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Finance Working Paper N° 486/2016
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Abstract

We analyze how employee compensation contracts of target firms affect merger terms and outcomes. Using unique data from merger agreements, we document that in 80.0% of all M&A deals at least some of the target's ESOs are canceled by the acquirer and not replaced by new equity-based grants. Contract modifications reduce the value of employee stock options by 38.4% in the average M&A deal. Further, the combined merger returns are larger when employees experience greater losses. Overall, our results indicate that the benefits of reducing the number of employee stock options outweigh potential negative effects on firm value.

Keywords: M&As, stock options, incentive compensation

JEL Classifications: M40, G34, J33

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ABSTRACT

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1. Introduction

Employee stock options (ESOs) are an integral component of compensation packages, particularly for firms in the high-tech industry (see, e.g., Core and Guay, 2001; Ittner, Lambert, and Larcker, 2003; Chang et al., 2015).[1] Because of the nature of competition for employee talent and because financing constraints can make it difficult to pay high wages to employees, the small highly innovative firms, that are attractive acquisition targets (Bena and Li, 2014; Hoberg and Phillips, 2010; Phillips and Zhdanov, 2013), have an especially high concentration of ESOs in their compensation plans. In this study, we document how the broad-based option plans of target firms are treated in M&A deals, analyze the financial implications for employees, and determine whether the treatment of ESO compensation in a merger can be a source of takeover gains. Our findings suggest that merger returns increase with ESO cancellations and help to inform the debate on the efficacy of stock option compensation for employees.

Using unique data from merger agreements on 1,277 deals announced over the period of 2006 to 2014, we document that ESO compensation is typically reduced or modified by acquirers in a way that does not benefit employees. Although compensation plans commonly provide for accelerated vesting following change-of-control, we observe that in 80.0% of all completed M&A deals, some of the target's outstanding employee stock options are terminated by the acquirer. While the most common scenario is canceling all out-of-the-money stock options, sometimes even in-the-money stock options are terminated without any payment to employees, and vested and unvested stock options can all be fair game.[2] Further, employees are often forced to accept the intrinsic value (in cash, escrow account, or as an earnout) of their vested in-the-money stock options in lieu of the Black-Scholes value. Finally, even in cases when acquirers assume the target option plans, the Black-Scholes value of options typically drops because the newly converted options are written on the acquirer's stock, which tends to be less volatile than the target's stock. Overall, we estimate that contract modifications in the average M&A deal reduce the value of employee stock options

[1] According to the National Center for Employee Ownership, options were the most common form of individual equity compensation in 2014. For example, the General Social Survey estimates that 7.2 million employees held stock options in 2014. Furthermore, almost 70% of all options are offered to rank-and-file employees rather than firm executives (Core and Guay, 2001).

[2] For example, when Microsoft was buying Skype in 2011, employees were not even able to keep the vested portion of their stock options.

by approximately 38.4%, which is equivalent to 3.1% of the market capitalization of the target firm prior to the merger. In addition, we find no evidence that these options are replaced by new stock option grants or other equity-based compensation after the acquisition.

What is behind the decision to cut option compensation of the target firm's employees? A possible reason is that acquirers are simply attempting to control labor-related costs as the value of ESOs can increase manyfold in the M&A transaction if these contracts are left unchanged. This can be especially important if employees of target firms are entrenched and overpaid because it presents an opportunity for the new owners to reset employee compensation at competitive levels.[3] However, options may sometimes be needed for motivation, attraction, and retention of qualified labor (Core and Guay, 2001; Oyer and Schaefer, 2005; Aldatmaz, Ouimet, and Van Wesep, 2018). Further, employees who have their options canceled may attempt to resist the prospective M&A deal. For example, employees can refuse to sell their stock and vote against the merger, exert pressure on management, or threaten to go on strike (Rauh, 2006; Pagano and Volpin, 2005). Our evidence that most acquirers decide in favor of option cancellation suggests that benefits of cancellation nevertheless outweigh the costs.

If outstanding employee stock options of the target firm can be modified without a significant negative effect on the combined firm profitability, we should expect to see that the realized compensation savings accrue to the shareholders of the acquirer and target firms. Indeed, after we control for deal and firm characteristics, we find that M&A deals in which target firm's employees realize significant losses are associated with better overall deal performance. For example, we find that a one standard deviation increase in employee losses from modified options is associated with an increase of $55.0 million in the total takeover gains.[4] Similarly, the combined deal return, calculated as the ratio of the total takeover gains to the combined pre-takeover firm size, also increases with employee option losses. Specifically, the combined deal return is 3.3% on average in deals in the bottom quintile by employee losses from modified options, whereas it is over 8.7% in deals in the top quintile by employee losses.

[3] Theoretical papers show how employee entrenchment can arise under the optimal contract (Harris and Holmstrom, 1982; Berk, Stanton, and Zechner, 2010). Although such contracts are optimal ex ante, they can become suboptimal ex post and create an opportunity for the acquirer to reduce excess compensation.

[4] Using the econometric test by Oster (2019), we find that selection on unobservables has to be implausibly large to explain away the positive relation between employee losses and the takeover gains.

We then analyze how the combined gains from employee stock option modifications are shared by the acquirer and the target. Our results indicate that a significant part of compensation savings from ESO contract modifications accrues to the shareholders of the target firm in the form of higher takeover premium. For example, a one standard deviation increase in losses to employees is associated with an approximately 3.3% higher takeover premium. Additional tests show that our results are unlikely to be driven by omitted variables or outstanding options and resulting employee losses proxying for some unobservable characteristics of the target firm. For example, our results are robust to the estimation with geography-based instrument for losses from stock options used in the compensation literature (Hochberg and Lindsey, 2010; Chang et al., 2015). We also find that some benefits from ESO contract modifications accumulate to the shareholders of the acquiring firm, but the relation between employee losses and the acquirer's CARs is statistically weaker and less monotonic than the relation between employee losses and the offer premium. Nevertheless, the average three-day announcement cumulative abnormal return (CAR) of the acquirer is -1.7% for deals in the bottom quintile of the distribution of employee losses, whereas it is positive 1.9% for deals in the top quintile of the same distribution.

What is the potential channel for shareholder value creation? To answer this question, we use individual employee data from the survey by Kruse, Freeman, and Blasi (2010) and link the individual's propensity to vote in favor of a merger to employee compensation structure and entrenchment. In the survey, employees were asked whether they would vote to sell their company if an outsider offered to buy it for 50% more than the current market value. We find that the negative attitude towards a merger was more pronounced among employees who held many unvested and newly granted stock options. Further, individuals who classified themselves as overpaid had a more negative attitude towards the merger and were more worried about their stock options, particularly if these options were unvested. Overall, the survey results provide support for the employee entrenchment theory by Berk, Stanton, and Zechner (2010), whereby M&As provide an opportunity for an outsider to abrogate inefficient compensation contracts, thereby creating gains to the shareholders.

Our study contributes to the literature on the effect of mergers and acquisitions on employee

labor contracts. Shleifer and Summers (1988) were among the first to argue that *hostile* takeovers breach implicit contracts between managers and employees, and early literature found evidence consistent with their argument (Rosett, 1990; Lichtenberg and Siegel, 1990; Pontiff, Shleifer, and Weisbach, 1990). More recent literature that studies *friendly* M&A deals, finds mixed results on the effect of mergers and acquisitions on employee wages (Li, 2013; Ma, Ouimet, and Simintzi, 2017). Also related to our work are recent studies that analyze how labor protection laws affect the takeover activity and gains to shareholders in M&As (John, Knyazeva, and Knyazeva, 2015; Dessaint, Golubov, and Volpin, 2017). We contribute to this literature by documenting how the ESO compensation is changed in M&As and by showing that it can be a source of takeover gains. A unique aspect of ESOs relative to other types of compensation is that, by contractual design, they are flexible and can be easily modified in a merger.

We do not focus on the compensation contracts for CEOs. Several previous studies conclude that top executives often receive special treatment in M&A deals. For example, Bliss and Rosen (2001) find that CEO compensation increases following bank mergers, whereas Hartzell, Ofek, and Yermack (2004), Heitzman (2011), and Fich, Cai, and Tran (2011) document that target firms' CEOs often negotiate large special bonuses, golden parachutes, and unscheduled stock option grants in M&A deals. As for CEOs of acquiring firms, Grinstein and Hribar (2004) document that they too receive lucrative compensation packages for completing M&A deals, and such packages appear to be unrelated to deal performance or managerial effort.

Our findings that acquirers frequently cancel ESOs and do not reinstate the incentives after the merger, coupled with the fact that the market reacts positively to ESO cancellations, contribute to the long-standing debate on the efficacy of option compensation. For example, Core and Guay (2001) find evidence consistent with firms using options to attract and retain employees as well as to provide incentives, whereas Oyer and Schaefer (2005) reject the incentive-based explanation. Choudhary, Rajgopal, and Venkatachalam (2009) document a negative market reaction at vesting acceleration of ESOs in anticipation of FAS 123R, which suggests that removing long-term incentives is costly. Our results suggest that at least in some firms, acquirers are able to significantly reduce option compensation without realizing immediate negative consequences for their shareholders.

The remainder of this paper is organized as follows. The next section provides institutional details relevant to ESOs and develops the empirical hypotheses. Section 3 discusses our data sources and sample selection. Section 4 summarizes how target firm's employee stock options are treated in the M&A deals, evaluates the implications of such treatment for employees, and discusses employee survey results. Section 5 examines the relation between employee losses from modified stock options and the total takeover gains, whereas Section 6 presents the results separately for the offer price premium and the acquirer's cumulative abnormal returns. The last section concludes.

2. Background

2.1 Institutional Details

How the employee stock options of a target firm are treated in the event of a change in control is generally determined by two legal documents: a company's compensation plan that outlines the terms and conditions governing ESOs and a merger agreement signed by the target firm and the acquirer. Typically, a compensation plan specifies the *possible ways and circumstances* in which ESOs can be adjusted, as well as whether the board of directors has discretion to amend the terms of the plan. In contrast, the merger agreement provides information on how ESOs of the target firm are actually treated in a given M&A deal. Our formal analysis relies on data from merger agreements. Here we briefly describe what provisions are contained in compensation plans.

Most compensation plans allow for a range of possible ESO treatments in connection with mergers and acquisitions, with the exception of the vesting acceleration rules, which are often precisely defined. In Appendix A, we provide the summary statistics for possible ESO treatment as outlined in company compensation plans; we give examples of legal language in Appendix C. To understand what restrictions on treatment of options are specified in the compensation plans, we collect information on the compensation plans that cover the last year of our sample. In particular, we obtain information on 105 most recently adopted compensation plans from the SEC filings (8-K, 10-K, 10-Q, and proxy statements) for the M&A deals from our sample that were announced between January 1, 2014 and December 31, 2014. In each compensation plan, we search for the keywords *control*, *merger*, *event*, and *corporate transaction*.[5]

[5]We do not collect the information on compensation plans for the full sample of firms because companies typically

Approximately 67.6% of the compensation plans specify that vesting will be accelerated after the change in control. More than 35.2% mention that "vesting may be accelerated," and only 11.4% of plans do not mention vesting in relation to a change in control.[6] When vesting treatment is specified, vesting is either automatically accelerated ("single trigger," 26.7%), accelerated conditional on the termination of employment ("double trigger," 21.9%), or accelerated if options are not assumed by the bidder (31.4%). We further observe that the boards of directors prefer to preserve the maximum flexibility in compensation plans, perhaps because they do not want to miss out on potentially valuable takeover offers. In particular, 61.9% of company stock option plans give the board of directors discretion to adjust awards under the plan, replace them with other instruments, allow for cancellations, or allow the exchange of options for a payment equal to the difference between the exercise price of the option and the price per share. Nevertheless, even if the acquirer chooses one of the explicitly allowed ESO modifications as outlined in the compensation plan, it still could be successfully sued for damages by the target firm's employees.[7] Another 36.2% of plans do not specify how ESOs should be treated by the acquirer. We were able to find only two instances of plans that required a specific ESO treatment–one plan required that all outstanding options be cashed out for their intrinsic value and the other one required to assume all options.

2.2 Effects of ESOs on Merger Terms and Outcomes

There are several channels through which previously granted employee stock options can affect the terms of the offer and the outcomes of the M&A deal for target firm employees and the shareholders of the acquirer and the target.

have multiple outstanding compensation plans, the information on older plans is rarely available, and it is difficult to estimate what fraction of options is covered by a particular plan.

[6]Note that some categories in Table A1 are not mutually exclusive, so the percentages may sum to more than 100%. For example, the compensation plan may specify that vesting will be accelerated if options are not assumed or if employees are fired shortly after the merger.

[7]One such case was AT&T's acquisition of MediaOne Group in 2000. MediaOne had an option plan that allowed for canceling all out-of-the-money stock options, but it also contained an "anti-destruction" provision that required options to be appropriately adjusted in M&A transactions so as not to decrease option holders' economic positions. At the time of the acquisition, AT&T asked to cancel all underwater options and cash out others, but MediaOne refused and demanded that all options be converted into AT&T options. Even though the acquisition ultimately went through after many rounds of negotiations, the question whether the acquiring firm could legally cash out the target employees' stock options despite the existence of an "anti-destruction" provision in the option plan was not answered until a 2007 decision by the Delaware Court of Chancery. The Court stated that the ability to cancel out-of-the-money employee stock options without consideration depends entirely on the provisions of the governing stock option plan, and that less-than-clear language in such plans will not be interpreted against the interests of option holders.

First, employee stock options can present a significant cost to the shareholders of the acquirer. The assumption of outstanding ESOs of the target dilutes shareholder value and creates an administrative burden. The costs are higher with stock options than with other types of compensation plans (e.g., 401(k) plans, ESOPs, or restricted stock) because options represent levered claims on a stock that increase in value exponentially with the price. The assumption of target compensation plans may also present integration issues if the terms or depth of target employee stock options are inconsistent with the acquirer's compensation culture. Further, the acquirers are often reluctant to assume employee stock options because of the concern that this will create the incentive for a target firm to make new extraordinary large grants immediately before a merger. Forcing a cash-out of employee stock options may also require substantial cash resources, create discord among employees (e.g., low productivity, high employee turnover and absenteeism, negative effects on morale and teamwork), and increase the probability of lawsuits brought by the target's employees. Further, it may send a potentially negative signal about the acquirer's tendency to treat its employees and therefore hinder the ability to hire new employees. If these costs are indeed significant, we would expect a negative relation between ESOs of the target firm and the takeover premium paid by the bidder, as well as between ESOs and the acquirer announcement return.

Second, to the extent that stock options of the target firm are not essential for motivation or retention of workers in the new company, the acquirer can cancel or modify ESOs in a way that significantly reduces their value. Therefore, options can present an opportunity to improve the overall efficiency of compensation structure by eliminating excess pay and to transfer wealth from the target firm employees to shareholders. For example, in option plans that do not explicitly contain an "anti-destruction" provision, the acquirer can cancel all out-of-the-money options without providing any payment to employees. In some cases, particularly when option plans do not contain the "change-of-control" provisions that accelerate vesting, unvested in-the-money stock options can also be canceled. The acquirer typically cannot completely take away vested in-the-money stock options as employees can choose to exercise them before the merger close. However, even in these cases, the acquirer can significantly shorten the maturity of options or force employees to accept the intrinsic option value instead of the Black-Scholes value. Further, forcing an early cash-out

of options typically allows the target firm to take a tax deduction for this compensation expense, making it more valuable for the acquirer.[8] Overall, we expect that the possibility of canceling some of the outstanding options makes an acquisition more attractive, increases the willingness of the bidder to pay more for the target, and may increase the bidder's announcement return.

Third, given that the value of employee compensation contracts is at stake, it is natural for employees to view the merger unfavorably and to resist it. For example, by exercising some of their stock options, employees can acquire shares in the target firm and refuse to sell them to the bidder. Pagano and Volpin (2005) argue that employees can also lobby against a merger and take political actions to oppose the deal. Further, employees can try to dissuade the management from accepting a deal. In cases in which the bidder's main objective is to acquire valuable human capital (so-called "acqui-hire" mergers), employees could also threaten to quit if their compensation value is not preserved (see, e.g., Ouimet and Zarutskie (2016)). Importantly, the magnitude of wealth transfers between employees and shareholders is directly related to the offer premium, as options move deeper in-the-money with a higher takeover premium. Thus we expect employee resistance to the deal to subside when a higher premium is paid. As a consequence, deals in which the target firm has many outstanding stock options may also require a higher premium to close.

The relation between options and merger negotiations can become more complicated if options are issued to employees for strategic reasons in anticipation of a future merger. Theory predicts that in many situations managers and employees are natural allies against takeovers (Garvey and Gaston, 1997; Pagano and Volpin, 2005). It is therefore conceivable that a manager anticipating a future takeover attempt could preemptively put the stock in friendly hands by granting more stock options to the firm's employees. Previous literature suggests that firms may adopt ESOPs and increase employee ownership in 401(k) plans as a takeover defense (Gordon and Pound, 1990; Beatty, 1995; Rauh, 2006). However, it is not clear whether options are as effective at preventing takeovers as ESOPs and 401(k) plans. On one hand, options may grow more quickly in value,

[8] As a general rule, the deduction arising from the employee compensation is received by a taxpayer who is using the employee's services, which is the target company. Specifically, as explained in IRS AM2012-010, deductions arising from the cash-out of nonqualified employee stock options are governed by the "end-of-the-day rule" in Treas. Reg. section 1.1502-76(b)(1)(ii)(A)(1) and must be properly reported on target's tax return for the short taxable year ending on the acquisition date. Finally, the extent to which the acquirer may benefit from the deductions reported by the target is limited by Sections 382 and 280G of the IRC.

making them more effective as a poison pill. On the other hand, the acquirer may significantly curb this cost by canceling the stock options. Furthermore, if employees do not exercise their options, they have no voting power on a stock and cannot influence the outcome of the takeover attempt by voting.

In the next section we describe the main data sources used in our study.

3. Data Description and Summary Statistics

3.1 Acquisition Sample

The initial sample of mergers and acquisitions comes from the Thomson Financial SDC Platinum database and includes all M&A deals announced between January 1, 2006 and December 31, 2014. We require the target to be a publicly listed company in the United States and exclude spin-offs, self-tenders, exchange offers, repurchases, recapitalizations, acquisitions of assets, remaining interest or partial interest, and transactions for which the deal value is not available. Our choice of the starting date is motivated by the availability of stock option data in Compustat. In December 2004, the FASB issued a new rule (FAS 123R) that requires employee stock options to be expensed in accounting statements using the fair value method. This rule became effective for firms' fiscal years beginning June 15, 2005. As a result of the new regulation, firms started to disclose more details on their outstanding options and new grants in financial statements, and these data became recorded in the Compustat database.[9] We further restrict our attention to completed deals with non-missing information on the number of stock options and the offer premium (1,277 deals). We obtain data on the offer price premium and other deal characteristics from the SDC Platinum database. The reported offer premium is calculated as 100 multiplied by the ratio of the initial offer price to the target's stock price four weeks before the merger announcement date minus one.[10]

To obtain the detailed information on the treatment of employee stock options in each deal, we perform a manual search of SEC filings for the sample of 1,277 deals. The data on option treatment are typically contained in merger agreements, tender offer statements, and asset purchase

[9] If instead of January 1, 2006, we choose June 15, 2005, as the starting date, our sample increases by 12 observations and all results are very similar.

[10] Following prior literature, we remove from the sample 17 observations where the offer premium is either below 0% or above 200%.

agreements filed with the SEC as a part of 8-K, 425, DEFA, or DEFM forms. We were unable to find the details on option treatment for 32 deals, which reduced the size of our sample to 1,245 deals. Appendix C provides several examples of text in merger agreements that describes how employee stock options are to be treated.

The data on employee stock options are from Compustat. We calculate the value of outstanding, granted, vested, and unvested stock options using the Black-Scholes formula. Since 2005, firms have been required to disclose their assumptions in the calculation of fair option values, including the assumed dividend yield, risk-free rate, and stock return volatility. Johnston (2006), Aboody, Barth, and Kasznik (2006), and Choudhary (2011) argue that firms have some latitude in determining the inputs for option expense calculation and find that firms tend to manipulate the estimate of the volatility downward, which may reduce their option expense.[11] In contrast, Johnston (2006) finds no manipulation of the risk free rate or the dividend yield estimates. We therefore do not rely on the firms' disclosed information for the estimates of volatility, and for all firms calculate the annual volatility from the daily data on stock returns over the previous fiscal year. We assume the life of outstanding options to be the same as the term of granted options and the life of vested options to be one half of the term of granted options.[12] Stock option values are normalized by the market value of their firm's equity at the most recent fiscal year-end before the acquisition. The value of unvested options is defined as the difference between the value of outstanding stock options and the value of vested options.

Panel A of Table 1 reports the summary statistics on deal characteristics, target firm characteristics, and option variables. The average offer premium is 41.6% over the target's stock price four weeks prior to the deal announcement. Most of the acquisitions (87.7%) are at least partially financed with cash, and we classify 67.2% of the deals as diversifying—i.e., deals in which the acquirer and the target belong to different industries as defined by their four-digit Standard Industrial Classification (SIC) codes. In our sample, 58.1% of all deals are done by a tender offer, and in 60.0% of the cases the acquirer is a public firm. The target firms are typically smaller than

[11] Carpenter, Stanton, and Wallace (2010) examine how the option cost to shareholders is affected by volatility and conclude that in general the relation is ambiguous.

[12] If we were to assume that both vested and unvested stock options have the same time-to-maturity, our estimates for employee losses in Table 3 would increase.

their acquirers, with the average ratio of the target firm's book value of assets to the sum of the book values of the target firm's assets and the acquirer's assets equal to 15.8%.

The average target firm employs more than 4,000 people, has assets of $1.2 billion, and has higher R&D expenses than the average firm in Compustat. Target firms also tend to have many employee stock options, with the average ratio of the number of outstanding options to the firm's outstanding shares equal to 9.7%. Outstanding options have substantial Black-Scholes value. Specifically, target firms have outstanding options valued at 4.9% of the firm's market capitalization on average (2.3% unvested options and 2.6% vested). The outstanding options are on average 39.8% in-the-money four weeks prior to the M&A announcement, but the moneyness is highly skewed. For example, the ratio of the number of out-of-the-money stock options to the number of the firm's outstanding shares is 4.2% on average. Naturally, the moneyness of vested options is greater than the moneyness of the unvested options.

We also report in the table the cumulative abnormal return (CAR) of the acquirer over the three-day window centered on the M&A announcement, which is estimated using the market model over one year of daily returns and ending four weeks before the M&A announcement.[13] The average acquirer's stock price reaction to the M&A announcement is slightly negative in our sample.[14] Nevertheless, we find that the combined market value of the acquirer's and the target's stock increases, on average, by $366 million in M&A deals. Correspondingly, the average combined deal return is also positive in our sample and equals 4.6%.

4. Treatment of Employee Stock Options in M&As and Implications for Employees

4.1 Treatment of Employee Stock Options in M&A deals

In Table 2, we summarize the key statistics on treatment of target employee stock options in M&A deals. Because the actual treatment may depend on whether options are exercisable and whether they are in- or out-of-the-money, we present statistics for four separate categories. Most often

[13] Some acquirers in our sample are private firms, and we cannot calculate the CARs for them.

[14] It is well known that bidders may on average experience large dollar losses on the announcement of M&A deals even if the average CAR to the announcement is close to zero (Moeller, Schlingemann, and Stulz, 2005). This is driven by a fact that negative CARs are more likely to be observed for firms with large market capitalizations.

acquirers choose to cash out vested in-the-money options (76.4%), which means that employees are forced to accept the intrinsic value of the options in lieu of their Black-Scholes value. Vested in-the-money options are never canceled, which is not surprising given that employees can freely exercise their options after the announcement but before the consummation of the merger. In 3.0% of the deals, the vested in-the-money options are made to expire upon the merger close, which significantly shortens their time to maturity. Finally, in 17.9% of the deals the acquirer assumes or converts the target's vested in-the-money stock options on *essentially the same terms*.[15]

The treatment of unvested in-the-money options is somewhat similar. They are cashed out in 70.2% of the deals and assumed or converted in 22.1% of the cases. Yet it is possible for the unvested in-the-money stock options to be canceled by the acquirer without any payment to employees; this happens in 45 deals or 3.6% of sample. Further, in some deals unvested in-the-money stock options expire when the merger closes, which in most cases precludes employees from retaining any value.

In contrast to in-the-money options, the out-of-the-money options are very frequently canceled by acquirers. Cancellation takes place in 79.0% of all deals for vested out-of-the-money options and in 76.0% for unvested options. Some acquirers, however, assume or convert out-of-the-money options (18.3% for vested and 21.4% for unvested). Overall, we find that in 80.0% of M&A deals there are cancellations of at least some of the outstanding options.

In Panel B of the table, we compare deal and firm characteristics across deals with option cancellations and without. Options are more likely to get canceled in deals financed with cash, when the target firm is smaller and has more option compensation obligations, and when the acquirer and the target are from different industries. Naturally, there is a higher propensity to cancel ESOs for private acquirers. Finally, we observe that in mergers which result in the cancellation of employee stock options, the target's top five executives hold significantly more shares prior to the merger.[16] We attribute this fact to the greater willingness of the target firm's management to negotiate a higher premium and seal the deal by any means when they hold more shares and stand to benefit

[15] In some of these cases, option vesting is accelerated. We do not focus on the acquirer's choice whether to accelerate vesting because, in many cases, option plans already have a built-in change-of-control provision that automatically accelerates vesting upon the change of control.

[16] The data on top five share ownership come from the Execucomp database and are available for less than one-third of the firms in our sample. We therefore do not include the executive ownership variables in our multivariate tests.

more from the merger.[17]

4.2 Implications of Contract Modifications in M&As for Target Firm Employees

Here we estimate how the value of employee option-based compensation is affected by contract modifications in a merger. There are several effects at play. First, the value of employee compensation may be adversely affected if the acquirers cancel outstanding employee stock options, shorten their maturity, or force employees to accept the intrinsic value. Second, when acquirers assume a target's stock options by converting them to options written on the acquirer's stock, the value of stock options may change because of the differences in volatility of stock returns and dividend yield in target firms and acquirers. Finally, when an acquisition is stock-financed, there is a potential concern that the acquirer's stock is overvalued (Shleifer and Vishny, 2003). For example, Louis (2004) finds that acquiring firms manage earnings upward before the merger announcement, whereas Ahern and Sosyura (2014) document that bidders in stock mergers manipulate media coverage during the period when the stock exchange ratio is determined. We do not, however, take into account the possibility that the acquirer's stock is overvalued, because it is difficult to reliably estimate the degree of such overvaluation. In this sense, the employee losses that we document are underestimated.

In Panel A of Table 3, we present summary statistics on the implications of option contract modifications. We first calculate how much value is lost by employees on their options given the treatment by the acquirer. Note that because we estimate the losses at the actual offer price, our procedure already takes into account that some options move deeper in-the-money with the higher price offered by the acquirer. For few firms that do not have any outstanding employee stock options, we set losses to zero.

We find that because of option cancellations and modifications, employees lose on average 38.4% of value of their outstanding stock options or $15.3 million, which is equivalent to approximately

[17]The positive relation between the executive stock ownership and the probability that ESO compensation is canceled can also be explained based on the theoretical argument by Pagano and Volpin (2005). In their theory, managers with a low equity stake may wish protect themselves against hostile takeovers by transforming employees into a "shark repellent" through long-term labor contracts. In our context, such managers could design the employee option compensation plans in such a way that canceling or modifying them is difficult for the acquirer from a legal perspective.

3.1% of the market capitalization of the target firm prior to the merger.[18] Further, when at least some options are canceled in the deal, employees of a target firm experience a 45.6% reduction in the value of their option compensation. When no options are canceled, the corresponding reduction is 9.4%, most of which is due to converting the old options into the new options with a less volatile underlying stock price. We also find that unvested outstanding stock options contribute more to employee losses than do vested stock options (20.6% vs 15.7%). This is mainly explained by the fact that unvested options are more likely to be canceled (e.g., they are more likely to be out-of-the-money) and have a longer time left to maturity.

Of course, one could argue that the Black-Scholes or any other risk-neutral valuation overestimates the value of stock options to risk-averse and undiversified employees (Hall and Murphy, 2002; Ingersoll, 2006), which also makes us to overestimate the losses to employees from contract modifications. For example, risk-averse employees may find it optimal to exercise options well before their expiration dates (Huddart, 1994).[19] To address this issue, we also provide the estimate for the value loss under the assumption that the original maturity of the outstanding options is twice shorter. Since our goal is to gauge how much value can be transferred from employees to shareholders, we do not need to estimate the certainty equivalent of ESOs to employees, which typically requires, among other things, making assumptions on the utility function of employees, their risk aversion, and outside wealth. We observe that shortening maturity negatively affects the value of outstanding options and reduces the effect of compensation modifications at the time of the merger. However, the results do not change in a significant way. We find that employees lose an estimated 32.6% of the value of their outstanding stock options, compared to 38.4% we obtained previously without the maturity adjustment.

An additional consideration for the estimation of employee losses from contract modifications is that a firm that cancels ESOs may be able to offer a higher premium, which would increase the value of the incentive-based compensation and bias our estimates. The empirical results in Section

[18] We find similar results if we focus on the M&A deals involving only public acquirers. In such deals, employees lose on average $19.2 million, which translates to 32.2% of the Black-Scholes value of their stock options.

[19] Empirical evidence indicates that employees are likely to exercise their options approximately half way through their contractual life. For example, Huddart and Lang (1996) document that by month 60 since the option grant approximately 40% of all options are exercised. Further, Bettis, Bizjak, and Lemmon (2005) suggest that simply adjusting the maturity of an American option produces option values that are similar to the values obtained from the utility model calibrations.

5 indeed show that the offer premium is higher when there are option cancellations. To account for this effect, we reestimate employee losses under the assumption that whenever some options are canceled, the offer premium is increased by 10% (e.g., from 30% to 40%). We continue to find that even with a substantial increase in the offer premium, contract modifications cause employees to lose 33.1% of their option value. Thus modification of option contracts allows for significant savings for the acquirers.

The next panel of the table reports the average annual volatility and dividend yield of the target and the acquirer, which are relevant for valuation of assumed stock options. In practice, when the acquirer assumes options "on essentially the same terms," it implies that the intrinsic value of the options is preserved, whereas the Black-Scholes value can in general be affected positively or negatively.[20] However, acquirers tend to be substantially larger and more mature, and as a result they typically pay higher dividends and have less volatile stock returns. For example, the average annual volatility of the target firms' stock returns is 53.8%, whereas for acquirers it is 34.4%. Similarly, the average dividend yield for acquirers is 1.4%, but for targets it is 0.9%; the volatilities and dividend yields are statistically different in these two samples. These results explain why even when acquirers fully assume the employee stock options, the market value of these options decreases in value on average.

Interestingly, we observe that acquirers do not reinstate option incentives after the acquisition (see Panels C and D). First, approximately 40% of all bidders in the sample are private firms. These firms are unlikely to issue stock options, especially if they have no definite plans to go public.[21] Second, for public acquirers that did not assume any of the target firm's stock options, we compare the value of option grants in the year prior to, the year of, and the year after the acquisition. Despite the fact that the number of employees increases, we do not see that the overall value of option grants increases. If anything, the opposite is true. Further, when we compare new option grants in the merged firms for deals with option cancellations and without, we observe that the new grants are smaller when options are canceled.

[20] When options are assumed, the number of target firm stock options is divided by the option coverage ratio, and the strike price is multiplied by the same ratio. If the deal is financed by stock, the option coverage ratio is typically the same as the stock exchange ratio.

[21] The data on stock option grants by private firms are not available. In our sample, only 3 out of 511 private acquirers go public by 2016.

One possible explanation for these results is that during the post-expensing period there is an increased tendency by firms to substitute options with restricted stock (see, e.g., Hayes, Lemmon, and Qiu, 2012 for evidence on executives). We therefore also check whether firms increase their total equity-based grants. Although the data on restricted stock grants to employees are not readily available, starting in 2006 firms have to report the total stock-based compensation expense (STCKO), which reflects the fair value of all equity-based grants made to employees, including stock options, restricted stock, deferred stock bonuses, long-term incentive awards, and other types of stock-based compensation. The evidence in Panel D shows that the equity-based grants are not higher for acquirers that cancel stock options during M&As.[22] Overall, we conclude that employees of target firms experience significant negative changes to their option compensation as a result of the bidder's treatment.

A related interesting question is whether the potential for option cancellation and ex post modification is priced into the original employment contracts, long before the merger becomes a possibility. While we cannot directly answer this question because of lack of accurate wage data, we believe that this is unlikely to be the case because the actual treatment of option compensation is rarely known to employees before the M&A announcement. For example, as indicated in Section 2, only 2 out of 105 compensation plans we studied specified how ESOs will be treated in case of an M&A, while others leave it up in the air until merger negotiations.

Finally, the last panel of Table 3 shows the estimates of predicted employee losses from modified options, i.e., how much employees would have lost on their outstanding options if the offer premium were zero and the treatment of ESOs from the merger agreement would apply. Similarly, we report the average predicted employee losses from modified options in a potential cashout, i.e., how much employees would have lost on their outstanding options if all out-of-the-money options were canceled and all in-the-money options were cashed out for the intrinsic value. Importantly, all variables in Panel E are evaluated under assumption of the zero offer premium. We use the predicted rather than actual losses as the main explanatory variable when we examine the relation between takeover gains and employee losses. This is done in order to purge our results from the issue that the actual

[22]We also check whether wages tend to increase more in firms that cancel employee stock option compensation. We do not find this to be the case; if anything, we observe the opposite pattern. We do not present these results because wage data reporting is voluntary and wage data (XLR) are available for only 32 deals in our sample.

offer premium drives both variables (actual employee losses and takeover gains) for mechanical reasons.

4.3 Survey Evidence on Employee Attitudes Towards M&A

Although we find that the value of employees' option compensation drops in most M&A deals, it is harder to answer a broader question whether employees are made worse off by an M&A deal. First, many components of an employee compensation package may be affected, including wages, non-option equity-based compensation, and pensions, which are not easily observable to a researcher. Second, employee job security can be at stake,[23] their workloads and job functions may change, and there could be more or less room for advancement and promotion in a new organization. Even more difficult question is how employees *feel* about the changes in their compensation. Because employees are risk-averse and undiversified, their valuations may significantly diverge from the Black-Scholes valuation (Huddart, 1994; Hall and Murphy, 2002). Further, the behavioral economics literature shows that employees are not financially savvy and find it hard to value complex financial securities, such as options (Van Rooij, Lusardi, and Alessie, 2011; Babenko and Sen, 2014). For example, some employees may believe that out-of-the-money options have no value at all, while others may systematically overvalue options.

We therefore next investigate employee self-reported attitudes toward a hypothetical merger and relate those to the value and structure of their equity-based compensation. We use survey data on individual employees of four public firms that participated in the NBER survey conducted by Kruse, Freeman, and Blasi (2010). The surveys contained the following question about a merger: "If an outside investor offered to buy your company for 50% more than the current value of the stock, would you vote to sell the company?" With respect to equity-based compensation of employees, the surveys gathered information on the dollar value of company stock held by employees, the intrinsic value of vested and unvested stock options, and the total number of stock options held.

The summary statistics are reported in Table 4. Interestingly, most employees (57.8%) would vote not sell the company to an outsider for 50% above the current value of the stock. This is

[23]Some M&As result in production redundancies and overcapacity and may call for significant employee layoffs (Lichtenberg and Siegel, 1990). If laid-off employees are less productive and/or have outdated skill sets that prevent them from quickly reentering the labor force, their financial welfare will be negatively affected by the merger.

consistent with a generally held view in the literature that employees are allies of management against mergers and acquisitions. The table also shows that employees hold large amounts of stock options and stock, with median values of $146,556 and $25,000, respectively. Finally, employees were asked if their annual wages last year were higher or lower than those of employees with similar experience and job descriptions in other companies in their region, and their responses were coded from -2 (much lower) to 2 (much higher). According to this measure, an average employee is slightly underpaid.

We next relate employee willingness to sell the company to their equity-based compensation. Table 5 presents the results of a probit model estimation (marginal effects are reported), where the dependent variable is equal to one if an employee would sell the company at a 50% premium. The variables of interest are the Black-Scholes value of stock options, the fraction of unvested options, and the value of company stock held. We control for many employee characteristics, including gender, age, education, income, risk tolerance, and the measure by how much the employee is overpaid. Most control variables enter with expected signs. For example, employees who are overpaid, more risk-averse, female, and middle-aged are unwilling to have an outsider take control, and therefore they vote against the merger.

Employees who hold more company stock are more likely to vote for a merger, which is not surprising since the value of their stock would then increase by 50%.[24] We do not find a relation between the total value of stock options and voting for a merger. Employees with more unvested stock options, however, are more likely to look negatively on an offer by an outsider. This may be because employees are not certain whether the acquiring firm would allow them to keep their unvested options. These results also hold when we drop managerial employees from the sample.

In the last specification of the table, we provide indirect evidence that change of control may help to reduce compensation inefficiencies and employee entrenchment. Berk, Stanton, and Zechner (2010) suggest that over time employees become entrenched and overpaid in their jobs, particularly those employees who have long tenure and low ability. This situation may change if an outsider takes control of the firm. Mergers and acquisitions are often associated with changes in firm management,

[24]From our reading of company filings, stock held by employees (as opposed to stock options) is never taken away in M&As.

and hence, just like bankruptcies, they present an opportunity for an outsider to abrogate previous employee contracts and reset the pay at competitive levels. Employees who are not overpaid are unlikely to be affected much by a change of control. We therefore limit our sample to only those employees who say their annual wages in the previous year were higher or much higher than those of employees with similar experience and job descriptions. Consistent with theory, our results show that those employees who classify themselves as overpaid, are substantially more worried about their stock options and especially unvested stock options in relation to a potential merger. Overall, the survey evidence indicates that employees holding many ESOs are concerned about the effect of the merger on their options.

Next, we analyze whether removing ESOs of the target firm's employees can be a source of takeover gains.

5. Takeover Gains

5.1 Deal Value Creation and Combined Deal Return

To see whether the resulting savings from modified ESOs in M&A deals can be a source of takeover gains, we first plot the deal value creation in million dollars against the losses from modified options given merger treatment. We calculate deal value creation as the sum of the offer premium received by the target firm multiplied by the market capitalization of the target firm four weeks before the M&A announcement and the three-day announcement CAR of the acquirer multiplied by the market capitalization of the acquirer before the deal. Panel A of Figure 1 shows that in deals with relatively low employee losses from modified options (the bottom quintile), the deal value created is substantially lower than in deals with relatively high employee losses (the top quintile). The scatter plot in Panel B also shows a positive relation between deal value creation and employee losses from modified options. The slope of the fitted line is greater than one, which may indicate that employee losses are positively correlated with some variables that are associated with better deal performance (e.g., cash payment, other cost cutting measures taken by the acquirer, positive synergies). In addition, dollar value of employee losses may be correlated with firm size.

To address the last issue, we also calculate the combined deal return, which is equal to dollar deal

value created divided by the size of the combined firm, i.e., by the sum of the market capitalizations of the target firm and the acquirer before the M&A deal. Figure 2 shows that the combined deal return is substantially higher for deals in which the acquirer chooses to cancel many options. For example, in deals with relatively small losses from modified options (the bottom quintile), the combined deal return is approximately 3% on average, whereas in deals with relatively large losses from modified options (the top quintile), it is over 8% (see Panel A). A positive relation between the two variables is also evident in the scatter plot in Panel B.

Tables 6 and 7 present the results of the multivariate OLS regressions, where the dependent variables are the deal value creation and the combined deal return, respectively. In the first specification of Panel A of Table 6, we include only the predicted dollar loss from modified options given merger treatment, along with industry and year fixed effects. The estimation results show that a dollar of employee losses is associated with approximately 3.83 dollars of deal value creation (t-stat = 6.57). The fact that the coefficient is positive is consistent with the savings from target firm's ESOs being a source of takeover gains. However, because the coefficient is greater than one, the results also suggest that employee losses may proxy for some omitted variables that are correlated with deal performance. In the second specification, we therefore add a list of various observable deal and firm characteristics that could explain deal performance. Although the R-squared of the regression increases almost twice, we find that the coefficient decreases only slightly to 3.06 (t-stat = 6.29). To account for the fact that treatment of ESOs is a choice variable which may be also correlated with other unobservable characteristics of the acquirer and deal performance, in the remaining two specifications of Table 6 we calculate the predicted loss from modified options under the assumption that all in-the-money options are cashed out for their intrinsic value and all outstanding out-of-the-money options are canceled. We still observe a positive relation between the potential savings from modified stock options and deal value creation, with a point estimate dropping to 2.72 in the last specification.

To assess the potential omitted variable bias in our sample, we also conduct the test proposed by Altonji, Elder, and Taber (2005) and developed by Oster (2019). In particular, Oster (2019) shows that, under reasonable assumptions, it is possible to determine how large the selection on

unobservables must be in order to explain away the coefficient of interest. The test gauges how much the regression coefficients and the model R-squared change with the inclusion of additional control variables. We use her suggested input of $R_{max} = 1.3\widetilde{R}$, where $\widetilde{R}$ is the largest empirically observed R-squared (20.65% in our case). In Panel B of Table 6, we report Oster's δ for each variable of interest corresponding to linear models 1-4 estimated in Panel A. Oster (2019) proposes to use $\delta = 1$ as a reasonable cutoff, as $\delta = 1$ implies that the selection on unobservable variable must be exactly as large as the selection on observable variables in order for results to be explained by the omitted variable bias. We find that all deltas for variables of interest are substantially greater than one, which satisfies the robustness reporting standard suggested by Oster (2019).

In Table 7 we report the results for the combined deal return, which may help us to address a potential concern that the dollar value of employee losses may be correlated with the deal value creation measured in dollars because both variables are correlated with firm size. Again, we observe a positive relation between the normalized predicted loss from modified options and the combined deal return. For example, based on the second specification that includes multiple control variables and has R-squared of 42.22%, a one percentage point increase in the predicted loss from modified options is associated with 2.01 percentage increase in the combined deal return. Correspondingly, the results of the Oster's test in Panel B suggest that omitted unobservable variables have to explain significant part of variation in the combined deal return in order to explain away the coefficient on the loss from modified options to zero.[25]

6. Offer Premium and Acquirer's Announcement Return

Our evidence so far indicates that there are higher takeover gains in deals in which employees lose significant value of their stock options. However this evidence is silent on whether the takeover gains mostly accrue to the shareholders of the target firm in the form of higher offer premium or to the shareholders of the acquiring firm in the form of higher announcement return. Below, we investigate this question more closely.

We first present a simple plot that illustrates how the takeover premium and the bidder's CAR

[25]Note that for one of the specifications in Table 7, the test is inconclusive because the coefficient of interest increases with the inclusion of more control variables.

are affected by the treatment of ESOs (see Figure 3). The offer price premium is defined as the initial offer price divided by the target's stock price four weeks before the merger announcement. In Panel A we plot the average offer premium for target firms as a function of predicted losses from modified options normalized by the market capitalization of the target firm before the deal. The bars in the figure display the average offer premium for each quintile of the distribution of losses from modified options. We observe that the offer premium increases fairly monotonically with the estimated loss from modified options, and the difference in the offer premium between the lowest and the highest quintiles of the distribution of employee losses is more than 20%.

Similarly, Panel B shows how the average announcement return of the acquirer varies with the estimated loss of the target's employees' option compensation. The cumulative abnormal return of the acquirer is calculated over the window (-1,+1) around the deal announcement date using the market model. The bins in the figure correspond to the quintiles of the distribution of predicted losses from modified options normalized by the market capitalization of the acquirer prior to the deal. The panel shows that the acquirer's CARs tend to be negative in deals with small employee losses and average -1.7%, whereas CARs are positive and average 1.9% in deals with large employee losses. Nevertheless, the relation between employee losses from modified options and CARs is not monotonic across quintiles. Overall, the graphical evidence suggests that the shareholders of the target firms may capture the larger share of the savings from modified ESOs than do the shareholders of the acquiring firms.

6.1 Offer Premium and Employee Losses

Next, we use the OLS regressions to investigate how the offer premium and the acquirer's CARs depend on the estimated loss from option compensation modification. Note that our sample size for the offer premium regressions is significantly larger than for the deal value creation and combined deal return because all targets in our sample are public firms, whereas some acquirers are private firms.[26] We control for various deal characteristics: whether the acquirer is a public firm, whether the deal is cash- or stock-financed, tender offers, a diversifying deal dummy, and toeholds. These

[26]Nevertheless, we obtain very similar results for the offer premium estimation if we restrict our sample only to the deals in which both the acquirer and the target are public firms.

control variables are motivated by the prior literature. For example, Offenberg and Pirinsky (2015) find that tender offers allow for faster completion but typically require a higher acquisition premium. Bargeron et al. (2008) document that private acquirers pay significantly less than public acquirers. We also include firm characteristics that can capture target firm attractiveness, such as the target size, leverage, profitability, market-to-book ratio, and the amount of investment in R&D. Finally, we include industry (Fama-French 17) and year fixed effects to capture the differences in takeover premiums across different industries and business conditions.

Table 8 presents the results of our estimation. Most of the control variables have the expected signs. We find that offers by public acquirers and deals structured as tender offers are associated with a higher premium. Acquirers that have a toehold prior to the bid pay a higher premium perhaps because these acquirers have a greater interest in the target, whereas larger targets and firms that are less likely to be undervalued, as indicated by their high market-to-book ratios, collect a lower takeover premium.

In the first specification in Table 8, we regress the offer premium directly on the predicted loss to employees from option cancellations and modifications given the proposed merger treatment. To ensure that the regression is well specified and offer premium is not used in the construction of the right-hand-side variables, the predicted loss is calculated four weeks before the deal announcement. It captures how the value of ESOs would be affected if the bidder implemented the treatment of stock options laid out in the merger agreement and offered no premium on the stock. Indeed, we see that the more employees stand to lose, the greater the premium the acquirer chooses to pay on the stock. For example, a one standard deviation increase in losses to employees is associated with an approximately 3.3% higher takeover premium. We find similar results when instead of calculating employee losses given the proposed merger treatment, we estimate losses given a hypothetical cashout, i.e., canceling all outstanding out-of-the-money stock options and paying the intrinsic value for outstanding in-the-money options. We also find that target firms with larger number of canceled employee stock options relative to the number of shares outstanding are acquired at a significantly higher premium.

Further, we examine separately how the offer premium is related to the treatment and the

number and value of outstanding employee stock options. The estimates reveal that deals with option cancellations by the acquirer are associated with 3.6% to 4.4% higher takeover premium, depending on the specification. Similarly, target firms with more out-of-the-money stock options and larger value of all outstanding stock options are acquired at a higher premium.[27] Because it is much easier and common for acquirers to cancel out-of-the money stock options, these results provide further support for the employee expropriation hypothesis.

Finally, in the last two specifications, we include the interaction terms between the number of out-of-the-money options (or the value of all outstanding options) and the dummy variable for option cancellations. Presumably, canceling ESOs is more valuable for shareholders when the target firm has more stock options, particularly when the large fraction of these options are out-of-the-money and can be canceled without any payment to employees. Consistent with this explanation, we find that the offer premium is higher when employees have a large number of out-of-the-money stock options and the merger agreement calls for canceling options. Overall, Table 8 provides evidence consistent with the transfers of wealth from employees of the target firm to the firm's shareholders.

6.2 Endogeneity of ESOs and Instrumental Variables Estimation

We next explore the alternative hypothesis that employee losses in M&As proxy for unobservable target firm characteristics. Clearly, employee losses are positively correlated to the number of target firm's ESOs prior to the merger. In turn, employee stock options could be correlated with the quality of the firm's labor force, employee entrepreneurship, productivity, and innovativeness. If employee losses proxy for target firm characteristics that acquirers find valuable, the OLS estimates for the offer premium regressions will be inconsistent and we will overestimate the effect of losses on the takeover premium ("affirmative endogeneity"). However, it is also possible that ESOs are associated with undesirable characteristics of the target firm, in which case OLS estimates can be biased downward ("corrective endogeneity"). For example, ESOs can be correlated with the difficulty of the target firm in attracting talent, high employee mobility, inefficiencies at the firm,

[27]Consistent with prior literature (Fich, Cai, and Tran, 2011), we also find that the offer premium is negatively (although not significantly) related to stock options held by the top five executive officers. We do not report these results because the use of Execucomp database decreases our sample size by more than two-thirds.

employee entrenchment, or the incentive of management to cover up financial irregularities.

To understand whether omitted variables drive our results, we use an instrumental variables approach. Ideally, we need to find economic variables that are strongly correlated with the number of ESOs and hence with employee losses but are unrelated to a firm's attractiveness as a target. We rely on one such geography-based instrument used in the compensation literature. Specifically, Kedia and Rajgopal (2009) find that the location of firms' headquarters explains a significant part of the variation in broad-based option grants. The location of a firm's headquarters matters because of knowledge spillovers among directors and executives adopting such plans, local labor market conditions, and social interactions among employees of neighboring firms. Specifically, our instrument is the *neighbor firms option use*, calculated as the ratio of the number of the firm's outstanding options to the firm's outstanding shares, averaged over all Compustat firms in the year of the M&A announcement that have headquarters located in the same three-digit zip code as the target firm (but excluding the target itself). It is unlikely that all firms in a given region (e.g., in Silicon Valley) become attractive targets in a given year. A potential concern for using this instrument, however, is the existence of technological spillovers within industry clusters, which might be problematic if firms are more likely to be acquired for their technology and innovation. We therefore also present the results by constructing the instrument using local other-industry firms only. Specifically, we define the *neighbor firms option use outside firm industry* as the ratio of the number of the firm's outstanding options to the firm's outstanding shares, averaged over all Compustat firms in the year of the M&A announcement that have headquarters located in the same three-digit zip code as the target firm, but do not belong to the same one-digit SIC industry. A similar instrument is used in Hochberg and Lindsey (2010) and Chang et al. (2015).

Our model is identified by exclusion restrictions and estimated by the limited information maximum likelihood. The results are presented in Table 9. Odd columns present the estimates of the first-stage regression, where the dependent variable is the predicted loss from modified options normalized by the market capitalization of the target firm. We first employ the instrument that uses all firm local neighbors and then the one which uses only neighbors outside of industry. When the neighbor firms option use is employed as the instrument, we see that it positively predicts the

employee losses in M&A (t-stat = 4.81). In the second stage, as in our OLS results, we observe a positive relation between the quasi-exogenous variation in employee losses and the offer premium. The IV estimates are larger than their corresponding OLS counterparts, which may indicate that employee losses are more strongly correlated with characteristics that bidders find undesirable, such as firm inefficiencies, accounting irregularities, and employee entrenchment.

Overall, our results do not fit the story that employee losses proxy for valuable unobservable target firm characteristic.

6.3 Bidder CAR and Employee Losses

We next examine whether reducing option compensation of target firm employees is associated with any value creation for the shareholders of the acquiring firm. Because we find that acquirers tend to pay a higher offer premium for targets with more canceled stock options, we might expect that acquirers earn a lower announcement return in such deals. Alternatively, it is possible that some realized savings from option contract modifications also accrue to the acquirers. We therefore investigate how the acquirer's stock price reacts to the announcements of deals in which the target firm employees experience loss in the value of their options.

The results of the estimation are presented in Table 10. Columns 1 and 2 show the results of the regression of the acquirer CAR on several control variables and the predicted loss from modified options. We first evaluate employee losses given the proposed merger treatment and then also calculate loss under the (perhaps counterfactual) assumption that all options would be cashed out for their intrinsic value or canceled if the intrinsic value were negative. The table shows that the market reacts more favorably to the announcement of deals in which stock options are significantly reduced in value. For example, a one standard deviation increase in predicted loss from modified options translates into a 1.0% higher announcement return for the acquirer. However, the estimate has relatively large standard errors and is different from zero only at the 10% significance level. In the last two specifications, we attempt to separate the effect of merger treatment and the value of the target outstanding stock options. We do not find a significant effect of outstanding ESOs before the M&A deal on the acquirer CAR, but interestingly we observe that canceling target option obligations is associated with an approximately 1.5% higher announcement return for the bidder.

An interesting question then is why all acquirers do not choose to cancel employee stock options if this action is value-creating for their shareholders. We believe that in some cases preserving the target firm's employee stock options is necessary to retain and motivate employees. Moreover, some stock option plans are designed in such a way that it is impossible for the acquirer to cancel them legally without triggering an avalanche of lawsuits (e.g., when the plan has an explicit anti-destruction provision).

7. Conclusion

Using unique data from 1,277 M&A agreements for the deals announced by U.S. firms during the period 2006 to 2014, we analyze how the employee compensation obligations of the target firm are treated in M&As and what implications it has for the negotiation of merger terms and merger outcomes. In 80.0% of all deals, the acquirers choose to cancel some employee stock options, with a high propensity to cancel all out-of-the-money stock options of the target firm. In cases when options are not explicitly canceled, their value is often reduced because the acquirer stock is less volatile than the target stock or because employees are forced to accept the intrinsic value. Overall, we find that employees lose approximately 38.4% of option value because of contract modifications.

We further show that the realized savings from the modification of employee compensation are positively related to the total takeover gains. In particular, the offer price premium is larger when the target firm has more stock options, particularly when these options are out-of-the-money, and when the acquirer cancels options. Deals with option cancellations are greeted by more positive bidder stock price reaction. Our results can be taken to imply that, when extant compensation contracts are modified, target and acquirer shareholders benefit at the expense of employees.

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Appendices

A. Target Compensation Plan Provisions Governing ESO Treatment in M&As

Table A.1. Change of Control Provisions from ESO Plans.

The sample consists of 111 firms that were targets of an acquisition announced between January 1, 2014 and December 31, 2014. For each target firm, we search for all company compensation plans that cover outstanding employee stock options. We are unable to find any option plan information for four target firms, and two firms do not have any employee stock options, leaving us with information on 105 compensation plans. For firms with multiple ESO plans, we collect information from the most recently adopted compensation plan. We search for keywords "control," "merger," "event," and "corporate transaction." Note that some vesting provision categories are not mutually exclusive, so the percentages may sum to more than 100%.

	Variable	Mean
Vesting	1. Plan does not specify how vesting will be adjusted in change of control	11.4%
	2. Plan specifies that vesting *may be* accelerated in change of control	35.2%
	3. Plan specifies that vesting *will be* accelerated in change of control	67.6%
	a. Unconditionally (single trigger)	26.7%
	b. If employment is terminated (double trigger)	21.9%
	c. If options are not assumed	31.4%
ESO treatment	1. Plan does not specify how ESOs can be treated by acquirer	36.2%
(other than	2. Plan allows for flexible ESO treatment by acquirer	61.9%
vesting)	3. Plan requires a particular ESO treatment by acquirer	1.9%

B. Variable Definitions

All continuous variables are winsorized at the 1% tails.

Variable	Description
Offer premium	The ratio of the initial price offered by the acquirer to the target's stock price four weeks before the announcement minus one (%).
Tender offer	A dummy variable equal to one if the deal is structured as a tender offer.
Cash payment	A dummy variable equal to one if any part of the deal is paid with cash.
Diversifying deal	A dummy variable equal to one if the acquirer and target are from different industries (four-digit SIC code).
Public acquirer	A dummy variable equal to one if the acquirer is a public company.
Toehold	A dummy variable equal to one if the acquirer has a toehold in the target.
Combined firm size	Logarithm of the sum of the book values of the target firm's assets and the acquirer's assets before the M&A announcement.
Relative target size	The ratio of the book value of assets of the target to the sum of the target firm's assets and the acquirer's assets before the M&A announcement (%).
Bidder CAR	The cumulative abnormal return of the acquirer over the three-day window centered on the M&A announcement (%); the market model is estimated over one year of daily returns ending four weeks before the M&A announcement.
Deal value creation	The offer premium multiplied by the market capitalization of the target firm four weeks before the M&A announcement plus the bidder CAR multiplied by the market capitalization of the acquirer before the deal ($M).
Combined deal return	Deal value creation divided by the sum of the market capitalizations of the target and the acquirer before the M&A deal (%).
Target size	Logarithm of the book value of the target firm's assets.
M/B	Market value of target firm's assets divided by the book value of assets.
ROA	The target firm's EBIT plus depreciation divided by the book value of assets.
R&D	The target firm's R&D expenses divided by the book value of assets.
Leverage	The sum of long-term and short-term debt divided by the book assets.
Top five ownership	The number of shares, excluding options, held by the top five executives as reported in Execucomp divided by the number of shares outstanding (%).
Stock return volatility	The annualized standard deviation of log-returns, estimated using daily data over one year prior to the M&A announcement.
Dividend yield	The value of common dividends per share of stock divided by the market price at the end of the fiscal year prior to the M&A announcement.
Cancel options	A dummy variable equal to one if any of the target firm's employee stock options are canceled in the deal without any payment to employees.
Outstanding options/ tgt shares	The number of the target firm's outstanding stock options divided by the number of outstanding shares at the fiscal year-end prior to the M&A (%).
Canceled options/ tgt shares	The number of target firm's stock options canceled in the M&A deal divided by the number of shares outstanding (%).

Variable	Description
Moneyness of outstanding options	The stock price four weeks prior to the M&A announcement divided by the weighted average strike of outstanding options at the fiscal year-end, minus one.
Out-of-the money options/tgt shares	The number of out-of-the-money outstanding stock options four weeks before the M&A announcement divided by the number of outstanding shares (%).
Value of outstanding options/tgt mv	The B-S value of outstanding options four weeks before the M&A announcement divided by the target firm market capitalization.
Value of vested options/target mv	The B-S value of vested options four weeks before the M&A announcement divided by the target firm market capitalization (%).
Value of unvested options/tgt mv	The B-S value of unvested options four weeks before the M&A announcement divided by the target firm market capitalization, i.e., the difference between *value of outstanding options/tgt mv* and *value of vested options/target mv*.
Actual loss from modified options	The difference in $ million between the B-S value of outstanding options at the M&A announcement and the value of outstanding options modified according to the merger agreement.
Actual loss from modified options as % of outstanding options	*Actual loss from modified options*, divided by the B-S value of outstanding options at the M&A announcement.
Actual loss from modified options adjusted for early exercise as % of outstanding options	The difference between the B-S value of outstanding options at the M&A announcement (assuming maturity is 50% of option life) and the value of outstanding options modified according to the merger agreement, all divided by the B-S value of outstanding options at the M&A announcement (assuming maturity is 50% of option life).
Predicted loss from modified options	The difference in $ million between the B-S value of outstanding options four weeks before the M&A announcement and the value of options modified according to the proposed merger agreement.
Predicted loss from modified options in a cashout	The difference in $ million between the B-S value of outstanding options four weeks before the M&A announcement and the value of options realized in a typical cashout, i.e., if all out-of-the-money options were canceled and all in-the-money options were cashed out for their intrinsic value.
Actual loss from modified options adjusted for a 10% premium increase as % of value of options	The difference between the B-S value of outstanding options at the M&A announcement and the value of options modified according to the merger agreement (the value of options at the announcement is estimated at the actual offer price if no options are canceled and at the offer price minus 10% if options are canceled), divided by the B-S value of outstanding options at the announcement.
Option grants by acquirer after M&A/ total mv	The B-S value of stock option grants by the combined firm in the first year after the merger divided by the market value of the combined firm at the end of the first fiscal year after the merger (%).
Equity grants by acquirer after M&A/ total mv	The stock-based compensation expense recorded by the combined firm in the first year after the merger divided by the market value of the combined firm at the end of the first fiscal year after the merger (%).

C. Possible and Actual ESO Treatment (Examples)

C.1 Target Compensation Plan Provisions Governing ESO Treatment

Below we provide examples of legal language used in company stock option plans that describe how ESOs can be treated in the event of a change in control.

1. Compensation Plan that Allows for Flexible ESO Treatment

Viasystems Group, Inc., 2010 Equity Incentive Plan

Upon the occurrence of a Change in Control, the Committee is authorized (but not obligated) to make adjustments in the terms and conditions of outstanding Awards, including: (a) continuation or assumption of such outstanding Awards under the plan by the company; (b) substitution by the surviving company or corporation or its parent of awards with substantially the same terms for such outstanding Awards; (c) accelerated exercisability, vesting and/or lapse of restrictions under outstanding Awards immediately prior to the occurrence of such event; (d) upon written notice, provide that any outstanding Awards must be exercised, to the extent then exercisable, during a reasonable period of time immediately prior to the scheduled consummation of the event, or such other period as determined by the Committee (contingent upon the consummation of the event), and at the end of such period, such Awards shall terminate to the extent not so exercised within the relevant period; and (e) cancellation of all or any portion of outstanding Awards for fair value (as determined in the sole discretion of the Committee and which may be zero).

2. Compensation Plan that Specifies How Vesting Will Be Adjusted

Trivida Corp., 1998 Equity Incentive Plan

In the event of a merger or consolidation in which the Company is not the surviving corporation ("Corporate Transaction"), any or all outstanding Awards may be assumed, converted or replaced by the successor or acquiring corporation. In addition, if a Termination Event occurs with respect to a Participant within six (6) months of the consummation of a Corporate Transaction, then notwithstanding any other provision in this Plan to the contrary, the vesting of such Participant's Awards will accelerate and such Participant's Options will become exercisable in full. "Termination Event" shall have occurred if the successor or acquiring corporation terminates the employment of such Participant for any reason other than cause, death or disability. In the event such successor or acquiring corporation does not assume or substitute Awards, then notwithstanding any other provision in this Plan to the contrary, the vesting of all Awards will accelerate and the Options will become exercisable in full, and if such Options are not exercised prior to the consummation of the corporate transaction, they shall terminate.

C.2 Examples of Option Treatment from Merger Agreements

Below we provide examples of legal language used in merger agreements that describe how ESOs are treated in the event of a change in control.

1. Cashout of In-the-money ESOs and Cancellation of Out-of-the-money ESOs

Global Cash Access Holdings and Multimedia Games Holdings, Sep 8, 2014

As of the Effective Time, each Company Option granted prior to the date hereof and that is outstanding and unexercised immediately prior to the Effective Time (whether vested or unvested) shall automatically terminate and be canceled without any action on the part of any holder of such Company Option in con-

sideration for the right at the Effective Time to receive in full satisfaction of the rights of such holder with respect thereto, as promptly as reasonably practicable following the Effective Time, the Option Cash Payment. "Option Cash Payment" means, with respect to any Company Option, a cash payment equal to the product of (A) the number of shares of Company Common Stock subject to such Company Option as of immediately prior to the cancellation of such Company Option and (B) the excess, if any, of the Merger Consideration over the exercise price payable per share of Company Common Stock issuable under such Company Option, without interest and less any required withholding Taxes. For the avoidance of doubt, if the exercise price per share of any Company Option, whether vested or unvested as of the Effective Time, is equal to or greater than the Merger Consideration, then by virtue of the occurrence of the Effective Time and without any action on the part of Parent, the Company or the holder thereof, the Company Option will automatically terminate and be canceled without payment of any consideration to the holder.

2. Cancellation of Options

Nightingale Informatix and Vantagemed, Feb 16, 2007

Within two business days following the date hereof, the Company shall deliver notice to the holders of Company Options, which such notice shall be in compliance with the terms of the Plan and such Company Options, that the Plan and Company Options will not be assumed by Parent and will be canceled or terminated immediately prior to the Effective Time.

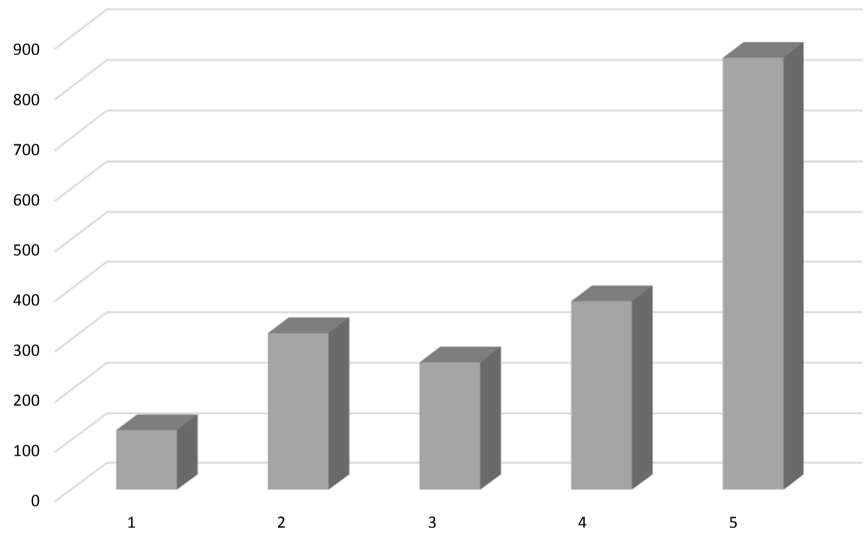
3. Assumption of Options

Black & Decker, Stanley Works, and Blue Jay Acquisition, Nov 2, 2009

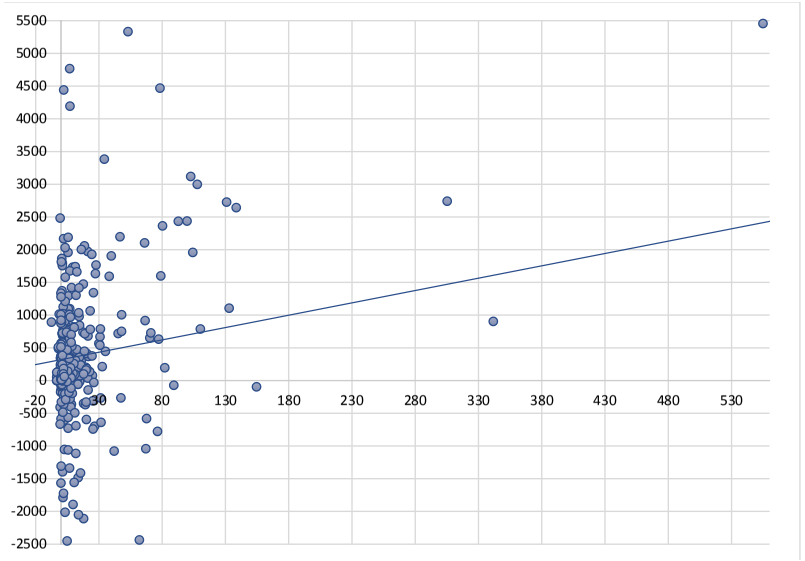
The Black & Decker Board shall (except, with regard to Nolan D. Archibald) adjust the terms of each outstanding Black & Decker Stock Option to provide that, at the Effective Time, each such option, whether vested or unvested, outstanding immediately prior to the Effective Time shall be converted into, and shall constitute, an option to acquire, on the same terms and conditions as were applicable to such Black & Decker Stock Option immediately prior to the Effective Time, the number of shares of Stanley Common Stock (rounded down to the nearest whole share) determined by multiplying the number of shares of Black & Decker Common Stock subject to such Black & Decker Stock Option by the Exchange Ratio, at an exercise price per share of Stanley Common Stock, rounded up to the nearest whole cent, equal to (A) the per share exercise price for the shares of Black & Decker Common Stock otherwise purchasable pursuant to such Black & Decker Stock Option divided by (B) the Exchange Ratio (each, as so adjusted, an "Adjusted Option").

Figure 1. Deal Value Creation and Employee Losses from Modified ESOs

The figure plots deal value creation (in $ million) as a function of the predicted loss from modified options. Deal value creation is calculated as the sum of the offer premium multiplied by the market capitalization of the target firm four weeks before the announcement and the bidder three-day announcement CAR multiplied by the market capitalization of the acquirer before the M&A announcement. In Panel A, Bin 1 is the lowest quintile of the distribution of the predicted loss from modified options, and Bin 5 is the highest quintile of the same distribution. In each bin, the bars display the average deal value creation for the group. In Panel B, the straight line indicates the linear fit of the deal value creation (in $ million) regressed on a constant and the predicted loss from modified options (in $ million).

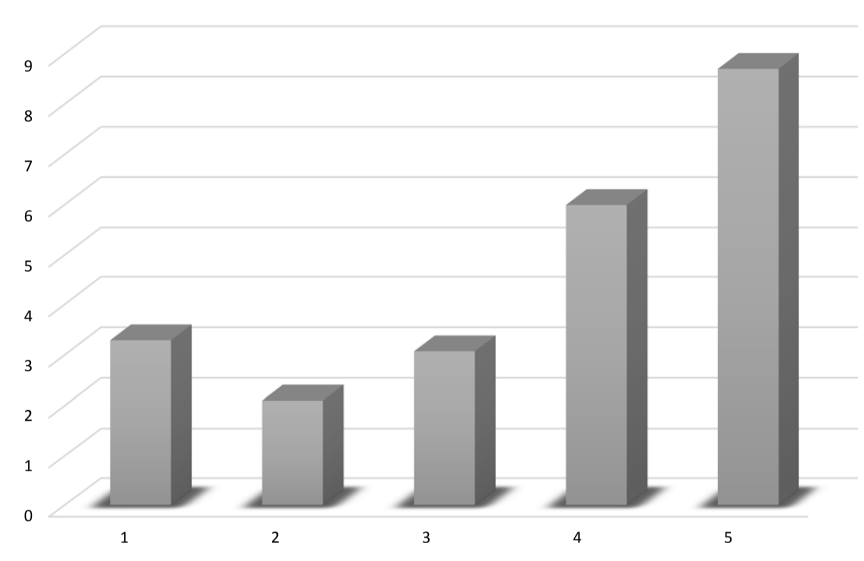


Panel A: Deal Value Creation (in $ million) vs. Quintiles of Predicted Loss from Modified Options

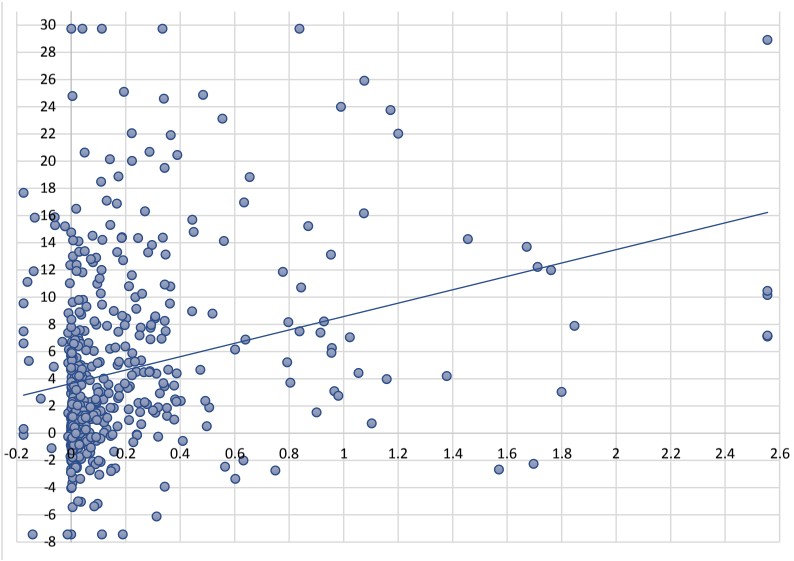


Panel B: Deal Value Creation (in $ million) vs. Predicted Loss from Modified Options (in $ million)

Figure 2. Combined Deal Return and Employee Losses from Modified ESOs
The figure plots combined deal return (%) as a function of the predicted loss from modified options normalized by the market capitalization of the combined firm prior to the merger. Combined deal return is calculated as the sum of the offer premium multiplied by the market capitalization of the target firm four weeks before the announcement and the bidder three-day announcement CAR multiplied by the market capitalization of the acquirer before the M&A announcement, all divided by the sum of market capitalizations of target and acquirer firms before the M&A deal. In Panel A, Bin 1 is the lowest quintile of the distribution of the predicted loss from modified options and Bin 5 is the highest quintile of the same distribution. In each bin, the bars display the average combined deal return (%) for the group. In Panel B, the straight line indicates the linear fit of the combined deal return regressed on a constant and the predicted loss from modified options normalized by the combined firm size.



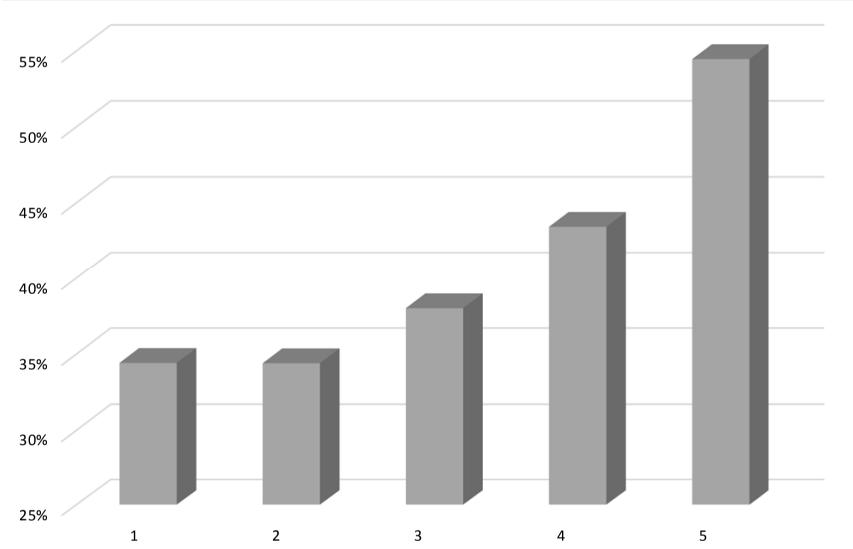
Panel A: Combined Deal Return (%) vs. Quintiles of Predicted Loss from Modified Options/Total Firm Size



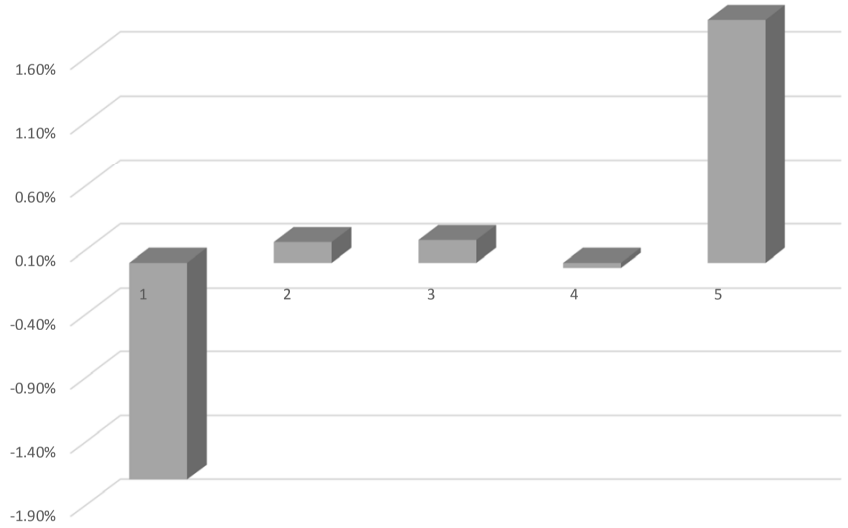
Panel B: Combined Deal Return (%) vs. Predicted Loss from Modified Options/Total Firm Size (%)

Figure 3. Offer Premium, Bidder CAR, and Employee Losses from Modified ESOs

The figure plots the average offer price premium (%) for target firms and the average three-day announcement CAR (%) for bidders as a function of the predicted loss from modified options. In Panel A, Bin 1 is the lowest quintile and Bin 5 is the highest quintile of the distribution of the predicted loss from modified options normalized by the target market capitalization. In each bin, bars display the average offer premium for the group. In Panel B, Bin 1 is the lowest quintile and Bin 5 is the highest quintile of the distribution of the predicted loss from modified options normalized by the acquirer market capitalization. In each bin, bars display the average bidder CAR for the group.



Panel A: Offer Premium vs. Quintiles of Predicted Loss from Modified Options/Target Firm Size



Panel B: Bidder CAR vs. Quintiles of Predicted Loss from Modified Options/Acquirer Firm Size

Table 1. Summary Statistics.

Panel A presents the summary statistics for firm characteristics, deal characteristics, and stock option variables for the sample of completed M&A deals announced between January 2006 and December 2014 in which target firms are public firms in the United States with non-missing data on the number and value of outstanding stock options and the offer premium. Panel B presents the means of main variables for the sample of actual targets and a control sample of potential targets. All variable definitions are provided in Appendix B.

Variable	Obs.	Mean	SD	25th	Median	75th
Deal characteristics:						
Offer premium, %	1,277	41.594	31.721	20.826	33.279	52.104
Tender offer	1,277	0.581	0.494	0	1	1
Cash payment	1,277	0.877	0.328	1	1	1
Diversifying deal	1,277	0.672	0.470	0	1	1
Public acquirer	1,277	0.600	0.490	0	1	1
Toehold	1,277	0.044	0.205	0	0	0
Combined firm size	527	8.707	1.873	7.424	8.685	10.201
Relative target size, %	527	15.789	17.137	2.003	9.009	25.111
Bidder CAR, %	524	-0.007	6.598	-2.585	-0.114	2.355
Deal value creation, $M	524	365.950	1,547.490	3.459	99.300	531.908
Combined deal return, %	524	4.607	6.748	0.003	2.488	7.483
Target firm characteristics:						
Assets, $M	1,277	1,225	3,460	94	297	978
Employees	1,258	4,203	11,274	277	802	3,100
M/B	1,277	1.527	1.193	0.801	1.204	1.866
ROA	1,277	0.059	0.204	0.024	0.101	0.154
R&D	1,277	0.071	0.128	0	0.012	0.098
Leverage	1,277	0.193	0.231	0	0.108	0.306
Top five ownership, %	408	2.895	5.286	0.351	0.831	2.637
Option variables:						
Outstanding options/tgt shares, %	1,277	9.657	6.994	4.437	8.552	13.407
Value of outstanding options/tgt mv, %	1,277	4.934	4.314	1.871	3.929	6.798
Moneyness of outstanding options	1,265	0.398	1.219	-0.282	0.155	0.675
Out-of-the money options/tgt shares, %	1,197	4.191	6.185	0	0	7.429
Value of vested options/tgt mv, %	1,249	2.566	2.614	0.750	1.790	3.498
Moneyness of vested options	1,233	0.581	1.603	-0.329	0.179	0.868
Value of unvested options/tgt mv, %	1,250	2.298	2.217	0.681	1.725	3.191
Moneyness of unvested options	1,115	0.310	1.036	-0.218	0.131	0.504

Table 2. Treatment of Target Employee Stock Options by Acquirers.

The sample is hand collected from merger agreements, tender offers, and asset purchase agreements filed with the SEC as a part of 8-K, 425, DEFA, or DEFM forms for completed M&A deals announced between January 2006 and December 2014 that have non-missing offer premium, number and value of outstanding options, and are public firms in the United States. *Cashout (intrinsic value)* is equal to one if for each option an employee receives the merger consideration price, offer price, or the stock price prior to the merger minus the exercise price. *Payout* is equal to one if for each option an employee receives a fixed amount specified by the company that is different from the option intrinsic value. *Assume or convert* is equal to one if each option is either assumed by the acquirer on essentially the same terms or converted into a similar financial instrument, with the original vesting schedule being either kept or accelerated. *Expire on close* is equal to one if an option expires upon the merger close and is worthless if left unexercised. *Cancel without a payment* is equal to one if each option is canceled by the acquirer without any payment to employees, other than to directors. *Other treatment* is equal to one if any combination of the above treatments is used. Panel B shows the means for firm and deal characteristics for deals where at least some of the outstanding employee options are canceled and for deals where options are instead assumed or converted.

Panel A	Vested stock options				Unvested stock options			
Treatment	In-the-money		Out-of-the-money		In-the-money		Out-of-the-money	
	Number	%	Number	%	Number	%	Number	%
Cashout (intrinsic value)	951	76.4%			874	70.2%		
Cancel without a payment	0	0.0%	984	79.0%	45	3.6%	946	76.0%
Assume or convert	224	17.9%	228	18.3%	276	22.1%	266	21.4%
Expire on close	37	3.0%	0	0.0%	15	1.2%	0	0.0%
Payout	5	0.4%	7	0.6%	6	0.5%	7	0.6%
Other treatment	14	1.1%	12	1.0%	15	1.2%	12	1.0%
Target has no options	14	1.1%	14	1.1%	14	1.1%	14	1.1%
Total deals with data	1,245	100%	1,245	100%	1,245	100%	1,245	100%

Panel B	Cancel (Mean)	Assume (Mean)	Difference	t-stat
Tender offer	0.595	0.550	0.045	1.24
Cash payment	0.945	0.635	0.310	9.07***
Diversifying deal	0.704	0.550	0.154	4.21***
Public acquirer	0.537	0.859	-0.322	-11.70***
Target size	5.542	6.502	-0.960	-7.37***
M/B	1.531	1.533	-0.002	-0.03
R&D	0.072	0.070	0.002	0.24
ROA	0.065	0.052	0.013	0.89
Leverage	0.189	0.202	-0.013	-0.74
Outstanding options/tgt share, %s	9.966	8.575	1.391	2.60***
Outstanding options value/tgt mv, %	5.080	4.364	0.716	2.33**
Top five ownership, %	3.168	2.037	1.131	1.97**

Table 3. Effect of Contract Modifications in M&As on Employee Compensation.

The sample consists of completed M&A deals announced between January 2006 and December 2014, in which target firms are public firms in the United States with non-missing data on the number and value of outstanding stock options and the offer premium. The stock option treatment data are hand collected from merger agreements, tender offers, and asset purchase agreements filed with the SEC as a part of 8-K, 425, DEFA, or DEFM forms. All variables are described in Appendix B.

Panel A: Losses from Option Contract Modifications

Variable	Obs.	Mean	Std. dev.	25th	Median	75th
Cancel options	1,189	0.80	0.40	1	1	1
Actual loss from modified options as % of value of outstanding options	1,189	38.42	35.80	7.66	25.46	68.49
Actual loss from modified options/ tgt mv, %	1,189	3.11	4.72	0.29	1.33	3.88
Actual loss from modified options, $M	1,189	15.29	106.21	0.75	3.39	10.32
Actual loss from modified vested options as % of value of outstanding options	1,189	15.71	17.97	1.73	8.37	26.30
Actual loss from modified unvested options as % of value of outstanding options	1,189	20.64	23.27	1.79	13.33	30.89
Actual loss from modified options as % of value of outstanding options (cancel=1)	954	45.57	35.22	14.71	33.41	78.65
Actual loss from modified options as % of value of outstanding options (cancel=0)	235	9.39	19.98	-0.00	0.19	9.95
Actual loss from modified options adjusted for early exercise as % of value of outstanding options	1,189	32.56	38.30	0.21	17.93	64.79
Actual loss from modified options adjusted for a 10% premium increase as % of value of outstand. options	1,189	33.09	38.30	0.00	10.95	53.47

Panel B: Differences Between Target and Acquirer Relevant for Value of Assumed Options

Variable	Target firm	Acquirer firm	Difference	t-test
Mean stock return volatility, %	53.75	34.42	19.33	11.89***
Mean dividend yield, %	0.85	1.39	-0.55	-2.93***

Panel C: Option Grants by Bidders That Cancel Options Before and After Acquisition

Variable	Mean	Median	Variable	Mean	Median
Option grants value t-1, $M	75.83	18.30	Option grants value t-1/total mv, %	1.14	0.38
Option grants value t, $M	64.47	18.13	Option grants value t/total mv, %	1.13	0.34
Option grants value t+1, $M	60.48	18.70	Option grants value t+1/total mv, %	0.47	0.27

Panel D: Differences in Average Grants After M&A for Firms That Cancel Options and Do Not

Variable	Cancel	Assume	Difference	t-test
Mean option grants by acquirer after M&A/total mv, %	0.40	0.90	-0.50	-4.55***
Mean equity grants by acquirer after M&A/total mv, %	0.80	1.00	-0.20	-1.56

Panel E: Predicted Losses from Option Contract Modifications						
Variable	Obs.	Mean	Std. dev.	25th	Median	75th
Predicted loss from modified options, $M	1,189	13.380	74.519	0.586	3.228	10.024
Predicted loss from modified options in a cashout, $M	1,245	18.477	78.928	1.371	5.186	14.163
Predicted loss from modified options/tgt mv, %	1,189	2.344	2.896	0.298	1.272	3.349
Predicted loss from modified options in a cashout /tgt mv, %	1,245	2.830	3.085	0.617	1.810	3.974
Predicted loss from modified options/acq mv, %	507	0.285	0.678	0.008	0.056	0.284
Predicted loss from modified options in a cashout /acq mv, %	525	0.452	0.848	0.024	0.127	0.403
Predicted loss from modified options/total mv, %	507	0.197	0.391	0.008	0.050	0.222
Predicted loss from modified options in a cashout /total mv, %	525	0.308	0.504	0.022	0.111	0.338

Table 4. Summary Statistics on Employee Attitudes Toward M&As.

The sample consists of surveys by individual employees of four public firms conducted by Kruse, Freeman, and Blasi (2010). *Vote to sell at 50%* is equal to one if employee answers "yes" to "If an outside investor offered to buy your company for 50% more than the current value of the stock, would you vote to sell the company?" and is 0 otherwise. *Value of options* is the Black-Scholes value of all options held by employee. *Fraction of unvested options* is ratio of the intrinsic value of unvested options to the intrinsic value of all options; variable is set to zero if an employee holds no options. *Value of stock held* is the dollar value of all stock held (401(k), ESPP, ESOP, kept after option exercises, bought on the open market). *Management* is 1 if employee is part of management (department heads, mid-level managers, and executive management). *Risk tolerance* is the logarithm of one plus the maximum price an employee would pay for a 10% chance to win $1,000. *Employee is overpaid* is coded by answers to "Do you believe your fixed annual wages last year were higher or lower than those of employees with similar experience and job descriptions in other companies in your region?"

Variable	Obs.	Mean	Std. dev.	25th	Median	75th
Vote to sell at 50% premium	8,680	0.422	0.494	0	0	1
B-S value of options ($000's)	8,680	376.114	836.660	0	146.556	389.721
Intrinsic value of options ($000's)	8,680	173.103	483.915	0	50.000	150.000
Fraction of unvested options	8,680	0.442	0.330	0	0.500	0.750
Value of stock held ($000's)	8,680	88.385	307.425	12.500	25.000	75.000
Management	8,680	0.157	0.364	0	0	0
Female	8,680	0.309	0.462	0	0	1
BA degree	8,680	0.630	0.483	0	1	1
Graduate degree	8,680	0.255	0.436	0	0	1
Age	9,404	39.244	8.884	33	39	45
Annual income ($000's)	8,680	77.162	49.733	37.500	70.000	100.000
Risk tolerance	8,680	2.584	1.401	2.397	3.045	3.932
Employee is overpaid (-2 to 2)	8,168	-0.227	0.988	-1	0	0

Table 5. Stock Options and Employee Attitudes Toward M&As.

The table reports the marginal effects from the probit model estimation, where the dependent variable is *vote to sell at a 50% premium.* The sample consists of all employees in column 1, only non-managerial employees in column 2, and employees who say their wages were higher or much higher than those of employees with similar experience and job descriptions in other companies in their region in column 3. Variable definitions are provided in Table 4. Specifications include firm fixed effects. T-statistics are based on standard errors clustered by the firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	All employees	Non-managerial employees	Overpaid employees
	(1)	(2)	(3)
B-S value of options ($M)	0.003	-0.003	-0.015**
	(0.55)	(-0.72)	(-2.21)
Fraction of unvested options	-0.052***	-0.064***	-0.154***
	(-4.85)	(-3.83)	(-4.54)
Value of stock held ($M)	0.027***	0.050***	0.035**
	(7.53)	(10.79)	(2.40)
Management	0.017		0.061***
	(0.74)		(2.87)
Female	-0.106***	-0.111***	-0.067*
	(-3.83)	(-4.49)	(-1.82)
BA degree	-0.002	-0.006	-0.002
	(-0.08)	(-0.23)	(-0.10)
Graduate degree	0.041***	0.032***	0.090***
	(5.28)	(3.66)	(20.10)
Age	-0.020***	-0.014***	-0.024***
	(-5.12)	(-4.13)	(-3.19)
Age squared/100	0.017***	0.017***	0.028***
	(5.28)	(4.12)	(3.27)
Log(annual income)	0.024	0.018	0.005
	(1.14)	(0.89)	(0.14)
Risk tolerance	0.011***	0.009***	0.007***
	(3.21)	(2.79)	(3.69)
Employee is overpaid	-0.021***	-0.024***	
	(-3.76)	(-4.30)	
Observations	8,680	7,314	1,919
Log-likelihood	-5749.97	-4834.11	-1265.09

Table 6. Deal Value Creation and Employee Losses.

Panel A of the table reports estimates of the OLS regressions of the deal value creation ($M) on firm characteristics, deal characteristics, and employee losses from modified stock options. The sample consists of completed M&A deals announced between January 2006 and December 2014, in which target firms are public firms in the United States with non-missing data on the number and value of outstanding stock options and the offer premium. All variables are described in Appendix B. All specifications include industry fixed effects (Fama-French 17) and year fixed effects. T-statistics based on heteroskedasticity-consistent standard errors clustered by the acquirer are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Panel B of the table reports Oster's δ corresponding to specifications in Panel A. We use the input of $R_{max}= 1.3\widetilde{R}$, where $\widetilde{R}$ is the largest empirically observed R-squared (20.65%).

Panel A: Estimation Results	(1)	(2)	(3)	(4)
Predicted loss from modified options	3.833***	3.059***		
	(6.57)	(6.29)		
Predicted loss from modified options in a cashout			3.643***	2.721***
			(4.05)	(3.60)
Tender offer		-143.594		-133.414
		(-0.89)		(-0.91)
Cash payment		280.160		291.650
		(1.14)		(1.27)
Toehold		-917.759		-786.333
		(-1.36)		(-1.26)
Diversifying deal		-218.489*		-221.506*
		(-1.91)		(-1.95)
Combined firm size		163.175*		150.870*
		(1.86)		(1.93)
Relative target size		9.420***		8.076**
		(2.85)		(2.20)
M/B		-77.096**		-80.143**
		(-2.11)		(-2.33)
ROA		373.979		343.737
		(0.83)		(0.80)
R&D		483.275		423.167
		(0.77)		(0.70)
Leverage×100		16.074		16.237
		(1.49)		(1.56)
Observations	493	493	511	511
R-squared	10.49%	20.65%	10.28%	20.16%
Panel B: Oster's δ with $R_{max} = 1.3\widetilde{R}$	(1)	(2)	(3)	(4)
Predicted loss from modified options	3.551	4.709		
Predicted loss from modified options in a cashout			12.216	3.994

Table 7. Combined Deal Return and Employee Losses.

Panel A of the table reports estimates of the OLS regressions of the combined deal return on firm characteristics, deal characteristics and employee losses from modified stock options. The sample consists of completed M&A deals announced between January 2006 and December 2014, in which target firms are public firms in the United States with non-missing data on the number and value of outstanding stock options and the offer premium. All variables are described in Appendix B. All specifications include industry fixed effects (Fama-French 17) and year fixed effects. T-statistics based on heteroskedasticity-consistent standard errors clustered by the acquirer are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Panel B of the table reports Oster's δ corresponding to specifications in Panel A. We use the input of $R_{max} = 1.3\widetilde{R}$, where $\widetilde{R}$ is the largest empirically observed R-squared (42.22%).

Panel A: Estimation Results	(1)	(2)	(3)	(4)
Predicted loss from modified options/total mv	5.183***	2.007**		
	(5.42)	(2.23)		
Predicted loss from modified options in a cashout/total mv			5.178***	1.937**
			(6.60)	(2.16)
Tender offer		-1.011		-0.745
		(-1.28)		(-0.93)
Cash payment		2.031**		2.180***
		(2.56)		(2.92)
Toehold		-1.499		-0.669
		(-0.81)		(-0.41)
Diversifying deal		-0.408		-0.752
		(-0.72)		(-1.34)
Combined firm size		-0.223		-0.216
		(-1.41)		(-1.13)
Relative target size		0.192***		0.171***
		(9.44)		(7.98)
M/B		-0.202		-0.223
		(-0.97)		(-1.13)
ROA		-0.509		-0.569
		(-0.38)		(-0.41)
R&D		-6.287**		-6.955***
		(-2.53)		(-2.76)
Leverage		2.110*		2.055*
		(1.69)		(1.69)
Observations	493	493	511	511
R-squared	17.21%	42.22%	22.41%	40.76%

Panel B: Oster's δ with $R_{\max} = 1.3\widetilde{R}$	(1)	(2)	(3)	(4)
Predicted loss from modified options/total mv	10.254	1.325		
Predicted loss from modified options in a cashout/total mv			N/A	0.901

Table 8. Offer Premium and Employee Losses (OLS).

The table reports estimates of the OLS regressions of the offer premium on firm characteristics, deal characteristics, and employee stock option variables. The dependent variable is the acquisition premium provided by the SDC, calculated as the ratio of the initial offer price divided by the target's stock price four weeks before the deal announcement, minus one, and all multiplied by 100. The sample consists of completed M&A deals announced between January 2006 and December 2014, in which target firms are public firms in the United States with non-missing data on the number and value of outstanding stock options and the offer premium. All specifications include industry fixed effects (Fama-French 17) and year fixed effects. T-statistics based on heteroskedasticity-consistent standard errors clustered by the acquirer are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. All other variables are described in Appendix B.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Predicted loss from modified options/tgt mv	1.136***						
	(2.62)						
Predicted loss from modified options in a cashout/tgt mv		1.098***					
		(2.67)					
Canceled options/tgt shares			0.889***				
			(4.48)				
Out-of-the-money options/tgt shares				0.894***		0.095	
				(4.76)		(0.26)	
Cancel options				3.596*	4.355**	0.108	1.175
				(1.71)	(2.10)	(0.05)	(0.51)
Value of outstanding options/tgt mv					0.475*		-0.153
					(1.76)		(-0.41)
Cancel options × out-of-the-money options/tgt shares						0.948**	
						(2.40)	
Cancel options × value of outstanding options/tgt mv							0.693**
							(2.39)
Tender offer	5.522*	5.377*	5.654*	4.829	7.695**	4.528	7.567**
	(1.78)	(1.77)	(1.84)	(1.57)	(2.43)	(1.48)	(2.39)
Cash payment	8.541***	9.332***	8.040***	7.804**	7.340**	7.742**	7.495**
	(2.90)	(3.18)	(2.72)	(2.51)	(2.27)	(2.49)	(2.33)
Toehold	9.466*	7.656	7.824	9.945*	11.760**	8.595*	11.545**
	(1.73)	(1.46)	(1.51)	(1.79)	(2.09)	(1.77)	(2.05)
Public acquirer	3.095	3.327	3.719*	4.763**	4.478**	4.617**	4.310**
	(1.52)	(1.56)	(1.84)	(2.22)	(2.09)	(2.18)	(2.04)
Diversifying deal	2.619	2.549	2.780	3.263*	3.682**	3.301*	3.740**
	(1.38)	(1.38)	(1.49)	(1.82)	(2.00)	(1.83)	(2.04)
Target size	-3.071***	-3.335***	-3.050***	-3.139***	-3.233***	-3.078***	-3.233***
	(-4.87)	(-5.30)	(-5.02)	(-4.96)	(-5.07)	(-4.90)	(-5.09)
M/B	-2.871***	-2.493***	-2.205**	-1.607	-3.546***	-1.629	-3.351***
	(-3.20)	(-2.69)	(-2.26)	(-1.60)	(-3.72)	(-1.62)	(-3.48)
ROA	-11.714	-13.992*	-11.310	-5.833	-13.930*	-6.091	-14.735*
	(-1.49)	(-1.82)	(-1.46)	(-0.77)	(-1.77)	(-0.81)	(-1.87)
R&D	12.251	7.544	14.582	12.688	15.201	13.694	14.711
	(0.92)	(0.55)	(1.08)	(0.91)	(1.09)	(1.01)	(1.06)
Leverage	15.330***	16.877***	17.041***	16.779***	18.594***	16.432***	18.628***
	(3.04)	(3.32)	(3.28)	(3.14)	(3.53)	(3.09)	(3.56)
Observations	1,189	1,245	1,205	1,171	1,245	1,171	1,245
R-squared	19.80%	19.43%	21.57%	22.28%	19.51%	22.80%	19.78%

Table 9. Effect of Employee Losses on Offer Premium (Instrumental Variables).

The table presents the results of LIML estimation of the deal offer price premium and employee stock options use. Odd columns present the results of the first equation, where dependent variable is the *predicted loss from modified options/tgt mv*. Even columns present the estimates of the model with the *predicted loss from modified options/tgt mv* endogenized. The excluded instrument is *neighbor firms option use (outside firm industry)*, which is the average ratio of the number of options outstanding to the shares outstanding, calculated for all Compustat firms excluding the firm itself (and firms from the same 1-digit SIC industry), for a given three-digit zip code and year. The estimation includes intercept, year fixed effects, industry fixed effects (Fama-French 17), and all control variables from Table 8. T-statistics based on heteroskedasticity-consistent standard errors clustered by the acquirer are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Predicted loss from modified options/tgt mv (1st stage)	Offer premium (2nd stage)	Predicted loss from modified options/tgt mv (1st stage)	Offer premium (2nd stage)
Predicted loss from modified options/tgt mv		0.609**		0.635**
		(2.37)		(2.15)
Neighbor firms option use	0.075***			
	(4.81)			
Neighbor firms option use outside firm industry			0.062***	
			(4.05)	
Observations	1,180	1,180	1,178	1,178
First-stage R^2	30.41%		30.01%	
(first-stage joint F-test)	(11.22 p-val<0.001)		(11.11 p-val<0.001)	
Partial R^2 of excluded instrument	1.97%		1.50%	
Weak identification test (Craigg-Donald F-stat)	23.14 (p-val<0.001)		16.42 (p-val<0.001)	

Table 10. The Acquirer Market Price Reaction to the M&A Announcement.

This table reports estimates of the OLS regressions of the acquirer's market price reaction to the M&A announcement on employee losses from modified stock options. All variables are described in Appendix B. The specifications include industry fixed effects (Fama-French 17) and year fixed effects. T-statistics based on heteroskedasticity-consistent standard errors clustered by the acquirer are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Predicted loss from modified options/acq mv	1.475*			
	(1.92)			
Predicted loss from modified options in		0.424		
a cashout/acq mv		(0.63)		
Cancel options			1.553**	1.516**
			(2.10)	(2.03)
Value of outstanding options/acq mv			35.405	32.353
			(1.14)	(0.99)
Cancel options × value of outstanding				1.475
options/acq mv				(0.87)
Tender offer	-1.028	-0.772	-0.955	-0.964
	(-1.07)	(-0.82)	(-1.04)	(-1.05)
Cash payment	1.451	1.434*	1.142	1.120
	(1.63)	(1.64)	(1.29)	(1.26)
Toehold	-0.237	0.719	0.268	0.261
	(-0.18)	(0.54)	(0.21)	(0.21)
Diversifying deal	-1.113*	-1.345**	-1.203**	-1.196**
	(-1.75)	(-2.15)	(-2.00)	(-1.98)
Combined firm size	-0.036	-0.070	-0.028	-0.037
	(-0.20)	(-0.38)	(-0.16)	(-0.21)
Relative target size	-0.039	-0.036	-0.023	-0.025
	(-1.53)	(-1.24)	(-0.79)	(-0.81)
M/B	-0.836***	-0.912***	-0.904***	-0.896***
	(-3.80)	(-4.24)	(-3.98)	(-3.93)
ROA	-3.444**	-3.310**	-3.785**	-3.762**
	(-2.16)	(-2.02)	(-2.34)	(-2.32)
R&D	-8.236***	-7.927***	-7.963***	-7.970***
	(-2.97)	(-2.85)	(-2.90)	(-2.90)
Leverage	2.059*	2.094*	2.539**	2.590**
	(1.74)	(1.77)	(2.35)	(2.37)
Observations	493	511	518	518
R-squared	16.12%	15.18%	16.76%	16.80%

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