	0.001***	-0.004***
	(0.007)	(0.007)	(0.000)	(0.001)
MB_{q-1}	-0.003	0.010***	-0.001***	-0.001**
	(0.003)	(0.003)	(0.000)	(0.000)
ROA_{q-1}	-0.174	0.305***	0.022***	0.042***
	(0.113)	(0.075)	(0.005)	(0.008)
RET_{q-1}	0.034***	0.041***	0.008***	0.008***
	(0.008)	(0.008)	(0.001)	(0.001)
$MALIQ_{q-1}$	0.895***	-0.048	0.021***	0.013
	(0.168)	(0.119)	(0.007)	(0.011)
$HERFINDAHL_{q-1}$	0.251*	-0.377*	0.003	-0.008
	(0.129)	(0.227)	(0.005)	(0.015)
Year-Qtr FE	Yes	Yes	Yes	Yes
Firm FE		Yes		Yes
Observations	94,362	94,362	89,680	89,680
Adjusted R^2	0.057	0.292	0.009	0.045

This table presents the ordinary least squares (OLS) regression results on the relation between the number of M&A announcements (as well as the total size of the M&A deals announced) and the CEO's vesting equity. Variable definitions are in Appendix A and Table OA13. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA5: M&A analyses restricting to the deals that are subsequently completed

Panel A: M&A announcement and vesting equity

	(1)	(2)	(3)
	Probit	**LPM**	
Dependent Variables		MA_q	
$VESTING_q$	**5.958****	**1.722****	**0.248**
	(2.435)	(0.694)	(0.579)
	[1.036]		
Controls	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.066	0.046	0.165

Panel B: Stock returns surrounding M&A announcement and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING_q$	**2.143****	**-2.242***	**-2.773****	**-2.402****	**-2.290****
	(0.991)	(1.167)	(1.288)	(1.084)	(1.082)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	8,819	8,821	8,796	8,763	8,457
Adjusted R^2	0.193	0.227	0.237	0.304	0.273

Panel A presents the regression results on the relation between the likelihood of M&A announcement and the CEO's vesting equity, and Panel B presents the regression results on the relation between BHAR over the period from one quarter prior to the M&A announcement date to four years after the announcement date and the CEO's vesting equity. Both include only the announcements for the M&A that is subsequently completed within our sample period. Variable definitions are in Appendix A. Column (1) of Panel A estimates a probit model and columns (2)-(3) of Panel A estimate an LPM. All three columns of Panel B estimate an OLS model. *VESTING* is in billions. BHAR is calculated over the value-weighted market index. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA6: Stock returns surrounding repurchase (and M&A) and vesting equity using long-term CAR

Panel A: Long-term CAR surrounding repurchases and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*CAR over value-weighted market index return*				
VESTING$_q$	**0.915****	**-2.549*****	**-1.674*****	**-0.433**	**-0.360**
	(0.398)	(0.502)	(0.489)	(0.439)	(0.436)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,535	28,479	28,360	27,171	23,458
Adjusted R^2	0.095	0.227	0.254	0.254	0.252

Panel B: Long-term CAR surrounding M&A and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*CAR over value-weighted market index return*				
VESTING$_q$	**1.908****	**-1.995****	**-0.722**	**-1.506****	**-1.330***
	(0.743)	(0.836)	(0.816)	(0.764)	(0.745)
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,202	12,203	12,167	12,117	11,662
Adjusted R^2	0.189	0.249	0.259	0.268	0.262

Panel A presents the OLS regression results on the relation between long-term cumulative market-adjusted abnormal return (CAR) over the period from one quarter prior to the quarter in which a share repurchase occurred to four years after the repurchase quarter and the CEO's vesting equity. Panel B presents the OLS regression results on the relation between long-term CAR over the period from one quarter prior to the M&A announcement date to four years after the announcement date and the CEO's vesting equity. CAR is calculated over the value-weighted market index in both panels. Variable definitions are in Appendix A and Table OA13. *VESTING* is in billions. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA7: Repurchase and M&A analyses replacing *VESTING* with *VESTING_ATM*

Panel A: Repurchase and vesting equity

	(1)	(2)	(3)	(4)	(5)
	Probit	**LPM**		**OLS**	
Dependent Variables		REP_q		$REP\%_q$	
$VESTING\_ATM_q$	**14.011*****	**4.983*****	**2.982*****	**13.310*****	**7.206*****
	(2.952)	(0.966)	(0.576)	(1.953)	(1.600)
Controls	Yes	Yes	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		Yes
Observations	93,537	93,537	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.113	0.137	0.507	0.063	0.254

Panel B: Stock returns surrounding repurchases and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_ATM_q$	**0.930****	**-3.426*****	**-2.342*****	**-0.427**	**-0.481**
	(0.466)	(0.602)	(0.642)	(0.609)	(0.521)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,535	28,479	28,360	27,171	23,458
Adjusted R^2	0.088	0.201	0.218	0.241	0.237

Panel C: M&A announcement and vesting equity

	(1)	(2)	(3)
	Probit		**LPM**
Dependent Variables		MA_q	
$VESTING\_ATM_q$	**11.202*****	**3.796*****	**1.583****
	(2.470)	(0.826)	(0.727)
Controls	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.069	0.059	0.159

Panel D: Stock returns surrounding M&A announcement and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_ATM_q$	**2.010****	**-2.164****	**-1.089**	**-2.276****	**-1.711***
	(0.934)	(0.980)	(1.148)	(1.022)	(0.936)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,202	12,203	12,167	12,117	11,662
Adjusted R^2	0.177	0.211	0.217	0.254	0.250

Panel A (C) presents the regression results on the relation between share repurchases (M&A announcements) and the CEO's vesting equity. Panel B (D) presents the regression results on the relation between BHAR over the period from one quarter prior to the quarter in which a share repurchase occurred to four years after the repurchase quarter (from one quarter prior to the M&A announcement date to four years after the announcement date) and the CEO's vesting equity. Variable definitions are in Appendix A and Table OA13. All are estimated using an OLS model unless otherwise specified. *VESTING* is in billions. BHAR is calculated over the value-weighted market index. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA8: Repurchase and M&A analyses replacing *VESTING* with *VESTING_TB*

Panel A: Repurchase and vesting equity

	(1)	(2)	(3)	(4)	(5)
	Probit	**LPM**		**OLS**	
Dependent Variables		REP_q		$REP\%_q$	
$VESTING\_TB_q$	**26.069*****	**8.961*****	**4.152*****	**15.425*****	**8.039*****
	(3.505)	(1.117)	(0.677)	(2.201)	(1.825)
Controls	Yes	Yes	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		Yes
Observations	93,537	93,537	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.114	0.138	0.507	0.063	0.254

Panel B: Stock returns surrounding repurchases and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_TB_q$	**1.294***	**-4.543*****	**-2.798*****	**-0.504**	**-0.944**
	(0.774)	(0.706)	(0.734)	(0.715)	(0.617)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,535	28,479	28,360	27,171	23,458
Adjusted R^2	0.088	0.201	0.218	0.241	0.237

Panel C: M&A announcement and vesting equity

	(1)	(2)	(3)
	Probit		**LPM**
Dependent Variables		MA_q	
$VESTING\_TB_q$	**10.588*****	**3.429*****	**1.745****
	(2.957)	(0.970)	(0.846)
Controls	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.064	0.058	0.159

Panel D: Stock returns surrounding M&A announcement and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_TB_q$	**2.122***	**-2.834****	**-1.023**	**-1.464**	**-2.918****
	(1.182)	(1.153)	(1.378)	(1.307)	(1.138)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,202	12,203	12,167	12,117	11,662
Adjusted R^2	0.177	0.211	0.217	0.254	0.250

Panel A (C) presents the regression results on the relation between share repurchases (M&A announcements) and the CEO's vesting equity. Panel B (D) presents the regression results on the relation between BHAR over the period from one quarter prior to the quarter in which a share repurchase occurred to four years after the repurchase quarter (from one quarter prior to the M&A announcement date to four years after the announcement date) and the CEO's vesting equity. Variable definitions are in Appendix A and Table OA13. All are estimated using an OLS model unless otherwise specified. *VESTING* is in billions. BHAR is calculated over the value-weighted market index. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA9: Repurchase and M&A analyses replacing *VESTING* with *VESTING_INT*

Panel A: Repurchase and vesting equity

	(1)	(2)	(3)	(4)	(5)
	Probit	**LPM**		**OLS**	
Dependent Variables		REP_q		$REP\%_q$	
$VESTING\_INT_q$	**12.366*****	**4.338*****	**2.709*****	**11.016*****	**6.953*****
	(2.484)	(0.802)	(0.495)	(1.644)	(1.363)
Controls	Yes	Yes	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes	Yes	Yes
Firm FE			Yes		Yes
Observations	93,537	93,537	93,537	93,537	93,537
Pseudo (Adjusted) R^2	0.113	0.138	0.507	0.063	0.254

Panel B: Stock returns surrounding repurchases and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_INT_q$	**0.830****	**-3.046*****	**-2.435*****	**-0.431**	**-0.531**
	(0.390)	(0.515)	(0.551)	(0.541)	(0.467)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	28,535	28,479	28,360	27,171	23,458
Adjusted R^2	0.088	0.201	0.219	0.241	0.237

Panel C: M&A announcement and vesting equity

	(1)	(2)	(3)
	Probit		**LPM**
Dependent Variables		MA_q	
$VESTING\_INT_q$	**8.683*****	**3.007*****	**1.462****
	(2.083)	(0.701)	(0.625)
Controls	Yes	Yes	Yes
Year-Qtr FE	Yes	Yes	Yes
Firm FE			Yes
Observations	94,362	94,362	94,362
Pseudo (Adjusted) R^2	0.069	0.058	0.159

Panel D: Stock returns surrounding M&A announcement and vesting equity

	(1)	(2)	(3)	(4)	(5)
Period	*[q-1, q]*	*[q+1, q+4]*	*[q+5, q+8]*	*[q+9, q+12]*	*[q+13, q+16]*
Dependent Variables	*BHAR over value-weighted market index return*				
$VESTING\_INT_q$	**2.389*****	**-1.966****	**-1.341**	**-2.227*****	**-1.590****
	(0.782)	(0.803)	(0.931)	(0.853)	(0.759)
Year-Qtr & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	12,202	12,203	12,167	12,117	11,662
Adjusted R^2	0.178	0.211	0.217	0.254	0.250

Panel A (C) presents the regression results on the relation between share repurchases (M&A announcements) and the CEO's vesting equity. Panel B (D) presents the regression results on the relation between BHAR over the period from one quarter prior to the quarter in which a share repurchase occurred to four years after the repurchase quarter (from one quarter prior to the M&A announcement date to four years after the announcement date) and the CEO's vesting equity. Variable definitions are in Appendix A and Table OA13. All are estimated using an OLS model unless otherwise specified. *VESTING* is in billions. BHAR is calculated over the value-weighted market index. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA10: M&A announcement returns and vesting equity

	(1)	(2)	(3)
Period	*[-1, +1]*	*[-2, +2]*	*[-3, +3]*
Dependent Variables		CAR_q	
$VESTING_q$	**0.432***	**0.540***	**0.595****
	(0.242)	(0.276)	(0.297)
$UNVESTED_{q-1}$	0.026	0.057	0.093
	(0.094)	(0.102)	(0.110)
$VESTED_{q-1}$	0.000	0.002	-0.005
	(0.007)	(0.009)	(0.010)
$SALARY_{q-1}$	-0.006	-0.000	-0.002
	(0.006)	(0.006)	(0.006)
$BONUS_{q-1}$	0.001	0.002	0.003
	(0.002)	(0.002)	(0.002)
AGE_{q-1}	0.018	0.031	0.032
	(0.029)	(0.036)	(0.040)
$TENURE_{q-1}$	-0.014	-0.006	0.004
	(0.030)	(0.037)	(0.043)
$NEWCEO_q$	-0.002	0.001	-0.000
	(0.004)	(0.005)	(0.005)
MV_{q-1}	0.001	-0.003	-0.003
	(0.003)	(0.004)	(0.004)
MB_{q-1}	0.004**	0.007***	0.010***
	(0.002)	(0.002)	(0.002)
Year-Qtr FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	12,624	12,624	12,624
Adjusted R^2	0.111	0.103	0.107

This table presents the OLS regression results on the relation between M&A announcement return and the CEO's vesting equity. Variable definitions are in Appendix A. *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA11: Repurchases and equity sales: 2SLS analysis

	(1)	(2)	(3)	(4)
	First-stage	**Second-stage**	**First-stage**	**Second-stage**
Dependent Variables	$EQUITYSOLD_q$	REP_q	$EQUITYSOLD_q$	$REP\%_q$
$VESTING_q$	**0.141*****		**0.104*****	
	(0.011)		(0.011)	
$FIT\_EQUITYSOLD_q$		**85.724*****		**64.892*****
		(18.194)		(14.003)
$UNVESTED_{q-1}$	0.035***	9.197***	0.014***	3.080***
	(0.004)	(1.954)	(0.004)	(1.006)
$VESTED_{q-1}$	0.003***	-0.429***	0.003***	-0.205**
	(0.000)	(0.104)	(0.000)	(0.099)
$SALARY_{q-1}$	0.000**	0.355***	0.000***	0.062
	(0.000)	(0.059)	(0.000)	(0.047)
$BONUS_{q-1}$	-0.000	-0.001	-0.000	0.011
	(0.000)	(0.029)	(0.000)	(0.018)
AGE_{q-1}	-0.000	-0.434**	0.001**	-0.472***
	(0.000)	(0.201)	(0.001)	(0.171)
$TENURE_{q-1}$	0.002***	0.233	0.003***	0.081
	(0.000)	(0.234)	(0.001)	(0.171)
$NEWCEO_q$	-0.000**	0.017	0.000	0.009
	(0.000)	(0.034)	(0.000)	(0.019)
$SALES_{q-1}$	0.000***	0.118***	0.000***	0.021**
	(0.000)	(0.012)	(0.000)	(0.010)
MB_{q-1}	0.000***	-0.045***	0.000***	-0.067***
	(0.000)	(0.013)	(0.000)	(0.008)
$BKLEV_{q-1}$	-0.000***	-0.674***	-0.000	-0.428***
	(0.000)	(0.078)	(0.000)	(0.052)
ROA_{q-1}	0.001***	3.895***	0.001	0.288**
	(0.000)	(0.365)	(0.001)	(0.141)
$NROA_{q-1}$	0.002	-1.400	0.005***	0.613
	(0.002)	(1.633)	(0.002)	(0.469)
RET_{q-1}	0.000***	-0.169***	0.000***	-0.086***
	(0.000)	(0.022)	(0.000)	(0.014)
Year-Qtr FE	Yes	Yes	Yes	Yes
Firm FE			Yes	Yes
Observations	93,537	93,537	93,537	93,537
Adjusted R^2	0.160		0.296	0.292

This table presents the two-stage least squares (2SLS) regression results on the relation between share repurchases and the CEO's equity sales, using *VESTING* as an instrument for *EQUITYSOLD*. Repurchase is measured using *REP* in Column (2) and *REP%* in Column (4). Variable definitions are in Appendix A. The first two columns estimate an ivprobit model, with Column (1) presenting the first-stage results and Column (2) presenting the second-stage results, respectively. The last two columns estimate an ivreg model, with Column (3) presenting the first-stage results and Column (4) presenting the second-stage results, respectively. *EQUITYSOLD*, *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA12: M&A announcement and equity sales: 2SLS analysis

	(1)	(2)
	First-stage	**Second-stage**
Dependent Variables	$EQUITYSOLD_q$	MA_q
$VESTING_q$	**0.140*****	
	(0.011)	
$FIT\_EQUITYSOLD_q$		**70.093*****
		(16.035)
$UNVESTED_{q-1}$	0.035***	1.806
	(0.004)	(1.236)
$VESTED_{q-1}$	0.003***	-0.086
	(0.000)	(0.070)
$SALARY_{q-1}$	0.000**	-0.057
	(0.000)	(0.041)
$BONUS_{q-1}$	-0.000	0.052***
	(0.000)	(0.018)
AGE_{q-1}	-0.000	-0.893***
	(0.000)	(0.133)
$TENURE_{q-1}$	0.002***	0.174
	(0.000)	(0.155)
$NEWCEO_q$	-0.000**	-0.106***
	(0.000)	(0.032)
$MKLEV_{q-1}$	-0.000***	-0.538***
	(0.000)	(0.045)
$SALES_{q-1}$	0.000***	0.139***
	(0.000)	(0.009)
MB_{q-1}	0.000***	-0.038***
	(0.000)	(0.008)
ROA_{q-1}	0.001***	1.265***
	(0.000)	(0.232)
RET_{q-1}	0.000***	0.069***
	(0.000)	(0.026)
$MALIQ_{q-1}$	0.001**	2.111***
	(0.001)	(0.310)
$HERFINDAHL_{q-1}$	-0.000	0.513**
	(0.000)	(0.235)
Year-Qtr FE	Yes	Yes
Observations	94,362	94,362
Adjusted R^2	0.160	

This table presents the two-stage least squares (2SLS) regression results on the relation between M&A announcement and the CEO's equity sales, using *VESTING* as an instrument for *EQUITYSOLD*. Variable definitions are in Appendix A. Column (1) presents the first-stage results of an ivprobit model, and Column (2) presents the second-stage results. *EQUITYSOLD*, *VESTING*, *UNVESTED*, *VESTED*, *SALARY*, and *BONUS* are in billions. *AGE* and *TENURE* are in hundreds. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table OA13: Definition of variables used in the Online Appendix

This table describes the calculation of variables used only in this online appendix. The variables used also in the core analysis are described in Appendix A of the paper.

Variable	Definition
$REPANN_q$	An indicator variable that equals one if a firm announced either the establishment of a new share repurchase program or actual repurchase(s) under an existing repurchase program in quarter q as captured by the SDC Platinum, and zero otherwise.
$MANUM_q$	The number of M&A that a firm announced in quarter q, and zero if none was announced.
$MASUM_q$	The sum of deal size for all M&A that a firm announced in quarter q, as a percentage of market capitalization at the end of quarter q-1, and zero if none was announced. We delete a firm-quarter if a firm announces at least one M&A in a quarter but none of the M&A has transaction size recorded in the SDC Platinum.
$CAR_{q-1\ to\ q}$	A firm's cumulative market-adjusted abnormal return over quarter q-1 and q, with quarter q being either the fiscal quarter in which a share repurchase occurred or one-quarter time that follows an M&A announcement (with the first day of the quarter being the M&A announcement date). For repurchase events, it is calculated as the sum of the firm's monthly abnormal returns over the two quarters with the monthly abnormal return being the firm's monthly raw return minus the corresponding return on the CRSP value-weighted index. For M&A events, it is calculated as the sum of the firm's daily abnormal returns over the two quarters with the daily abnormal return being the firm's daily raw return minus the corresponding return on the CRSP value-weighted index. $CAR_{q+1\ to\ q+4}$, $CAR_{q+5\ to\ q+8}$, $CAR_{q+9\ to\ q+12}$, and $CAR_{q+13\ to\ q+16}$ are analogously calculated as a given firm's CAR for quarter $q+1$ to $q+4$, $q+5$ to $q+8$, $q+9$ to $q+12$, and $q+13$ to $q+16$, respectively.
$VESTING\_ATM_q$	Similar to $VESTING_q$, except that all options are assumed to be at the money.
$VESTING\_TB_q$	Similar to $VESTING_q$, except that it includes only post-2006 time-based vesting grants without performance provisions (i.e., we remove post-2006 grants labeled "retirement," "performance-based," "contingent," or "accelerated," and post-2006 grants with unknown vesting schedule).
$VESTING\_INT_q$	Similar to $VESTING_q$, except that options' deltas are replaced with their intrinsic values, i.e., delta is set to one for all in-the-money options and zero for all out-of-the-money options.