

Own company stock in defined contribution pension plans: a takeover defense?

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Received 15 November 2004; received in revised format 16 June 2005;
Accepted 7 July 2005

Abstract

If managers induce employees to hold company stock in defined contribution pension plans as a form of takeover defense, then changes in state laws that enhance managerial protection should lead to a reduction in employer stock in 401(k) plans. Delaware's mid-1990s validation of the poison pill in conjunction with a staggered board was followed by a significant decline in employee ownership within defined contribution plans for firms incorporated in Delaware. Evidence using governance data suggests that this is due to responses of firms with staggered boards. Binary choice models confirm that employee ownership in defined contribution plans lowers takeover probabilities.

JEL Classifications: G34; G32; J32

Keywords: Takeover; Ownership; Pensions

I thank James Poterba, Stewart Myers, Jonathan Gruber, Dirk Jenter, Daniel Bergstresser, Lauren Cohen, Mihir Desai, Guhan Subramanian, Steven Venti, an anonymous referee, and participants at the MIT Public Finance Lunch Seminar, the MIT Finance Lunch Seminar, and the Stockholm School of Economics for helpful discussions and comments. Thanks to Keith Park for research assistance. I am grateful to the Center for Retirement Research at Boston College and the National Bureau of Economic Research for financial support.

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1. Introduction

Employees who hold a large share of their defined contribution (DC) retirement assets in the company stock of their employer are exposed to a great degree of undiversified risk compared to holders of a diversified portfolio. Not only do they bear idiosyncratic asset price risk, but the value of their retirement accounts is correlated with the profitability of their employer and hence with their wage income. Programs that provide requirements for matching contributions are responsible for a substantial amount of own-company stock investment in DC plans. As of year-end 2002, DC plans that offer company stock covered 48% of all DC plan participants and 62% of all DC plan assets (Holden and VanDerhei, 2003). Moreover, of the plans that offer employer stock, approximately 45% direct employer contributions to employer stock, and of these directed plans, 68% to 81% impose diversification restrictions (Mitchell and Utkus, 2002). While about a quarter of discretionary contributions are invested in own company stock, this could reflect an endorsement effect if employees interpret their employers' choice to invest nondiscretionary allocations in company stock as implicit investment advice (Benartzi, 2001). Employers also can influence employees' discretionary allocations through menu design and the choice of default options (see Choi, Laibson, Madrian, and Metrick, 2004).

Given the prevalence of own-company stock in DC plans and the effects employers have on employee allocations, it is natural to ask what strategic motives make this form of employee ownership desirable to managers or shareholders. Evidence on the productivity of firms with employee ownership is mixed, and arguments that it is more cost-effective for firms to contribute to a pension plan using stock rather than cash hold only if the cost savings is greater than the discount at which plan participants might value a non-diversified portfolio.

This paper tests whether corporate control motives partially explain management's desire to encourage employee ownership in DC plans. Since employees are interested in job retention, they are more likely to vote for incumbent managers in proxy contests. Thus, giving employees stock serves as a defense against a change in corporate control. This rationale predicts that a firm

whose managers have a stronger incentive to defend against takeovers will have more employee ownership than an identical firm whose management is insulated from takeover by state laws. In this context, employee holdings of company stock and state laws that protect managers are substitute mechanisms for lowering the probability of a successful takeover.

I find that companies that experience changes in state-level takeover protection also experience changes in DC employee ownership relative to firms not affected by the new laws. This paper tests several changes in the rules governing the market for corporate control, including the mid-1990s validation of the poison pill in Delaware case law discussed by Subramanian (2004), the late-1980s business combination statutes emphasized in Bertrand and Mullainathan (2003), and other late-1980s laws considered by Bertrand and Mullainathan (1999) and Garvey and Hanka (1999). Analysis of variation in Delaware law is particularly useful as Delaware commands about half of the incorporation market. A company is subject to the legal regime of the state in which it is incorporated, rather than the state in which it is headquartered or the state where its income arises.

Delaware's validation of the use of the poison pill in conjunction with a staggered board is associated with a reduction in employee ownership shares of between 0.3 and 1.0 percentage points of the firm's market value. This is the sort of magnitude that would be predicted if contributions in company stock were curtailed after the law but existing own-company shares in the DC account were not sold. The higher estimates reflect the results of models that assume employees desire a positive amount of own-company stock by restricting the level of ownership to be greater than zero. The measured effect is also larger in linear specifications that weight the regressions by market value and that therefore emphasize the responses of larger firms. In terms of the percentage of employee DC holdings that is invested in company stock, the decline in response to the Delaware cases is between 1.1 and 3.9 percentage points.

I examine the robustness of these effects to controls for variables that reflect the firm's financial strength, its desirability as a takeover target, and the tax advantages of funding DC plans

with stock. It is important to include controls for these factors insofar as it is plausible that their dynamics are correlated with the timing of the legal changes. The coefficients on the controls also provide some evidence for the tax-saving hypothesis. The decline in employee ownership as a share of firm market value is completely robust to the inclusion of controls, whereas the results associated with scaling by total employee DC holdings are attenuated somewhat.

Changes in takeover law are a more useful source of identifying variation than are cross-sectional governance characteristics, as the endogeneity of corporate governance decisions to the ownership structure decision challenges cross-sectional inferences. However, since the mid-1990s cases only affected firms with staggered boards, which can only be added or removed with shareholder approval, cross-sectional governance data at the firm level confirm that observed changes in employee ownership are due to the new state-level protections.

A rigorous control specification tests whether the decline in employee DC holdings in Delaware is due to firms with staggered boards. To identify staggered board firms, I supplement governance data from the Investor Responsibility Research Center (IRRC) by manually collecting staggered board information from SEC filings. When I consider the share of the firm's market value owned by employees, Delaware firms with staggered boards realize a decline of 0.9 percentage points; however, this result obtains only in weighted regressions and is therefore concentrated among large firms. I also consider the holdings of top management in response to the legal changes. The top management of Delaware firms with staggered boards own 1.9% less of the firm after the Delaware cases, with employees and Delaware firms together owning 2.6% less. Thus it appears that while management internalizes some cost of the ownership takeover defense themselves, they also pass substantial takeover defense costs onto workers.

Similarly clean effects of the late 1980s takeover legislation on employee ownership are more difficult to identify due to the clustering of various legal changes that have diverse theoretical predictions with respect to ownership. Business combination legislation, for example, renders hostile takeovers easier to block in general, but it also makes employee ownership a more

effective takeover defense. However, I find only weak evidence that business combination statutes lead to a higher share of company stock held in DC plans.

This paper also confirms that employee ownership has a deterrence effect on takeover probabilities. Business combination statutes that allow 15% blocks of shareholders to impede a takeover attempt are in place in most states. Conditional on the inside ownership of employees and top executives being equal to 15 to 30% of the firm, each additional percentage point of employee ownership reduces the probability of takeover by 0.44 percentage points per year, so that a one standard deviation increase in employee ownership reduces the probability of takeover by 2.2 percentage points per year. Given that the unconditional probability of takeover for a firm-year observation is 4.7%, these magnitudes represent economically meaningful deterrence effects.

To the extent that adoption of the defense is endogenous, for example, in anticipation of takeover bids, coefficients in simple takeover probits will underestimate any decline in the takeover probabilities brought about by a higher level of inside ownership. Simultaneous estimation of takeover probabilities and employee ownership performed using instrumental variables allows for the separation of the deterrence effect of employee ownership from endogenous likelihood effects. Using tax characteristics that plausibly do not affect takeover probabilities by themselves but that do affect the tax benefits of employee stock holdings, I find that each percentage point of employee (or managerial) ownership reduces the takeover probability by 0.6 percentage points.

Strategic corporate control motives are, therefore, one significant reason managers encourage employees to hold company stock in their defined contribution pension accounts. As laws grant managers more insulation from market discipline, the incentive for management to encourage employees to hold company stock decreases.

This paper proceeds as follows. Section 2 reviews the existing literature about employee ownership and DC plans. Section 3 discusses the data, including both the sample construction and the cross-sectional correlations between inside ownership structures and corporate

governance measures. Section 4 develops the identification strategy and presents the empirical specifications. Section 5 provides the results. Section 6 submits evidence on the deterrence effect of employee ownership. Section 7 concludes and identifies areas for further research.

2. Employee ownership in defined contribution pension plans

Studies such as Meulbroek (2002), Ramaswamy (2002), Mitchell and Utkus (2002), Poterba (2003), and Poterba (2004) demonstrate substantial financial and welfare costs to employees of holding own-company stock in DC plans. Moreover, the problem of non-diversified company stock holdings in DC plans is widespread. At 18 of the 100 largest corporate DC pension sponsors, more than 50% of employee assets were invested in the stock of the sponsoring company as of September 2002, based on data from the *Pensions and Investments 1000* survey.¹ According to Liang and Weisbenner (2002), 41% of DC plans that offered employer matches and filed 11-K forms with the SEC in 1998 required at least part of the match to be in company stock; 32% required that the entire employer match be invested in company stock.

The literature on the motivation for employers to encourage employee ownership focuses on the employee stock ownership plans (ESOPs) of the 1980s. While ESOPs have similar disclosure requirements as pension plans, historically they have not been implemented as substitutes for retirement benefits provided by companies. Kruse (1995) provides evidence that the ESOPs of the early and mid-1980s did not supplant defined benefit (DB) retirement plans.

Starting in the 1990s, the majority of new employee ownership of employer stock in the U.S. occurred not through ESOPs but rather through retirement plans such as 401(k) plans and so-called KSOPs, which are 401(k) plans with an embedded ESOP structure. Mitchell and Utkus (2002) document this blurring of the lines between retirement security plans and plans designed

¹ An additional 28 of these 100 largest DC sponsors did not provide any asset allocation information in the survey.

for the explicit purpose of employee ownership: At least six of the ten companies with the largest absolute dollar value of pension assets in employer stock in 2001 were organized as KSOPs. KSOPs retain many of the characteristics of ESOPs but are explicitly classified as retirement savings plans under section 401(k) of the Internal Revenue Code.

This paper considers the motivations that can explain the variation in employee ownership in DC pension plans in general, and especially in 401(k) plans, over the period between 1985 and 1998. While the sample does not exclude stand-alone ESOPs, approximately 90% of the mid-1990s sample observations have 401(k) plans and only 1% are characterized as firms that have ESOPs but no 401(k). The approach I use is to specify employee ownership as a function of changes in state-level takeover protection and to test for a decline in the share of employee ownership in states that provide more protection to managers relative to ones that do not.

2.1. The takeover defense as a motive for encouraging employee ownership

There are many circumstances in which management and workers emerge as allies against hostile takeovers (see Stulz, 1988; Pagano and Volpin, 2005). Shivdasani (1993) presents evidence that ownership by managers, employees, and other affiliated blockholders reduces the likelihood of a successful takeover attempt. In particular, Gordon and Pound (1990) argue that many firms established ESOPs in the late 1980s explicitly to defend against takeovers. Chaplinsky and Niehaus (1994) show that in the 1980s ESOP firms were less likely to change control in a takeover contest, Beatty (1994) finds that ESOPs are more likely for companies with a higher predicted probability of takeover, and Chang and Mayers (1992) document that ESOP-related changes in managerial voting rights impact firm value. This paper tests whether similar control motives explain why management has desired that employees hold own-company stock in 401(k) plans.

2.2. Alternative motives: tax advantages, costs, and productivity gains

The takeover defense is only one of several possible motivations for management to encourage employee ownership. For instance, Scholes and Wolfson (1990) and Scholes, Wolfson, Erickson, Maydew, and Shevlin (2005) detail two sources of tax savings associated with ESOPs and, by extension, KSOPs. First, lenders in an ESOP transaction receive a tax exclusion for up to 50% of the income they receive from firms' interest payments on ESOP debt. This provides firms tax arbitrage opportunities when they buy back stock for the ESOP. Second, dividend payments are tax deductible if the dividends are paid in cash directly to ESOP participants, if the dividends are paid to the plan but with a distribution to participants within 90 days of the end of the plan year, or if the dividends are used to repay an ESOP loan (see Beatty, 1995).² The value to the firm of these tax deductions is an increasing function of the firm's marginal tax rate. Despite this benefit, Chaplinsky and Niehaus (1990) find that ESOPs are not managed to provide the maximum tax benefits to shareholders.

Another reason that firms may encourage employee ownership in 401(k) plans is that under some circumstances issuing new shares to fund the plan is less costly to the firm than making cash contributions. If the firm is financially constrained and employees value the shares more than the market would, contributing stock would generate cost advantages. When one weights these cost savings against the potential dilution effect of issuing new shares (Mitchell and Utkus, 2002), as well as the fact that workers are not likely to value an undiversified retirement portfolio at its cash value, paying contributions in employer stock might appear less attractive. However, worker myopia about the market in the late 1990s may well have led to private overvaluations of such portfolios. If, on the other hand, firms purchase the shares through buybacks and then allocate them to employees, funding with shares is no cheaper than funding

² The 2001 tax reform relaxes these restrictions. As Mitchell and Utkus (2002) observe, it is now possible to take a tax deduction for dividends reinvested into the ESOP, provided the dividend reinvestment is not mandatory for the participants.

with cash. Benartzi (2001) shows that approximately one-half of the firms with a company stock menu option conduct buybacks from the open market to obtain the shares.

A third alternative motivation for management to encourage employee ownership is the belief that if employees own shares in the firm they will be more productive.³ Kruse (2002) reviews the empirical studies on the productivity of workers at firms with ESOPs and finds mixed results. Although empirical work suggests that ESOP firms do not perform *worse* than non-ESOP firms in terms of productivity and profitability, there is no clear positive link between ESOPs and performance (Blasi, Conte, and Kruse, 1996).

2.3. Employee ownership versus executive ownership

The takeover defense hypothesis carries over to the ownership of company stock by executives. When state laws offer managers more protection against takeovers, managerial ownership of company stock should also decline, to the extent that managerial ownership is used for control purposes. As the jobs of top management are presumably more at risk than those of rank-and-file employees in a takeover, the takeover defense should be more valuable to managers than to employees. If top managers wish to use ownership structure to defend against takeovers, then they must choose how much of the diversification costs they will bear themselves and how much they will attempt to pass on to other parties. If top management owns stock to reduce the probability of takeover, they internalize some of the costs of inadequate diversification. If they advise or impose employee stock ownership, then some of these costs fall on employees. The distinction between the effects of changes in the laws on employee versus executive ownership is necessary because the welfare consequences of such changes are different for each of these stakeholder groups. For the purposes of evaluating the takeover defense hypothesis, evidence of

³ Chiplinsky, Niehaus, and Van de Gucht (1998) summarize these arguments. See also Alchian and Demsetz (1972), Holmström (1979), and Williamson (1979).

effects on executive ownership offers confirmation that ownership of employer stock in DC plans is correlated with control motives.

3. Data

3.1. Sample construction and employee ownership data in the IRS 5500 filings

Table 1 summarizes the compilation of the sample. The data on defined contribution pension plans come from the IRS 5500 research file from the Department of Labor, which is available for 1985 through 1998. The IRS form 5500, which contains complete asset valuations as of the end of the plan year, must be filed annually by pension plan sponsors. Only plans with greater than 100 employees are required to file the primary 5500 form; other firms were allowed to file form 5500-EZ or 5500-C/R and are not required to file every year. This study only uses defined contribution plans that filed the primary form. I obtain equity share prices and financial variables by merging the IRS 5500 data file with data from CRSP and Compustat.

[Table 1 here]

One notable complication to the construction of the sample is the presence of common and master trusts as an asset category. As of the mid-1990s, an average of 15% of assets are reported to be held in common or master trusts, and 25% of the firm-year observations have at least some assets reported in trusts. Sponsors who organize all or part of their pension fund assets as a master trust or common/collective trust are not required to disclose the asset allocation of such entities on the main form. Trusts are a problem for the results if what appears to be a decline in own-company stock in DC plans actually reflects companies moving more of this stock into trusts. To address this potential bias, I exclude firms that declare any assets in common, collective, or master trusts. This step reduces the sample size by about 25%.

The full IRS sample less excluded firms consists of 31,145 firm-years that represent 6,553 firms. The IRS covariate subsample consists of the firm-year observations for which a full set of control variables from Compustat and the simulated tax rate database of John Graham (see Graham, 1996) are available. This subsample comprises 14,157 firm-years and 2,889 firms.

(The next section describes the control variables in greater detail.) A further subset of the firm-year observations in the IRS covariate sample is matchable to executives in the ExecuComp database. I use the sample matched to ExecuComp to test for effects on ownership by top management. The executive compensation data are available for firms in the S&P 500, the S&P MidCap 400, and the S&P SmallCap 600, and contain details on the holdings of the top 5 executives at these companies.

Table 2 presents summary statistics over time for the main ownership variables in the full IRS sample. The first three columns provide the total number of firms in the sample, and the number of firms with employee ownership in DC pension plans. The next two columns indicate the percent of the firm's equity market value that employees hold in DC plan accounts for plans with nonzero DC ownership only.

The share of the firm's equity market value that employees hold is the variable predicted to have a direct effect on the probability of takeover. It is, therefore, an important dependent variable in testing the effects of changes in managerial protection on employee ownership. Due to business combination statutes, even what may appear to be a relatively small ownership share can contribute critically to takeover deterrence (refer to Section V for further details). Moreover, ownership figures in Table 2 do not include equity owned by the managers themselves or other affiliated constituencies. Thus, this analysis essentially assumes that each outstanding common share has the same number of votes. This assumption is valid for all firms except the small minority that have multiple classes of outstanding equity.⁴

The next two columns in Table 2 indicate the percent of employee DC holdings that is invested in company stock for the same sample. The firm has more control over this measure.

⁴ Gompers, Ishii, and Metrick (2004) identify only 168 out of 4,992 companies in the merged CRSP-Compustat database as firms with multiple classes of stock.

Moreover, it is also the variable most related to employee welfare. For these reasons it also a useful measure of employee ownership.

[Table 2 here]

According to the above measures, employee ownership steadily fell until approximately 1995, at which point it began to rise again for the last several years of the sample. Part of this pattern is due to the fact that a high share of DC plans in the 1980s were explicitly started as ESOP plans. Indeed, the final columns in Table 2 indicate that the ratio of DB to DC assets rose substantially in the late 1980s, but fell precipitously in the 1990s as employee ownership shifted to 401(k) plans and began to replace DB plans as a source of pension benefits. The table gives 75th percentiles of the DB-to-DC ratio rather than medians, as the median DB assets for a DC firm is zero.

3.2. Construction of other variables

Table 3 reports summary statistics for the control, interaction, and dependent variables. There are two categories of control variables, namely, financial and tax. I select and construct financial control variables such that they are as close as possible to those used by Comment and Schwert (1995), and relate to the firm's financial condition and probability of being taken over. Specifically, the controls are: the annual percentage change in net sales ($\% \Delta Sales$), the ratio of long-term debt to common equity ($Debt/Equity$), the market-to-book ratio ($Market/Book$), the price-to-earnings ratio on a nondiluted basis ($Price/Earnings$), the average abnormal return ($Abnormal Return$) from the Capital Asset Pricing Model (CAPM) as constructed as in Comment and Schwert (1995),⁵ the logarithm of assets at book value ($Size$), and the dividend-price ratio ($Dividend/Price$).

⁵ I estimate the CRSP value-weighted returns (including distributions) for NYSE/AMEX/Nasdaq, according to $Ret_{it} = \alpha_i + \beta_i Ret_{mt} + \varepsilon_{it}$ for each firm on daily data from a two-year period beginning four

Following Comment and Schwert (1995), I average the ratio variables over the four years prior to the observation. However, large outliers in the financial control variables remain, so I winsorize these financial controls at the 1st and 99th percentiles. This procedure is applied because control variables with large outlying values will not sufficiently pick up variation correlated with the main variable of interest. Winsorization of the financial controls does not affect the main results.

[Table 3 here]

I use four main variables to measure the tax burden on the firm. To control for the marginal tax rate, which is directly related to the value of the tax benefits of employee ownership in a KSOP, I use simulated marginal tax rates from Graham (1996). The Graham method accounts for taxable income, tax-loss carrybacks and carryforwards, the investment tax credit, and the alternative minimum tax. Taxable income in the Graham calculations is determined before any employee-ownership dividend deduction is subtracted.⁶ An indicator variable shows that 16% of firms in the IRS sample with covariates have zero marginal tax rates after interest deductions. I also use a firm's net operating loss (NOL) carryforwards as an additional control, as the U.S. tax code permits firms to carry forward tax losses if they cannot be used to offset taxable income in the year they are incurred.

The third panel of Table 3 provides summary statistics for the staggered board variable. A staggered board provision stipulates that only a certain fraction (usually one-third) of the corporation's directors stand for election in any given year. Bebchuk, Coates, and Subramanian (2002) argue that in combination with poison pills, staggered boards are an effective takeover

years before each observation. The average abnormal return is the mean of $Ret_{it} - \alpha_i - \beta_i Ret_{mt}$, over the period between one and two years prior to the observation.

⁶ Until the tax reform of 2001, deductions for dividends paid to ESOPs and KSOPs were included in retained earnings and their effect on tax would have been incorporated into the deferred taxes item. See National Center for Employee Ownership (2002).

deterrent. While poison pills can be quickly implemented in the event of a hostile takeover bid, a staggered board must be written into the corporate charter and thus requires a shareholder vote.

The standard source for whether a firm has a staggered board in place is the IRRC database of corporate governance characteristics described by Gompers, Ishii, and Metrick (2003). The IRRC universe comprises over 90% of the aggregate market capitalization of the three major U.S. stock exchanges, and tabulates numerous charter bylaw provisions for the years 1990, 1993, 1995, 1998, 2000, and 2002. I fill in governance characteristics for years not covered by the IRRC (e.g., 1991) by taking the data from the nearest year for a given firm (e.g., 1990).

The IRRC sample covers only about 40% of the firms in this study. I therefore augment IRRC data on staggered boards with results of a manual collection of observations from prospectuses, proxies, registration statements, and periodic reports filed with the SEC by the sample firms. Disclosure of whether a board is staggered is not mandatory. However, it is possible to discern from proxy forms that involve the election of directors whether the directors are elected in staggered classes. Moreover, voluntary disclosures are often found in the other filings. The collection procedure identifies 1,551 staggered board observations for firms not in the IRRC sample. These observations, together with the existing 1,782 staggered board observations from the IRRC data, result in a staggered board incidence of 37.3%. The fact that the collection sample has a smaller incidence of staggered boards than the IRRC sample reflects in part the fact that these firms are smaller and less likely to have staggered boards, and in part the ability of firms to avoid disclosure. Thus, this selection procedure creates a bias against finding that the decline in Delaware ownership was concentrated in staggered board firms, as some firms with staggered boards will slip through the filter and be classified as firms without staggered boards.

Table 3 also shows that in the IRS covariate sample, the average percentage of the market value of firms held by employees is 1.8% including zeros and 4.3% excluding zeros. The 90th percentile and 95th percentile values are 5.2% and 9.7%, respectively. As a share of total DC

assets, on average employer stock amounts to 13.8% including zeros and 33.4% excluding zeros. For the sample matched to the executive ownership data, the mean share of the firm owned by top executives is 4.6% and the mean owned by top executives and employees combined is 6.0%.

3.3. Patterns of ownership structure and corporate governance

Employee and executive ownership shares demonstrate different cross-sectional patterns with respect to corporate governance. Fig. 1 shows median employee and executive ownership graphed against the corporate governance index of Gompers, Ishii and Metrick (2003) as of 1998 (the most recent year of the employee data). The corporate governance index captures shareholder rights, with higher values implying lower levels of shareholder rights against management. This figure shows an unmistakable cross-sectional relation between higher employee ownership in DC plans and weaker corporate governance. Furthermore, the percentage of the firm that is owned by executives is generally lower for firms with weaker corporate governance. Although this figure reflects a bivariate relationship and not a regression with controls, it supports the notion that employee ownership is partly explained by managers seeking entrenchment without paying the diversification costs in full themselves.

3.4. States of incorporation

As the identification strategy relies on state variation in takeover protection, each observation must be assigned its proper state of incorporation. The Compustat database assigns only the most recent state of incorporation, even if a company has switched its state of incorporation over time. Subramanian (2002) documents reincorporation patterns that could be a problem for longer panels if they are not properly taken into account.

To correct for this problem, states of incorporation are taken from Compustat and then cross-checked with Moody's Manuals and the IRRC database. Table 4 presents the incorporation shares of the states with the largest share of the total for the full IRS sample. Given approximately one-half of all public companies are incorporated in Delaware, variation in

Delaware law is of great importance.⁷ I find that of the observations that I check, which represent approximately 60% of the total, approximately 5.2% of checked firms were affected by a reincorporation that is not accounted for by Compustat. Thus, for these sample firms, the state of incorporation changes over time.

[Table 4 here]

In the absence of the Moody's correction, the primary difference is that approximately 1% of firms are incorrectly assigned to Delaware early in the sample when they were actually incorporated in California. The correction does not modify the central qualitative effects presented in this paper, but quantitatively the main coefficient in the control specifications would be overestimated by a factor of 5-10% if the uncorrected states of incorporation were used. An alternative way to correct for incorporation is to drop all firms that reincorporate during the sample period. This does not have a significant effect on the results relative to the correction I present above.

4. Identification through takeover laws

4.1. Cross-state variation in the legal takeover environment

In general, if a state's laws make it easier for management to impede a takeover attempt, there should be a decline in employee ownership in that state relative to other states. Thus, entrenched managers who encouraged employee ownership prior to such laws are likely to abandon this policy if the concentration of stock in friendly hands is no longer necessary for a takeover defense. However, not all takeover laws yield this same theoretical prediction for employee ownership. Some forms of antitakeover laws, such as business combination statutes,

⁷ The origins of Delaware's supremacy in the state corporate charter market is a subject of some debate; see Romano (1985) for one view. Bebchuk and Ferrell (2001) argue that the passage of laws that protect incumbent managers is a manifestation of the competition among states to gain a larger share of incorporations.

render employee ownership itself a more effective takeover defense. Thus, a manager who wants to secure takeover protection might respond to such a law by trying to increase the concentration of stock in the hands of friendly voters such as the firm's employees.

An important assumption underlying this general approach is that the statutory changes only affect employee ownership through the takeover environment, that is, the timing of a legal change in a given state is not systematically related to changes in ownership that would have occurred in the state in the absence of the law. This type of legislative endogeneity is a concern because it is plausible that if employee ownership is used as a takeover defense and if the laws are introduced in response to (or in anticipation of) a high-pitched takeover environment, laws might be introduced in states in which employee ownership would have risen in the absence of such laws. This would tend to bias the apparent effect of anti-takeover laws on employee ownership in an upward (positive) direction, and would generally work against the negative effects that I find.

The most widely cited changes in states' takeover environments have been the so-called "second-generation" laws of the late 1980s, which are tabulated by Pinnell (2000) and reviewed by Subramanian (2002). In many states, several second-generation laws were passed within a short period of time. Given this clustering of new legislation and the persistence of ownership from one year to the next, simultaneous identification of the effects of each of the individual legal measures on both employee ownership and takeover probabilities proves difficult.

Subramanian (2004) discusses an important shift in the legal takeover regime in Delaware, arguing that a series of takeover contests in the mid-1990s legitimized the use of the poison pill in certain situations and thereby "eliminated Delaware's distinctiveness as a takeover-friendly jurisdiction." These cases — *Younkers*, *Wallace Computer*, and *Circon* — were built on cases in the 1980s that declared the poison pill legal in certain instances but contained caveats as to the extent to which the case could be applied to other situations. *Moran v. Household International* (1985), for example, states that targets did not have "unfettered discretion" to use poison pills (see Subramanian, 2002).

The issue at hand in all three cases was whether a target with a staggered board could implement its poison pill defense after losing a first proxy contest against an unwanted bidder. This change in the stance of Delaware case law in the 1990s represents a legal shift in the takeover regime in a period in which employee ownership has not to date been heavily studied. Fig. 2 shows that the aggregate employee ownership shares for Delaware and non-Delaware firms were quite similar before the mid-1990s, at which point they diverge.

[Figure 2 here]

Given these facts and the period under study, I focus on the following four legislative and judicial changes to the takeover environment:

1. *Delaware case law in the 1990s* extended the use of a poison pill to firms with staggered boards. To the extent that different forms of takeover defense are partial substitutes, employee ownership in Delaware should decline following these rulings.
2. *Business combination statutes (BCS)* such as the one introduced in Delaware in 1987 allow a minority of shareholders (usually 15%) to block a takeover for a period of years. These statutes have an ambiguous predicted effect on employee ownership.
3. *Control share acquisition (CSA)* laws place an upper bound of 20 to 50% on the number of shares a bidder can use to vote in a takeover contest. For the same reason as business combination statutes, the overall predicted effect of CSA laws is ambiguous.
4. *Fair price statutes (FPS)* set forth procedures and guidelines to establish the “fair price” of a takeover contest. While Karpoff and Malatesta (1989) find insignificant value responses to fair price statutes, they nonetheless receive attention in other studies such as Bertrand and Mullainathan (1999). Fair price statutes should substitute for other takeover defenses such as employee ownership, and therefore may cause a decline in ownership.

4.2. Empirical models of employee ownership

I use several specifications to test the effect of the statutory changes on employee ownership in DC plans. One concern particular to the company stock dependent variables is the

large number of observations that have no employee ownership. There are two ways to address this problem. First, one can consider a latent unobserved variable for the *desired* level of employee ownership, where the latent variable can take negative values, especially in firms for which there are minimal benefits to employee ownership of company stock and in which employees are very risk averse. The baseline specification for this approach is the tobit equation

$$\begin{aligned}
Share_{it} &= \max(Share_{it}^*, 0) \\
Share_{it}^* &= \alpha_t + \alpha_{state} + \beta_1(Delaware_i * After1_{it}) + \beta_2(BCS_i * After2_{it}) \\
&\quad + \beta_3(FPS_i * After3_{it}) + \beta_4(CSA_i * After4_{it}) \\
&\quad + (X_{FIN}'\Gamma) + (X_{TAX}'\Delta) + \varepsilon_{it},
\end{aligned} \tag{1}$$

where controls (X_{FIN} , X_{TAX}) are vectors of financial and tax characteristics, respectively. State and year fixed effects are included. The latent variable $Share_{it}^*$ is the unobserved desired level of employee ownership. The $After_{it}$ variables are binary variables for whether the observation is affected (or “treated”) by the respective laws. In the presence of state fixed effects, the β coefficients measure the effect of each law on employee ownership.

Second, one can model the actual level of ownership using a linear model with firm and year fixed effects, that is,

$$\begin{aligned}
Share_{it} &= \alpha_t + \alpha_i + \beta_1(Delaware_i * After1_{it}) + \beta_2(BCS_i * After2_{it}) \\
&\quad + \beta_3(FPS_i * After3_{it}) + \beta_4(CSA_i * After4_{it}) \\
&\quad + (X_{FIN}'\Gamma) + (X_{TAX}'\Delta) + \varepsilon_{it}.
\end{aligned} \tag{2}$$

The marginal effect of the laws is predicted to be smaller in specification (2) compared to specification (1) because the probability that employee ownership is strictly positive is less than one. Standard errors are clustered by state in all linear specifications to address the serial correlation issues highlighted by Bertrand, Duflo and Mullainathan (2004).

4.3. Hypothetical calculation of expected magnitudes

When shareholders or managers want to change a firm’s DC investment policy, the observed result should be a gradual decline in ownership shares. Given the documented tendency of 401(k) investments to be inertial (see Madrian and Shea, 2001; Choi, Laibson, Madrian, and

Metrick, 2002), employees are unlikely to rebalance and sell shares that are already in employer stock in response to a change in matching policy. Thus, changes in menu options or a reduction in matching requirements are only expected to affect new investment in company stock. While the data I use in this study do not permit the calculation of flows to specific investments, summary statistics allow for hypothetical calculations that show what magnitudes would be expected if new flows to company stock declined to zero but no existing own-company shares were sold by employees.

Employee ownership in DC plans averaged 1.5% of firm market value for Delaware firms in 1994. Data from the full sample of IRS 5500 filings show that employer contributions amounted to an average of 0.9% of firm value per year, while employee contributions amounted to about 1.9% of firm value per year. Also in 1994, Delaware firms allocated 10.2% of DC plan investments to employer stock. This figure was relatively stable for several years, so it is reasonable to make the steady-state assumption that approximately 10% of Delaware firm DC contributions were being allocated to employer stock before the statutory change. With respect to total contributions, this amounts to a flow to company stock of 0.3% of firm market value per year. If this flow stopped, we would expect to see 0.3 percentage points per year less ownership for firms that stopped compared to those firms that did not stop. After three years, we would expect to see up to 0.9 percentage points less ownership than otherwise, and averaged over three years (1996 to 1998) there would be 0.6 percentage points less ownership than otherwise.

Similar calculations can be computed in terms of employer stock as a share of total DC assets. The mean Delaware firm in 1994 had DC pension assets of 17.6% of the firm's equity market value. The contributions of employers and employees amounted to 5.1% and 10.8% (0.9/17.6 and 1.9/17.6) of DC assets respectively, for a total of roughly 16% of DC assets. If we start from 10% of the DC account invested in employer stock and move to zero contributions to employer stock, the employer stock share will be diluted with the new share equal to $0.10/1.16 = 8.6\%$. This implies a reduction of 1.4 percentage points in the share of DC assets invested in

employer stock. After three years, the ratio of employer stock to total DC assets would decline by 3.6 percentage points. Averaged over three years the decline would be 2.5 percentage points.

5. Results: employee ownership and takeover protection

5.1. Employee ownership and antitakeover laws

Inspection of Table 5 presents parameter estimates for Eqs. (1) and (2) without control variables X_{FIN} and X_{TAX} on the full IRS sample. The left panel shows the results when the dependent variable is the share of the firm's equity market value held by employees in DC accounts, in percentage points. The right panel scales the market value of company stock in DC accounts by total DC assets. The first column of each panel presents estimates from the tobit specifications, which consider the desired level of employee ownership. The second column presents estimates from within-firm specifications, and the third column presents estimates from within-firm specifications weighted by market capitalization.

[Table 5 here]

Inspection of Table 5 indicates a generally robust effect of the shift in Delaware corporate law on employee ownership in defined contribution plans. In the tobit specifications, the magnitude of this effect is a decline of approximately 0.9 percentage points of the value of the firm held by employees, and a decline of approximately 4.9 percentage points of the employees' DC account assets allocated to company stock. Since the regression coefficients are essentially an average of the difference in post-treatment period (1996 to 1998) levels, it is more appropriate to compare them to the hypothetical three-year average values of 0.6 and 2.5 percentage points, respectively. Thus, the tobit coefficients are somewhat larger than the hypothetical predictions.

In within-firm linear specifications, the effect is -0.3 percentage points of the value of the firm held by employees and -1.1 percentage points of employee DC assets; these are clearly smaller than the hypothetical predictions. In within-firm regressions weighted by market value, the effect is -0.4 percentage points of the value of the firm held by employees, which is closer to but still smaller than the hypothetical predictions. The effect is -3.5% of the value of DC assets

held in employee stock, but this latter effect is not statistically significant in the weighted regressions. The weighted regression results suggest that larger firms either react more to the statutory changes or are more successful at controlling the share of the firm owned by employees.

These results are driven by a reduction in the level of employee ownership among firms that displayed positive ownership before the legal shift. In 1994, 40% of non-Delaware firms in the IRS covariate sample and 30% of Delaware firms overall had positive employee ownership. In 1997, these figures rose to 41% and 33%, respectively. Since the share of Delaware firms with employee ownership actually rose more than the share of non-Delaware firms, the negative coefficients must be driven by declines in the level of ownership among firms that displayed positive ownership in the pre-treatment period.

Table 6 reports results of estimations that are similar to those in Table 5, but now include control variables for tax and financial characteristics. The left-panel estimates are similar to those in Table 5, except that the effects are larger in the weighted regression. In fact, in the weighted regression, only *Delaware*After* is statistically significant. In the unweighted regressions in the right panel, the point estimates of the effect on the share of DC assets held in employer stock are 25 to 35% smaller than in Table 5, and they lose their statistical significance (*t*-statistics of 1.25 to 1.50). The weighted regression remains insignificant.

[Table 6 here]

The results in Tables 5 and 6 are similar if 1995 is used as the first year in which the new stance of Delaware case law was in full effect rather than 1996. In particular, the Delaware effect is three basis points larger in each of the first three columns of the left panel of Table 6 under this redefinition, and is statistically significant at the same levels. The point estimates of the negative effect on company stock as a share of DC assets are 10 to 20% larger, and in the tobit specification this effect becomes statistically significant at the 10% level. As the cutoff date moves further back, the results diminish.

The tobit specifications in Tables 5 and 6 suggest that there is some role for control share acquisition statutes and business combination statutes, respectively, in increasing employee ownership by making it a more effective takeover defense. However, in contrast to the Delaware numbers, these results are not very robust. Furthermore, the fact that control share acquisition statutes tended to be passed in tandem with business combination statutes complicates the identification of separate effects. The results are only weakly supportive of the theory that these late-1980s statutes boosted employee ownership.

The tax variables in Table 6 suggest that tax characteristics matter for employee ownership through the firm's before-interest marginal tax rate and the dividend yield. A ten percentage point higher before-interest tax rate in the tobit specifications leads to 0.5 percentage points more of the firm's equity held by employees and 2.5 percentage points more of the employees' DC accounts held in employer stock. The tax rate effects are not statistically significant in the linear models that consider the share of the firm's equity held by employees. While they are present in the unweighted linear models that consider the share of employees' DC accounts held in employer stock, they are substantially smaller (0.4 percentage points of ownership per ten percentage points of tax). Theory predicts that higher dividend firms have more employee ownership, as the primary tax advantage comes through dividends on shares held in ownership plans. In the tobit specifications, each percentage point of dividend yield translates into 0.6% more of the firm's equity market value held by employees and 2.5% more of employee DC assets held in employer stock; these effects are not found in the linear specification.

Many of the financial control variables are correlated with the employee ownership shares. In several cases these are statistically significant effects whose economic magnitudes are negligibly small, as is the case with abnormal returns, the debt-to-equity ratio, and the market-to-book ratio. Firm size (represented by the natural logarithm of total assets measured in millions of dollars) has significant effects on employee ownership in the tobit specifications. The size coefficient in the specification using the share of the firm's equity market value held by

employees is 0.8. The median firm in the sample has assets of \$194.4m. An additional \$100m of assets raises the log of assets at this mean by 0.41, which in turn raises employee ownership by 0.33 percentage points. No effect is measured in the linear specifications. However, size effects do appear in the right panel, where the share of employees' DC assets held in company stock is the dependent variable. The median firm would have 1.1 to 2.9 percentage points more employer stock in DC plans if it had an additional \$100m of assets. More liquid firms (or firms with a larger amount of net working capital relative to their assets) have moderately less employee ownership. Firms whose revenues are growing faster also appear to have somewhat smaller levels of employee ownership.

5.2. Evidence from governance characteristics and managerial ownership

The mid-1990s case law changes in Delaware affected only Delaware firms with staggered boards. Firms that are incorporated in Delaware and have staggered boards comprise about one-quarter of the sample. Thus, the change in employee ownership that I document above should be present only for these firms. I use the following specification to test whether the change in Delaware employee ownership is due to a change in Delaware firms with staggered boards:

$$\begin{aligned}
 Share_{it} = & \alpha_t + \alpha_{state} + \alpha_{h(i)} + \beta_1(Delaware_{it}) + \beta_2(After_{it}) + \beta_3(Staggered_{it}) \\
 & + \beta_{12}(Delaware_{it} * After_{it}) + \beta_{13}(Delaware_{it} * Staggered_{it}) + \beta_{23}(After_{it} * Staggered_{it}) \quad (3) \\
 & + \beta_{123}(Delaware_{it} * Staggered_{it} * After_{it}) + (X_{TAX} \Gamma) + \varepsilon_{it}.
 \end{aligned}$$

This type of specification is common in the labor economics and public finance literature (notably Gruber (1994)) and is known as a triple-difference or DDD specification, since there are three levels of “differences”: Delaware versus non-Delaware, staggered board versus non-staggered board, and before versus after the law. The coefficient of interest here is β_{123} , which represents the effect of the change in Delaware law on firms incorporated in Delaware with staggered boards. The specification allows for separate control effects for several groups of firms. The inclusion of $Delaware * After$ allows Delaware firms to have different levels of employee

ownership before and after the law for reasons that are unrelated to the law. The term *Delaware*Staggered* allows Delaware firms with staggered boards to have a different average level of employee ownership from Delaware firms without staggered boards. Finally, the term *After*Staggered* allows staggered board firms to have different average levels of employee ownership before versus after the law for reasons that are unrelated to the law. Fixed effects are included for state, year (t), and industry (h). The industry effects are included in lieu of firm fixed effects, which are not appropriate for these types of specifications.⁸

Table 7 presents the results of estimating this specification. The first row of the left panel shows effects of the law on the percentage of firm market value held by employees in Delaware staggered board firms. A statistically significant effect obtains only when the regression is weighted by firm market value, where the effect is -0.9 , which implies that this effect was dominated by larger firms. Significant coefficients continue to appear on the *Delaware*After* term as well, in both the weighted and unweighted regressions. One interpretation of this result is that Delaware experienced a decline in company stock usage for reasons unrelated to the law, in addition to the law-related declines detected among the larger firms (which receive a heavier weight in the weighted regression). An alternative explanation is that miscategorization of a firm's staggered board status biases against finding significant coefficients on the triple-difference coefficient and that this miscategorization is reflected in the *Delaware*After* coefficient.

[Table 7 here]

In the right panel of Table 7, the share of employee DC holdings invested in company stock is the dependent variable. The interaction effect is -3.9 percentage points in the

⁸ Including firm fixed effects requires variation within firms across time in the treatment characteristic, which here is the use of a staggered board. Firm fixed effects would defeat the purpose of the triple-difference estimator, which identifies effects of employee ownership through the fact that staggered board firms are affected differently from the law relative to firms without staggered boards.

unweighted regressions and is significant at the 1% level. As in Tables 5 and 6, the effect on employee ownership scaled by DC assets is not statistically significant in the weighted regression.

Table 8 presents the results of unweighted regressions on ownership by the top-5 executives (left panel) and by employees and top-5 executives combined (right panel). The purpose of this exercise is to corroborate the decline of employee pension plan ownership after the Delaware decisions by showing that managers also reduced their own holdings of company stock. These regressions are all unweighted, as the sample is already reduced to the largest firms (the firms in the *IRS-ExecuComp* sample); within this subsample of large firms, regressions weighted by size do not produce interesting results. The first column of each panel estimates the simple specification in Eq. (2). Without looking at the distinction between firms with and without staggered boards, no Delaware effect is observed. The second column of each panel shows the results of the triple-difference specification. Here, Delaware firms with staggered boards show a decline of 1.9 percentage points of executive ownership and 2.6 percentage points of employee plus executive ownership relative to the control groups. These findings confirm that ownership of employer stock in DC pension plans is related to corporate control motives.

[Table 8 here]

6. The deterrence effect of employee ownership

Employee ownership in defined contribution pension plans is 2.1% of firm value at the mean and 6.5% at the 90th percentile. Total ownership of employees and top executives is 6.0% at the mean and 15.6% at the 90th percentile. Given business combination statutes, employee ownership should be an effective takeover defense at these levels. This section uses binary choice models to demonstrate that employee ownership has a deterrence effect on takeover probabilities. Other studies that use binary choice models in the context of takeovers include Hasbrouck (1985), Palepu (1986), Hall (1988), Ambrose and Megginson (1992), and Mørck, Shleifer, and Vishny (1988).

A lower bound on the magnitude of the deterrence effect is given by the coefficient of employee ownership in simple takeover probits. If, however, there is endogenous adoption of employee ownership as a takeover defense, e.g., by firms whose managers know that they are likely takeover targets, this coefficient will underestimate the true effect. I employ a two-stage strategy to address this endogeneity issue.

The sample for this exercise is the *IRS-ExecuComp* sample from 1993-1998. While executive compensation data are available back to 1992, there are no takeovers in my sample for 1992 among these observations and hence, with year effects, the 1992 observations must be dropped. CRSP delisting codes flag all securities that are delisted due to a merger or acquisition. The original source for these codes was Commerce Clearing Houses's Capital Change Reporter. There are 123 takeovers in this sample, which amount to 4.7% of the observations. Note that this method of identifying takeovers does not distinguish hostile or desired takeovers from friendly takeovers. Schwert (2000) tests for economic differences between friendly and hostile takeovers and argues that the two are indistinguishable. Under a strong view of managerial entrenchment, managers may wish to avoid all changes of corporate control, even those that appear in the press to be "friendly."

The first two columns of Table 9 show the results of estimating the following probit model with a binary takeover variable:

$$\begin{aligned} Takeover_{it}^* &= \alpha_i + \alpha_{state} + \alpha_{h(i)} + OWN' \Pi \\ &+ \beta_1 (Delaware_i * After1_{it}) + \beta_2 (BCS_i * After2_{it}) \\ &+ (X_{FIN}' \Gamma) + (X_{TAX}' \Delta) + \varepsilon_{it}, \end{aligned} \quad (4)$$

$$Takeover_{it} = I[T_{it}^* > 0],$$

where T_{it}^* is a continuous latent variable that determines takeovers such that a takeover is observed if the latent variable takes on a positive value. The table presents the marginal effects of the dependent variables on the probability of takeover. The coefficients of interest are in the vector Π , as these are the effects of the ownership variables on the takeover probability. In the

first column of Table 9, the two ownership variables are the percentage of the firm owned by employees and the percentage owned by top executives. The estimated effects of employee ownership and executive ownership are quite similar. Each percentage point of employee ownership is correlated with a decline in takeover probability of 0.16 percentage points (with a standard error of 0.086), and each percentage point of executive ownership is correlated with a decline of 0.19 percentage points (with a standard error of 0.028). When both ownership components are combined into one variable as in the second column, the effect is a decrease of 0.18 percentage points (standard error of 0.023) in the takeover probability.

[Table 9 here]

The third column examines the effect of an additional percentage point of employee ownership conditional on different levels of total inside (employee plus executive) ownership. If total inside ownership is less than the 15% threshold for business combination statutes, takeover probabilities should not be affected by employee ownership. Above 15%, an effect would be expected up to the point at which inside ownership was so large that the effective probability of takeover was zero. This specification therefore allows employee ownership to have different effects on takeover probabilities at different levels of total inside ownership. This is implemented by including interactions of employee ownership with binary indicator variables that specify whether total inside ownership is 0 to 7.5%, 7.5% to 15%, 15% to 30%, or over 30%, as well as by allowing for level effects of total inside ownership at each of these quantiles. Each percentage point of employee ownership reduces the takeover probability by 0.44 percentage points in the range in which total inside ownership of the firm is 15 to 30%. The magnitude of 0.44 percentage points amounts to 9.4% of the sample unconditional takeover probability of 4.7%, and thus represents an economically meaningful deterrence effect. The magnitude of 0.44 percentage points also implies that a one standard deviation increase in employee ownership (4.94%) reduces the probability of takeover by 2.2 percentage points per year. Statistically significant marginal

effects of employee ownership do not obtain at the other levels of total inside ownership, although higher levels of total inside ownership are correlated with lower takeover probabilities.

These estimates can be compared to those found in studies that examine the effects of other takeover defenses. Chaplinsky and Niehaus (1994) find that the ESOPs of the 1980s were strong deterrents of takeovers when there were contested bids. Conditional on a contested takeover, each additional percentage point of employee ownership in an ESOP reduced the probability of a change in control by two percentage points, although this is relative to a roughly 67% unconditional probability of the contested bid succeeding. Comment and Schwert (1995) find that with no corrections for the endogeneity of poison pill adoption, the use of a poison pill correlates with a two percentage point *higher* probability of takeover and thus they argue that poison pills generally do not have substantial deterrence effects. In any event, the deterrence effects of employee ownership are clearly weaker than the powerful marginal effects of staggered boards documented by Bebchuk, Coates, and Subramanian (2002).

Because of the potential endogeneity problem highlighted above, these estimates are lower bounds on the effect of inside ownership on the takeover probability. To measure a deterrence effect that is purged of this problem, I use a system of two equations, namely, an employee ownership equation and a takeover probability equation. Such a system can only be estimated if there are instruments that can be excluded from the takeover probability equation. The two-stage analysis I present in this section is in the spirit of Comment and Schwert (1995), who estimate two-stage models of takeover probabilities in which the first-stage dependent variable is the adoption of poison pills.⁹

One possibility is that three of the tax variables (before-interest marginal tax rate, after-interest marginal tax rate, and zero marginal tax rate indicator) can be used as instruments while

⁹ Comment and Schwert estimate “predicted” and “surprise” components of their takeover defense. Their method is not an instrumental variables approach per se in that it does not contain exclusion restrictions.

the fourth (net operating loss carryforwards) is a control. The identifying assumption behind this setup is as follows: to the extent that the takeover target's tax status might matter to the contest outcome and to the firm's attractiveness as a target, this effect can be absorbed by net operating loss carryforwards. During the very early part of the sample, net operating loss carryforwards were useful to a potential acquirer that wished to offset gains with the tax losses of a new subsidiary. They therefore serve as control variables in both the ownership and takeover equations. In addition, tax rates should not affect the attractiveness of a takeover target or the probability that a takeover contest will be won by a bidder, especially in the presence of controls for the financial condition of the firm. Furthermore, empirical studies fail to show a connection between corporate tax rates and takeover activity. Auerbach and Reishus (1988) find that the only potential tax characteristics that impact merger activity are on the side of the acquiring firms, not the firms being acquired. Thus, the model I estimate is

$$\begin{aligned}
Takeover_{it}^* &= \alpha_i + \alpha_{h(i)} + \alpha_{state} + Ownership_{it} \cdot \pi \\
&+ \beta_1(Delaware_i * After1_{it}) + \beta_2(BCS_i * After2_{it}) \\
&+ (X_{FIN} \cdot \Gamma) + (\tilde{X}_{TAX} \cdot \Delta) + \varepsilon_{it},
\end{aligned} \tag{5a}$$

$$Takeover_{it} = I[T_{it}^* > 0], \tag{5b}$$

$$\begin{aligned}
Ownership_{it} &= \alpha_i + \alpha_{h(i)} + \alpha_{state} \\
&+ \beta_1(Delaware_i * After1_{it}) + \beta_2(BCS_i * After2_{it}) \\
&+ (X_{FIN} \cdot \Gamma) + (X_{TAX} \cdot \Delta) + u_{it},
\end{aligned} \tag{5c}$$

where \tilde{X}_{TAX} contains at least one fewer tax variables than X_{TAX} .

Under the assumption that ε_{it} has a standard normal distribution, Eq. (5a) is a probit equation. As described in Rivers and Vuong (1998), Costa (1995), and Wooldridge (2001) the coefficients in the probit equation the system (5a)-(5c) can be estimated by two-stage conditional maximum likelihood (2SCML). The first-stage (company stock) linear model is estimated, and then the probit specification is augmented with the residuals from the first stage. A scale correction must be applied to the coefficients before the marginal effects are computed.

Wooldridge (2001) shows that this correction takes a simple form; before calculating marginal effects, each coefficient is multiplied by the factor $(\hat{\theta}^2 \hat{\tau}^2 + 1)^{-1/2}$, where $\hat{\theta}$ is the estimated coefficient on the augmented residuals term in the probit equation and $\hat{\tau}$ is the root mean squared error of the residuals from the first-stage (company stock) equation. In the present context, the scale correction leads to 20% larger marginal effects. The overall estimated effect is a 0.6 percentage point decline in the takeover probability per one percentage point of inside ownership.

In two-stage estimation, the financial variables that have statistically significant effects on takeover probabilities are abnormal return, sales growth, liquidity, market-to-book ratio, and price-to-earnings ratio. The magnitudes of these effects are generally modest. In the baseline specification in the first column, the average abnormal return variable must rise by ten basis points to lower the probability of takeover by 0.26 percentage points. A doubling of revenue would reduce the probability of takeover by 1.1%. A rise in the market-to-book ratio from one to two would make a takeover 0.3 percentage points less likely. The coefficient on the *Delaware*After* variable indicates that takeovers were substantially less likely in Delaware after the mid-1990s, perhaps as a result of the doctrinal change in corporate law.

7. Conclusions

This paper considers the effect of changes in statutory takeover regimes on employee ownership. As laws grant managers insulation from market discipline, managerial incentives to encourage employees to hold company stock diminish. I find that the changes in Delaware case law in the mid 1990s analyzed by Subramanian (2004) lowered employee ownership shares by 0.3 to 1.0 percentage points depending on the econometric model used. These magnitudes are similar to the predictions of hypothetical calculations in which firms cease making DC plan contributions in employer stock but employees do not rebalance out of existing employer stock. Since such laws affected only firms with staggered boards, which cannot be easily adopted in direct response to a specific hostile bid, variation in this effect across firms with different

governance provisions can help confirm whether the observed effects are due to the legal change. While this exercise is complicated by an imperfect ability to identify whether a firm has a staggered board, the results support the entrenchment hypothesis, especially among larger firms.

Managerial holdings of company stock should also exhibit declines in response to the Delaware law. A 1.9 percentage point decrease in ownership by top managers of Delaware-incorporated firms with staggered boards suggests that managers bear some of the diversification costs of the takeover defense themselves. Other costs are shifted onto employees through DC pension investment policy, as suggested by the employee ownership and combined ownership results.

The deterrence effect of employee ownership stands in contrast to the results of Comment and Schwert (1995) with respect to poison pills. Specifically, Comment and Schwert (1995) find that the poison pill does not appear to have a tangible takeover deterrence effect; it simply increases the bargaining power of the target. Thus, their evidence is more suggestive of a complementary role between state-level protection and firm-specific takeover defenses. In this paper, I find that state-level protection and insider ownership appear to be at least partial substitutes.

There are certainly other determinants of employee ownership that I do not test here, determinants that include both strategic and managerial-behavioral factors. Given the ability of management to directly or indirectly affect asset allocation in employee 401(k) accounts, identification of other managerial motives for inducing employee ownership is an important area for further research. This could be done by analyzing flows to DC pension accounts or data on matching policies.

This paper also develops empirical relations between corporate governance and the share of the firm's outstanding equity owned by employers and employees. In situations in which management's ability to entrench increases due to changes in the state's legal environment, employer and employee ownership both decline, and both seem to provide roughly equal

protection against corporate takeovers. Looking at governance in the cross-section, however, suggests that firms with worse governance are generally the ones with more employee ownership and less executive ownership. Further research could aim to disentangle which elements of corporate governance generate these cross-sectional patterns.

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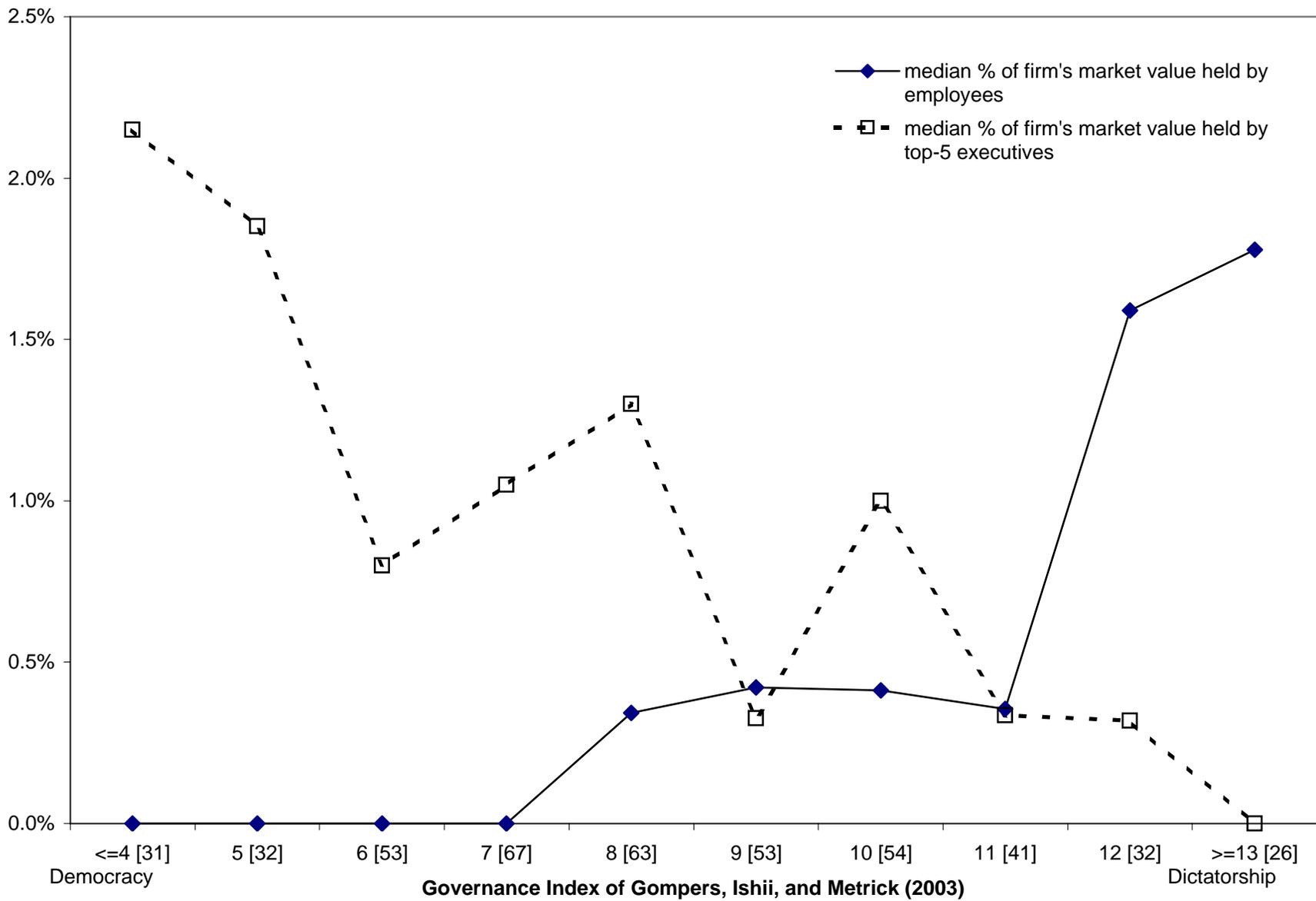
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Fig. 1: Governance and percent of market value owned by employees and top-5 executives. This figure shows the 1998 median percentage of the firm's market value held by employees and top-5 executives against the corporate governance index of Gompers, Ishii, and Metrick (2003). The sample consists of all firms for which both pieces of information are available for 1998. Sample counts are shown in square brackets.

Fig. 2: Aggregate employee ownership in defined contribution plans as a share of equity market value. This figure plots the percentage of aggregate equity market value owned by employees in defined contribution pension plans for sample firms incorporated within and outside of Delaware. The sample consists of 31,145 observations on 6,553 firms whose IRS 5500 filings are matched to Compustat. Delaware commands approximately half of the market for incorporations. Case law strengthening the poison pill takeover defense in conjunction with a staggered board was passed in 1994-1996.



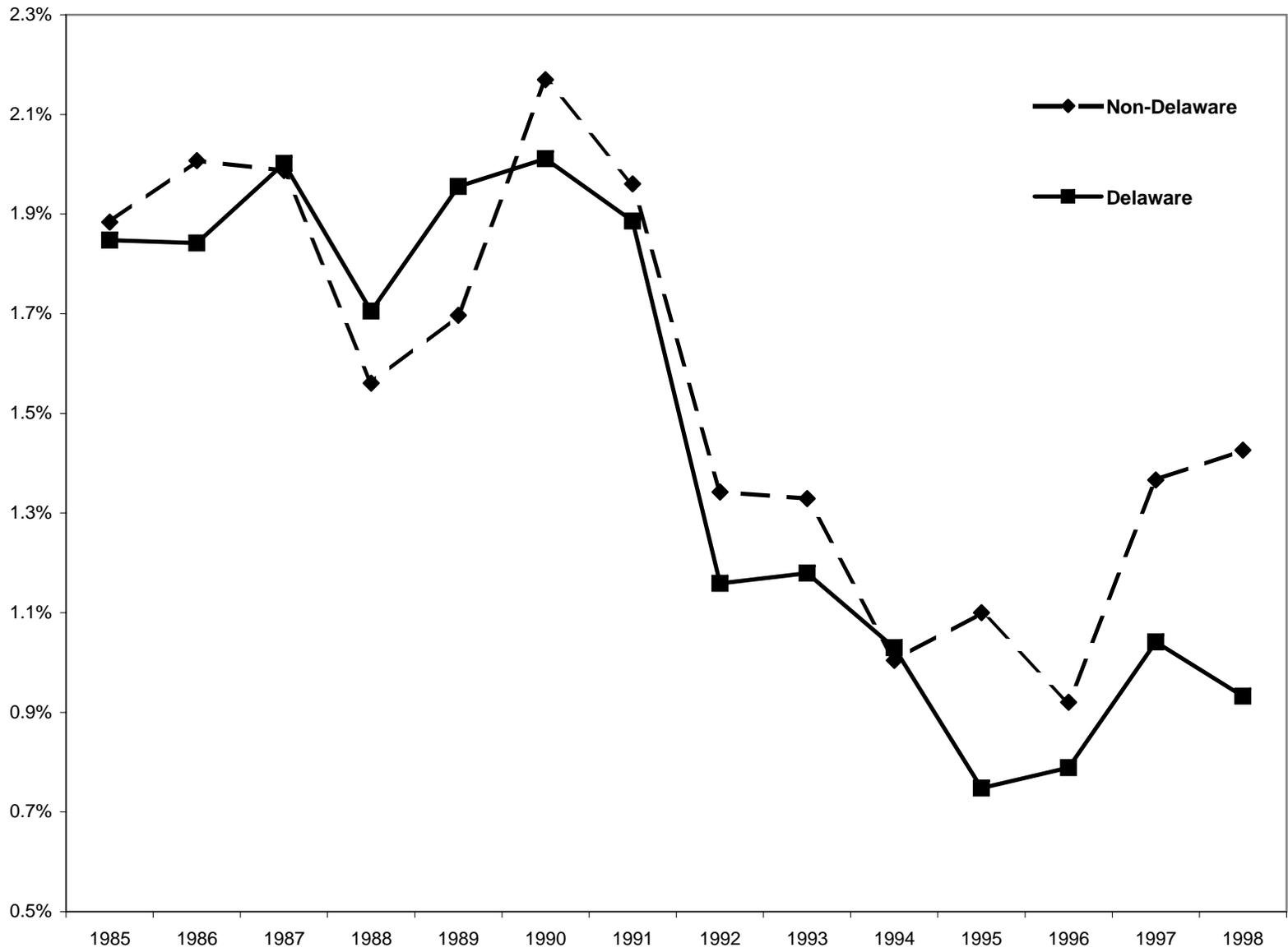


Table 1

Sample construction

This table shows the construction of the sample. The *Full IRS Sample* consists of observations from the IRS 5500 DC pension plan filings matched to Compustat. We first collapse plan-year observations to the firm-year level. We match to Compustat by employer identification number (EIN) and by a name-checking algorithm that uses Compustat names. Names whose companies were not matched to Compustat in the first step were lined up with the CRSP historical names to fill in missing identifiers and obtain as many links to CRSP-Compustat as possible. The *Governance Covariate Sample* consists of observations from the *IRS Covariate Sample* that can also be matched with IRRC governance data. The *IRS ExecuComp Sample* is the subset of the IRS Covariate Sample that can also be matched with the executive compensation data. Observation counts given in boldface are samples that appear in the regression analysis.

	No. Observations	No. Firms
IRS 5500 DC plans on 1985-1998 IRS filings matched to CRSP & Compustat	42,592	7,347
that have available incorporation info	42,012	7,185
and nonzero plan assets	41,719	7,149
and properly coded employee ownership shares	41,677	7,146
and whose plan years end 1/85-12/98	41,228	7,117
and that have no assets in common, collective or master trusts [<i>Full IRS Sample</i>]	31,145	6,553
and for which all tax and financial control variables are present [<i>IRS Covariate Sample</i>]	14,157	2,889
and whose plan years are 1990-1998 only	8,936	2,360
and that are in the Executive Compensation data file for years 1992-1998 [<i>IRS ExecuComp Sample</i>]	2,976	866

Table 2

Employee ownership in DC plans by year

Author's calculations from IRS 5500 filings and Compustat. We aggregate IRS 5500 filings are aggregated from the plan level to the firm level. See Table 1 for sample construction. We obtain number of firms with DC ownership and the value of the assets are from the IRS 5500 filings. Equity market values are calculated from CRSP, and defined benefit asset values are from Compustat. In the final column we present 75th percentiles rather than medians, because the median DB assets for a DC firm in the sample is zero.

Full IRS Sample (N = 31,145)

year	Number of Firms in Sample	Number of Firms with DC Ownership	Share of Firms with DC Ownership	% of Firm's Equity Market Value Held by Employees in DC Accounts (nonzero observations only)		% of Employee DC Holdings Invested In Company Stock (nonzero observations only)		Ratio of Defined Benefit to Defined Contribution Assets (nonzero DC ownership)	
	count	count	share	mean	median	mean	median	mean	75th percentile
1985	1,565	757	48.4%	3.9%	1.9%	43.8%	37.5%	—	—
1986	2,231	1,108	49.7%	3.9%	1.7%	39.6%	32.5%	1.8	1.3
1987	2,368	1,130	47.7%	4.2%	1.6%	37.0%	27.6%	2.6	2.8
1988	2,369	865	36.5%	4.5%	2.0%	36.9%	28.6%	2.5	2.5
1989	2,529	973	38.5%	4.7%	2.2%	37.0%	29.0%	2.2	2.4
1990	1,961	755	38.5%	5.4%	2.6%	35.8%	26.4%	2.1	1.9
1991	1,911	721	37.7%	5.1%	2.5%	37.7%	27.7%	1.7	1.7
1992	1,679	558	33.2%	3.8%	1.6%	31.9%	21.4%	1.8	1.6
1993	2,067	692	33.5%	3.8%	1.7%	34.2%	26.6%	1.5	1.4
1994	2,146	652	30.4%	3.4%	1.5%	30.2%	22.2%	1.3	1.0
1995	2,306	670	29.1%	3.2%	1.3%	28.0%	19.6%	1.2	1.1
1996	2,508	708	28.2%	3.0%	1.2%	26.5%	17.3%	1.0	0.8
1997	2,769	870	31.4%	3.7%	1.5%	31.4%	20.9%	0.7	0.6
1998	2,736	855	31.3%	3.7%	1.6%	28.4%	17.7%	0.6	0.6

Table 3
Summary statistics, financial and tax characteristics

We obtain financial data from Compustat, tax data from Graham (1996), governance data from the IRRC, executive ownership data from the ExecuComp database, and pension data are from the IRS 5500 filings. We supplement the IRRC governance data with manual collection from SEC proxies and prospectuses. Sales growth ($\% \Delta \text{Sales}$) is the annual percent change in net sales. Liquidity equals current assets minus current liabilities, as a share of total assets. The debt-to-equity ratio is the ratio of long term debt to common equity. The market-to-book ratio is the calendar year closing stock price times number of shares outstanding as a share of common equity. The P/E ratio is the calendar year closing stock price over basic (nondiluted) earnings per share. The abnormal return is the daily mean of $Ret_{it} - \alpha_i - \beta_i Ret_{mt}$ over the period between one and two years prior to the observation, where we estimate parameters α_i and β_i for each firm in the two-year period beginning four years before each observation. (For this calculation the market return Ret_{mt} is the CRSP value-weighted return including distributions for NYSE/AMEX/Nasdaq.) Size is the natural log of the book value of total assets. Following Comment and Schwert (1995), we average financial variables over four years and then winsorize at the 1st and 99th percentiles to avoid outliers in ratios

Characteristic	Median	Mean	StdDev
<i>Financial (N = 14,157 Observations)</i>			
% Δ Sales	0.090	0.132	0.236
Liquidity	0.277	0.272	0.200
Debt/Equity	0.337	0.561	1.121
Market/Book	1.626	2.110	1.845
Price/Earnings \div 100	0.134	0.160	0.280
Abnormal Return (%)	0.029	0.040	0.172
Size	5.270	5.438	1.778
Dividend/Price (%)	0.438	1.250	1.786
Equity Market Value (\$m)	152	886	2020
<i>Tax (N = 14,157 Observations)</i>			
Before-interest Marginal Tax Rate	0.340	0.317	0.105
After-interest Marginal Tax Rate	0.338	0.232	0.166
Zero After-interest Rate (Binary)	0.000	0.159	0.365
NOL Carryforwards (\$10M)	0.000	0.103	0.378
<i>Governance (1990-1998)</i>			
Staggered Board (N = 8,936)	0.000	0.373	0.484
Staggered Board IRRC (N = 3,362)	1.000	0.530	0.499
Governance Index in 1998 (N = 3,362)	8.000	8.523	2.800
<i>DC Asset Allocation (N = 14,157 Observations)</i>			
% of Firm Owned in DC Plans	0.00	1.77	4.94
[nonzero only]	1.84	4.28	6.96
Share of DC Held in Company Stock	0.00	13.78	25.24
[nonzero only]	23.67	33.43	29.81
<i>Executive and Employee Ownership Structure (N = 2,976 Observations)</i>			
% of Firm owned by Top-5 Executives	0.300	4.57	9.27
% of Firm owned by Employees and Top-5 Executives	1.995	6.04	9.66

Table 4

Sample states of incorporation for firms with DC pension plans

Source: Compustat corrected with Moody's Manuals and IRRC data. Without the corrections, firms that change their state of incorporation during the course of the sample would receive an incorrect state from Compustat. In particular, the share of Delaware-incorporated companies in 1985 would be overstated by around 1 percentage point and the share of California and New York incorporated companies would be understated.

Full IRS Sample (N = 31,145)

Year	DE	CA	NY	PA	OH	MA	Other
1985	39.9%	3.5%	6.6%	3.8%	3.5%	2.7%	40.1%
1986	42.2%	4.3%	5.5%	3.5%	3.6%	3.0%	37.8%
1987	45.7%	3.6%	5.6%	3.7%	3.4%	3.2%	34.9%
1988	46.4%	3.8%	5.6%	3.8%	3.4%	3.2%	33.9%
1989	47.0%	3.7%	5.2%	3.8%	3.3%	3.0%	34.0%
1990	48.2%	4.6%	5.8%	3.6%	3.7%	3.2%	31.1%
1991	50.3%	5.1%	5.3%	3.3%	3.6%	3.7%	28.7%
1992	50.9%	5.1%	5.2%	3.9%	3.3%	2.9%	28.8%
1993	51.2%	5.0%	4.7%	3.5%	3.3%	3.1%	29.0%
1994	52.5%	4.8%	4.3%	2.9%	3.1%	2.9%	29.5%
1995	52.0%	4.6%	4.3%	3.2%	3.0%	3.3%	29.6%
1996	51.8%	5.3%	4.0%	3.0%	2.6%	3.0%	30.2%
1997	51.6%	5.0%	3.1%	3.0%	2.6%	3.0%	31.7%
1998	53.4%	4.8%	3.1%	2.6%	2.1%	2.7%	31.3%
Δ 1998-1985	13.5%	1.3%	-3.5%	-1.1%	-1.4%	0.0%	-8.8%

Table 5

Effects of takeover laws on employee ownership

This table presents the results of regressions of ownership variables on changes in state-level takeover laws, without additional control variables. The sample is the Full IRS Sample (see Table 1). The left panel considers the percentage of the firm's equity market value held by employees in DC pension accounts. The right panel considers the percentage of employee DC holdings that are invested in company stock. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors in the linear specifications are clustered by state. The coefficient on the interaction term between the treatment and after-law dummy represents the marginal effect of the law on employee ownership. The dependent variables are measured in percentage points.

<i>Dependent Variable:</i>	Without Controls					
	% of firm's equity market value held by employees in DC accounts			% of employee DC holdings invested in company stock		
<i>Laws:</i>						
Delaware*After	-0.87 *** (0.30)	-0.29 *** (0.10)	-0.43 ** (0.22)	-4.85 *** (1.68)	-1.09 ** (0.50)	-3.48 (4.88)
(Business Combination)*After	0.08 (0.28)	-0.07 (0.18)	-0.02 (0.35)	1.06 (1.59)	-0.02 (1.23)	-3.48 (3.24)
(Fair Price Statute)*After	0.27 (0.33)	0.18 (0.21)	-1.00 (0.84)	0.77 (1.87)	0.05 (1.59)	-2.90 (5.13)
(Control Share Acquisition)*After	0.69 ** (0.34)	0.14 (0.18)	0.80 (0.54)	3.57 * (1.89)	1.59 (1.73)	4.37 (5.38)
Method	Tobit	Within	Within	Tobit	Within	Within
Sample	All	All	All	All	Nonzero	All
Weighting	None	None	Market Cap	None	None	Market Cap
Fixed Effects	State	Firm	Firm	State	Firm	Firm
	Year	Year	Year	Year	Year	Year
Adjusted-R ²	—	0.618	0.668	—	0.654	0.650
Number of Observations	31,145	31,145	31,145	31,145	31,145	31,145
Number of Censored Observations	19,831	—	—	19,831	—	—
Number of Firms	6,553	6,553	6,553	6,553	6,553	6,553

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6

Takeover laws and employee ownership, control specification

This table presents the results of regressions of ownership variables on changes in state-level takeover laws, as well as tax and financial control variables. The coefficient on the interaction term between the treatment and after-law dummy represents the marginal effect of the law on employee ownership. The sample is the IRS Covariate Sample, which contains only those firms for which the financial control variables are available from Compustat and the marginal tax rates are available from the Graham (1996) database. The dependent variable is measured in percentage points. Standard errors are reported in parentheses. Standard errors in the linear specifications are clustered by state.

<i>Dependent Variable:</i>	With Controls					
	% of firm's equity market value held by employees in DC accounts			% of employee DC holdings invested in company stock		
<i>Laws:</i>						
Delaware*After	-0.96 ** (0.42)	-0.33 ** (0.15)	-0.94 *** (0.34)	-3.20 (2.15)	-0.82 (0.56)	0.96 (2.44)
(Business Combination)*After	0.69 * (0.40)	0.02 (0.26)	0.15 (0.48)	4.55 ** (2.03)	-0.15 (1.94)	-6.71 (4.61)
(Fair Price Statute)*After	-0.07 (0.46)	0.19 (0.30)	-0.96 (0.90)	-0.40 (2.29)	0.32 (2.23)	-1.01 (6.47)
(Control Share Acquisition)*After	0.39 (0.47)	0.04 (0.21)	0.83 (0.70)	2.87 (2.36)	0.23 (2.34)	5.42 (6.68)
Method	Tobit	Within	Within	Tobit	Within	Within
Sample	All	All	All	All	All	All
Weighting	None	None	Market Cap	None	None	Market Cap
Fixed Effects	State	Firm	Firm	State	Firm	Firm
	Year	Year	Year	Year	Year	Year
<i>Tax Variables:</i>						
Before-interest Marginal Tax Rate	5.00 *** (1.21)	0.95 (0.82)	-0.91 (0.63)	24.55 *** (6.14)	4.31 ** (1.97)	-0.96 (9.51)
After-interest Maginal Tax Rate	-0.01 (0.81)	0.23 (0.21)	-0.62 (0.54)	5.59 (4.11)	-1.39 (1.64)	-13.07 (13.65)
Zero After-interest Rate	0.09 (0.34)	0.14 (0.09)	-0.22 (0.22)	0.51 (1.71)	-0.77 (0.50)	-1.40 (3.58)
NOL Carryforwards (\$10M)	-0.02 (0.03)	0.02 ** (0.01)	0.02 (0.01)	-0.22 * (0.13)	0.11 (0.07)	-0.07 (0.25)
<i>Other Controls:</i>						
Abnormal Return (%)	0.79 (0.55)	-0.28 ** (0.13)	-0.38 (0.25)	11.60 *** (2.78)	1.89 (1.18)	10.71 *** (2.04)
%Δsales	-3.02 *** (0.44)	-0.10 (0.15)	0.17 (1.31)	-10.83 *** (2.16)	-0.17 (0.79)	-3.27 (4.56)
Liquidity	-1.13 ** (0.51)	-2.27 *** (0.41)	-0.47 (1.58)	-14.41 *** (2.57)	-6.47 *** (1.99)	-8.39 (13.30)
Debt/Equity	0.26 *** (0.08)	0.06 (0.05)	0.10 (0.09)	0.72 * (0.42)	-0.72 *** (0.21)	-0.70 (1.74)
Market/Book	-0.18 *** (0.05)	-0.01 (0.02)	-0.06 (0.08)	1.06 *** (0.27)	1.14 *** (0.18)	2.65 *** (0.97)
Price/Earnings	-0.51 (0.32)	-0.05 (0.12)	-0.32 (0.69)	-0.64 (1.61)	-0.62 (0.49)	0.59 (4.26)
Dividend/Price	0.61 *** (0.06)	0.16 (0.11)	0.11 (0.11)	2.52 *** (0.29)	-0.58 (0.50)	-0.96 (0.66)
Size	0.81 *** (0.06)	0.00 (0.10)	-0.21 (0.22)	6.99 *** (0.32)	2.63 *** (0.52)	1.97 (3.88)
Adjusted-R ²	—	0.668	0.643	—	0.673	0.751
Number of Observations	14,157	14,157	14,157	14,157	14,157	14,157
Number of Censored Observations	8,323	—	—	8,323	—	—
Number of Firms	2,889	2,889	2,889	2,889	2,889	2,889

***, **, and * indicate significance at the 1%, 5%, and 10% levels, C1 respectively.

Table 7

Takeover laws, staggered boards, and employee ownership

The change in the stance of Delaware corporate law in the mid-1990s affected firms with staggered boards. The coefficient of interest is the interaction term *Staggered Board*Delaware*After*, as this represents the marginal effect of the legal change on the affected firms. Staggered board data are from the IRRC database augmented with manually collected information from proxies, prospectuses, and annual reports filed with the SEC. Standard errors are reported in parentheses and are clustered at the state level.

<i>Dependent Variable:</i>	% of firm's equity market value held by employees in DC accounts		% of employee DC holdings invested in company stock	
<i>Delaware and Staggered Board:</i>				
(Staggered Board)*Delaware*After	0.13 (0.37)	-0.87 * (0.50)	-3.89 *** (1.48)	-2.51 (3.86)
Delaware*After	-0.56 ** (0.23)	-0.45 ** (0.23)	-0.15 (0.85)	-1.77 (3.71)
Staggered Board*After	-0.03 (0.36)	0.35 (0.48)	0.36 (1.45)	-2.28 (3.34)
Staggered Board*Delaware	-0.33 (0.35)	-0.07 (0.39)	-0.48 (1.57)	3.39 (4.95)
Staggered Board	0.60 * (0.35)	0.74 ** (0.36)	5.01 *** (1.64)	4.30 (4.54)
<i>Tax Variables:</i>				
Before-interest Marginal Tax Rate	2.04 *** (0.42)	1.48 *** (0.47)	14.96 *** (2.02)	23.52 *** (5.79)
After-interest Marginal Tax Rate	0.05 (0.29)	1.18 ** (0.52)	10.88 *** (2.40)	19.74 (13.43)
Zero After-interest Rate	0.09 (0.12)	-0.18 (0.24)	0.52 (0.55)	0.16 (3.29)
NOL Carryforwards (\$10M)	-0.02 *** (0.01)	0.00 (0.01)	0.01 (0.05)	-0.27 (0.28)
Method	OLS	OLS	OLS	OLS
Fixed Effects	State, Year Industry	State, Year Industry	State, Year Industry	State, Year Industry
Weighting	None	Market Cap	None	Market Cap
Adjusted-R ²	0.07	0.29	0.19	0.47
Number of Observations	8,936	8,936	8,936	8,936
Number of Firms	2,360	2,360	2,360	2,360

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8

Takeover laws, staggered boards, and executive ownership

The change in the stance of Delaware corporate law in the mid-1990s particularly affected firms with staggered boards. The coefficient of interest is the interaction term *Staggered Board*Delaware*After*, as this represents the marginal effect of the legal change on the affected firms. Staggered board data are from the IRRC database, augmented with manually collected information from proxies, prospectuses, and annual reports. The sample is the IRS-ExecuComp sample (see Table 1). Standard errors are reported in parentheses and are clustered at the state level. All regressions are unweighted as the ExecuComp selection already reduces the sample to the largest firms.

<i>Dependent Variable:</i>	% of firm's equity market value held by			
	top-5 executives		employees & top-5 executives	
<i>Delaware and Staggered Board:</i>				
(Staggered Board)*Delaware*After		-1.90 *** (0.73)		-2.59 *** (0.95)
Delaware*After	0.33 (0.49)	1.24 * (0.69)	0.07 (0.62)	1.10 (0.83)
Staggered Board*After		0.41 (0.73)		0.73 (0.94)
Staggered Board*Delaware		3.80 *** (1.22)		3.94 *** (1.31)
Staggered Board		-2.65 ** (1.22)		-2.07 (1.31)
<i>Tax Variables:</i>				
Before-interest Marginal Tax Rate	-2.76 ** (1.23)	1.71 (2.22)	-2.52 ** (1.22)	3.67 (2.38)
After-interest Marginal Tax Rate	-0.60 (1.83)	2.63 (1.70)	-0.73 (1.87)	3.33 * (1.74)
Zero After-interest Rate	-1.13 * (0.62)	-0.76 * (0.42)	-1.46 ** (0.70)	-0.48 (0.41)
NOL Carryforwards (\$10M)	0.01 (0.01)	-0.13 *** (0.04)	0.05 ** (0.02)	-0.15 *** (0.05)
Method	Within	OLS	Within	OLS
Fixed Effects	Firm	State, Industry	Firm	State, Industry
	Year	Year	Year	Year
Weighting	None	None	None	None
Adjusted-R ²	0.83	0.21	0.81	0.20
Number of Observations	2,976	2,976	2,976	2,976
Number of Firms	866	866	866	866

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 9

Probability of takeover: marginal effects from binary choice models

The dependent variable is binary: 1 if the firm is taken over in a given year, 0 otherwise. Reported figures are marginal effects. Takeovers are identified using delisting codes 200-299 from CRSP. The sample is the IRS ExecuComp Sample excluding the first year, 1992, in which there are zero takeovers. All specifications include industry, state, and year fixed effects. Standard errors are clustered by state of incorporation. Probit models are estimated by maximum likelihood. The two-stage conditional maximum likelihood (2SCML) specification is estimated by including the residuals from the first-stage (employee ownership) equation in the second stage regression and applying error and scale corrections as described in Rivers and Vuong (1988) and Wooldridge (2001). Employee ownership data is from the IRS 5500 filings and executive ownership data are from ExecuComp. Tax rate control variables are from Graham (1996), and other controls are from Compustat. Standard errors are clustered by state.

Specification	Dependent Variable: Takeover Indicator			
	Probit None	Probit None	Probit None	2SCML MTRs
Instruments				
Employee Ownership in DC Plans as a share of firm value (%)	-0.161 *			
	(0.086)			
Top 5 Executive Ownership as a share of firm value (%)	-0.187 ***			
	(0.028)			
Total (Employee + Top 5 Executive) Ownership as a share of firm value (%)		-0.182 ***		-0.637 **
		(0.023)		(0.302)
Employee Ownership in DC Plans (%) * (Indicator Total Ownership 0-7.5%)			0.203	
			(0.193)	
Employee Ownership in DC Plans (%) * (Indicator Total Ownership 7.5-15%)			-0.039	
			(0.202)	
Employee Ownership in DC Plans (%) * (Indicator Total Ownership 15-30%)			-0.441 **	
			(0.174)	
Employee Ownership in DC Plans (%) * (Indicator Total Ownership over 30%)			0.116	
			(0.147)	
Indicator Total (Employee + Top 5 Executive) Inside Ownership (7.5-15%)			-0.372	
			(1.099)	
Indicator Total (Employee + Top 5 Executive) Inside Ownership (15-30%)			-2.909 ***	
			(0.378)	
Indicator Total (Employee + Top 5 Executive) Inside Ownership (over 30%)			-2.388 ***	
			(0.665)	
Before-interest Marginal Tax Rate	-0.943	-0.946	-1.182	
	(1.356)	(1.365)	(1.293)	
After-interest Marginal Tax Rate	-4.978 **	-4.998 **	-5.345 ***	
	(2.115)	(2.151)	(1.968)	
Zero After-interest Rate	-1.778 ***	-1.779 ***	-1.747 ***	
	(0.320)	(0.320)	(0.309)	
NOL Carryforwards (\$10m)	0.043	0.042	0.047	0.061
	(0.037)	(0.038)	(0.037)	(0.053)
Delaware*After	-1.913 **	-1.922 **	-1.832 *	-2.572 **
	(0.974)	(0.973)	(0.971)	(1.225)
(Business Combination)*After	-0.560	-0.518	-0.580	-0.816
	(6.307)	(6.270)	(6.512)	(7.914)
Abnormal Return	-2.576 *	-2.554 *	-2.480 *	-2.234
	(1.363)	(1.368)	(1.283)	(1.566)
%ΔSales	-1.121 *	-1.135	-1.129 *	-1.990 **
	(0.669)	(0.692)	(0.678)	(0.990)
Liquidity	-4.916 **	-4.928 **	-4.798 **	-5.252
	(2.417)	(2.381)	(2.348)	(3.512)
Debt/Equity	0.199	0.199	0.192	0.375
	(0.208)	(0.207)	(0.183)	(0.259)
Market/Book	-0.306 ***	-0.308 ***	-0.292 ***	-0.368 ***
	(0.108)	(0.103)	(0.112)	(0.138)
Price/Earnings	-1.432 **	-1.437 **	-1.278 **	-1.537 **
	(0.562)	(0.559)	(0.560)	(0.715)
Dividend/Price	-0.319	-0.314	-0.318	-0.367
	(0.218)	(0.229)	(0.199)	(0.279)
Size	-0.300 **	-0.290 **	-0.299 **	-0.498 **
	(0.148)	(0.146)	(0.144)	(0.220)
Observed Probability	0.047	0.047	0.047	0.047
Predicted Probability	0.032	0.032	0.030	0.032
Number of Observations	2,550	2,550	2,550	2,550
Number of Firms	786	786	786	786
Log likelihood	-449.8	-449.8	-451.6	-451.2

***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.