

CEO Preferences and Acquisitions*

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This paper explores the impact of target CEOs' retirement preferences on takeovers. Mergers frequently force target CEOs to retire early, and CEOs' private merger costs are the forgone benefits of staying employed. Using retirement age as a proxy for CEOs' private merger costs, we find strong evidence that target CEO preferences affect merger patterns. The likelihood of receiving a successful takeover bid is sharply higher when target CEOs are close to age 65. Takeover activity is elevated in a narrow window around age 65, with only a small gradual increase as CEOs approach retirement age. Takeover premiums and target announcement returns are similar for retirement-age and younger CEOs, implying that retirement-age CEOs are able to increase firm sales without sacrificing premiums. Better corporate governance is associated with more acquisitions of firms led by young CEOs, and with a smaller increase in deals when CEOs reach retirement age.

From 1990 to 2012, close to 9,700 public U.S. firms were acquired. For the 6,418 target firms with available data, target shareholders received a median premium of 36% over the pre-announcement share price, and the total value increase from all deals combined was about \$1.7 trillion. These magnitudes suggest that the takeover market has great potential to create shareholder value. This paper provides evidence that the career concerns and retirement preferences of target firms' CEOs have first-order effects on takeover decisions, leading to outcomes that are unlikely to be in the target shareholders' best interest.

The target firm's CEO is, arguably, one of the most important actors in the takeover market. The CEO plays a key role in his firm's decisions leading up to a bid (e.g., the decision to seek out a buyer, or to initiate merger talks), and once a bid is made, the CEO leads his firm's response and its negotiations with buyers (Graham, Harvey, and Puri (2013)). Given this unique role, it is interesting to note that target CEOs' career concerns and retirement preferences are likely to be at odds with shareholders' objectives: target CEOs typically lose their jobs during or shortly after a takeover, and in only a handful of cases does the departing CEO find a new position in a public firm (see, for example, Martin and McConnell (1991) and Agrawal and Walkling (1994)). This suggests that mergers can represent serious setbacks to target CEOs' careers. Though most CEO compensation contracts recognize these costs – they include golden parachutes or bonuses conditional on mergers – it is unclear to what extent they succeed at eliminating the inherent incentive problem.

In this paper, we test whether target CEOs' retirement preferences affect the incidence and the pricing of takeovers. If mergers force target CEOs to retire early, the CEOs' private merger costs are the forgone benefits of staying employed until the planned retirement date. Though retirement plans differ across individuals, research in labor economics shows that a disproportional fraction of workers retires at the age of 65. This effect cannot be fully explained by monetary incentives, including social security benefits or Medicare, which suggests behavioral explanations related to customs or social norms. If CEOs similarly favor 65 as retirement age, this preference should be reflected in their private merger costs, and – provided that these costs affect merger decisions – in the observed merger patterns. Specifically, one should observe an increase in merger activity as CEOs approach 65, or a discrete jump in this activity around the age-65 threshold (we derive these predictions in Section 1).

We find strong evidence that target CEOs' retirement preferences affect merger patterns. In data on U.S. public firms from 1989 to 2007, the likelihood of a firm being acquired increases sharply when its CEO reaches retirement age. Controlling for CEO and firm characteristics and the 1997-99 merger wave, the implied probability that a firm receives a successful takeover bid is close to 4.4% per year for CEOs just below retirement age, but it increases to 5.8% for CEOs aged 64-66. This corresponds to a 32% increase in the odds of a sale, and the increase is statistically significant at the 1% level. (Henceforth, we refer to the increase in takeover frequency for firms with CEOs aged 64-66 as the "age-65 effect", and we use "retirement age" as synonymous with age 64-66.) The increase in takeover activity appears abruptly at retirement age, with only a small gradual increase as CEOs approach age 65. The effect is similar if all bids instead of only successful bids are included, and it remains economically large and significant even when CEO age and age squared are included separately as controls. These results show that bidders are more likely to target firms with retirement-age CEOs, possibly due to these CEOs' greater willingness to accept takeover bids.

The increase in takeover activity at retirement age is not uniform across types of firms and time. First, during the merger wave of the late 1990s, the peak in takeover activity shifted from the retirement-age group (64-66) to the age group immediately below it. This shift may have been caused by target CEOs responding to the increased benefits from merging (which fueled the merger wave) by selling their firms at a younger age.

Second, the age-65 effect on takeover frequencies is significantly weaker among better governed firms. The empirical measures of good governance used are stock ownership by the CEO, by blockholders, and by directors, board size, board independence, and CEO-chairman duality.¹ Five out of the six good-governance measures reduce the spike in takeover activity at retirement age. When the six measures are combined into a good-governance index, a one standard deviation increase in the index around its mean reduces the effect of retirement age on takeover frequencies from 2.4% to 0.7% ($t=2.45$). This finding points towards agency conflicts between shareholders and target CEOs as the explanation for the age-65 effect. The

¹ Several prior studies offer evidence that better corporate governance is associated with better outcomes for target shareholders in mergers. See, for example, Shivdasani (1993), Brickley, Coles, and Terry (1994), Cotter, Shivdasani, and Zenner (1997), and North (2001).

result also underscores the importance of corporate governance in aligning CEOs with shareholders.

We next explore how target shareholders' gains from acquisitions change around retirement age. One might expect that retirement-age CEOs – because of their lower personal costs – would be willing to accept less valuable deals, and thus would experience lower average shareholder gains. However, empirically, we find that takeover premiums and target announcement returns are slightly (but insignificantly) *higher* for retirement-age than younger CEOs. This finding, combined with the takeover frequency results, suggests that retirement-age CEOs are able to increase the frequency of firm sales by almost one-third without sacrificing premiums. One explanation, consistent with the governance results described earlier, is that young CEOs are reluctant to sell their firms, and that weak boards allow them to reject value-increasing deals. More broadly, the evidence raises the possibility that the overall frequency of takeovers might be significantly lower than optimal for target shareholders, suggesting that managerial self-interest is a first-order impediment to value-increasing business combinations.

Finally, it is interesting to note that acquirer announcement returns appear unrelated to the age of the target CEO. Hence, there is no evidence that the large increase in firm sales at retirement age is associated with weaker bargaining by targets or with larger gains for acquirers.

Section 4 evaluates different explanations for the change in merger patterns as target CEOs reach retirement age. Because takeover activity is elevated in a narrow window around age 65, it is difficult to come up with explanations that are unrelated to CEO retirements. There is, however, more than one channel through which CEOs' desire to retire at 65 might affect takeover activity. We find little support for the alternative hypotheses in the data. First, retirement-age CEOs appear to be no more frequent targets of disciplinary takeovers than younger CEOs. Second, there is no evidence that the more frequent takeovers of firms with retirement-age CEOs are due to CEOs' desire to cash out their illiquid stock holdings. Third, it is possible that retirement-age CEOs sell their firms more frequently in order to solve succession problems. However, we find no evidence that the retirement-age effect on takeovers is larger in firms or industries in which we expect succession problems to be more severe.

This paper has a number of broader implications. A growing literature in corporate finance examines the effects of executives' personal attributes – including risk aversion, overconfidence, or life experience – on corporate finance decisions (Bertrand and Schoar (2003), Malmendier and Tate (2005, 2008), Malmendier, Tate, and Yan (2011), Schoar and Zuo (2011)). Our paper extends this literature with evidence that CEOs' retirement preferences have a significant and systematic effect on the decision to sell a public firm. The preferences we examine likely arise from societal norms that are known to influence the retirement decisions of executives and employees. However, in our setting, these norms affect not only CEOs' personal decisions of when to retire but also the decisions of whether (or when) to sell their firms.

The costs of this behavior for target shareholders could be large. In some cases, the takeover may simply be delayed; in others the opportunity to sell the firm at a premium may vanish by the time the CEO is ready to retire. Moreover, the evidence in this paper makes it likely that CEO preferences and attributes affect capital allocation choices more broadly and in ways that are detrimental to shareholders. The importance of these effects merits further examination and may require a revision of the standard corporate finance model in which managers maximize shareholder value or their own personal wealth.²

This paper also offers a different and arguably important perspective on the discussion of managerial career concerns and horizon problems. Holmström (1982) and Gibbons and Murphy (1992) argue that agency problems worsen as managers approach retirement and care less about their career prospects. Dechow and Sloan (1991) provide consistent evidence that older managers focus excessively on actions with short-term gains. In contrast, our results suggest that a short horizon can improve corporate decisions. If CEOs are generally reluctant to sell their firms because of the associated loss of rents, an imminent retirement mitigates this loss and reduces resistance to takeovers. More generally, many firm-value maximizing choices, such as improving corporate governance or eliminating pet projects, are associated with future costs to CEOs. Such costs should be less important to CEOs at the end of their careers.

² The literature on agency conflicts in mergers and acquisitions has long recognized that managers' self-interest might affect M&A behavior. However, direct evidence on the role of CEO preferences in merger decisions is rare, as we discuss in more detail below.

Finally, the paper also contributes to the literature on agency conflicts in merger and acquisitions. Theoretical models of mergers frequently start with the assumption that target CEOs' preferences affect M&A decisions (e.g., because of private benefits of control). However, because preferences are unobservable, direct empirical evidence on the role of managers' preferences in mergers is almost non-existent.³ Instead, the literature has focused on the effects of target CEOs' explicit incentives, such as equity stakes, on mergers.⁴ For example, Mikkelsen and Partch (1989) and Song and Walkling (1993) show that target managers' equity holdings are negatively related to the probability of a takeover bid, while Ambrose and Megginson (1992) find no relation, and Morck, Shleifer, and Vishny (1988) a positive one. Stulz, Walkling, and Song (1990) and Song and Walkling (1993) document a positive correlation between target managers' equity stakes and takeover premiums, while Moeller (2005) finds a negative relation. Walkling and Long (1984), Morck et al. (1988), and Cotter and Zenner (1994) find that managers with smaller equity stakes put up more resistance to takeover bids. Finally, both Wulf (2004) and Barger, Schlingemann, Stulz, and Zutter (2010) examine the retention of target CEOs by the merged firm. Wulf, in a small sample of mergers of equals, finds a negative relation between target CEO retention and takeover premiums, while Barger et al., in a broader sample, find no evidence that target CEOs trade lower premiums for continued employment.

While the associations between target CEO incentives and mergers documented in prior studies are interesting, they are difficult to interpret. Both equity holdings and offers of post-merger employment are choice variables, are determined jointly with other merger decisions, and can be adjusted quickly by boards. As a result, both variables are likely to be correlated with prior performance, CEO quality, CEO power, and many other unobservable factors that are themselves likely to affect merger patterns.

In comparison, using the presence of a retirement-age CEO as a proxy for low career costs is attractive. The age of the target CEO is not the result of immediate choices by the

³ Malmendier and Tate (2008) show that optimistic CEOs are more likely to engage in acquisitions, a result arguably caused more by differences in beliefs than in preferences. Bertrand and Schoar (2003) show that a given CEO's propensity to engage in acquisitions persists across different firms, which might be due to persistent differences in beliefs, preferences, or skills.

⁴ A large literature examines the effects of *bidder* CEO incentives on mergers. See, for example, Lewellen, Loderer, and Rosenfeld (1985), Morck, Shleifer, and Vishny (1990), Denis, Denis, and Sarin (1997), Datta, Iskandar-Datta, and Raman (2001), Grinstein and Hribar (2004), Harford and Li (2007), and Yim (2013).

parties negotiating the deal, and changing CEO age requires replacing the CEO. Moreover, as we argue in more detail in the next section, preferences are likely to change for at least some CEOs around age 65, making CEO age a useful proxy for otherwise unobservable preferences. Finally, the fact that merger patterns change *abruptly* around age 65 suggests that we are in fact capturing an effect of CEO preferences: any other determinants of mergers that are correlated with CEO age are unlikely to change discretely just because the CEO reaches retirement age.⁵

The observed effects of retirement-age CEOs on mergers are nevertheless not the true causal effects. Instead, what we observe is the combined effect of changing CEO preferences *and* of boards' reactions to them. There are at least two mechanisms at work that render retirement-age CEOs endogenous: First, boards decide to have a retirement-age CEO. CEOs are bundles of many attributes, making it impossible to have CEOs who are optimal on all dimensions at all times, but CEO age is one of the attributes boards are likely to consider. Second, boards can adjust the terms of CEO compensation contracts, and especially of golden parachutes, to offset CEO preferences that change with CEO age. If career concerns cause younger CEOs to be reluctant to sell their firms, boards can mitigate this through monetary incentives. If golden parachutes perfectly compensated CEOs for the loss of future income (and loss of other benefits) associated with being acquired, one should see no effect of CEO age on mergers.⁶ Our empirical evidence shows that golden parachutes, despite being a standard element of CEO compensation contracts, do not eliminate the effect of CEOs' retirement preferences on mergers.⁷ However, the observed effects of CEO age should be even larger without the countervailing effects of golden parachutes.

The remainder of the paper is organized as follows. Section 1 discusses motivating evidence and develops the hypotheses. Section 2 describes the data and sample construction, while Section 3 presents the main empirical results. Section 4 examines different

⁵ A small literature has started to document effects of CEO preferences on firm behavior. Cronqvist, Makhija, and Yonker (2012) document a connection between CEOs' corporate and personal leverage choices. Cain and McKeon (2012) link CEOs' decisions to engage in high-risk leisure activities to their managerial risk taking.

⁶ See Knoeber (1986), Harris (1990), and Eisfeldt and Rampini (2008) for models of optimal golden parachutes.

⁷ For tax reasons, golden parachutes are restricted to three times annual cash compensation in most firms. See Cotter and Zenner (1994) and Hartzell, Ofek, and Yermack (2004) for empirical evidence.

explanations for the retirement-age effect on mergers, Section 5 examines the adoption of takeover defenses, and Section 6 concludes.

1 CEOs' private merger costs and the age-65 effect

1.1 CEO's private merger costs

The prior literature shows that target CEOs typically lose their jobs during or shortly after a takeover, and that the departing CEO only rarely finds a comparable position in a public firm. Walkling and Long (1984), Martin and McConnell (1991), Agrawal and Walkling (1994), Hartzel, Ofek, and Yermack (2004), and Wulf and Singh (2011) all document that target CEOs suffer high turnover rates and poor career prospects following mergers.⁸ This suggests that being the target of a takeover bid can impose large career costs on the target CEO.

In addition, standard CEO compensation practices strongly suggest that acquisitions entail costs for target CEOs. Most CEO compensation contracts contain golden parachutes and special bonuses that generate additional income for CEOs in case a firm is sold. These widespread arrangements, documented in detail by Hartzel et al. (2004), Bebchuk, Cohen, and Wang (2010) and Fich, Tran, and Walkling (2010), make little sense unless being acquired is costly for target CEOs.⁹

1.2 The age-65 effect

Labor economists have studied retirement decisions for decades and have developed models that predict the retirement patterns of U.S. employees.¹⁰ One puzzling phenomenon is that these models underpredict the frequency of retirements at age 65. For example, in one of the firms studied by Lumsdaine, Stock, and Wise (1996), 48% of men working at 64 retire at

⁸ To verify that the turnover rates are similar in our sample, we use newspaper searches to obtain information on target CEOs' post-merger employment for a subset of our sample. A search of takeover targets from ExecuComp from 1993-2007 yields post-merger employment information for 596 target CEOs. Consistent with the prior literature, in 79% of the deals the target CEO has no executive role in the combined firm 12 months after deal closure. This percentage is increasing in CEO age, but it is higher for CEOs aged 64-66 (97%) than for CEOs aged 59-63 (88%) and for CEOs aged 67 or older (86%).

⁹ In the same vein, Fich, Cai, and Tran (2011) and Heitzman (2011) show that target CEOs often receive unscheduled equity grants during merger negotiations. Their evidence suggests that such grants provide bargaining incentives to CEOs and compensate them for future benefits forfeited because of the merger.

¹⁰ See, for example, Hurd and Boskin (1981), Burtless (1986), Hausman and Wise (1985), Stock and Wise (1990a, 1990b), and the overview in Lumsdaine, Wise, and Stock (1990).

65. This compares to 21% of men working at 63 who retire at 64.¹¹ Lumsdaine et al. test a number of potential explanations for this age-65 effect. They conclude that the magnitude of the spike cannot be explained by the provisions of Social Security, Medicare, or pension plans. They also argue that for a typical worker aged 64 the cost of retiring at 65 vs. the optimal age is quite high, so that “rule-of-thumb” behavior is unlikely to explain the data. They conclude: “We are inclined to attribute the unexplained high age 65 departure rates to an ‘age-65 retirement effect,’ that is, to the influence of custom or accepted practice.” Put differently, employees’ preferences for work vs. retirement seem to change discretely (or at least rapidly) at age 65.

In this paper, we exploit the age-65 effect to test whether CEOs’ personal preferences affect the likelihood and the outcomes of merger bids. Figure 1 shows that CEO turnovers spike at age 65, very similar to the pattern for rank-and-file employees. Moreover, departure rates are consistently higher after age 65 than before.¹² There are a number of possible reasons for why more CEOs retire around age 65. First, CEOs may have internalized customary retirement practices and their preferences for work vs. leisure may change around 65, similar to what the literature suggests for other employees. Alternatively, it may be because boards put pressure on CEOs to retire, perhaps because they believe that CEO skills deteriorate with age, or because they try to improve the incentives of potential successors. If boards’ pressure increases sharply at 65, CEOs may experience a corresponding decline in their utility from employment at that threshold.¹³

What are the implications of the many CEO retirements around age 65 for acquisitions? A straightforward implication is that many CEOs close to age 65 do not lose much by accepting a takeover bid. For younger CEOs, becoming the target of an acquisition usually implies an (involuntary) early retirement, as discussed in the previous section. For a CEO at or close to his expected retirement age, however, the cost of his firm being acquired should be small.

¹¹ See also Phelan and Rust (1997) and Blau (1994).

¹² Similar spikes in CEO turnover at age 65 have been observed by, among others, Gibbons and Murphy (1992), Murphy and Zimmerman (1993), and Weisbach (1995).

¹³ Mandatory retirement ages, which most commonly use 65 as the threshold for CEOs, would similarly limit CEOs’ horizons at this age (Vancil (1987)). Since 1978, the U.S. Age Discrimination in Employment Act prohibits mandatory retirement of “executives and high policy makers” at ages below 65, which implies that any mandatory retirements for CEOs must be at or above 65.

If CEOs are powerful enough to impose their personal preferences onto their firms' policies, acquirers should prefer target CEOs who are ready to retire. The exact effect of target CEO age on acquisition patterns around age 65 depends on why exactly CEOs retire at this age. If CEOs' preference for work over leisure gradually declines as they approach 65, their willingness to sell their firm should gradually increase, and so should the frequency of acquisition bids. Similarly, if CEOs' are concerned about the loss of future income due to an involuntary early retirement, this concern should gradually diminish as they approach their retirement, again causing a gradual increase in acquisitions. However, if CEOs have a strong preference to stay in office until age 65, or if CEOs are pressured to retire at age 65 even though they still prefer to work, we may observe an abrupt increase in takeover activity as CEOs reach retirement age. Finally, acquirers might find it optimal to wait with an offer until target CEOs reach their desired retirement age, and by doing so cause an abrupt increase in takeover activity at age 65.

Independently of whether CEOs' retirement preferences lead to a gradual or a sudden increase in acquisitions around the age of 65, acquisition frequencies should decline after age 65. If most CEOs of desirable takeover targets sell their firms at age 65 (at the latest), firms run by even older CEOs are likely to either not be desirable targets or to have CEOs who do not want to sell at any age.

1.3 The age-65 effect: additional predictions

1.3.1 Governance

This paper's hypothesis is that the likelihood of a takeover is affected, in part, by the target CEO's retirement preferences. These preferences are likely to be in conflict with the objectives of target shareholders, who want any value-increasing acquisitions to be completed. If the increase in takeover activity at retirement age is due to conflicts of interest between CEOs and shareholders, then this effect should be weaker for better governed firms. Specifically, firms with better governance should see more sales by young CEOs, and a smaller increase in sales at retirement age. We test these predictions in Section 3.2.

These tests are a useful extension of the prior literature on the role of governance in target firms. Several prior studies show that governance quality – including board independence

and the presence of large shareholders – is associated with better outcomes for target shareholders.¹⁴ Our more subtle prediction is that good governance should reduce or even eliminate the increase in firm sales at retirement age. This finding would be more difficult to explain with an omitted factor than the traditional tests, and would therefore provide useful additional evidence that the governance of target firms affects mergers.¹⁵

1.3.2 Merger waves and overvaluation

In the middle of our sample period, merger activity reached unprecedented levels, rising from 25 to 65 mergers per month in the course of the 1990s. This merger wave overlapped with the stock market boom of the late 1990s, during which the S&P500 nearly doubled in the course of three years (see Fig. 2). The literature points to two potential causes of this merger wave. First, a regulatory or technological shock might have increased the synergies from mergers, causing the surge in deals (Mitchell and Mulherin, 1996; Andrade, Mitchell, and Stafford, 2001; Andrade and Stafford, 2004). Second, overvaluation might have prompted some firms to merge to take advantage of their temporarily inflated prices (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004).

In either case, the rise in takeover activity during the late 1990s suggests a rise in the benefits of merging. This has two potential implications for the age-65 effect. First, the target CEOs' private merger costs become relatively less important, causing them to sell their firms earlier than they otherwise would. This suggests a weaker age-65 effect during the merger wave, especially if the additional merger benefits are expected to be short-lived. Second, if young CEOs have been blocking acquisitions of desirable takeover targets before the wave, and if the increased benefits of selling during the wave counteract their resistance, the rise in merger activity should be especially strong for young CEOs. As a result, the peak in merger activity predicted for CEOs close to 65 might have temporarily shifted to a younger age. To account for this possibility, the analysis below allows for the relation between CEO age and mergers to differ between the merger wave and other years.

¹⁴ See, for example, Shivdasani (1993), Brickley, Coles, and Terry (1994), Cotter, Shivdasani, and Zenner (1997), and North (2001).

¹⁵ It is possible that firms with poor governance are more likely to adopt stronger takeover defenses, so that any effect of governance on acquisitions works, at least in part, through its effect on takeover defenses.

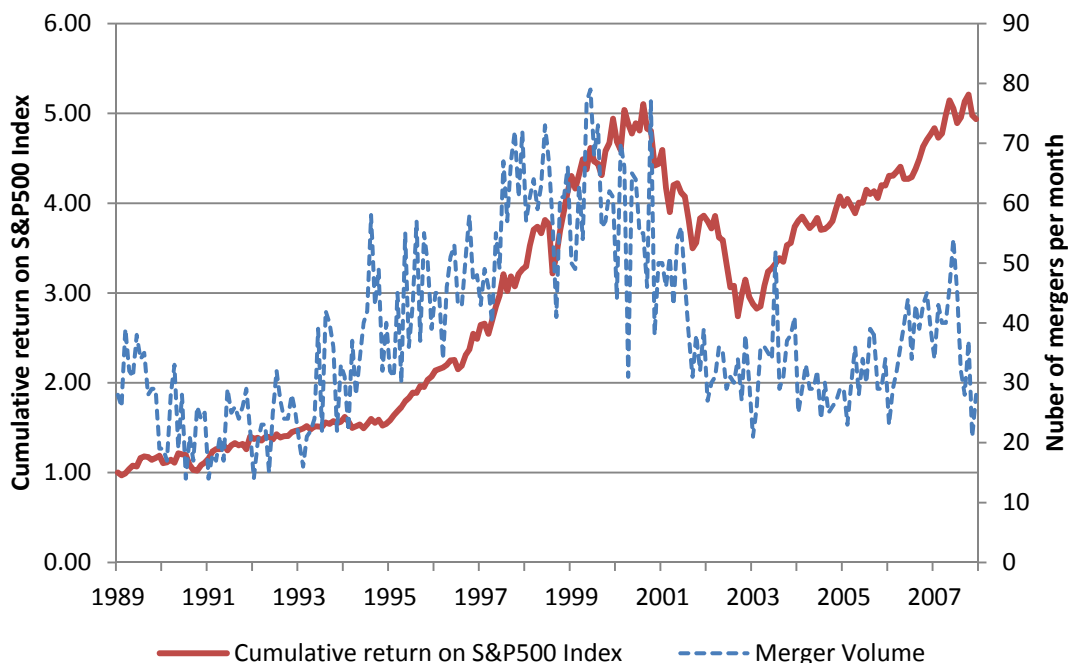


Fig. 2: Merger volumes and S&P 500 index returns. The figure shows the number of mergers per month and the cumulative return on the S&P 500 index from 1989 to 2007. Merger volume is computed as the number of completed takeover bids for U.S. public targets reported by SDC. Only bids for at least 50% of target shares outstanding are included.

2 Data and descriptive statistics

2.1 Data and sample

We obtain a comprehensive panel of CEOs for U.S. public firms from 1989 through 2007 from Edward Fee, Charles, Hadlock, and Joshua Pierce (see Fee, Hadlock, and Pierce (2013)). The dataset was extracted from Compustat Research Insight (formerly Compustat PC Plus) CDs, which contain the names and ages of the top four executives for U.S. listed firms. The sample is limited to firms with at least \$10 million in book assets and excludes financial firms, utilities, and firms incorporated outside the U.S. The timing of each CEO change reported in the database is cross-checked manually using information from 10K statements, annual reports, and news reports in the Factiva database. Further details on the Fee et al. dataset are in Appendix A.

The acquisition data are from the Securities Data Corporation’s (SDC) U.S. Mergers and Acquisitions Database. To identify acquisition targets in the CEO panel, we start with a list of all bids for panel firms with announcement dates during the sample period. We exclude

share repurchases, privatizations, exchange offers, recapitalizations, cases in which the bidder already owns 50% or more of the target's equity, and bids with missing data on the amount of target equity sought. The final sample contains 4,145 completed takeover bids for 3,956 firms.¹⁶ Based on this list, we identify the firm-years in the CEO panel in which the firm becomes an acquisition target. This is done in two steps. First, the acquisition indicator is set to one for a fiscal year if the firm receives an ultimately successful takeover bid during that year. Second, if a fiscal year is a firm's final reported year, the acquisition indicator is set to one if the firm receives a successful bid either during that year or within the next year. This second step ensures the inclusion of cases in which the bid announcement occurs after the end of the firm's last reported fiscal year.

This procedure yields 3,397 firm-years in the CEO panel in which a firm is an acquisition target, corresponding to 4.7% of all panel years.¹⁷ After merging with financial statement information from Compustat and monthly stock return data from the Center for Research in Security Prices (CRSP), and after eliminating observations with missing data, the final panel has 56,183 firm-years, 2,966 of which are years in which the firm is a target. The sample used in the takeover premium analysis in Section 3.3 consists of 2,801 completed bids with available control variables and takeover premium data. Takeover premium information comes from SDC or, if missing, is approximated using announcement returns.

Some tests require measures of board structure, CEO ownership, block ownership, and director ownership provided to us by James Linck (see Linck, Netter, and Yang (2008)). The dataset was compiled for a large sample of U.S. public firms from 1991 to 2004 using proxy statements available in the Disclosure database. The details of the data construction are described in Appendix A. To combine the governance data with the CEO panel, we merge each fiscal year on the panel with governance variables measured in the prior fiscal year or, if

¹⁶ There are more completed bids than takeover targets for two main reasons: First, SDC and Compustat sometimes disagree as to which of the merging firms is the target vs. the acquirer, with Compustat retaining the SDC target as the surviving firm after the merger. Second, some acquirers purchase less than 100% of the target's equity, allowing the target to survive as a public firm. Both situations make it possible for the same target to receive a second completed bid later. All the paper's results are similar if targets with multiple completed bids are excluded from the sample.

¹⁷ Some sample firms received acquisitions bids in years in which they are not included in the CEO panel. Also, a few firms received more than one bid during a single year. This explains the difference between the total number of bids and the number of firm-years classified as bid years.

not available, in the fiscal year twice lagged. This procedure results in a panel with a full set of non-missing governance variables of 22,532 firm-years (7,992 firms) from 1992 to 2006.

2.2 *Descriptive statistics*

Descriptive statistics for the full sample and for the sub-sample with available governance data are in Table 1. The average CEO is 54.1 years old and has been in office for 6.2 years (the medians are 54.0 and 4.0). The firms with available governance data are somewhat larger and have slightly older and more seasoned CEOs. The average firm has 7.9 directors on its board, 32% of whom are insiders (the medians are 7.0 and 29%). The CEO is chairman of the board in 62% of the sample. Blockholders hold, on average, 34% of the firm's equity, while the average equity ownership by the CEO is 5.5% (the median is only 0.9%). These values are similar to those reported in Linck et al.

Table 2a shows descriptive statistics for sub-samples of firm-years based on CEO age, and Table 2b does so for firms that are takeover targets in that year. Importantly, firms run by CEOs aged 64-66 are similar to firms run by CEOs aged 59-63, the next lower age group. Table 2b shows that targets with retirement-age CEOs are somewhat smaller and have slightly higher book-to-market ratios. The two age groups are similar with respect to the proportion of cash-only acquisitions, hostile takeovers, tender offers, the incidence of toeholds, and the incidence of takeover contests. There is a noticeable difference in the frequency of LBOs, which is 12% for targets run by retirement-age CEOs but only 7% for targets run by CEOs aged 59-63. It is possible, and would be consistent with this paper's hypothesis, that private-equity sponsors seek out targets with CEOs who have reached retirement age. Finally, Table 2b shows that targets run by CEOs who are 67 or older are substantially smaller and earn lower takeover premiums and announcement returns than targets led by retirement-age CEOs.

3 **Retirement age and takeovers**

3.1 *The retirement age effect*

This section establishes the effect of retirement-age CEOs on the likelihood of receiving a successful acquisition bid. Using the panel data set described in Section 2.1, we estimate a logit model with the dependent variable equal to one if a firm becomes the target of an ultimately completed bid in a given fiscal year. The results are in Table 3.

The main variable of interest is the retirement-age indicator RET_AGE, which is equal to one if the CEO is of age 64-66 at the time of the bid. The first four regressions, in addition to firm and CEO characteristics, include dummy variables for other CEO age groups, and the last four regressions control separately for CEO age and age squared. The analysis allows the effect of retirement age on bid frequencies to differ between the merger wave of 1997-99 and other years.

Table 3 shows that the likelihood of receiving a successful takeover bid increases sharply at retirement age. The increase appears to be discrete, with a much smaller gradual rise as CEOs approach retirement age, and it is caused entirely by takeovers outside of the merger wave. In the first regression, the coefficient on the retirement-age indicator is positive and highly significant ($t=4.08$), while the coefficient on the interaction with the merger wave dummy is negative ($t=-2.49$).¹⁸ The second regression forces the effect of retirement age on bids to be the same throughout the sample period, which makes the retirement-age effect smaller but leaves it strongly significant ($t=2.66$).

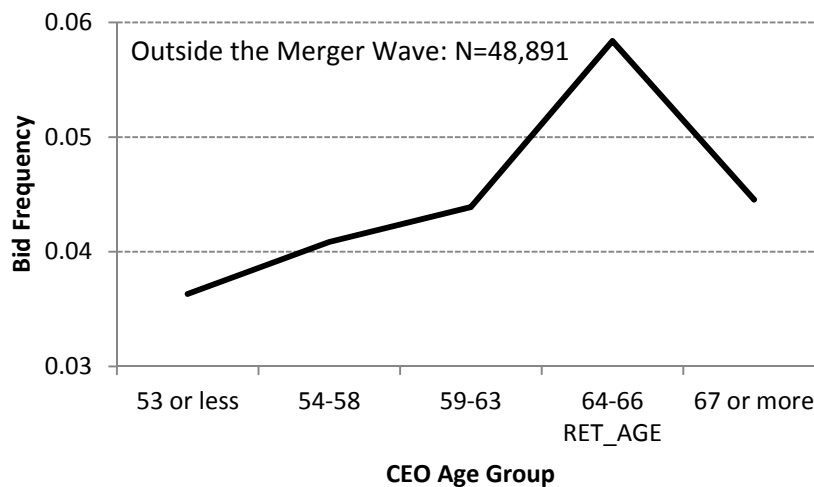


Fig. 3a: Implied bid frequencies outside the merger wave. The figure shows the frequencies of successful bids for different CEO age groups implied by column 3 of Table 3.

The next two columns show separate regressions for the sample without the merger wave and for only the merger wave. The implied bid frequencies, calculated at the means of the

¹⁸ The t-statistic for the difference in marginal effects of the retirement age indicator during and outside the merger wave (estimated at the mean of all control variables) is -2.05.

control variables, are plotted in Figs. 3a and 3b. Outside the merger wave, the probability of a successful bid is 4% per year for CEOs in the 54-58 age group and 4.4% in the next older age group (59-63). The probability of a bid increases sharply to 5.8% at retirement age (a 32% increase in the odds), before falling again to 4.5% for CEOs aged 67 or older. There is no comparable jump in bid frequencies for any age group other than at retirement age.

During the merger wave, as shown in Fig. 3b, the probability of younger CEOs receiving a successful bid nearly doubled (e.g., from 4.1% to 8.1% for age 54-58). Even though retirement-age CEOs also received more bids, the increase is substantially smaller (from 5.8% to 6.9%). As a result, bid frequencies peak in the 59-63 age group already. This pattern is consistent with this paper’s hypothesis and the discussion in Section 1.3.2: before the wave, younger CEOs were more likely than retirement-age CEOs to block attractive deals. As the wave set in, the increased benefits from merging counteracted this resistance, leading to larger increases in merger volumes for the younger age groups. Firms run by younger CEOs might have also experienced a greater increase in merger benefits during the wave, contributing to the pattern in Fig. 3b.

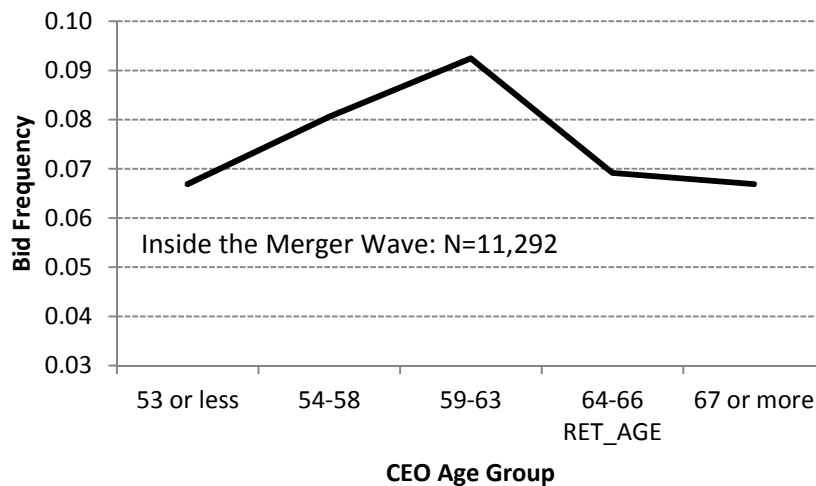


Fig. 3b: Implied bid frequencies inside the merger wave. The figure shows the frequencies of successful bids for different CEO age groups implied by column 4 of Table 3.

The last four columns of Table 3 repeat the analysis but replace the age-group indicators (other than the indicator for retirement age) by linear and quadratic controls for CEO age. Controlling separately for CEO age and age-squared works against finding a retirement-age

effect because CEO age itself should be correlated with CEOs' private mergers costs. Specifically, private merger costs should decline as CEOs get older, independently of any additional age-65 effect, though this relation may be confounded by correlated factors. For example, younger CEOs might have better career opportunities outside their firms and, consequently, view mergers as less costly. Younger CEOs might also lead more dynamic firms and therefore experience a more active takeover market.

These last four regressions show that the retirement-age effect on takeover frequencies is not caused by bids following a linear or even a quadratic trend in CEO age. The increase in M&A activity at retirement age (outside the merger wave) remains large and highly significant in this alternative, and arguably too conservative, specification. This reinforces the result that the incidence of successful takeover bids is elevated in a narrow window around age 65.

The analysis in Table 3 examines the probability of receiving an ultimately completed takeover bid. Table B1 in Appendix B examines separately the probability of receiving a takeover bid (whether completed or not), and the likelihood that a bid, once made, is successful. The results show that, outside of the merger wave, the likelihood of a firm receiving a bid is positively and significantly associated with retirement age. In column 1 of Table B1, retirement age has a t-statistic of 3.38, and the likelihood of a bid increases from 6.2% for the median (54-58) age group to 8.0% for the retirement age group, for an odds ratio of 1.29. In addition, the presence of a retirement-age CEO is also associated with a higher probability that a takeover bid results in a completed merger. Based on column 3, the likelihood of bid completion increases from 76% for bids with a median-age CEO to 82% for bids with a retirement-age CEO ($t=1.92$). These estimates imply a 24% lower probability of bid failure for retirement-age CEOs compared to CEOs in the 54-58 age group.¹⁹ This further supports the existence of a retirement-age effect in acquisitions: acquirers are more likely to approach targets led by retirement-age CEOs, and bids for targets with retirement-age CEOs are more likely to succeed.

¹⁹ This is likely an understatement of the unconditional difference in failure probabilities. Potential acquirers take the target CEO's expected resistance into account when deciding whether to make a bid, so that bids expected to encounter strong resistance are less likely to be made.

3.2 *Corporate governance and the retirement-age effect*

If, as we suspect, the increase in takeover activity at retirement age is due to young CEOs who are reluctant to sell their firms, then firms with better governance should see more sales by younger CEOs, and a smaller increase in sales at retirement age. This section therefore examines whether the relationship between CEO age and acquisition activity varies with the targets' corporate governance.

A number of studies have shown that specific governance features, including higher block ownership, independent and smaller boards, and higher CEO stock ownership, are associated with better outcomes for shareholders (Morck, Shleifer, and Vishny (1988), Yermack (1996), Cotter, Shivdasani, and Zenner (1997), Denis, Denis, and Sarin (1997), and Core, Holthausen, and Larcker (1999)). However, measuring governance quality is challenging. Several studies point out that the cross-sectional variation in governance attributes, such as board size or independence, is to a large degree consistent with firms' choosing their governance efficiently in response to the environments in which they operate (Coles, Daniel, and Naveen (2008), and Link, Netter, and Yang (2008)). In addition, firms typically have multiple governance mechanisms to choose from, so focusing on one mechanism in isolation is likely to provide an incomplete picture of the overall governance strength.

To try to address these challenges, we jointly examine several governance characteristics available for a broad sample of firms. These variables measure stock ownership by the CEO, by blockholders, and by directors, board size, board independence, and an indicator for CEOs who are also chairmen of the board. Each governance measure is orthogonalized with respect to firm and CEO characteristics and the residual (or "abnormal") governance characteristic is used to explain acquisition behavior.²⁰ In addition to examining the variables separately, we combine them into a broader index of governance quality, GOVQ. To construct the index, each of the residual governance measures is sorted into tertiles, with higher values indicating better governance, and the tertile ranks (0-2) are added up. The resulting index is again

²⁰ Using residual governance is necessary because the governance measures are highly correlated with firm characteristics. Simply controlling for firm characteristics in the bid frequency regressions is insufficient because we are interested in the interaction effects of governance with CEO age. We therefore first regress each governance variable on firm and CEO characteristics (listed in Table 4) and then use the regression residuals as governance measures.

orthogonalized with respect to firm and CEO characteristics, and the residual index is used to explain acquisition behavior.

The results are reported in Table 4. Similar to the previous analyses, each regression estimates the likelihood that a firm becomes the target of an ultimately successful takeover bid in a given fiscal year. In addition to the retirement-age indicator and the usual controls, the first regression includes the governance quality index GOVQ and its interaction with retirement age. As predicted, the effect of good governance on bid frequencies is positive ($t=3.69$), and the interaction effect with retirement age is negative and highly significant ($t=-3.17$). The dampening impact of good governance on the retirement-age effect is economically large: increasing GOVQ by one standard deviation around its mean diminishes the marginal effect of RET_AGE on the bid probability from 2.4% to 0.7% ($t=2.45$).²¹

The coefficient on the governance-quality indicator GOVQ itself is positive and significant ($t=3.69$). Table B2 in Appendix B shows that this effect is robust to alternative specifications, in particular to including an indicator for CEOs older than retirement age and interacting this indicator with GOVQ. In this specification, the coefficient on GOVQ, which now measures the effect of better governance for CEOs below retirement age, remains highly significant ($t=3.64$). Hence, as predicted, better governance, as measured by GOVQ, is associated with more sales by CEOs younger than retirement age, and with a smaller increase in sales at retirement age.

The second regression in Table 4 replaces the governance index with its individual components. A higher value of a component indicates better governance. Five out of the six components have a negative interaction coefficient with the retirement-age indicator, suggesting that better governance dampens the increase in acquisitions at retirement age. The strongest negative interaction effects are for CEO-Chairman Separation, Small Boards, and Block Ownership (with t-statistics of -2.02, -2.12, and -1.83, respectively).²² Directors' stock ownership has a positive (but insignificant and close to zero) coefficient on the interaction term. In sum, Table 4 shows that the increase in firm sales at retirement age is significantly

²¹ The marginal effects are evaluated at the means of the control variables and with the merger wave indicator set to zero.

²² The t-statistics for the change in marginal effects caused by a one unit change in the governance variables from one to two, evaluated at the means of the independent variables and with the merger wave indicator set to zero, are -1.78, -1.40, and -1.31, respectively.

smaller for better governed firms, consistent with the hypothesis that the retirement-age effect is due to conflicts of interest between target shareholders and their CEOs.

3.3 *Announcement returns and takeover premiums*

3.3.1 *Target announcement returns and premiums*

We next examine the implications of target CEO age for takeover premiums and for the target's stock price reaction to bid announcements. Three mechanisms suggest *lower* target announcement returns and premiums for retirement-age CEOs. First, the additional deals done around age 65 might be low-synergy deals that only retirement-age CEOs are willing to do but younger CEOs (who suffer higher personal costs) reject. Second, outside investors might (correctly) view bids for firms with retirement-age CEOs as more likely, causing target valuations to increase already ahead of the bid. Third, target CEOs who are ready to retire might bargain less hard and capture a smaller fraction of the synergies for their firms.

Working in the opposite direction, bad corporate governance can create a positive correlation between deals that are rejected by young CEOs and deals with especially high value creation. Badly-governed firms might benefit the most from being acquired but are also most likely to let the CEO reject an offer if he is not yet willing to depart. If (some of) these deals are subsequently done once the CEO reaches retirement age, they would increase the average announcement returns and premiums in the retirement-age group.

Table 5 analyzes how announcement returns and takeover premiums change around retirement age. The sample, described in Section 2.1, consists of 2,801 completed takeover deals. In columns 3 and 6, the sample is restricted to 1,608 firms with public acquirers to allow for additional control variables. The dependent variable in the first three regressions is the bid announcement return $RET(-20,1)$, defined as the target's cumulative market-adjusted stock return from trading day -20 to day +1 after the announcement date. We use the CRSP NYSE/AMEX/NASDAQ value-weighted market index for the market adjustment. The dependent variable in the last three columns is the takeover premium, computed from the closing price on trading day -20 to the final offer price and adjusted for the market return over the same period. Missing takeover premiums are approximated using the (-20,1) announcement returns, and the premiums are truncated at -100% and 200% as suggested by Officer (2003). The average announcement return and the average takeover premium in this sample are 29% and 39%, respectively.

The main result in Table 5 is that announcement returns and takeover premiums for targets with retirement-age CEOs are as high as or higher than for targets with younger CEOs. In the regressions with announcement returns (in percent) as the dependent variable, the coefficients on the retirement-age indicator range from 1.13 to 2.42 and are not statistically significant (t-statistics range from 0.41 to 1.12). In the regressions with takeover premiums (in percent) as the dependent variable, the coefficients on the retirement-age indicator range from 4.91 to 5.52 and are significant in one out of the three specifications (t-statistics from 1.06 to 1.77). These results, combined with those in Section 3.1, show that retirement-age CEOs are able to increase the frequency of firm sales by almost one-third without accepting lower takeover premiums. Consistent with the governance results in the previous section, this suggests that some boards allow younger CEOs to reject value-increasing offers.

Notably, the coefficients on the $AGE \geq 67$ dummy are negative in all six regressions, though are significant only in two of the premium regressions. A decline in premiums in this age group would be consistent with the retirement-age effect if a large fraction of high-synergy targets have been acquired by the time their CEOs reach age 67. Finally, in untabulated announcement return and premium regressions, we have interacted the CEO age-group indicators with the 1997-99 merger wave. The retirement-age effect is qualitatively unchanged: takeover premiums are, on average, 6% higher during the merger wave, but there is no significant difference in this increase between mergers with retirement-age CEOs and younger CEOs.

3.3.2 Price run-ups before the first bid announcement

Announcement returns and takeover premiums can differ across CEO age groups because of differences in pre-bid information leakage or takeover rumors. For example, if investors view firms led by retirement-age CEOs as more likely to receive takeover bids, they might watch these firms more attentively and spot signs of an impending bid earlier. To examine the role of pre-bid price movements, Fig. 4 plots the cumulative industry-adjusted stock returns from trading days -30 to +20 around the first bid announcement for different CEO age groups.

Based on the figure, there are no significant pre-announcement price run-ups before day -20, which is the day from which we measure announcement returns. This is consistent with

Betton et al. (2008) and suggests that the comparison of announcement returns and premiums across CEO age groups is not affected by differences in information leakage or takeover rumors immediately before the announcement.

It is possible that differences in merger expectations formed in the more distant past affect the comparison of announcement returns and premiums across CEO age groups. Section 4.1.1 therefore provides a comparison of long-term pre-bid stock returns across CEO age groups. There are no statistically significant differences in stock returns over the two years before the first bid announcement across CEO age groups, thus again providing no evidence of differences in bid anticipation.²³

3.3.3 *Acquirer gains*

Announcement returns and takeover premiums can also change with target CEO age if different age groups bargain less hard and, as a result, leave more of the takeover gains to acquirers. Table 6 examines the association between target CEO age and acquirer gains. Because of the need to observe acquirer stock returns, the sample consists of 1,577 acquisitions by publicly-held acquirers. The dependent variables are the acquirer announcement returns $RET(-1,1)$ and $RET(-20,1)$, defined as the acquirers' cumulative market-adjusted stock returns over trading days -1 (or -20) through +1 around the first bid announcement date. The regressions use the same control variables as the analysis of target announcement returns in Table 5.²⁴

Based on Table 6, acquirer announcement returns are not significantly related to whether the target CEO is of retirement age. In the regression with 3-day returns (in percent) as the dependent variable, the coefficients on the retirement-age indicator are -1.32 and -1.06 with insignificant t-statistics of -1.25 and -1.12. In the regressions with the (-20,1) announcement returns as the outcome variable, the coefficients on retirement age are even closer to zero and

²³ As an additional test, we calculate average daily market-adjusted stock returns from trading day -150 (-100, or -50) to trading day -21 relative to the announcement date and regress these average returns on CEO age and firm and deal characteristics similar to those in Table 5. These untabulated regressions show no evidence of significantly different price run-ups for targets with retirement-age CEOs.

²⁴ In untabulated robustness tests, we include additional acquirer characteristics: an indicator for deals in which target and acquirer are in the same industry, the acquirer's leverage and volatility in the prior year, and indicators for foreign acquirers and small acquirers (i.e., acquirers in the bottom sample quartile based on market capitalization by year). The inclusion of these controls has no significant effect on the results.

less significant. Hence, there is no evidence that the large increase in firm sales at retirement age is associated with weaker bargaining by targets or with larger gains for acquirers.

Because the total synergies created through acquisitions might systematically vary with CEO age, we also test whether the age of the target CEO affects the *fraction* of the total synergies captured by the acquirer. Following methodology developed by Bradley, Desai, and Kim (1988), Ahern (2012), and Harford, Jenter, and Li (2011), total synergies are defined as the combined changes in bidder and target values around the bid announcements. In untabulated regressions, we find no evidence that acquirers manage to capture a larger fraction of the combined synergies when the target CEO is of retirement age. This again suggests that retirement-age CEOs bargain no less hard than younger CEOs, and that the increase in firm sales at retirement age is not due to retirement-age CEOs offering better deals to acquirers.

4 Alternative (or complementary) explanations for the retirement-age effect

This paper has documented a spike in takeover activity when target CEOs are close to age 65. This pattern is consistent with young CEOs suffering high personal costs from selling their firms and thus being reluctant to do so. Because takeover activity is elevated in a narrow window around age 65, it is difficult to come up with alternative explanations that are unrelated to CEO retirements. There is, however, more than one channel through which CEOs' desire to retire at 65 might affect takeover activity, and this section explores some of these alternative (or complementary) mechanisms.

4.1.1 Disciplinary takeovers

CEOs close to age 65 who are unwilling to retire might experience more frequent disciplinary takeovers, which we define as takeovers aimed primarily at replacing the CEO. If a firm is run by an unsuitable CEO, potential acquirers might refrain from bidding if they expect the CEO to soon retire voluntarily. They may, however, swoop in with an offer once it becomes clear that the CEO intends to stay beyond the expected retirement age. This explanation can generate a spike in takeover activity for target CEOs close to 65, but proposes disciplinary rather than voluntary firm sales as the mechanism behind the spike.

Because disciplinary takeovers are usually preceded by bad performance, we test this hypothesis by examining the long-run pre-bid stock price and operating performance of

takeover targets. Table 7 shows regressions of pre-bid stock returns and return-on-assets (ROA) on the retirement-age indicator, other CEO age controls, and firm and CEO characteristics. Stock price performance is measured as the average industry-adjusted monthly stock return over one or two years ending three months before the first bid announcement. Operating performance is measured as the average ROA over the three years prior to the bid. To conserve on space, only coefficients and t-statistics for the CEO age variables are reported in the table.

The coefficients on the retirement-age indicator are statistically insignificant and are positive in four out of the six regressions. Thus, there is no evidence that retirement-age CEOs perform worse than younger CEOs before receiving successful takeover bids. As an additional test, columns one and two of Table 8 regress the probability of a successful takeover bid on target CEO age and interactions between the retirement-age indicator and past stock returns (column 1) or past ROA (column 2). Both interaction terms are positive and insignificant, suggesting that the retirement-age effect on bids is, if anything, weakly stronger if prior performance is better. This contradicts the hypothesis that the increase in firm sales around age 65 is caused by bad performers. Overall, the analysis provides little support for disciplinary takeovers as an explanation for the increase in takeovers at retirement age.

4.1.2 Firms with succession problems

Some firms with CEOs who want to retire at age 65 may have difficulties finding a successor. Merging with another firm can solve a CEO succession problem by giving the target firm access to the acquirer's managers. This explanation makes CEOs' desire to retire itself the cause of why more firm sales become optimal when CEOs reach age 65.

To explore whether succession problems can explain the spike in acquisitions at retirement age, we use several methods to identify firms for which replacing a retiring CEO may be more difficult. The first approach identifies industries in which CEO talent is scarce as industries with unusually high CEO pay. The measure of abnormal industry-average CEO pay (Industry Pay) is the loadings on industry dummies from a regression of CEO pay on

firm characteristics and 2-digit SIC industry indicators.²⁵ To test whether target CEO age matters more in high-paying industries, column three of Table 8 regresses the probability of receiving a successful takeover bid on CEO age, the usual controls, and the interaction between the retirement-age indicator and Industry Pay. The interaction effect is negative and not statistically significant ($t=-0.96$). The positive coefficient on RET_AGE itself, which now captures the effect of having a retirement-age CEO in an industry with average pay, remains large and significant.

Next, we try to identify extraordinarily skilled individual CEOs who may be difficult to replace. The departure of a highly-skilled CEO can trigger a succession problem if the board insists on a successor who matches the predecessor's ability. The attempt to match ability can be optimal if the firm needs a highly-skilled CEO, or it might reflect board irrationality. The fourth column of Table 8 replaces Industry Pay with CEO Performance, the average industry-adjusted stock price performance over the CEO's tenure. The interaction term is negative and significant ($t=-2.07$), indicating a weaker rather than a stronger retirement-age effect for more successful CEOs.

Boards might find it more difficult to replace CEOs who have been in office for a long time and therefore opt for a company sale when the CEO retires. Column 5 of Table 8 tests whether the retirement-age effect is stronger for CEOs with tenure longer than six years. The interaction term between RET_AGE and Long Tenure is positive but statistically insignificant.²⁶

In the same vein, boards might find it more difficult to replace retiring founders, and founders themselves might prefer selling their firm to passing it on to a successor, for psychological or liquidity reasons.²⁷ Column 6 of Table 8 therefore interacts the retirement-age indicator with an indicator for founder CEOs. The interaction term is negative and

²⁵ To estimate abnormal industry pay, we use data on CEO compensation from Compustat's ExecuComp database. The analysis is based on 3,016 ExecuComp firms with available data. Total annual CEO compensation is regressed on industry-adjusted stock returns over the current and the previous year, the log market value of equity, the book-to-market ratio, the ratio of R&D to assets, the ratio of PP&E and inventory to assets, book leverage, sales growth, ROA, firm age, and industry dummies.

²⁶ The retirement-age effect might be stronger for long-tenured CEOs not because of succession problems but because CEOs' ability to impose their will increases with tenure.

²⁷ Section 4.1.3 examines the liquidity motive for selling the firm at the CEO's retirement and finds no evidence for it.

insignificant. Hence, if anything, founders are associated with a smaller increase in firm sales at retirement age.

Overall, the evidence in Table 8 provides little support for the idea that the increase in takeover activity when target CEOs reach retirement age is caused by succession problems. However, we cannot rule out that succession problems contribute to the retirement-age effect in at least some firms.

4.1.3 CEO illiquidity

Acquisitions frequently allow target CEOs to cash out their illiquid stock and option holdings in their firm. Cai and Vijh (2007) find evidence that CEOs with illiquid holdings are more likely to receive takeover bids and less likely to resist bids. Even though there is no reason to expect that CEOs' illiquidity problems increase abruptly at age 65, illiquidity can explain why CEOs who are ready to retire might prefer an acquisition to a CEO succession.

To test whether the retirement-age effect on mergers is stronger for CEOs with larger equity holdings, we use two measures of CEO illiquidity: the natural logarithm of the dollar value of CEO stock holdings (Holdings \$), and the fraction of company stock owned by the CEO (Holdings %). Columns 7 and 8 of Table 8 regress the probability of receiving a successful takeover bid on CEO age, the usual controls, and the interaction between the retirement-age indicator and the two illiquidity measures. Both interaction effects are negative and one of them is significant ($t=-1.18$ for Holdings % and $t=-1.95$ for Holdings \$), indicating that the retirement-age effect is, if anything, weaker for CEOs with larger holdings. This is inconsistent with illiquidity concerns causing the retirement-age effect. It might, however, be consistent with larger equity holdings improving merger decisions by aligning CEOs' incentives with shareholders' (in line with the governance results in Table 4).

4.1.4 CEO wealth changes

A CEO's willingness to sell his firm might increase as he gets closer to retirement simply because his financial losses from selling become smaller, or even turn into gains. In this section, we explore whether changes in the monetary benefits of selling the firm might be responsible for the increased takeover activity at retirement age.

To estimate the effect of being acquired on target CEO wealth, we follow Cotter and Zenner (1994) and compute the change in wealth as the gain from stock and option

ownership plus the value of golden parachutes minus the present value of lost future compensation. Because the necessary information on CEO compensation and stock and option holdings is not available for our sample, their values are imputed using ExecuComp data. The revaluation of equity holdings due to an acquisition is calculated assuming a takeover premium of 35% for all observations, which corresponds to the median premium in our sample. Appendix C describes the details of the calculations, and Table C1 shows descriptive statistics for the estimated wealth effects.

The regressions in Table C2 in the appendix estimate the probability of receiving a successful takeover bid as a function of CEO age and the usual controls, and include the estimated wealth effects as additional control variable. Controlling for the predicted change in target CEO wealth has no significant impact on the retirement-age effect on takeovers. The coefficients on the retirement-age indicator remain large and statistically significant, with t-statistics between 2.88 and 3.30. The marginal effects of the retirement-age dummy imply increases of 28 to 36 percent in the odds of receiving a successful takeover bid for retirement-age CEOs.

These results suggest that retirement-age CEOs' greater willingness to sell is not explained by their smaller monetary losses (or larger gains) from acquisitions alone. Instead, it seems likely that the retirement-age effect is caused by non-monetary benefits of control and status that CEOs are unwilling to give up prior to their planned retirement. This type of behavior would also be consistent with the apparent preference shift underlying the spike in retirements at age 65 for rank-and-file employees (see Section 1.2).

4.2 Do the additional deals accepted by retirement-age CEOs create value?

The evidence in this paper supports the idea that retirement-age CEOs have lower personal merger costs, be they monetary or non-monetary, and are therefore better aligned with shareholders. However, an alternative interpretation is that it is the younger CEOs who act in the best interest of shareholders, and that retirement-age CEOs are *too* eager to give up control.

The balance of evidence from prior studies, as well as the results in this paper, speak against this possibility. More power of target managers vis-à-vis shareholders, due to larger equity stakes, insider-dominated boards, poison pills, or a lack of outside blockholders, is associated with fewer acquisitions in the literature (Mikkelsen and Partch (1989), Shivdasani

(1993), Song and Walkling (1993), North (2001)). This suggests that target managers are on average more reluctant than shareholders to sell their firms. Consistent with this, Section 3.2 has shown that better governance is associated with more takeovers of firms led by young CEOs, and with a smaller increase in bids when CEOs reach retirement age. Moreover, the additional deals done by retirement-age CEOs earn premiums that are at least as high as those done by younger CEOs. These results suggest that young CEOs reject deals with substantial shareholder value creation, and that the additional deals by retirement-age CEOs are in shareholders' interest.

5 Retirement age and the adoption of takeover defenses

This section explores the relation between CEO age and the adoption of takeover defenses, such as poison pills, classified boards, and supermajority rules. Assuming that takeover defenses are used, at least in part, to prevent takeovers, a retirement-age CEO's increased willingness to sell might lead to less frequent adoptions of these provisions.

There are two challenges to testing this prediction. First, takeover defenses can be used for reasons other than as deterrent against takeovers. DeAngelo and Rice (1983), Comment and Schwert (1995) and others argue that some firms adopt defenses not to prevent takeovers but to strengthen their bargaining power in negotiations with acquirers. As a result, the empirical relation between CEO age and adoptions will reflect not only the deterrent motive (which we expect to be weaker at retirement age) but also the bargaining (and any other) motive that might or might not be related to CEO age.

Second, firms are more likely to adopt takeover defenses when they become (or anticipate to become) targets of takeover bids (Comment and Schwert (1995)). Firms that do not anticipate being targeted have no reason to deter bidders or strengthen their bargaining positions, independently of their CEOs' age. Both complications are especially relevant in our context given that retirement-age CEOs are more frequently targeted by bidders. Because of this, retirement-age CEOs might increase takeover defenses more often than other CEOs to increase bargaining power even if they have no desire to deter bids.

The tests below explore the net effect of CEO age on the adoption of takeover defenses, both in a broad panel of firms and in sub-samples of firms that receive or have received bids (and are therefore more likely to increase takeover defenses). Finding that retirement-age

CEOs adopt takeover defenses less often, despite the obstacles discussed above, would further support the idea that retirement-age CEOs are more willing to sell their firms.

5.1 *Sample and data*

We combine our CEO panel with data on takeover defenses compiled by the Investors Research Responsibility Center (IRRC). The dataset, described in detail in Gompers, Ishii, and Metrick (GIM, 2003), contains information on 24 governance provisions that, to varying degrees, make it more difficult to take over a firm. The data is available for eight cross-sections of large U.S. firms from 1990 to 2006.²⁸ Gompers et al. (2003) summarize information from all 24 provisions by combining them into a single Governance index (G-index). The index increases by one for every provision that increases takeover defenses or decreases shareholder rights.²⁹ Bebchuk, Cohen, and Ferrell (2009) propose a modified Entrenchment index (E-Index) of six out of the 24 provisions that, based on their evidence, are the more powerful deterrents. These provisions, described in more detail in Table 9, are poison pills, classified boards, golden parachutes, supermajority requirements, limits to amend corporate bylaws, and limits to amend corporate charters. We use the E-index in the main tests in Table 10 and the G-index in Table B3 in Appendix B.

The combined CEO-IRRC panel consists of 8,963 firm-years with available levels and 6,822 firm-years with available changes of the IRRC indicators. The changes are computed relative to the most recent year in which data is available.³⁰ Table 9 shows that the average levels of the E- and the G-index are 2.1 and 9.0, respectively, which is similar to prior studies. The G-index increased in 26% and decreased in 10% of the 6,822 firm years. The corresponding numbers are 15% and 6% for the E-index. The most frequent changes are due to adoptions of golden parachutes (9% of firm-years) and poison pills (5% of firm-years).

²⁸ The database covers primarily S&P 1500 firms and the years 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006. A more detailed description of the data is in Table 9. See also Gompers et al. (2003) and Bebchuk, Cohen, and Ferrell (2009).

²⁹ Gompers et al. show that higher levels of the index predict lower stock prices, returns, and operating performance during the 1990s, suggesting that firms' use of takeover defenses is detrimental to shareholder value. Core, Guay, and Rusticus (2006) and Bebchuk, Cohen, and Wang (2013) provide further analysis of this relationship.

³⁰ For example, the change in 1995 is measured relative to 1993 (the closest prior year with available data), and the change is set to missing in 1994. This approach is consistent with prior studies that use the IRRC database. As a robustness test, we re-run the tests using alternative assumptions with similar results. Specifically, in the example above, we either record the change in 1994 and set the change in 1995 to missing, or we assume that no change occurs in 1994 and record a change in 1995.

5.2 *Regression specifications*

Table 10 relates changes in the E-index to CEO age. The regressions are estimated using an ordered logit model with the dependent variable equal to one, zero, or minus one for an increase, no change, or a decrease in the index, respectively. The key explanatory variable is the retirement-age indicator for CEOs between 64 and 66. Other CEO and firm characteristics serve as control variables and are described in the table.

Takeover defenses might be adopted to deter both current and future takeover attempts. Thus, a CEO who is not yet retiring but is planning to do so soon might perceive little reason to boost takeover defenses. To capture the forward-looking nature of defense adoptions, Table 10 regresses changes in takeover defenses in both year $t-1$ and t on CEO age in year t .³¹ Table B3 in Appendix B examines changes in takeover defenses in years t and $t-1$ separately, and Table B4 redefines the retirement-age indicator to identify CEOs aged 63 to 65 (rather than 64 to 66).

The first two regressions in Table 10 use the full CEO-IRRC panel. The other regressions, in order to focus on firms that are more likely to have reason to adopt defenses, limit the sample to firms that are more likely takeover targets. One easy way to do so is to focus on firms that have already been targeted, either recently or in the more distant past. In columns 3-4, the sample includes all firms for which we observe a bid for any amount of equity (completed or not completed) either in the current or any of the prior three years. In columns 5-6, the sample includes all firms with any bid in years $t-6$ to $t-3$ relative to the current year. The advantage of using bids from several years ago is that these bids are less likely to be affected by (anticipated) current changes to takeover defenses. The disadvantage is that many firms with bids from several years ago might not currently be likely targets, thus reducing the motive for defense adoptions. As we show below, the results are not sensitive to how we define targeted firms.

³¹ Specifically, the dependent variable is set to one, zero, or minus one if there is an increase, no change, or decrease recorded in year t or $t-1$, in each case relative to the most recent year with available data. The within-firm correlation resulting from the overlapping horizons in the dependent variable is accounted for by clustering the standard errors by firm.

5.3 Regression results

The relation between the retirement-age indicator and takeover defense adoptions is negative in all regressions in Table 10 and is statistically significant when the sample is limited to more likely takeover targets. When targeted firms are identified using contemporaneous and recent bids (columns 3 & 4), the coefficients on RET_AGE are -0.69 and the t-statistics are -2.36 (in the regression with age-group indicators) or -2.46 (in the regression with age and age squared). Based on the model in column 3, the implied probability of an increase in takeover defenses is 10% for retirement-age CEOs and 18% for other CEOs (estimated at the mean of the control variables). The effects are similar when targeted firms are identified using bids from several years ago (columns 5 & 6).³²

Table B3 in Appendix B analyses each provision of the E-index separately and also examines the broader G-index (only regressions with firms targeted several years ago are reported). The coefficients on retirement age are negative for all components of the E-index but are generally not statistically significant. Retirement age is also negatively but again insignificantly related to changes in the G-index, consistent with the E-index containing the more powerful defense provisions. Table B4 shows that the negative association between defense adoptions and retirement age is stronger for adoptions in year $t-1$ than for adoptions in year t (with age measured in year t). The contemporaneous relation between retirement age and adoptions is stronger in Table B5 in which retirement age is defined as 63-65 (rather than 64-66). These results suggest a decline in the incentives to adopt takeover defenses that occurs one to two years before CEOs reach age 65.

Overall, the results in this section provide further support for a retirement-age effect in acquisitions: firms appear less likely to increase takeover defenses when their CEOs are close to retirement age. If these provisions are used, at least in part, to deter bidders, this pattern suggests that the deterrence motive is weaker for retirement-age CEOs.

6 Conclusions

This paper explores the impact of target CEOs' retirement preferences on the frequency and pricing of takeover bids. Most target CEOs' careers suffer when their firms are acquired.

³² In untabulated robustness tests, we repeat the regression adding additional controls for CEO ownership, leverage, R&D, PPE, and growth in sales and obtain results similar to those in Table 10.

If incentive pay does not fully compensate CEOs for their private costs, firms' takeover decisions are likely to be distorted. We examine this hypothesis using a novel test. We exploit the labor literature's observation that workers' propensity to retire increases discretely at the age of 65. This pattern cannot be explained by the provisions of social security, Medicare, or pension plans, and is often attributed to customs and social norms. We observe a similar spike in departures around age 65 for CEOs, and we derive implications of this age-65 effect for CEOs' private merger costs, and, indirectly, for predicted merger patterns.

Consistent with the private merger costs hypothesis, the data show that takeovers are substantially more frequent for target CEOs close to age 65. The increase in takeover activity appears discretely at this threshold, with only a small gradual increase as CEOs approach retirement age. We propose that this pattern is a consequence of a discrete drop in CEOs' private merger costs around age 65, caused by the same preference shift that also underlies the age-65 retirement effect.

Takeover premiums and target announcement returns are similar for retirement-age and younger CEOs, implying that retirement-age CEOs are able to increase the frequency of firm sales without sacrificing premiums. Moreover, better governance is associated with more acquisitions of firms led by young CEOs, and with a smaller increase in acquisitions when CEOs reach retirement age. These results suggest that the retirement-age effect is due to conflicts of interest between target shareholders and their CEOs, and that these conflicts are caused by young CEOs who are reluctant to sell their firms. Overall, our findings suggest that managerial self-interest has a significant impact on firms' takeover decisions and, ultimately, on shareholder value.

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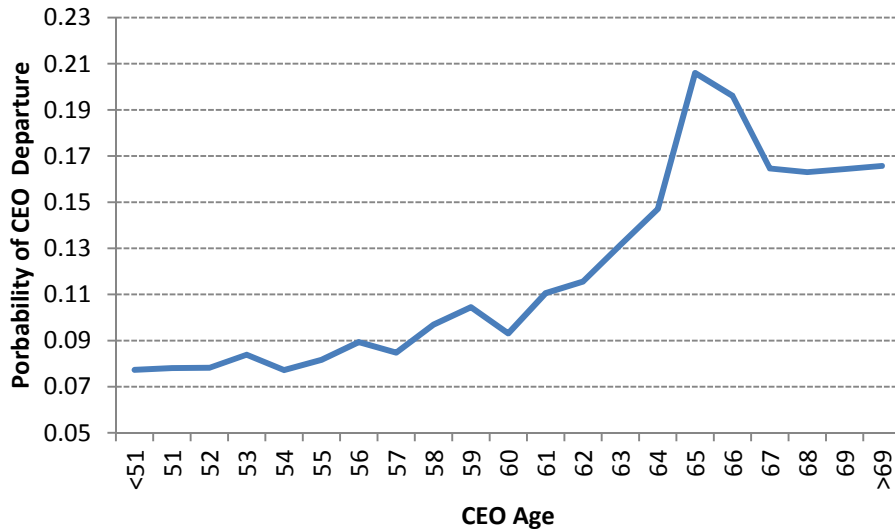


Fig. 1: Probability of CEO departure as a function of CEO age. The figure shows the probability that a CEO of a given age leaves office at that age. The probability is computed as the number of firm-years in which a CEO of a given age leaves office divided by the number of firm-years with CEOs of that age at the start of the year. The sample consists of 56,183 firm-years from 1989 to 2007. The sample was created by extracting a comprehensive CEO panel for U.S. public firms from the Compustat Research Insight CDs, merging with financial statement and stock return information from Compustat and CRSP, and dropping observations with missing information. See Section 2.1 for details on the sample construction.

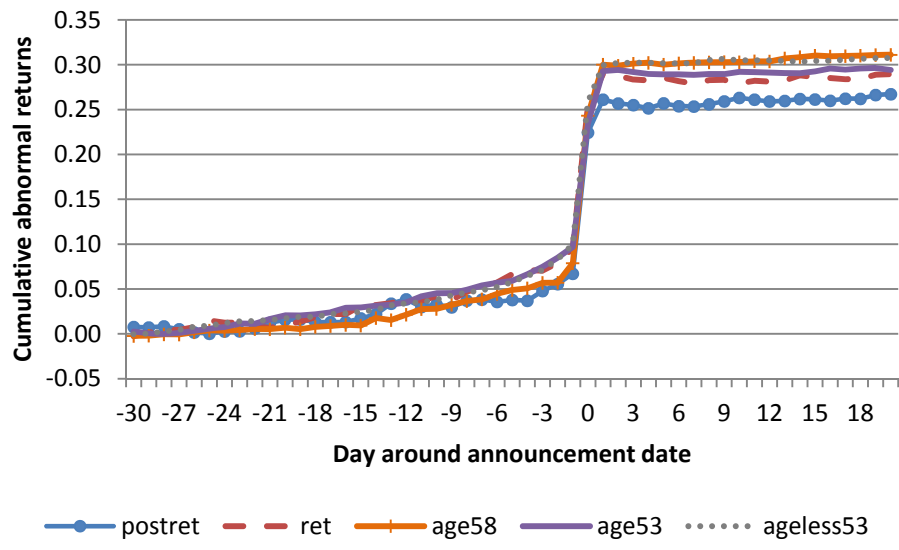


Fig. 4: Stock returns around merger announcements. The figure shows average cumulative market-adjusted stock returns from trading day -30 to day +20 after bid announcements. The sample consists of 2,801 completed control bids from 1989 through 2007 and is described in Section 2.1. The returns are computed separately for five target CEO age groups with age measured at the time of the bid.

Table 1: Descriptive statistics for the CEO panel. The full panel consists of 56,183 firm-years (7,992 firms) from 1989 to 2007. The panel with complete governance data consists of 22,532 firm-years (4,607 firms) from 1992 to 2006. Tenure is the number of years the CEO is in office. New CEO is a dummy variable for CEOs in their first two years of tenure. Founder is a dummy variable for CEOs who are in office at least one year before the firm's first year on Compustat. B/M and MVEQ are the ratio of book value to market value of equity and the market value of equity (\$ billions) at the end of the prior fiscal year. ROA is return on assets averaged across three years ending with the current year, where return on assets is annual operating income before depreciation scaled by lagged total assets. Past Return is the average monthly industry-adjusted return for the prior fiscal year. The Compustat variables and Past Return are winsorized at 1%. All governance variables are from Linck, Netter, and Yang (2008). Block, Director, and CEO Ownership are the fraction of shares outstanding held by blockholders, directors, and the CEO. Board Size is the number of directors on the board. CEO-Chair Separation is a dummy variable equal to one if the CEO is not the chairman of the board. Independent Directors is the fraction of directors that are not insiders of the firm. All governance variables are lagged by one year, or by two years if one-year lagged values are not available.

	Full panel (N=56,183)			Panel with complete governance data (N=22,532)		
	Mean	Median	Std	Mean	Median	Std
CEO age	54.12	54.00	8.63	55.00	55.00	8.45
Tenure	6.20	4.00	6.64	7.59	6.00	6.69
New CEO	0.36	0.00	0.48	0.21	0.00	0.40
Founder	0.20	0.00	0.40	0.22	0.00	0.41
MVEQ	2.11	0.17	11.76	2.88	0.22	14.69
B/M	0.67	0.51	0.58	0.65	0.50	0.56
ROA	0.11	0.13	0.19	0.12	0.14	0.18
Past return (%)	0.22	-0.02	4.56	0.38	0.09	4.41
Firm age	15.70	11.00	13.19	17.52	12.00	13.63
Block ownership (%)				34.01	32.93	21.88
Director ownership (%)				1.63	0.15	4.73
CEO ownership (%)				5.46	0.85	10.52
Board size				7.94	7.00	2.64
CEO-Chair separation				0.38	0.00	0.49
Independent directors				0.68	0.71	0.16

Table 2a: Descriptive statistics for the CEO panel by CEO age group. The full panel consists of 56,183 firm-years (7,992 firms) from 1989 to 2007. All variables are defined in Table 1.

CEO age:	Means for sub-samples based on CEO Age					Medians for sub-samples based on CEO Age				
	53 or less	54-58	59-63	64-66 RET_AGE	67 or more	53 or less	54-58	59-63	64-66 RET_AGE	67 or more
CEO age	47.01	55.95	60.79	64.84	71.75	48.00	56.00	61.00	65.00	70.00
Tenure	4.41	5.92	7.68	9.75	12.78	3.00	4.00	6.00	7.00	9.00
Founder	0.19	0.18	0.19	0.24	0.30	0.00	0.00	0.00	0.00	0.00
New CEO	0.45	0.34	0.25	0.19	0.19	0.00	0.00	0.00	0.00	0.00
MVEQ	1.53	2.73	3.16	2.33	1.32	0.15	0.22	0.26	0.20	0.12
B/M	0.64	0.67	0.67	0.71	0.82	0.48	0.51	0.52	0.56	0.65
ROA	0.09	0.12	0.13	0.13	0.12	0.12	0.14	0.14	0.14	0.12
Past return (%)	0.24	0.20	0.21	0.26	0.09	-0.02	0.02	0.00	-0.02	-0.12
Firm age	12.51	17.33	19.63	19.44	19.85	8.00	12.00	15.00	17.00	18.00
Block ownership (%)	35.45	33.16	32.83	32.19	32.23	34.90	31.78	31.31	31.01	29.03
Director ownership (%)	1.86	1.45	1.48	1.64	1.94	0.13	0.12	0.10	0.11	0.12
CEO ownership (%)	5.74	4.99	5.10	6.51	8.83	1.02	0.56	0.65	1.16	3.35
Board size	7.48	8.11	8.39	8.12	7.68	7.00	8.00	8.00	8.00	7.00
CEO-Chair separation	0.49	0.38	0.30	0.26	0.21	0.00	0.00	0.00	0.00	0.00
Independent directors	0.66	0.69	0.70	0.67	0.62	0.67	0.71	0.71	0.71	0.63
N	26,879	12,769	9,352	3,082	4,101	26,879	12,769	9,352	3,082	4,101

Table 2b: Descriptive statistics for target firms by CEO age group. The sample consists of 2,801 completed takeovers from 1989 through 2007. CEO age is the age of the target CEO in the bid announcement year. Tenure is the number of years from the year the CEO takes office to the announcement year. Founder is an indicator for CEOs who are in office at least one year before the firm's first year on Compustat. B/M, MVEQ, and ROA are the ratio of book value to market value of equity, the market value of equity (\$ billions), and the return on book assets of the target firm in the year prior to the takeover. Pre-bid Return is the average monthly industry-adjusted return over the year ending three months prior to the announcement date. Return (-20 to 1) is the cumulative market-adjusted daily return from trading day -20 to +1 around the bid announcement. In case of a takeover contest (identified as multiple bids for a target within a six month period), the first bid of the contest is considered. Premium (-20 to final) is defined as (final offer price - closing price on day -20) / (closing price on day -20), adjusted for the cumulative market return over the same period. Missing premiums are approximated with (-20 to 1) announcement returns, and premiums are truncated at -100% and 200% as suggested by Officer (2003). Compustat variables and pre-bid returns are winsorized at the 1% level. Cash Only (Stock Only) equals one if the SDC variable "consideration structure" is set to "cash only" ("shares"). Hostile, Tender, and LBO equal one if SDC classifies the takeover as hostile, as a tender offer, or an LBO. Toehold is set to one if the target received at least one bid for less than 50% of shares outstanding during the year preceding the final bid. Contest is set to one if the target received competing bids for more than 50% of shares outstanding during the six months preceding the final bid.

CEO age:	Means for sub-samples based on CEO Age					Medians for sub-samples based on CEO Age				
	53 or less	54-58	59-63	64-66 RET_AGE	67 or more	53 or less	54-58	59-63	64-66 RET_AGE	67 or more
CEO age	46.97	56.00	60.73	64.77	71.40	48.00	56.00	61.00	65.00	70.00
Tenure	3.72	4.85	5.30	7.78	9.00	2.00	4.00	4.00	6.00	5.00
Founder	0.21	0.19	0.16	0.19	0.20	0.00	0.00	0.00	0.00	0.00
MVEQ	0.70	1.34	1.34	1.06	0.52	0.14	0.19	0.18	0.15	0.11
B/M	0.60	0.63	0.67	0.73	0.79	0.45	0.49	0.53	0.58	0.62
ROA	0.07	0.10	0.12	0.13	0.13	0.12	0.13	0.14	0.13	0.13
Pre-bid return (%)	-0.98	-0.74	-0.72	-0.51	-0.96	-1.08	-0.77	-0.92	-0.77	-0.72
Firm age	8.93	12.99	14.71	16.85	17.22	6.00	9.00	10.00	13.00	14.00
Return (-20,1) (%)	29.47	28.32	30.69	29.38	25.82	26.52	24.89	26.97	25.50	22.28
Premium (-20, final) (%)	39.45	37.56	39.69	41.35	30.90	34.06	32.79	33.45	34.10	26.11
Cash only	0.45	0.52	0.53	0.52	0.55	0.00	1.00	1.00	1.00	1.00
Stock only	0.25	0.22	0.21	0.17	0.15	0.00	0.00	0.00	0.00	0.00
Hostile	0.01	0.02	0.03	0.03	0.04	0.00	0.00	0.00	0.00	0.00
Tender	0.23	0.29	0.26	0.25	0.28	0.00	0.00	0.00	0.00	0.00
LBO	0.08	0.08	0.07	0.12	0.10	0.00	0.00	0.00	0.00	0.00
Toehold	0.07	0.05	0.07	0.06	0.06	0.00	0.00	0.00	0.00	0.00
Contest	0.05	0.04	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00
N	1,400	644	447	155	155	1,400	644	447	155	155

Table 3: Logit models of bid frequencies. The sample consists of 56,183 firm years from 1989 to 2007. The models estimate the probability of a firm receiving a successful bid for at least 50% of its shares outstanding. RET_AGE is set to one if CEO age is from 64 to 66. Wave is a dummy variable for 1997-1999. All other control variables are defined in Table 1. All regressions include year dummies. Standard errors are clustered by firm and year. T-statistics are in parentheses. Implied probabilities are computed at the means of the control variables and after setting the merger wave indicator and the age dummy variables (other than RET_AGE) to zero.

	Full sample		Outside Wave	Merger Wave	Full sample		Outside Wave	Merger Wave
AGE \geq 67	-0.01 (-0.05)	-0.01 (-0.06)	0.07 (0.47)	-0.19 (-1.37)				
RET_AGE (64-66)	0.34 (4.08)	0.24 (2.66)	0.35 (4.07)	-0.16 (-1.39)	0.28 (3.21)	0.18 (1.85)	0.28 (2.95)	-0.18 (-0.87)
AGE 59-63	0.10 (1.36)	0.10 (1.35)	0.07 (0.83)	0.16 (1.11)				
AGE \leq 53	-0.14 (-3.11)	-0.14 (-3.12)	-0.12 (-2.20)	-0.19 (-2.25)				
RET_AGE*Wave	-0.45 (-2.49)				-0.46 (-2.51)			
CEO age					0.05 (1.60)	0.05 (1.60)	0.03 (0.68)	0.11 (3.15)
CEO age squared					0.00 (-1.26)	0.00 (-1.26)	0.00 (-0.40)	0.00 (-2.74)
Tenure	-0.04 (-8.77)	-0.04 (-8.70)	-0.03 (-8.83)	-0.04 (-3.39)	-0.04 (-8.88)	-0.04 (-8.81)	-0.04 (-8.80)	-0.04 (-3.50)
New CEO	0.18 (2.92)	0.18 (2.93)	0.23 (3.38)	0.06 (0.47)	0.18 (2.97)	0.18 (2.98)	0.23 (3.42)	0.06 (0.49)
Founder	0.13 (2.11)	0.13 (2.11)	0.10 (1.06)	0.19 (8.26)	0.13 (2.16)	0.13 (2.16)	0.10 (1.08)	0.19 (8.42)
Past return	-0.03 (-4.99)	-0.03 (-4.98)	-0.03 (-4.07)	-0.02 (-6.41)	-0.03 (-4.94)	-0.03 (-4.94)	-0.03 (-4.05)	-0.02 (-6.69)
B/M	-0.04 (-0.78)	-0.04 (-0.78)	-0.04 (-0.69)	-0.10 (-0.79)	-0.04 (-0.87)	-0.04 (-0.87)	-0.04 (-0.76)	-0.11 (-0.84)
Log(MVEQ)	-0.03 (-1.19)	-0.03 (-1.20)	-0.06 (-2.69)	0.05 (1.22)	-0.03 (-1.22)	-0.03 (-1.24)	-0.06 (-2.63)	0.05 (1.20)
ROA	0.06 (0.35)	0.06 (0.35)	0.08 (0.32)	0.02 (0.40)	0.06 (0.33)	0.06 (0.33)	0.08 (0.30)	0.01 (0.30)
Firm age	-0.02 (-14.37)	-0.02 (-14.44)	-0.03 (-11.34)	-0.02 (-8.48)	-0.03 (-14.70)	-0.03 (-14.78)	-0.03 (-11.67)	-0.02 (-8.06)
Wave	1.43 (31.17)	1.41 (27.94)			1.42 (30.30)	1.40 (27.24)		
Intercept	-3.26 (-31.07)	-3.26 (-31.61)	-3.20 (-27.17)	-2.11 (-8.91)	-4.97 (-5.86)	-4.96 (-5.85)	-4.21 (-4.22)	-5.46 (-6.40)
N non-event	53,217	53,217	42,807	10,410	53,217	53,217	42,807	10,410
N event	2,966	2,966	2,084	882	2,966	2,966	2,084	882
Prob. at RET_AGE=0	0.044	0.045	0.041	0.081	0.042	0.043	0.040	0.074
Prob. at RET_AGE=1	0.062	0.057	0.058	0.069	0.056	0.052	0.053	0.063

Table 4: The retirement-age effect and corporate governance. The sample consists of 22,532 firm-years from 1992 to 2006. The logit models estimate the probability of a firm receiving a successful bid for at least 50% of its shares outstanding. RET_AGE is set to one if CEO age is from 64 to 66. The governance measures are ranks from 0 to 2 with higher values indicating better governance. Each variable ranks residuals from a regression of the raw governance measure on the following firm and CEO characteristics: Log(MVEQ), B/M, Firm age, Past return, PPE/Total assets, R&D/Total asset (missing R&D is set to zero), Sales growth, ROA, Leverage, Tenure, Founder, CEO age, 2-digit SIC industry dummies, and year dummies. The raw governance measures and all other control variables are defined in Table 1. GOVQ is an index of governance quality. It is computed by summing up the individual ranks and orthogonalizing the result as described above. Wave is an indicator for the 1997-1999 merger wave. Standard errors are clustered by firm and year.

	GOVQ		Index components	
	Coef.	T-stat.	Coef.	T-stat.
Intercept	-4.23	-3.66	-4.44	-4.03
RET_AGE	0.31	2.65	1.23	3.76
RET_AGE*GOVQ	-0.18	-3.17		
GOVQ	0.07	3.69		
RET_AGE*Block own			-0.26	-1.83
RET_AGE*CEO own			-0.09	-0.74
RET_AGE*Director own			0.04	0.16
RET_AGE*Separation			-0.35	-2.02
RET_AGE*Independence			-0.00	-0.02
RET_AGE*Small board			-0.26	-2.12
Block own			0.15	4.16
CEO own			-0.01	-0.34
Director own			-0.04	-0.78
Separation			0.09	2.20
Independence			0.12	3.68
Small board			0.11	3.15
RET_AGE*Wave	-0.43	-1.59	-0.45	-1.62
CEO age	0.09	2.27	0.08	2.07
CEO age squared	0.00	-2.01	0.00	-1.79
Tenure	-0.04	-4.76	-0.04	-4.83
New CEO	0.11	1.14	0.14	1.42
Founder	0.14	1.61	0.14	1.65
Past return	-0.02	-1.77	-0.02	-1.79
B/M	-0.05	-0.63	-0.05	-0.71
Log(MVEQ)	-0.08	-2.25	-0.07	-2.16
ROA	0.33	1.75	0.30	1.53
Firm age	-0.02	-6.56	-0.02	-5.89
Wave	-0.31	-5.71	-0.31	-5.69
N non-event	21,424		21,424	
N event	1,108		1,108	

Table 5: Takeover premium and target announcement return regressions. The full sample consists of 2,801 completed takeover deals from 1989 to 2007. The sample in columns 3 and 6 is limited to 1,608 deals with public acquirers. The dependent variable in columns 1 to 3 is the target's cumulative market-adjusted daily stock return from trading day -20 to +1 around the announcement of the first control bid in the contest (in percent). In columns 4 to 6, the dependent variable is the takeover premium measured from trading day -20 before the first announcement to the final offer price, adjusted for the cumulative market return over the same period, in percent. RET_AGE is set to one if CEO age is from 64 to 66 in the announcement year. Relative size is the ratio of the target's equity market value to the combined market value of target and acquirer in the prior fiscal year. Acquirer B/M is the ratio of the acquirer's book value to its market value of equity in the prior fiscal year. Wave is an indicator for 1997-1999. Other controls are defined in Table 2b. Standard errors are clustered by year. T-statistics are in parentheses.

	Return(-20, 1)			Premium(-20, final)		
AGE ≥ 67	-2.44 (-1.12)	-3.94 (-1.39)	-1.65 (-0.38)	-6.97 (-2.32)	-7.66 (-1.91)	-9.76 (-1.64)
RET_AGE (64-66)	2.42 (1.12)	1.13 (0.52)	1.38 (0.41)	5.52 (1.77)	4.91 (1.49)	5.26 (1.06)
AGE 59-63	2.86 (1.67)			2.51 (1.14)		
AGE ≤ 53	1.22 (1.24)			1.78 (1.33)		
CEO age		-0.11 (-0.21)	0.41 (0.52)		-0.42 (-0.48)	-0.16 (-0.15)
CEO age squared		0.00 (0.20)	0.00 (-0.59)		0.00 (0.38)	0.00 (0.11)
Tenure	-0.08 (-0.71)	-0.07 (-0.63)	-0.19 (-1.18)	0.07 (0.49)	0.09 (0.61)	0.05 (0.26)
Founder	1.40 (1.09)	1.31 (1.02)	3.56 (1.59)	-1.46 (-0.92)	-1.55 (-0.98)	-0.98 (-0.39)
Pre-bid return	-0.47 (-4.03)	-0.47 (-4.04)	-0.74 (-3.90)	-0.70 (-5.39)	-0.70 (-5.38)	-0.91 (-3.28)
B/M	0.72 (0.64)	0.75 (0.66)	2.02 (1.10)	1.76 (1.08)	1.87 (1.12)	2.33 (1.05)
Log(MVEQ)	-1.65 (-5.10)	-1.65 (-5.22)	-1.53 (-3.60)	-2.21 (-6.12)	-2.20 (-6.27)	-2.56 (-5.24)
ROA	-9.13 (-2.83)	-8.97 (-2.74)	-6.82 (-1.57)	-3.18 (-0.63)	-2.82 (-0.54)	-2.42 (-0.28)
Firm age	-0.04 (-0.87)	-0.04 (-0.78)	0.06 (1.12)	-0.13 (-2.43)	-0.13 (-2.15)	-0.05 (-0.69)
Toehold	-5.10 (-2.01)	-5.01 (-1.95)	-2.02 (-0.75)	-5.86 (-1.76)	-5.76 (-1.71)	-4.22 (-0.97)
Cash only	7.36 (3.98)	7.40 (4.03)	4.20 (2.26)	5.61 (2.45)	5.71 (2.51)	0.56 (0.27)
Stock only	1.13 (0.92)	1.13 (0.90)	-1.58 (-1.08)	6.63 (4.53)	6.61 (4.45)	1.54 (0.86)
Hostile	-0.55 (-0.18)	-0.45 (-0.14)	1.04 (0.39)	16.51 (3.20)	16.63 (3.24)	15.40 (3.13)
Tender	11.34 (6.83)	11.25 (6.87)	9.60 (6.44)	10.87 (6.31)	10.74 (6.37)	9.36 (4.89)
Contest	8.01 (2.55)	8.09 (2.63)	11.24 (5.07)	7.15 (1.87)	7.20 (1.93)	11.03 (2.30)
LBO	-8.31 (-4.29)	-8.39 (-4.40)	-5.36 (-1.01)	-8.82 (-4.41)	-9.00 (-4.66)	0.47 (0.05)
Wave	2.30 (0.95)	2.29 (0.94)	3.23 (1.97)	6.07 (1.96)	6.07 (1.98)	7.54 (3.27)
Relative size			-25.27 (-6.96)			-16.90 (-2.16)
Acquirer B/M			-5.06 (-2.07)			-9.31 (-2.05)
Intercept	30.32 (14.22)	34.44 (2.27)	30.12 (1.38)	40.48 (15.82)	55.19 (2.30)	60.56 (2.07)

Table 6: Acquirer announcement return regressions. The sample consists of 1,577 completed takeover deals with public acquirers with available announcement returns from 1989 to 2007. The dependent variable is the acquirer's cumulative market-adjusted stock return from trading day -1 (or -20) before to trading day +1 after the announcement in percent. RET_AGE is set to one if CEO age is from 64 to 66 in the announcement year. Relative Size is the ratio of the target's equity market value to the combined market value of target and acquirer in the prior fiscal year. Acquirer B/M is the ratio of the acquirer's book value to its market value of equity in the prior fiscal year. Wave is an indicator for the 1997-1999 merger wave. All other controls are defined in Table 2b. Standard errors are clustered by year. T-statistics are in parentheses.

	Return(-1, 1)		Return(-20, 1)	
AGE \geq 67	0.18 (0.19)	0.05 (0.04)	1.29 (0.75)	1.07 (0.51)
RET_AGE (64-66)	-1.32 (-1.25)	-1.06 (-1.12)	0.20 (0.14)	-0.47 (-0.33)
AGE 59-63	-1.11 (-1.44)		0.92 (0.82)	
AGE \leq 53	-0.73 (-1.28)		0.52 (0.53)	
CEO age		-0.09 (-0.42)		0.37 (0.90)
CEO age squared		0.00 (0.55)		0.00 (-0.78)
Tenure	-0.08 (-1.78)	-0.08 (-1.75)	-0.11 (-1.18)	-0.12 (-1.28)
Founder	0.57 (0.90)	0.55 (0.85)	-0.01 (-0.01)	0.06 (0.05)
Pre-bid return	-0.06 (-0.50)	-0.06 (-0.49)	0.13 (0.98)	0.13 (0.97)
B/M	1.15 (2.10)	1.13 (2.01)	2.79 (2.92)	2.70 (2.76)
Log(MVEQ)	-0.57 (-3.24)	-0.57 (-3.24)	-0.53 (-1.49)	-0.55 (-1.51)
ROA	1.60 (0.77)	1.63 (0.79)	-1.78 (-0.57)	-1.95 (-0.63)
Firm age	0.05 (2.70)	0.05 (2.59)	0.01 (0.47)	0.01 (0.33)
Toehold	0.22 (0.20)	0.24 (0.21)	-2.06 (-1.47)	-2.10 (-1.48)
Cash only	1.73 (3.47)	1.74 (3.48)	-0.29 (-0.26)	-0.35 (-0.31)
Stock only	-1.05 (-1.38)	-1.07 (-1.40)	-0.94 (-0.91)	-0.91 (-0.86)
Hostile	-1.95 (-1.16)	-1.90 (-1.14)	-2.06 (-0.91)	-2.14 (-0.97)
Tender	1.25 (2.44)	1.20 (2.40)	1.48 (1.27)	1.55 (1.32)
Contest	1.38 (0.72)	1.41 (0.73)	0.96 (0.41)	0.94 (0.39)
LBO	1.79 (1.85)	0.94 (0.82)	-5.61 (-0.74)	-4.34 (-0.51)
Wave	-0.53 (-0.57)	-0.56 (-0.62)	0.47 (0.42)	0.49 (0.43)
Relative Size	-2.31 (-1.18)	-2.30 (-1.18)	3.40 (1.15)	3.41 (1.17)
Acquirer B/M	-0.52 (-0.49)	-0.56 (-0.53)	-2.42 (-1.72)	-2.41 (-1.68)
Intercept	1.34 (1.05)	2.37 (0.47)	2.13 (0.85)	-7.84 (-0.82)

Table 7: Stock return and accounting performance prior to the bid. The table shows regressions of target stock returns and return-on-assets (ROA) before a successful takeover bid on the retirement-age indicator (RET_AGE) and other CEO and firm characteristics. The dependent variable in the first two regressions is the target's cumulative industry-adjusted daily stock return over one year ending three months before the first bid announcement. For the middle two columns, the industry-adjusted daily return is cumulated over two years ending three months before the announcement and then divided by two. In the last two columns, the dependent variable is the target's average ROA over the three years before the first bid announcement. ROA is defined as annual operating income before depreciation scaled by lagged total assets. The table shows only coefficients for the CEO age variables. The untabulated control variables are the target's lagged book-to-market ratio, log market value of equity, firm age, and CEO tenure. The ROA regressions also include 2-digit SIC industry dummies and year dummies. T-statistics (in parentheses) are clustered by year.

	Cumulative return over one year prior to bid (%)		Average cumulative return over two years prior to bid (%)		Average ROA over three years prior to bid (%)	
AGE ≥ 67	-5.54 (-0.98)		-4.50 (-1.44)		1.76 (1.41)	
RET_AGE (64-66)	0.27 (0.06)	2.41 (0.60)	-1.10 (-0.38)	0.78 (0.33)	1.26 (0.76)	-0.38 (-0.25)
AGE 59-63	-0.47 (-0.21)		-1.24 (-0.57)		1.63 (1.79)	
AGE ≤ 53	-2.05 (-0.91)		-0.50 (-0.30)		-1.89 (-1.71)	
CEO age		1.13 (0.89)		0.69 (0.96)		1.17 (1.51)
CEO age squared		-0.01		-0.01		-0.01
	-5.54		-4.50		1.76	

Table 8: Cross-sectional differences in the retirement-age effect on bid frequencies. The logit regressions estimate the probability of receiving a successful takeover bid in a given year and are similar to those in column 5 of Table 3. In each column, the retirement-age indicator (RET_AGE) is interacted with a different CEO, firm, or industry characteristic described in the column's heading (and labeled Interaction). The continuous interaction variables are normalized by subtracting their mean. Past Return is the average monthly industry-adjusted stock return for the prior fiscal year in percent. ROA is return on assets averaged across three years ending with the prior fiscal year. Return on assets (ROA) is annual operating income before depreciation scaled by lagged total assets. Industry Pay is the excess CEO pay for the target firm's industry, estimated as the loadings on industry dummies from a CEO pay regression described in Footnote 25. CEO Performance is the average monthly industry-adjusted stock return from the beginning of CEO tenure to the prior fiscal year in percent. Long Tenure is a dummy variable equal to one if the target CEO's tenure is greater than six years. Founder is a dummy variable equal to one if the target CEO is in office one year before the firm appears on Compustat. Holdings (%) is the number of shares owned by the target CEO as a fraction of shares outstanding. Holdings (\$) is the natural logarithm of the dollar value of the target CEO's stock holdings. All other control variables are the same as in Table 3 and are omitted from this table. T-statistics are in parentheses. T-statistics for the marginal interaction effects estimated at the mean of all control variables and with the merger wave indicator set to zero are in italics.

Interaction:	Past Return	ROA	Industry Pay	CEO Performance	Long Tenure	Founder	Holdings (%)	Holdings (\$)
RET_AGE (64-66)	0.28 (3.20)	0.27 (2.95)	0.27 (3.02)	0.28 (2.93)	0.23 (1.94)	0.30 (2.77)	0.32 (3.61)	0.33 (3.99)
Interaction*RET_AGE	0.01 (0.58) <i>(0.23)</i>	0.36 (0.67) <i>(0.73)</i>	-0.11 (-0.96) <i>(-0.83)</i>	-0.05 (-2.07) <i>(-2.06)</i>	0.10 (0.70) <i>(0.18)</i>	-0.09 (-0.50) <i>(-0.35)</i>	-2.09 (-1.18) <i>(-1.26)</i>	-0.08 (-1.95) <i>(-2.12)</i>
Wave*RET_AGE	-0.46 (-2.53)	-0.46 (-2.58)	-0.45 (-2.51)	-0.46 (-2.23)	-0.44 (-2.42)	-0.45 (-2.42)	-0.63 (-2.45)	-0.61 (-2.41)
Interaction	-0.03 (-5.03)	0.05 (0.25)	0.08 (1.80)	0.00 (0.30)	-0.35 (-6.31)	0.14 (2.18)	-0.52 (-1.33)	-0.02 (-1.80)
CEO age	0.05 (1.60)	0.05 (1.61)	0.05 (1.66)	0.05 (1.47)	0.06 (1.94)	0.05 (1.61)	0.09 (2.41)	0.08 (1.97)
CEO age squared	0.00 (-1.26)	0.00 (-1.26)	0.00 (-1.28)	0.00 (-1.15)	0.00 (-1.67)	0.00 (-1.27)	0.00 (-1.99)	0.00 (-1.62)

Table 9: Descriptive statistics for the takeover defense measures. The takeover defenses described below are collected by the Investors Research Responsibility Center (IRRC) from 1990 to 2006 and are described in Gompers, Ishii, and Metrick (GIM, 2003). The variables are available for 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006. The table shows descriptive statistics for the merged CEO-IRRC sample. The full sample consists of 8,963 firm-years with available levels and 6,822 firm-years with available changes of the takeover defenses. Changes are measured relative to the last year with available data. For example, if an indicator increases in 1995 relative to 1993, an increase is recorded in 1995, and the change is set to missing for 1994. The G-index is the Gompers, Ishii, and Metrick (2003) Governance index constructed using 24 anti-takeover provisions. The index increases by one for every provision that increases defenses or reduces shareholder rights. The E-index is the Bebchuk, Cohen, and Ferrell (2009) Entrenchment index constructed from the six provisions shown in the table. Classified boards are boards divided into classes that serve overlapping terms, so that only part of the board can be replaced in any year. Poison pills (shareholder rights plans) give shareholders other than the bidder the right to purchase additional shares at a discount, thus diluting the bidder's stake. Limits to amendments are the sum of two provisions measuring limitations to shareholders' ability to amend corporate charters or bylaws. Supermajority is a provision requiring more than a majority vote to approve a merger. Golden parachutes provide management with additional compensation in case of a job separation following a takeover.

	Levels			Changes (Fractions)		
	Mean	Median	Std.	Increases	No Change	Decreases
G-index	9.00	9.00	2.71	0.26	0.64	0.10
E-index	2.12	2.00	1.31	0.15	0.79	0.06
Classified board	0.58	1.00	0.49	0.01	0.98	0.01
Poison pill	0.56	1.00	0.50	0.05	0.93	0.02
Limits to amendments	0.20	0.00	0.44	0.01	0.97	0.02
Supermajority	0.17	0.00	0.37	0.01	0.98	0.01
Golden parachute	0.61	1.00	0.49	0.09	0.89	0.02

Table 10: Ordered logit models of changes in takeover defenses. The dependent variable is an indicator for a change in the firm’s E-index: the indicator is equal to -1 for a decrease, 0 for no change, and +1 for an increase in the index. CEO age is measured in year t and the index change is measured in years t and t-1. Specifically, the dependent variable is set to 1, 0, -1 if an increase, no change, or decrease is observed in year t or year t-1, in each case relative to the prior year with available data. In columns 1 and 2, all firms in the merged CEO-IRRC dataset are included (“All firms”). There are 6,183 firm-years with available changes of the takeover defenses and non-missing control variables. The overlapping windows in the construction of the dependent variable increase the sample size to 12,758 firm-years. In columns 3-6, the sample is limited to firms that are more likely targets (“Targeted firms”). These are identified as firms that have received a bid in the four years ending in year t or in the four years ending in t-3 (bids for any amount of equity are counted). Turnover is an indicator equal to one if year t is followed by a CEO turnover. The other control variables are described in Table 2 and are measured in year t-2. Standard errors are clustered by firm.

	All firms		Targeted firms			
			Any bid received t-3 to t		Any bid received t-6 to t-3	
AGE ≥ 67	-0.27 (-2.25)		-0.15 (-0.62)		-0.42 (-1.24)	
RET_AGE (64-66)	-0.21 (-1.68)	-0.12 (-1.05)	-0.69 (-2.36)	-0.69 (-2.49)	-0.81 (-2.66)	-0.63 (-2.13)
AGE 59-63	-0.05 (-0.68)		0.04 (0.23)		-0.23 (-1.18)	
AGE ≤ 53	-0.12 (-1.66)		-0.26 (-1.72)		-0.31 (-1.82)	
CEO age		0.10 (3.15)		0.09 (1.13)		0.26 (3.30)
CEO age squared		0.00 (-3.22)		0.00 (-0.98)		0.00 (-3.17)
Turnover	0.10 (1.45)	0.10 (1.36)	0.12 (0.68)	0.11 (0.61)	0.20 (1.13)	0.18 (0.98)
Tenure	-0.02 (-2.79)	-0.02 (-2.76)	0.00 (-0.33)	-0.01 (-0.38)	0.02 (1.14)	0.02 (1.27)
Founder	-0.02 (-0.13)	-0.02 (-0.18)	-0.16 (-0.60)	-0.16 (-0.62)	-0.33 (-1.09)	-0.42 (-1.36)
Return	0.00 (0.48)	0.00 (0.49)	-0.02 (-1.60)	-0.02 (-1.57)	0.00 (-0.26)	0.00 (-0.18)
Lag(Index)	-0.46 (-21.77)	-0.46 (-21.86)	-0.48 (-9.80)	-0.47 (-9.76)	-0.50 (-9.39)	-0.51 (-9.57)
B/M	-0.06 (-0.79)	-0.06 (-0.77)	0.15 (1.06)	0.14 (1.02)	0.23 (1.57)	0.23 (1.53)
Log(MVEQ)	-0.11 (-4.87)	-0.11 (-4.90)	0.01 (0.24)	0.01 (0.21)	-0.02 (-0.30)	-0.02 (-0.43)
ROA	-0.18 (-0.53)	-0.16 (-0.49)	0.07 (0.10)	0.09 (0.14)	0.18 (0.25)	0.18 (0.25)
Firm age	-0.01 (-5.32)	-0.01 (-5.33)	-0.01 (-2.41)	-0.01 (-2.44)	-0.02 (-3.45)	-0.02 (-3.61)
N Increase	1,886	1,886	357	357	318	318
N No change	10,096	10,096	1,446	1,446	1,178	1,178
N Decrease	776	776	164	164	150	150
P(Incr.) RET_AGE=0	0.14	0.13	0.18	0.17	0.21	0.17
P(Incr.) RET_AGE=1	0.12	0.12	0.10	0.09	0.10	0.10

Appendix A: Sources of data on CEOs, ownership, and board structures

CEO data from Fee, Hadlock, and Pierce (2013)

Fee, Hadlock, and Pierce (2013) construct a comprehensive panel of CEOs of U.S. public firms using information from the Compustat Research Insight CDs. These discs include data on each firm's top four executives taken from the firms' U.S. Securities and Exchange Commission (SEC) filings. Fee et al. use discs from the summer of each year from 1990 to 2007. The sample excludes financial firms (SIC codes 6000-6999), utilities (SIC codes 4900-4949), and non-U.S. firms. The sample further excludes firms with less than \$10 million in book value of assets (measured in 1990 dollars). Firms that cross the \$10 million threshold are included in the sample until one year after they no longer meet the threshold. Fee et al. define a CEO as the executive holding the title of CEO or the dual titles of Chairman and President. When a firm drops from the files and later reappears with the CEO unchanged, they assume that no CEO turnover occurred during the omitted period. The CEO changes are cross-checked manually using information from the firms' financial statements and Factiva searches.

Board and ownership data from Linck, Netter, and Yang (2008)

The Linck, Netter, and Yang (2008) data is extracted from the Disclosure database and covers the period from 1991 to 2004. The database, currently offered by Thompson Research, contains SEC filings, insider trading filings, bankruptcy filings and other documents for U.S. public companies. Linck et al. limit their data collection to firms covered by Disclosure that can be merged to Compustat and CRSP and that have data on board size and composition for more than two years. In addition, firms with fewer than three board members, financial firms, and utility companies are excluded. Data extracted from the proxy filings on Disclosure by Linck et al. includes information on director ownership, block ownership, CEO ownership, and board characteristics. Director ownership is computed as the average percentage of shares held by non-executive directors. Block ownership is the percentage of shares owned by 5% blockholders. The board characteristics include board size (the number of directors on the board), insider representation (the proportion of executive directors on the board), and whether the CEO is also the Chairman of the board.

Appendix B: Additional tests

Table B1: Logit models of bid frequencies and bid completions. The sample in columns 1 & 2 consists of 56,183 firm years from 1989 to 2007. The dependent variable (*BID*) equals one for the 3,911 firm years in which the firm receives a takeover bid, with both completed and not completed bids included. In columns 3 & 4, the sample consists of the 3,911 firm years in which a bid was received. The dependent variable (*COMPLETED*) equals one for the 2,966 bids that are ultimately completed. Completed bids are identified using the SDC variable “Status”. *RET_AGE* is set to one if CEO age is from 64 to 66. *Wave* is a dummy variable for 1997-1999. All other control variables are defined in Table 1. All regressions include year dummies. Standard errors are clustered by firm and year in columns 1 & 2 and by year in columns 3 & 4. T-statistics are in parentheses. Implied probabilities are computed at the means of the control variables and after setting the merger wave indicator and the age dummy variables (other than *RET_AGE*) to zero.

	Sample: Full panel Dep. variable= <i>BID</i>		Sample: Firm years with <i>BID</i> =1 Dep. variable= <i>COMPLETED</i>	
AGE ≥ 67	0.06 (0.63)		-0.08 (-0.44)	
RET_AGE (64-66)	0.27 (3.38)	0.20 (2.31)	0.36 (1.92)	0.33 (1.78)
AGE 59-63	0.12 (2.49)		-0.03 (-0.21)	
AGE ≤ 53	-0.10 (-2.57)		-0.11 (-0.96)	
RET_AGE*Wave	-0.41 (-2.15)	-0.41 (-2.16)	-0.22 (-0.74)	-0.23 (-0.77)
CEO age		0.02 (1.04)		0.09 (2.46)
CEO age squared		0.00 (-0.69)		0.00 (-2.07)
Tenure	-0.03 (-7.86)	-0.03 (-7.78)	-0.02 (-1.74)	-0.02 (-1.96)
New CEO	0.20 (3.51)	0.19 (3.53)	0.02 (0.21)	0.04 (0.39)
Founder	0.13 (2.57)	0.13 (2.53)	-0.04 (-0.24)	-0.02 (-0.16)
Past return	-0.03 (-5.75)	-0.03 (-5.72)	0.01 (1.62)	0.01 (1.64)
B/M	0.08 (1.72)	0.08 (1.71)	-0.40 (-4.56)	-0.41 (-4.75)
Log(MVEQ)	-0.03 (-1.30)	-0.03 (-1.31)	-0.01 (-0.22)	-0.01 (-0.29)
ROA	-0.04 (-0.24)	-0.04 (-0.25)	0.26 (1.04)	0.22 (0.83)
Firm age	-0.02 (-9.76)	-0.02 (-9.87)	-0.02 (-6.99)	-0.03 (-7.61)
Wave	0.34 (9.86)	0.33 (9.71)	2.33 (21.32)	2.32 (21.80)
Intercept	-2.14 (-25.30)	-3.05 (-4.68)	-0.19 (-0.63)	-3.02 (-3.08)
N non-event	52,272	52,272	945	945
N event	3,911	3,911	2,966	2,966
Prob. at RET_AGE=0	0.062	0.060	0.761	0.749
Prob. at RET_AGE=1	0.080	0.073	0.819	0.805

Table B2: The retirement-age effect and corporate governance: robustness. The sample consists of 22,532 firm-years from 1992 to 2006. The logit models estimate the probability of a firm receiving a successful bid for at least 50% of its shares outstanding. RET_AGE is set to one if CEO age is from 64 to 66. GOVQ is an index of governance quality, with higher values indicating better governance. The index is constructed from six governance measures. The governance measures are described in Table 1 and the construction of the index in Table 4. All other control variables are defined in Table 1. Wave is an indicator for the 1997-1999 merger wave. Standard errors are clustered by firm and year.

AGE ≥ 67	0.07 (0.54)	0.05 (0.35)	0.16 (0.70)	0.14 (0.57)
AGE ≥ 67*GOVQ		0.08 (1.37)		0.08 (1.36)
RET_AGE	0.40 (2.75)	0.40 (2.74)	0.37 (2.08)	0.36 (2.07)
RET_AGE*GOVQ	-0.18 (-2.66)	-0.17 (-2.56)	-0.18 (-2.63)	-0.17 (-2.54)
RET_AGE*Wave	-0.43 (-1.42)	-0.43 (-1.42)	-0.43 (-1.43)	-0.43 (-1.43)
CEO age			0.12 (2.12)	0.12 (2.11)
CEO age squared			0.00 (-1.86)	0.00 (-1.84)
GOVQ	0.07 (4.27)	0.07 (3.72)	0.07 (4.17)	0.06 (3.64)
Tenure	-0.04 (-4.61)	-0.04 (-4.59)	-0.04 (-4.73)	-0.04 (-4.71)
New CEO	0.10 (1.14)	0.10 (1.14)	0.11 (1.33)	0.11 (1.33)
Founder	0.13 (1.31)	0.13 (1.29)	0.14 (1.38)	0.13 (1.35)
Past return	-0.02 (-1.99)	-0.02 (-1.99)	-0.02 (-1.94)	-0.02 (-1.94)
B/M	-0.04 (-0.58)	-0.04 (-0.60)	-0.05 (-0.72)	-0.05 (-0.75)
Log(MVEQ)	-0.07 (-3.66)	-0.07 (-3.65)	-0.07 (-3.89)	-0.07 (-3.88)
ROA	0.34 (2.15)	0.34 (2.14)	0.33 (2.03)	0.32 (2.03)
Firm age	-0.02 (-5.84)	-0.02 (-5.85)	-0.02 (-6.17)	-0.02 (-6.18)
Wave	-0.32 (-2.24)	-0.32 (-2.24)	-0.31 (-2.20)	-0.31 (-2.19)
Intercept	-1.49 (-8.08)	-1.49 (-8.07)	-4.78 (-3.36)	-4.78 (-3.34)
N non-event	21,424	21,424	21,424	21,424
N event	1,108	1,108	1,108	1,108

Table B3: Ordered logit models of changes in takeover defenses: G-index and components of the E-index. The dependent variable is an indicator for a change in a component of the firm's E-index (columns 1-5) or for a change in the firm's G-index (column 6). The indicator is equal to -1 for a decrease, 0 for no change, and +1 for an increase. CEO age is measured in year t and the index changes are measured in years t and t-1. Specifically, the dependent variable is set to 1, 0, -1 if an increase, no change, or decrease is observed in year t or year t-1, in each case relative to the prior year with available data. The sample consists of firms that have received a bid in the four years ending in year t-3 (bids for any amount of equity are counted). Turnover is an indicator equal to one if year t is followed by a CEO turnover. The other control variables are described in Table 2 and are measured in year t-2. The components of the E-index are described in Table 9. Standard errors are clustered by firm.

	Poison Pill	Classified Boards	Limits to Amendments	Super-majority	Golden Parachutes	G-index
AGE \geq 67	-0.08 (-0.21)	-0.80 (-1.33)	-1.13 (-1.97)	-0.19 (-0.33)	-0.16 (-0.33)	-0.23 (-0.74)
RET_AGE (64-66)	-0.35 (-0.77)	-0.11 (-0.20)	-0.94 (-1.69)	-0.90 (-0.92)	-0.43 (-1.05)	-0.34 (-1.21)
AGE 59-63	0.18 (0.61)	-0.82 (-1.91)	-1.23 (-2.23)	-0.50 (-0.70)	-0.19 (-0.86)	-0.02 (-0.12)
AGE \leq 53	-0.05 (-0.19)	-1.04 (-2.37)	-0.91 (-2.49)	-0.94 (-2.46)	-0.09 (-0.47)	-0.12 (-0.75)
Turnover	0.03 (0.13)	0.08 (0.23)	-0.07 (-0.21)	0.20 (0.49)	-0.10 (-0.50)	-0.13 (-0.92)
Tenure	0.02 (1.05)	0.02 (0.72)	0.00 (-0.00)	0.02 (0.68)	0.00 (0.27)	0.00 (0.14)
Founder	-0.28 (-0.77)	0.35 (0.72)	0.83 (1.51)	-0.68 (-0.80)	-0.22 (-0.59)	-0.21 (-0.79)
Past return	0.01 (0.36)	-0.02 (-0.46)	-0.03 (-0.65)	0.03 (0.79)	0.01 (0.46)	-0.01 (-0.61)
Lag(Index)	-0.55 (-7.10)	-0.73 (-6.06)	-0.14 (-1.41)	-0.43 (-3.12)	-0.46 (-7.59)	-0.33 (-6.70)
B/M	-0.03 (-0.13)	-0.48 (-1.21)	-0.02 (-0.06)	-0.25 (-0.99)	0.41 (2.51)	-0.15 (-1.05)
Log(MVEQ)	-0.15 (-1.99)	-0.21 (-1.31)	0.00 (-0.00)	-0.05 (-0.30)	0.07 (1.23)	-0.10 (-2.05)
ROA	-1.00 (-1.24)	-0.87 (-0.52)	3.73 (4.20)	-0.18 (-0.15)	-0.25 (-0.34)	0.34 (0.56)
Firm age	-0.02 (-3.08)	-0.01 (-0.80)	0.00 (0.27)	-0.01 (-0.70)	-0.02 (-2.57)	-0.02 (-4.40)
N Increase	139	31	47	22	179	489
N No change	1,444	1,583	1,586	1,604	1,396	976
N Decrease	63	32	13	20	71	181
P(Incr.) RET_AGE=0	0.063	0.019	0.048	0.018	0.102	0.299
P(Incr.) RET_AGE=1	0.045	0.017	0.019	0.007	0.069	0.232

Table B4: Ordered logit models of changes in takeover defenses: changes in year t-1 or year t. The dependent variable is an indicator for a change in the firm's E-index: the indicator is equal to -1 for a decrease, 0 for no change, and +1 for an increase in the index. CEO age is measured in year t and the index change is measured in year t-1 (columns 1 and 2) or t (columns 3 and 4). The sample consists of firms that have received a bid over the four year period ending in year t-3 (bids for any amount of equity are counted). Turnover is an indicator equal to one if year t is followed by a CEO turnover. The other control variables are described in Table 2 and are measured in year t-2. Standard errors are clustered by firm.

	Index change in year t-1		Index change in year t	
AGE \geq 67	-0.75 (-1.95)		-0.14 (-0.37)	
RET_AGE (64-66)	-1.13 (-3.17)	-0.88 (-2.53)	-0.50 (-1.42)	-0.35 (-1.06)
AGE 59-63	-0.13 (-0.58)		-0.36 (-1.50)	
AGE \leq 53	-0.42 (-2.03)		-0.21 (-1.08)	
CEO age		0.30 (3.26)		0.22 (2.61)
CEO age squared		0.00 (-3.20)		0.00 (-2.50)
Turnover	0.52 (1.70)	0.50 (1.62)	0.01 (0.05)	-0.02 (-0.09)
Tenure	0.01 (0.71)	0.02 (0.93)	0.02 (1.39)	0.02 (1.36)
Founder	-0.21 (-0.63)	-0.32 (-0.95)	-0.41 (-1.28)	-0.46 (-1.46)
Past return	0.02 (1.11)	0.02 (1.04)	-0.03 (-1.37)	-0.03 (-1.24)
Lag(Index)	-0.49 (-8.49)	-0.50 (-8.75)	-0.50 (-8.81)	-0.51 (-8.96)
B/M	0.06 (0.32)	0.07 (0.36)	0.37 (2.35)	0.36 (2.24)
Log(MVEQ)	-0.03 (-0.55)	-0.04 (-0.60)	0.00 (-0.05)	-0.01 (-0.20)
ROA	-0.49 (-0.66)	-0.41 (-0.55)	0.93 (1.21)	0.82 (1.08)
Firm age	-0.02 (-2.75)	-0.02 (-2.83)	-0.02 (-3.55)	-0.02 (-3.73)
N Increase	157	157	161	161
N No change	568	568	610	610
N Decrease	72	72	78	78
P(Incr.) RET_AGE=0	0.217	0.176	0.192	0.165
P(Incr.) RET_AGE=1	0.082	0.081	0.126	0.122

Table B5: Ordered logit models of changes in takeover defenses: retirement-age indicator set to one for CEO age between 63 and 65. The dependent variable is an indicator for a change in the firm's E-index: the indicator is equal to -1 for a decrease, 0 for no change, and +1 for an increase in the index. CEO age is measured in year t and the index change is measured in year t-1 (columns 1 and 2) or t (columns 3 and 4). The sample consists of firms that have received a bid over the four year period ending in year t-3 (bids for any amount of equity are counted). Turnover is an indicator equal to one if year t is followed by a CEO turnover. The other control variables are described in Table 2 and are measured in year t-2. Standard errors are clustered by firm.

	Index change in year t-1		Index change in year t	
AGE \geq 66	-0.58 (-1.74)		-0.22 (-0.61)	
RET_AGE* (63-65)	-0.86 (-2.34)	-0.75 (-2.10)	-0.95 (-2.97)	-0.81 (-2.67)
AGE 58-62	-0.07 (-0.33)		-0.28 (-1.25)	
AGE \leq 52	-0.20 (-0.99)		-0.50 (-2.55)	
CEO age		0.32 (3.41)		0.23 (2.83)
CEO age squared		0.00 (-3.36)		0.00 (-2.67)
Turnover	0.52 (1.70)	0.47 (1.54)	0.05 (0.24)	0.04 (0.19)
Tenure	0.01 (0.78)	0.01 (0.85)	0.02 (1.39)	0.02 (1.50)
Founder	-0.19 (-0.55)	-0.28 (-0.82)	-0.43 (-1.37)	-0.50 (-1.55)
Past return	0.02 (1.13)	0.02 (1.12)	-0.03 (-1.29)	-0.03 (-1.14)
Lag(Index)	-0.49 (-8.61)	-0.50 (-8.73)	-0.50 (-8.77)	-0.51 (-8.94)
B/M	0.07 (0.34)	0.04 (0.19)	0.36 (2.27)	0.37 (2.31)
Log(MVEQ)	-0.03 (-0.49)	-0.04 (-0.63)	-0.01 (-0.12)	-0.01 (-0.20)
ROA	-0.43 (-0.57)	-0.37 (-0.49)	0.83 (1.10)	0.82 (1.08)
Firm age	-0.02 (-2.67)	-0.02 (-2.89)	-0.02 (-3.77)	-0.02 (-3.79)
N Increase	157	157	161	161
N No change	568	568	610	610
N Decrease	72	72	78	78
P(Incr.) RET_AGE=0	0.201	0.176	0.212	0.169
P(Incr.) RET_AGE=1	0.096	0.092	0.094	0.083

Appendix C: The effect of acquisitions on target CEO wealth

This appendix estimates the effect of a potential acquisition on target CEO wealth. This estimate is then used to test whether the increase in acquisitions around retirement age documented in Table 3 can be explained by higher monetary gains from acquisitions at that age. We follow the methodology of Cotter and Zenner (CZ, 1994) and assume that the wealth effect (WE) consists of:

$$WE = \text{Golden parachute payments} - PV(\text{lost compensation}) \\ + \text{Gain from equity ownership}$$

Golden parachutes are set to three times the level of base salary and bonus (Hartzell, Ofek, and Yermack (2004)).³³ The present value of lost compensation is calculated under the assumption that the CEO would have continued in office until age 65 without the takeover and would have received his current compensation each year, with a real discount rate of 3%.³⁴

$$PV(\text{lost compensation}) = \sum_{t=1}^{\text{Years to retirement}} \frac{\text{Current compensation}}{1.03^t}$$

Following CZ, *Years to retirement* is set to (65 – current age), but is restricted to be between 3 and 15. *Current compensation* includes salary and bonus (to match CZ), or alternatively, salary and bonus plus stock and option grants. The *gain from equity ownership* is computed assuming a hypothetical 35% takeover premium, which is close to the median takeover premium in our sample.

Because the necessary information on CEO compensation and stock and option holdings is not available for our sample, we run a flexible prediction model based on firm and CEO characteristics for these variables using ExecuComp data, and then impute their values for our sample. The model allows each element of CEO compensation and equity ownership to vary flexibly with age, and to exhibit a retirement-age effect.³⁵ Table C1 shows descriptive

³³ Section 280G of the Internal Revenue Code limits corporate income tax deductions for golden parachute payments to three times the level of base salary and bonus.

³⁴ The 3% discount rate can be interpreted as the difference between the CEO's risk-adjusted discount rate and the expected growth rate of compensation.

³⁵ Specifically, we run five separate regressions for stock ownership, option ownership, stock grants, option grants, and salary and bonus. The explanatory variables are CEO age, age squared, the retirement-age dummy, CEO tenure, a founder dummy, log(MVEQ), B/M, firm age, past stock returns, PPE/total assets,

statistics for the estimated wealth effects and their individual components for the full CEO panel and for sub-samples based on CEO age. The table shows separate estimates for the cases in which *PV(lost compensation)* excludes or includes stock and option grants. The estimates without stock option grants match the methodology in CZ, and the magnitudes are similar to those reported in their paper.

Table C2 regresses the probability of receiving a successful takeover bid on CEO age, the usual controls, and includes the estimated wealth effects as additional control variable. To account for the considerable skewness of the wealth effects, we include their percentile ranks instead of the actual values in the regressions. The regressions in columns 2 and 4 control separately for CEO stock ownership as a fraction of shares outstanding (again imputed using ExecuComp data). Ownership could affect acquisition frequencies independently of the wealth effects, and this specification attempts to separate the two factors.

Table C2 shows that the effect of retirement age on acquisitions is robust to controlling for wealth effects. The coefficient on the retirement-age indicator remains large and statistically significant, with t-statistics from 2.36 to 2.75. The marginal effects are similar to the ones in Table 3 and imply increases in the odds of an acquisition of 28 to 36 percent for retirement-age CEOs.

These results suggest that retirement-age CEOs' greater willingness to sell is not explained by their smaller monetary losses (or larger gains) from acquisitions alone. This is perhaps not surprising given that the main drivers of the wealth effects – stock and option holdings and the loss of future compensation – change gradually with CEO age, while takeover frequencies change abruptly when CEOs reach retirement age. A more promising explanation might be that target CEOs receive substantial non-monetary benefits of control and status, and that they are unwilling to give up these benefits before their planned retirement.

R&D/total assets, sales growth, leverage, ROA, and year dummies. In the regressions (untabulated), the retirement-age indicator has no significant effect on stock ownership, option ownership, or grants. The coefficient on retirement age is positive and weakly significant ($t=1.71$) for salary and bonus.

Table C1: Descriptive statistics for the estimated effect of a potential acquisition on target CEO wealth. All values are in thousands. The sample consists of 54,724 firm years. The sample is smaller than in Table 3 because of missing imputed compensation or ownership data. The change in target CEO wealth due to an acquisition is estimated as the gain from stock and option ownership plus the value of golden parachutes minus the present value of lost future compensation. See the text of the appendix for more details. Lost future compensation is calculated either excluding or including future stock and option grants. The top panel shows the mean and median wealth effect estimates for the whole sample, the bottom panel shows the mean and the median estimates for five CEO age groups. The averages of the wealth effect components do not sum up to the average wealth effect because of winsorization at the 1% level.

	PV(lost compensation) = PV(lost salary & bonus)		PV(lost compensation) = PV(lost salary & bonus + lost stock & option grants)	
	Mean	Median	Mean	Median
<i>Wealth effects for the whole sample</i>				
Gain from equity ownership	11,817	2,947	11,817	2,947
Golden parachute	1,758	1,026	1,758	1,026
PV(Lost compensation)	4,372	2,161	15,841	4,303
Wealth effect	6,106	710	-5,367	145
<i>Wealth effects by CEO age</i>				
≤53	1,792	350	-14,423	-3,115
53-58	4,426	473	-6,396	-478
59-63	12,260	2,282	6,746	1,005
64-66	16,728	3,676	13,491	3,029
≥67	17,063	3,517	14,282	3,066

Table C2: Logit models of bid frequencies with wealth effect estimates as control. The sample consists of 54,724 firm years from 1989 to 2007. The models estimate the probability of a firm receiving a successful bid for at least 50% of its shares outstanding. RET_AGE is set to one if CEO age is from 64 to 66. Wave is an indicator for 1997-1999. The effect of a potential acquisition on CEO wealth is estimated as the gain from stock and option ownership plus the value of golden parachutes minus the present value of lost future compensation. The Wealth Effect included below is the percentile rank of the dollar wealth effect. Lost compensation is calculated either excluding (columns 1 and 2) or including (columns 3 and 4) future stock and option grants. CEO Ownership is the estimated percentage stock ownership by the CEO. All other variables are defined as in Table 1. Standard errors are clustered by firm and year. T-statistics are in parentheses. Implied probabilities are computed at the means of the control variables and with the merger wave indicator set to zero.

	PV(lost compensation) = PV(lost salary & bonus)		PV(lost compensation) = PV(lost salary & bonus + lost stock & option grants)	
RET_AGE (64-66)	0.24	0.26	0.26	0.28
	(2.88)	(3.01)	(3.20)	(3.30)
RET_AGE*Wave	-0.38	-0.38	-0.38	-0.38
	(-1.98)	(-2.05)	(-2.00)	(-2.05)
CEO age	-0.07	0.07	-0.06	0.07
	(-1.20)	(2.41)	(-0.96)	(2.45)
CEO age squared	0.00	0.00	0.00	0.00
	(1.47)	(-1.93)	(1.27)	(-1.85)
Wealth effect	0.00	0.00	0.00	0.00
	(0.18)	(-0.37)	(-1.54)	(-2.40)
CEO ownership	-13.31		-11.87	
	(-3.31)		(-2.69)	
Tenure	0.00	-0.03	0.00	-0.03
	(-0.03)	(-6.73)	(-0.21)	(-6.76)
New CEO	0.10	0.09	0.09	0.09
	(1.42)	(1.29)	(1.35)	(1.27)
Founder	0.15	0.02	0.14	0.03
	(1.83)	(0.38)	(1.69)	(0.44)
Past return	-0.02	-0.02	-0.02	-0.02
	(-3.25)	(-4.46)	(-3.50)	(-4.76)
B/M	-0.03	0.01	-0.03	0.00
	(-0.54)	(0.12)	(-0.64)	(-0.04)
Log(MVEQ)	-0.10	-0.04	-0.10	-0.05
	(-3.40)	(-1.71)	(-3.37)	(-2.51)
ROA	0.62	0.16	0.59	0.17
	(2.69)	(0.92)	(2.52)	(1.09)
Firm age	-0.02	-0.02	-0.02	-0.02
	(-10.50)	(-12.27)	(-10.08)	(-11.58)
Wave	1.20	1.23	1.19	1.22
	(25.82)	(26.82)	(24.88)	(25.39)
Intercept	-1.18	-5.31	-1.48	-5.19
	(-0.73)	(-7.11)	(-0.88)	(-7.17)
N non-event	52,052	52,052	52,052	52,052
N event	2,672	2,672	2,672	2,672
Prob. at RET_AGE=0	0.039	0.034	0.032	0.033
Prob. at RET_AGE=1	0.050	0.044	0.042	0.045