Deferred Compensation Plan Characteristics and Voluntary Employee Turnover

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Abstract

This study examines the effects of deferred compensation plan characteristics on voluntary turnover decisions, using detailed personnel data on store-level employees of a large retail firm. Overall, I find that employees who are eligible to receive deferred profit-sharing payments have significantly lower voluntary turnover. However, the relation between eligibility and turnover varies depending upon the specific plan eligibility requirement (i.e., age, tenure, hours worked per year), with stronger retention effects when plan contributions are larger. Vesting restrictions are associated with lower turnover rates, but only among lower-level store employees. Finally, the retention benefits from unvested plan holdings are driven primarily by deferred compensation that is invested in the company's stock rather than in diversified mutual funds. These findings suggest that employees may respond to the retention incentives provided by a deferred compensation plan, but that specific plan characteristics play a key role in determining the plan's retention benefits.

1. Introduction

Considerable research has examined the influence of compensation characteristics on employee behavior and firm outcomes. This research has primarily focused on the use of compensation for incentive purposes (e.g., Prendergast, 1999; Merchant et al., 2003). However, firms use compensation plans to achieve a number of other objectives, with employee retention among the most important.[1] Many compensation professionals and academic researchers contend that firms can increase retention (i.e., reduce voluntary employee turnover) through the use of deferred pensions, profit-sharing plans, 401(k) matching, and equity grants (e.g., Lazear, 1990; Oyer and Schaefer, 2005). These compensation mechanisms defer payouts by making them explicitly contingent on the employee staying with the firm for some specified amount of time, typically through the use of tenure-based eligibility and vesting restrictions.[2]

A key issue in the design of deferred compensation plans is the influence of specific plan characteristics (e.g., eligibility requirements, vesting schedules, size of deferred grants, investment vehicle) on employee turnover decisions. Labor economists such as Lazear (1990, p. 263) argue that "turnover rates are fundamentally influenced by the structure of deferred compensation." Yet most empirical studies to date have ignored this issue, instead focusing on the cross-sectional association between the presence of deferred compensation plans and employee turnover rates (e.g., Allen et al., 1993; Evan and Macpherson, 1996; Azfar and

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[1] For example, surveys by the compensation consulting firm PayScale found that retaining and attracting good talent were the two chief compensation objectives for both 2010 and 2011. (http://www.werc.org/assets/1/Publications/924a%201_13905_PayScales_Compensation_Practices_Survey[1].pdf, accessed November 22, 2011)

[2] Throughout this paper, I use the phrase "deferred compensation" to mean compensation that is explicitly contingent on tenure requirements. In other contexts, deferred compensation can refer more narrowly to the practice of executives voluntarily deferring a portion of current pay to achieve tax objectives (e.g., Anantharaman et al., 2011), or the practice of delaying the determination of contingent pay due to uncertainty with respect to performance measurement (e.g., Jackson and Lazear, 1991).

Danninger, 2001), and largely ignoring whether specific plan characteristics have differential effects on employee retention.[3]

This study addresses this limitation using ten years of detailed personnel data on individual, store-level employees of a large retail chain. The firm's deferred profit-sharing plan covers all store-level employees from entry-level customer service associates to store managers, with lower turnover one of the plan's primary objectives.[4] Although any single-firm study faces generalizability concerns, this sample offers a number of significant advantages for investigating the retention benefits from different plan characteristics. First, the plan's eligibility cutoffs and vesting schedules are based on age, tenure, and the number of hours worked during each year, allowing me to identify and test for discontinuities in individual employees' retention incentives that arise from the plan cutoffs and vesting schedules. Second, some of the plan's provisions, including the minimum age for eligibility, the percentage of firm profits contributed to the plan, the length of the vesting schedule, and the investment of plan assets (company stock or diversified mutual fund) changed during the sample period, providing natural experiments to test the effects of these characteristics on employee retention. Finally, the detailed, employee-level data allow an examination of claims regarding the importance of employee characteristics in deferred compensation design (e.g., Salop and Salop, 1976; Rosenbloom, 2005).

Using hazard analysis, I find that employees who are eligible to receive contributions under the deferred compensation plan have significantly lower turnover rates than employees who do not meet the eligibility requirements. Plan eligibility is associated with a 15–35% reduction in turnover rates, which corresponds to an expected employment length increase of 17

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[3] Exceptions include Kole (1997) and Cadman et al. (2011), which examine vesting terms for executive stock options as a function of proxies for retention importance.

[4] Similar deferred profit-sharing plans are used by more than eleven thousand U.S. firms to cover more than thirteen million employees, an increase of more than 333% over the last thirty years (NCEO, 2011).

–54% for the average employee. The effect of eligibility on turnover is stronger for larger values of deferred compensation grants.

Turnover is not significantly different between employees just below the age or tenure cutoffs and those just above the cutoffs. However, employees who receive deferred compensation by working just over the annual hour cutoff exhibit lower turnover rates than do employees who work just under the required number of hours. The plan eligibility retention effects are stronger for females than for males, and for older workers than for younger workers. To the extent that these characteristics proxy for employees' discount rates, these results are consistent with prior evidence that women have lower discount rates than men (thereby increasing the expected value of deferred compensation), and that discount rates decrease with age (e.g., Warner and Pleeter, 2001).

Because unvested deferred compensation is forfeited if the employee leaves the firm, unvested plan holdings may have a greater influence on voluntary turnover decisions than vested holdings (e.g., Core and Guay, 2001; Kedia and Rajgopal, 2009). Consistent with this argument, I find a negative and significant association between the value of unvested plan holdings and voluntary turnover, but only for employees at the lowest organizational level. For these employees, an additional $1,000 of unvested holdings is associated with a 26% turnover rate reduction. This reduced turnover rate corresponds to a 35% longer expected employment duration. I also find that the retention effects of unvested holdings are primarily driven by deferred compensation invested in the company's stock, and not by investments in diversified stock holdings. In contrast to low-level employees, unvested holdings are not statistically associated with reduced turnover rates for store managers, suggesting that unvested holdings do

not provide strong retention incentives to higher-level employees, who tend to have higher current pay and greater investments in firm-specific human capital.

This study contributes to the literature on compensation design and employee turnover in three ways. First, I extend prior research by examining whether *specific characteristics* of a deferred compensation plan are associated with employee turnover rates. Beyond the decision of whether to adopt a deferred compensation plan, employers face a number of different choices in designing a plan to meet their retention objectives. The evidence in this study suggests that some plan characteristics are associated with reduced turnover while others appear to have no effect, thus highlighting the importance of examining specific plan characteristics when investigating deferred compensation plan outcomes.

Second, I am better able to overcome the endogeneity problem that has limited prior research on the retention benefits from deferred compensation. Although I do not directly examine whether the existence of a deferred compensation plan affects voluntary turnover, my findings that certain characteristics influence employee turnover are consistent with the plan having retention effects. Prior studies have attempted to investigate the broad question of whether deferred compensation plans reduce employee turnover, with mixed results (e.g., Allen et al., 1993; Gustman and Steinmeir, 1993; Azfar and Danninger, 2001). One empirical difficulty in these cross-sectional studies is overcoming the endogenous decision to adopt such a plan in order to establish a causal relationship. My analysis of employee-level decisions in a single firm reduces this problem because the deferred compensation plan is relatively exogenous from the employees' perspective.

Third, although many studies have examined the determinants and consequences of compensation design for executives, relatively little is known about how design choices impact

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low-level employees. Research on the use of compensation design to mitigate employee turnover has generally focused on executives (e.g., Chen, 2004; Balsam and Miharjo, 2007; Sundaram and Yermack, 2007). In contrast, the setting for this study includes low-level store employees. For low-level workers, a number of factors may attenuate the retention effects related to plan characteristics. For example, low-level employees often fail to understand the provisions of deferred compensation plans in which they are eligible to participate (e.g., Mitchell, 1988; Luchak and Gunderson, 2000; Budd, 2008). In addition, deferred compensation for rank-and-file employees is commonly implemented as part of a qualified retirement plan to take advantage of tax savings. Regulatory requirements for these tax-qualified plans restrict the range of flexibility in designing eligibility criteria and vesting requirements, potentially diminishing the effect of various plan provisions on voluntary turnover. By examining the retention effects of deferred compensation plan characteristics in a setting made up of low-level workers, this study responds to calls for research on compensation for employees at lower organizational levels (e.g., Indjejikian, 1999).

The remainder of this paper is organized as follows: In the next section, I provide an overview of theoretical predictions related to the link between deferred compensation and turnover, discuss the research setting, and develop hypotheses related to the retention effects of the research site's specific deferred compensation plan characteristics and institutional setting. Section 3 discusses the sample and measures used for the empirical analysis. In Section 4, I present my results. Conclusions are provided in section 5.

2. Theory, Research Setting, and Hypotheses

2.1 Deferred compensation characteristics and employee turnover

Although prior research posits a number of motivations for the use of deferred compensation, such as taking advantage of tax benefits (Black, 1980; Tepper, 1981), providing effort incentives (Lazear, 1979; Lazear, 1981) and attracting high-quality employees (Salop and Salop, 1976), practitioners and academics alike cite reduced voluntary turnover as one of the most direct benefits of deferred compensation. Recent surveys, for example, show that employers list retention as a primary reason for offering defined benefit and defined contribution pension plans to workers, and employers believe such plans directly impact employee turnover (Diversified Investment Advisors, 2006; Grant Thornton, 2010). Similarly, economic theories argue that deferred compensation in general can be an effective tool for reducing employee turnover (e.g., Lazear, 1990). Other researchers contend that retention is a prime motivation for several specific forms of deferred compensation, including deferred profit-sharing plans and Employee Share Ownership Plans (ESOPs) (Kruse, 1996; Azfar and Danninger, 2001; Rosenbloom, 2005), pensions (Ippolito, 1991), and broad-based equity plans with vesting restrictions (Core and Guay, 2001; Ittner et al., 2003; Oyer and Schaefer, 2005).[5]

The argument for using deferred compensation to reduce voluntary turnover is straightforward. Because new compensation grants and/or vesting of previous grants are explicitly linked to tenure requirements, employees face increased implicit costs of quitting before tenure requirements are reached. However, the retention benefits from deferred

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[5] Several studies use firm-level data to examine whether the use of deferred compensation is related to retention-oriented compensation objectives. Using survey data on stated compensation objectives, Ryterband (1991) finds that reducing employee turnover is a primary objective among ESOP adopters, while Gerakos et al. (2011) find a negative relationship between retention objectives and the use of broad-based stock options. Core and Guay (2001) and Oyer and Schaefer (2005) use proxies for the relative importance of retention and find that these retention proxies are significant determinants of broad-based stock option grants.

compensation are likely to be driven not merely by the existence of such a plan, but also by the specific plan characteristics.

Eligibility rules, for example, can affect retention incentives by stipulating which employees participate in the plan. Holding current pay fixed, eligibility to receive deferred compensation increases future payouts, conditional on remaining with the firm (e.g., Lazear, 1979). The higher the present value of total compensation (i.e., current plus deferred), the less likely an outside offer will exceed the pay at the incumbent job, and therefore the less likely an employee will be to leave the firm.

The amount of money contributed to the plan is also likely to affect voluntary turnover because contribution size determines the difference in retention incentives between employees who are eligible and those who are ineligible for plan grants. Along these lines, Blasi et al. (2008) provide survey evidence that the size of profit-sharing contributions as a percentage of total pay is negatively associated with self-reported intention to seek a new job.

Vesting terms can provide retention incentives by extending the time horizon of payouts (Kole, 1997; Cadman et al., 2011). Prior research specifically cites *unvested* holdings as being especially effective in discouraging employees from quitting, because any outside opportunity must compensate the employee for unvested holdings that would be forfeited on departure (e.g., Core and Guay, 2001; Kedia and Rajgopal, 2009). Consistent with this intuition, Balsam and Miharjo (2007) find that the value of unvested equity holdings is negatively associated with voluntary turnover for their sample of executives.

Finally, the retention effects of unvested holdings depend on the value of the holdings *to the employee,* because the subjective value represents the perceived cost of forfeiture. Employees' valuation of unvested holdings, and thus the associated retention effects, may

depend on whether plan assets are invested in company stock or diversified investment vehicles. Prior research indicates that employees exhibit a preference for investments in employer stock (e.g., Huberman, 2001; Cohen, 2009), notwithstanding portfolio theory's clear prescriptions for diversification. Survey evidence indicates that employees actually consider company stock to be a *less* risky investment than a diversified equity portfolio (John Hancock Financial Services, 2002). Other studies suggest that owning company stock *per se* can increase employees' identification with the firm, and consequently improve loyalty and reduce voluntary turnover (e.g., Pierce et al., 1991; Kruse and Blasi, 1997; Kruse et al., 2008). All of these arguments imply that investing deferred contributions in company stock will yield stronger retention incentives. In contrast, recent studies highlight the cost of under-diversification associated with employees' investments in their companies' stock (e.g., Meulbroek, 2005; Poterba, 2003; Cohen, 2009). If employees recognize the costs of under-diversification, they may steeply discount investments in company stock, reducing the retention effects of company stock relative to diversified investments.

Although a number of studies have examined whether the *existence* of a deferred compensation plan is associated with reduced voluntary turnover,[6] relatively little evidence exists on the influence of specific plan characteristics on employee retention, despite their theoretical importance to plan outcomes. Given this limitation, I extend prior deferred compensation studies

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[6]Most research in this area uses data from broad employment and compensation surveys to compare employee turnover rates at firms using and not using deferred compensation (e.g., Azfar and Danninger, 2001; Ippolito, 1987; 1991; Allen et al., 1993; Evan and Macpherson, 1996). These studies generally find that firms with deferred compensation plans have lower turnover. However, Gustman and Steinmeier (1993) find that, after controlling for appropriate job-and firm-level characteristics, the link between deferred compensation and turnover is not significant. Allen et al. (1993) and Evan and Macpherson (1996) also find limited evidence that deferred compensation reduces voluntary turnover, as opposed to layoffs or other forms of non-voluntary employee departure.

by examining the association between eligibility rules, plan contributions, vesting schedules, and plan investment vehicles on voluntary turnover rates.

2.2 Research setting

I conduct my analyses using personnel records for store-level employees of a large retail firm. The firm is a U.S. private company that operates over 500 stores, employs over 17,000 people, and has annual sales of over $5 billion. This setting is well-suited for studying retention incentives because the firm experiences high employee turnover and reducing turnover is an important organizational objective. Although the sample firm's voluntary turnover rate is generally lower than those of its industry peers, it is still very high compared to rates for other industries. Over the sample period, voluntary turnover averaged nearly 75 percent annually and reached nearly 100 percent annually among the lowest-level employees.

The firm's strategy involves generating repeat customer business by offering excellent customer service and fostering a sense of community in its stores. A key component of this strategy is a focus on customer-employee interactions, which depend not only on employee "friendliness," but also on familiarity between customers and employees. For example, company management stresses to employees an ideal that stores should be "a place where everybody knows your name."[7]

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[7] Interviews with store managers and other employees provided a number of explanations for a link between employee turnover and store-level operating performance. First, turnover can lead to lower customer satisfaction. Repeat customers become familiar with particular employees and expect to see them when they come in. In addition, employees are better able to make credible "up sell" recommendations when they have rapport with a customer. Employee turnover can also harm a store's ability to maintain high operating standards because employee inexperience leads to slower service and longer lines. Longer-tenured employees are more likely to have mastered the basic routines in the store and thus are able to "focus on the details" to improve store presentation and meet customers' needs. Finally, managers cited the drain on their own time and attention associated with interviewing, hiring, and training new employees. This time-consuming process directs managers' efforts away from higher-value activities.

The firm operates a deferred profit-sharing plan, with senior managers citing reduced employee turnover as one of the plan's primary objectives.[8] Management's belief that the plan provides retention incentives is evidenced by a quote from the CEO on the company website, given in the context of discussing the plan. He states that while growth in financial measures is important to the firm, a very low employee turnover rate is what is "cherished most." However, management acknowledged that they do not have any direct evidence that the profit-sharing plan actually reduces turnover.

Under the plan, eligible employees receive an annual contribution from the company to an individual retirement account that is managed by a third party. The plan is structured as a qualified retirement plan for Federal income tax purposes, and current employees are restricted from accessing their funds until after retirement.[9] However, employees can receive distributions from their *vested* plan holdings before retirement age if they separate from the company for any reason.[10] Structuring deferred compensation as a retirement plan impacts the timing of ultimate distributions and the administrative details of the plan, but does not otherwise substantively affect the deferred elements of the plan. The plan is quite general in that it entails making grants to employees in the current period that will not be fully earned until later, similar to other common forms of deferred compensation (e.g., restricted stock, stock options, and pensions). Even so, structuring deferred compensation as a tax-qualified plan requires that plan provisions

[8] In addition to providing retention incentives, management mentioned increasing employee effort as another goal of the plan. However, the effect of plan characteristics on employee effort allocation is beyond the scope of this study.

[9] Management cited a desire to take advantage of tax benefits as the motivation for structuring the deferred compensation program as a retirement plan. The primary tax benefits are that contributions invested in the plan are not taxed to the employee until ultimately distributed, and investment returns on plan holdings can grow tax free

[10] For example, after leaving the company, an employee can elect to receive all of his or her vested holdings as a cash distribution, or can roll the vested holdings into another retirement account such as an Individual Retirement Account (IRA). Any cash distribution received before age 59 ½ is subject to an additional 10% penalty tax by the Internal Revenue Service (IRS). If an employee continues to work at the company beyond the normal retirement age (i.e., age 62), he or she can begin receiving distributions from plan holdings after age 70 ½ while still working at the firm.

conform to guidelines for tax-qualified plans outlined by the Employee Retirement Income Security Act (ERISA).

2.3 Hypotheses

In this section, I develop my hypotheses in the context of the specific characteristics of the research site's deferred profit-sharing plan and the firm's institutional setting.

2.3.1 Eligibility

Plan eligibility provisions impact retention incentives by determining which employees receive deferred compensation. Holding current pay fixed, eligible employees effectively earn a higher wage than ineligible employees, and therefore are less likely to find an outside offer that exceeds the incumbent total compensation (current and deferred). At the research site, eligibility to receive contributions under the deferred compensation plan is based on tenure, annual hours worked, and age. The firm has flexibility under ERISA to choose cutoffs for each of these criteria within an acceptable range. In particular, ERISA requires tenure cutoffs between zero and twelve months, annual hours worked cutoffs between zero and 1,000 hours, and age cutoffs that do not exceed 21 years. For each of these criteria, the firm has used the flexibility within the ERISA guidelines to adopt the most stringent eligibility requirements allowable for tax-qualified plans. Therefore, to be eligible to receive a contribution, a worker must have been with the firm for at least twelve months, must have worked at least 1,000 hours during the plan year, and must be at least 21 years old.[11]

Despite the positive expected value of deferred compensation, the store-level employees in the sample may not consider the deferred component of compensation when evaluating

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[11]The age-21 requirement was imposed beginning with the 2002 plan year due to a change in ERISA rules. To receive a plan contribution after this date, an employee needs to be age 21 or older, even if they had received a grant in a previous year.

potential outside employment opportunities.[12] Because the retail environment is characterized by high turnover rates for lower-level employees, these employees may consider their employment status to be tenuous, leading them to steeply discount future payouts that require them to stay with the firm for an extended period of time.

The uncertain relation between plan eligibility and retention in this setting leads me to test the prediction that employees consider the deferred component of their total pay when making stay or quit decisions. If so, eligible employees have stronger incentives to remain with the firm than ineligible employees, and consequently have lower turnover rates. Thus, my first hypothesis:

> *H1: Eligibility to receive deferred compensation is negatively associated with voluntary turnover rates.*

2.3.2 Level of contributions

Plan eligibility increases retention incentives by increasing the present value of future wages, but the size of this effect is likely to vary according to the level of contributions made to the plan. Contribution size at the research site is based on firm performance, but ultimately is at the discretion of the board of directors. Although there is no guarantee that the board will decide to make a grant, the company made a grant every year during the sample period. Annually, the board reviews the performance of the company and decides on the level of contribution to the plan as a percentage of company profits. From 2007 – 2009, annual plan contributions were 15% of profits. Prior to that, grants were 10% of annual profits.

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[12]In interviews, managers expressed the belief that store employees disproportionately weight current hourly pay when evaluating outside employment opportunities.

Each employee's grant is determined mechanically based on a multiplier of his or her total eligible earnings for the year.[13] The multiplier is derived by dividing the total aggregate contribution to the plan by the aggregate eligible earnings. For example, if total plan contribution was $100 in a given year (15% of firm profits), and total eligible employee earnings was $1,000, the "contribution factor" for that year would be 100/1,000 = 10%, meaning that each employee would receive a contribution equal to 10% of his or her eligible earnings during that year. Although the contribution as a percentage of firm profits was fairly constant over the sample period (with the exception of the increase for years 2007-2009), the contribution to each employee as a percentage of eligible earnings varied from year to year, ranging from roughly 4.9% to 11.4%.

Because employees who are eligible to receive grants under the plan accrue deferred compensation throughout the year, the effective hourly wage for eligible employees increases depending upon the size of the annual contribution factor. This accrued deferred compensation is then contributed to the employees' accounts at the time of the annual grant, and is subject to vesting provisions. If employees are aware of the computation that determines annual deferred compensation grants and are able to form reasonable expectations of the various inputs (e.g., annual profits and wages earned), then higher levels of contributions should increase retention incentives for eligible employees. Therefore, my second hypothesis:

> *H2: The association between eligibility and voluntary turnover rates is increasing in the level of plan contributions.*

2.3.3 Vesting

Tenure-based vesting provisions can provide retention incentives by explicitly linking employees' payouts to the length of time they remain with the firm. As a result, tenure-based

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[13] Eligible earnings include all wages earned after initial plan eligibility is achieved.

vesting schedules are one of the most straightforward means to defer compensation. As with the company's other plan provisions, vesting schedules must conform to ERISA guidelines to maintain the plan's tax-favored status. Although ERISA permits either cliff or gradual vesting, the company has chosen to use a gradual vesting schedule. The maximum length of a permissible vesting schedule changed during the sample period as a result of a change in legislation governing ERISA. Prior to 2007, employees under a gradual vesting schedule had to be fully vested after a maximum of seven years.[14] For 2007 and later, full vesting must be achieved after a maximum of six years.[15] As with its eligibility requirements, the company used the flexibility allowed within ERISA guidelines to choose the most restrictive vesting requirements available. For grants made prior to 2007, the vested percentage of plan holdings was 0% for fewer than three years of service, and 20% per year for three to seven years of service. Employees were 100% vested in their plan balances after accruing seven years of service. For grants made in 2007 and later, 20% vesting is achieved with each year of service from two to six, and employees are 100% vested in these grants after six years of service.[16] Table 1 presents the vesting schedule. Other than the pre-/post-2007 distinction, these vesting percentages are applied to the account balances themselves, and not to specific grants *per se*. For example, an employee with four years of service who receives a grant in 2005 is immediately 40% vested in that grant, as well as 40% vested in any grant received in previous years.

With respect to the choice to use the longest vesting term allowed under ERISA, company management pointed out that "vesting was structured to promote long-term commitment to the organization," consistent with the theory that longer vesting schedules

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[14] Vesting is based on the number of years of service an employee has accumulated with the company. Under the research site's plan, a "year of service" (YOS) is accrued for every year in which an employee works at least 1000 hours.

[15] Under ERISA, full vesting must be achieved after 3 year if cliff vesting is used.

[16] Regardless of years of service, employees achieve 100% vesting when they reach age 62.

increase the retention incentives provided by a deferred compensation plan (e.g., Kole, 1997; Cadman et al., 2011). Prior research argues that it is the value of *unvested* holdings that has the strongest incentive effects (e.g., Core and Guay, 2001; Kedia and Rajgopal, 2009). Unvested holdings represent compensation that is forfeited if an employee leaves, and therefore greater values of unvested grants should increase the employee's cost of leaving the firm, leading to my third hypothesis:

> *H3: The value of unvested holdings is negatively associated with voluntary turnover rates.*

2.3.4 Investment of plan assets

The relationship between unvested holdings and voluntary turnover may depend upon whether plan assets are invested in company stock or in diversified investments by altering employees' subjective valuations of their holdings. During the sample period, plan contributions were invested either in company stock as part of an employee share ownership plan (ESOP) or in diversified mutual funds. For the years 1999-2002 and 2004-2006, the investment of plan assets was split equally between company stock and mutual funds. For the years 2003 and 2007-2009, contributions were invested exclusively in company stock.[17] Whether plan contributions were invested in mutual funds or company stock did not have any impact on eligibility, contribution factors, vesting, or distribution of plan holdings, and therefore the ESOP and mutual fund arms of the deferred profit-sharing program were the same in all respects other than how the contributions were invested.

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[17] The reason the company made a contribution exclusively to the ESOP in 2003 was to fund a one-time tender offer to purchase shares from outside shareholders. During this year, the company offered employees the chance to transfer funds from other retirement sources into the ESOP. From 2007 onward, the company decided to contribute solely to the ESOP because they needed the additional funds to meet cash requirements for ESOP distributions (i.e., vested employees leaving the company).

As discussed earlier, psychological factors may cause employees to prefer company stock, despite portfolio theory's clear prescription for diversification. In addition, several studies have shown that employees "excessively extrapolate" company stock returns into the future (e.g., Bernartzi, 2001; Choi et al., 2003; Huberman and Sengmueller, 2004). This may be particularly important in this research setting. Over the sample period, the firm's stock significantly outperformed the market. [18] Since the company is privately held, the only way for employees to invest in company stock is through the deferred ESOP contributions, which the employee cannot continue to hold after leaving the firm. If employees extrapolated the superior company returns into the future, their valuation of investments in company stock would be higher than those in diversified funds, increasing the retention effects of ESOP investments vis-à-vis mutual fund holdings. This leads to my fourth hypothesis:

> H4: The association between unvested holdings and voluntary turnover rates is stronger for company stock holdings than for mutual fund holdings.

2.3.5 Employee characteristics

Although deferred compensation plan characteristics may affect turnover decisions on average, the extent to which *individual* employees respond to the retention incentives in deferred compensation is likely to differ with a number of employee characteristics (e.g., Salop and Salop, 1976). Rosenbloom (2005) emphasizes the importance of considering employee demographics in designing a deferred compensation plan because employees of different age and gender may find different plan features more or less attractive. For example, risk preferences, discount rates, and labor market participation are all likely to vary with age and gender (Eckel et al., 1998; Holt and Laury, 2002; Warner and Pleeter, 2001; Kirby and Markovic, 1996). These differences could

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[18] For ESOP purposes, the firm's stock is valued annually by a third party.

impact an employee's personal valuation of deferred compensation, and therefore moderate the extent to which plan characteristics impact the decision to stay with the firm.

Position in the firm is also likely to matter. For example, promotions within a firm may reflect the extent to which an employee has accumulated firm-specific human capital. The more human capital an employee has within the firm, the more likely the employee's marginal product within the firm exceeds what it would be in a different firm, and therefore the wage offered by the current firm is more likely to exceed what could be obtained through an outside offer (e.g., Becker, 1962; Parsons, 1972; Nagypal, 2007). For this reason, as employees are promoted current pay may provide sufficiently strong retention incentives so that there is less scope for the deferred compensation plan or its provisions to impact turnover decisions. Alternatively, employees in higher positions may better understand plan provisions (e.g., Mitchell, 1988; Luchak and Gunderson, 2000; Budd, 2008), making it more likely that they will take plan characteristics into account when deciding whether to leave.

Based on the results in related studies, I predict the retention effects of deferred compensation characteristics to vary according to employee gender, age, and position in the firm. Therefore, my fifth hypothesis is as follows:

> *H5: Employee gender, age, and position moderate the relationship between deferred compensation characteristics and voluntary turnover rates.*

3. Sample and Measures

3.1 Data collection

I test these hypotheses using personnel records for all store-level employees hired between 1998 and 2008. The data include employee hire date, termination date and type

(voluntary or involuntary), age, gender, wage, and position, as well as the size of grants to the employee under the company's deferred profit-sharing plan for plan years 1999-2008. The sample includes 145,961 unique employees hired between 1998 and 2008, working a total of 1,773,263 months. I observe 175,558 instances of employee turnover, of which 127,012 (72.35%) are classified as voluntary.[19] To better understand the deferred compensation plan and institutional setting, I examined official plan documentation, interviewed corporate employees responsible for administering the plan, and met with store employees across different organizational levels.

3.1.1 Dependent variable

The outcome of interest in this study is monthly voluntary turnover for each employee. The dependent variable *vol_turnover* equals one in the month a given employee voluntarily leaves the firm, and zero otherwise. Although there were no layoffs during the sample period, involuntary turnover occurred due to employees being terminated.[20]

3.1.2 Independent variables

As discussed above, eligibility to participate in the deferred profit-sharing plan is based on cutoffs with respect to age, tenure, and annual hours worked. After satisfying the age and tenure requirements, employees are technically eligible to receive a grant after passing a 1,000-hours-worked threshold. However, I consider employees eligible if they are *on pace* to achieve 1,000 hours in a given year, which corresponds to working an average of 20 hours per week. I do this to avoid coding all employees as non-eligible at the start of every year, even though they can fully expect to receive a grant at year-end if they remain with the firm. Specifically, *eligible* is an

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[19] Note that some employees that separate from the firm are re-hired, and may separate again.
[20] Following prior research on voluntary turnover (e.g., Trevor, 2001), I include in the analyses employees who are fired, and the survival analysis treats these observations as being right censored (i.e., although these employees exit the sample, they do so before voluntary turnover, the event of interest, is observed). The model accounts for the fact that there was no voluntary turnover during these censored employees' tenure.

indicator variable equal to one if an employee is at least 21 years old (for years 2002 and later), has been with the firm for at least 12 months, and worked an average of at least 20 hours per week during the given year. In addition, I employ indicator variables for the individual eligibility criteria in additional tests.

Unvested holdings measures the dollar value (in year-2000 terms) of previously granted holdings that are yet to vest. Employees achieve vesting based on accumulated "years of service," defined as the number of years in which an employee worked at least 1,000 hours. I therefore determine when an employee reaches a vesting cutoff by estimating the month an employee reaches the 1,000-work-hour mark in each year.[21]

To examine whether the effect of plan characteristics varies with employee characteristics, I use measures of age, gender, and position in the firm. *Age* is the employee's age in years. *Female* is an indicator equal to one if the employee is female and zero otherwise. Positions in the firm include Customer Service Associates (CSAs), hourly managers, assistant managers, and general managers.[22]

I include a number of control variables drawn from prior literature on employee turnover (e.g., Griffeth et al., 2000; Trevor, 2001; Benson et al., 2004). *Tenure* is the total number of months an employee has worked at the firm. I measure *Hourly wage* in real year-2000 dollars to account for the effect of inflation across my sample period. *Hours per week* is the total hours worked in a given year divided by the total number of weeks an individual was employed

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[21] The data for hours worked were provided on an annual basis, so I use the following procedure to estimate the month of vesting. First, I count the total number of weeks worked during the year, and divide the total hours worked by the number of weeks to obtain the hours worked per week. Next, I divide 1,000 by hours per week multiplied by 4.3 (i.e., monthly hours worked). For example, an employee who worked 1,500 hours and was employed for the entire year (52 weeks) would be estimated to vest during September, as follows: 1,500/52 = 28.85 hours per week. 1,000/(4.3*28.85) = 8.06.

[22] Organizational hierarchy at the store level consists of a general manager and an assistant general manager, both of whom are full-time, salaried employees. Below them are a number of lower-level managers with responsibility over specific store functions. These positions are paid hourly, but are also full-time. Below these hourly managers are the Customer Service Associates, who are paid hourly and may be either part time or full time.

during the year. In addition to these employee-level variables, I obtain monthly unemployment rates at the county level from the U.S. Bureau of Labor Statistics to control for outside employment opportunities in the local labor market. I include year fixed effects to control for changes in macroeconomic factors (other than unemployment) and company policies across years that affected all employees equally, and monthly fixed effects to control for seasonal differences in employee turnover.

3.2 Descriptive statistics

Table 2 highlights the differences in employee characteristics across organizational levels. CSAs are considerably younger, and have shorter tenure than employees in managerial positions, and earn lower wages working fewer hours per week. These differences may result in differential deferred compensation effects across employee categories. For example, the average CSA tenure (ranging from approximately 15 to 32 months across the sample period) implies that full (100%) vesting is still several years away for most CSAs. In contrast, managers are much more likely to be in the latter stages of the vesting schedule. Wages rise sharply with promotions (e.g., general managers' salaries in 2008 were almost three times higher than those for CSAs). This wage structure may reflect firm-specific human capital investments and hence wages at these levels more likely exceed what could be obtained from outside employment opportunities (e.g., Ippolito, 1991). Therefore, current pay following promotions may provide sufficiently powerful retention incentives so that the incremental retention effects from deferred compensation are small for managers. CSAs tend to work less than a standard "full-time" work week (mean hours per week ranges from approximately 24 to 29), while all other employee categories average more than 40 hours per week.

The average values for *age*, *tenure*, and *weekly hours* (Panels B through D) suggest that nearly all employees above the CSA level are eligible to receive contributions under the deferred profit-sharing plan. In contrast, there is substantial variation in CSA eligibility. The total proportion of eligible CSAs has generally increased over the sample period, with almost 40 percent of CSAs eligible to receive contributions by 2008. In terms of eligibility requirements, the proportions of employees meeting the age, tenure, and hours-worked cutoffs all increased over time.[23]

Table 3 indicates that the correlations among the *age*, *tenure*, and *weekly hours* cutoffs are all significantly positive. However, the three eligibility cutoffs do not necessarily collapse into a single eligibility dimension. In unreported analysis, I find that among CSAs who are *not* eligible, the most common reason for ineligibility is failure to meet the tenure requirement. In particular, approximately 20 percent of ineligible CSAs meet the other two requirements while falling short on tenure, compared to roughly 10 to 15 percent who would be eligible if not for either the age or hours requirement.

4. Results

4.1 The effect of turnover on store performance

One of the primary assumptions underlying the research site's deferred compensation plan is the (untested) belief that lower voluntary turnover leads to higher store financial performance. If this assumption is not true, then any relation between plan characteristics and lower turnover will have no impact on economic performance. Consequently, before testing my

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[23] Note that prior to 2002 there was no age eligibility requirement. As a result, the mean and median values of *age requirement* for 2000 are both 1.

hypotheses, I assess the validity of managements' assumption that lower voluntary turnover is associated with higher store-level operating performance.

Following prior studies in the retail industry, I measure store performance using operating margin, defined as store profit scaled by sales (Ton and Huckman, 2008).[24] I adjust store profits by subtracting plan contributions made to employees each year, which allows me to test whether a relationship between turnover and financial performance exists even after accounting for the expense relating to the profit-sharing plan. Based on interviews with store managers, I use four proxies to capture different aspects of store-level employee retention that are expected to influence performance. First, *turnover* represents total separations divided by the average number of employees for the period. This measure is commonly used in prior literature (e.g., Glebbeek and Bax, 2004; Shaw et al., 2005) and captures the overall instability that results from employees leaving. Second, *turnover_eligible* equals the annual number of turnover cases among eligible employees divided by the average number of employees in each store. This measure is intended to capture the level of turnover among employees expected to be influenced by the deferred compensation program. Third, *training_pct* is the total dollars spent on trainee labor scaled by total labor costs. Store managers indicate that a key source of turnover costs is the training costs and lost productivity due to inexperienced workers. Fourth, *average_tenure* proxies for the accumulation of human capital within the store, which managers argue leads to higher employee performance.

As discussed in related research, the theoretical time lag between turnover and store performance is unclear. As a result, I aggregate all variables to the annual level and regress annual operating margin on current-year turnover and controls. I assume that the one-year time

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[24] In unreported tests, I also measure performance using profits per square foot, a common performance metric in this industry. Results are similar to those using operating margin.

window is long enough to capture the majority of any performance benefits resulting from turnover reductions. Table 4 presents the results from this analysis.[25] Consistent with the firm's assumptions and prior retail research (e.g., Kacmar et al., 2006; Ton and Huckman, 2008; Hausknecht et al., 2009), three of the four turnover-related variables (*turnover_eligible*, *training_pct*, and *avg_tenure*) are significantly associated with store-level operating margin in the expected directions. The estimates in Table 4 suggest that one-standard-deviation improvements in the three significant turnover-related measures are associated with improvements of between .3% and .6% in operating margin, which correspond to percentage increases in profitability of between 1.2% and 3% for an average store. These magnitudes are similar to those reported in prior retail studies (e.g., Ton and Huckman, 2008) and indicate that lower turnover is associated with higher operating performance, even after controlling for plan payouts.

Although the results in Table 4 are consistent with managers' assumption that lower turnover leads to higher store operating performance, it is possible that lower operating performance causes higher turnover, and not the other way around. To more directly test whether turnover proxies are *leading* indicators of operating performance, I regress monthly operating margin on lagged values for the four turnover-related measures. Following Ton and Huckman (2008), I measure the turnover proxies over the prior three months to address concerns about potential noise in monthly turnover measures. In untabulated results, all four turnover measures are significantly associated with operating margin in the expected direction. The magnitude of the estimated effects using the lagged turnover measures is similar to those reported in Table 4;

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[25] In unreported tests, I also use a fixed effects specification to attempt to control for time-invariant, unobservable variables that are associated with particular stores, such as the extent of local competition or the proximity to public transportation. The results based on this specification are similar to those reported in Table 4, except that *turnover* is significantly negative, while *turnover_eligible* is negative but no longer significant.

one-standard-deviation improvements in the lagged turnover-related measures are associated with operating margin improvements of between .2% and .3%.

4.2 The effect of plan characteristics on voluntary turnover

The preceding results are consistent with the research site's assertion that reductions in turnover lead to improved store results. Given these results, the important question for this study is the influence of different deferred compensation plan characteristics on employees' voluntary turnover decisions. Participation in the plan depends on age, tenure, and hours worked, all of which are observed covariates. In addition, employee wages determine individual grant size, and hence plan holdings. Prior literature on employee turnover (e.g., Trevor, 2001; Hom and Kinicki, 2001) suggests that these covariates can have a direct impact on employee separation decisions, even in the absence of a deferred compensation plan. Thus, the empirical challenge is to identify the effect of the deferred compensation separately from the effect of the covariates that determine plan eligibility and grant size. The empirical strategy I rely on to overcome this challenge is a regression discontinuity (RD) research design, which has been widely used for program evaluation in the economics literature (e.g., Thistlewaite and Campbell, 1960; Trochim, 1984; Van Der Klaauw, 2002; DiNardo and Lee, 2004; Card et al., 2004). Regression discontinuity is appropriate when the "treatment" of interest (deferred compensation in this case) is determined by whether an observable covariate (known as a "forcing variable") is on either side of a threshold. Even if the covariate determining the treatment is itself associated with the outcome of interest, the effect of the treatment is still identified under the assumption that the relation between the forcing variable and the outcome of interest is not discontinuous exactly around the administrative cutoff.

Following prior literature on organizational turnover (e.g., Trevor, 2001; Hom and Kinicki, 2001; Benson et al., 2004), I primarily rely on Cox proportional hazard models to estimate the relationship between deferred compensation and voluntary turnover. Hazard analysis permits estimating the rate of voluntary turnover over time (i.e., the "hazard rate"), as opposed to estimating the odds of turnover occurring during some window of time, as is the case with logistic regression analysis. Rather than treating employee turnover as a dichotomous decision, hazard analysis implicitly accounts for the timing of the quit decision, so that an employee who leaves after one month conveys different information than an employee who separates after one year. Cox hazard models estimate the hazard rate as a "baseline hazard" (i.e., the hazard rate faced by everyone) shifted multiplicatively by observed covariates. The general Cox hazard model specification I use is

$$h(t|x) = h_0(t)\exp(\beta_1 x_{plan\ variable} + \beta_2 x_{controls}) \tag{1}$$

where $h(t|x)$ is the hazard rate conditional on having lasted until time t, $h_0(t)$ is the baseline hazard, *plan variable* represents either plan eligibility or plan holdings, and *controls* is a vector of the control variables discussed above. Within the hazard analysis framework, Cox models are commonly used in part because they are non-parametric, in the sense that no parametrization is assumed for the baseline hazard function and it is left unestimated.[26]

4.3 The effect of eligibility on voluntary turnover

My first hypothesis predicts that plan eligibility is negatively associated with voluntary turnover. To test this, I restrict the sample to include only CSAs, since this is the only group with meaningful variation in eligibility. Table 5 presents the Cox hazard model results. These and subsequent hazard analysis results are presented with exponentiated coefficients, which can be

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[26] When a specific parametrization of the baseline hazard can be reasonably assumed, a parametric hazard model can produce more efficient estimates than the semiparametric Cox model. However, if the assumed parametrization is not correct, the parametric model can produce biased coefficient estimates.

interpreted as hazard ratios (i.e., the ratio of hazard rates) so that values above one indicate an increased rate of voluntary turnover, and values below one represent a reduced rate of turnover. For example, the coefficient of .63 for *eligible* in column 1 indicates that the turnover rate for eligible employees is 37% (= 1 - .63) lower than the rate for non-eligible employees. An exponentiated coefficient equal to one represents no turnover effect, and is analogous to a coefficient of zero in an OLS regression.

Column 1 includes an indicator for whether an employee is eligible, along with a number of control variables. Since this model does not include hours worked or tenure, *eligible* likely captures not only the effect of the deferred compensation plan, but also the underlying covariates that determine eligibility. The identification strategy for RD designs is to exploit the discontinuity in eligibility that is distinct from the effect of the continuous forcing variables. To this end, columns 2 and 3 include linear and higher order functions of the forcing variables *tenure* and *hours per week.* By controlling for the continuous variation in the forcing variables, the *eligible* indicator can be interpreted as the effect of plan eligibility *per se*.[27] Columns 2 and 3 indicate that the effect of eligibility is to reduce the hazard rate by 18.5% and 15%, respectively. While these effects are smaller than those reported in column 1, they are still statistically significant, suggesting that at the margins of eligibility requirements, eligibility has a turnover effect beyond the direct effects of tenure and hours per week. Based on untabulated analyses, the estimated hazard rate (i.e., voluntary turnover rate) for a non-eligible employee with 12 months tenure and average values for the other covariates is approximately 7% per month. Given this

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[27] The necessary assumption for this interpretation is that hours worked and tenure do not have a discontinuous effect on turnover precisely at the levels required for eligibility (1,000 hours and 12 months, respectively). This assumption seems reasonable given that the firm chose the most restrictive eligibility requirements allowable under ERISA. Given that these values represent the boundary of permissible requirements, they can be thought of as relatively exogenously determined rather than being based on economically meaningful values with respect to employee behavior.

turnover rate, the estimated effect of eligibility for an average CSA is to increase the expected employment duration by roughly 2.5 months.[28] For comparison, the estimated hazard ratio for *hourly_wage* in column 3 is .893, suggesting that an additional dollar of hourly wage is associated with a reduction in the voluntary turnover rate of almost 11%.

The results reported in columns 1 - 3 represent the average effect of eligibility across gender and age categories. However, it is likely that employees of different age and gender face different employment horizons and discount rates, and thus are likely to respond to the retention incentives implicit in a deferred compensation plan differently. To investigate whether the effect of eligibility varies with gender, I include an interaction term between *female* and *eligible* in Column 4. The coefficient for the interaction term is significantly less than one, indicating that the retention effect of eligibility is greater for females than for males, consistent with women applying a lower discount rate when valuing deferred compensation than men. The hazard ratio for men is .926, whereas for women it is .806.[29]

In Column 5, I interact eligibility with an indicator for employees older than 30. The hazard ratio for the eligibility main effect is not significantly different from one, suggesting that, at the eligibility margins, eligibility is not associated with reduced turnover for younger employees. However, the eligibility effect for older employees is significant with a hazard ratio of .805 (i.e., the effect of eligibility is to reduce the turnover rate for older employees by nearly 20%). This is consistent with older employees using a lower discount rate to value deferred compensation than younger employees. Overall, the results presented in Table 5 support

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[28] Based on a 7% turnover rate, the expected number of months until turnover would be 14.28 (= 1/.07). A hazard ratio of .85 suggests a turnover rate of 5.95%, which corresponds to an expectation of 16.8 months until turnover (= 1/.0595). Note that this comparison involves an abstraction, because in actuality the hazard rate is expected to change over time. Therefore, while the hazard rate of eligible employees is expected to stay proportional to ineligible employees, the comparison rate may not stay at 7%.

[29] The interpretation of the coefficient on an interaction term (using hazard ratios) in Cox models is as the ratio of hazard ratios. For example, dividing .806 by .926 yields .871, which is the coefficient on the interaction term. In column 4, the hazard ratio for the interaction is based on the sum of the main effect and the interaction.

Hypothesis 1's prediction that plan eligibility is associated with lower voluntary turnover rates. However, the effect of eligibility depends upon employee characteristics.

4.3.1 Age eligibility requirement

I next test the turnover effects of the three individual eligibility criteria (age, tenure, and hours worked). First, I examine whether voluntary turnover rates changed for 18- to 20-year old employees before and after the age-21 restriction was put in place in 2002. I restrict the sample to include only employees in this age group, and I only include the years 1999-2004. In addition, I include only employees who had been with the firm for more than 12 months and had worked over 20 hours per week. In effect, all employees in this sample were eligible to receive deferred compensation before 2002, and none were eligible from 2002 onwards. The primary variable of interest for this test is *pre_02*, an indicator variable equal to one for the years 1999-2001, and zero otherwise. If restricting eligibility among this age group weakened retention incentives, the hazard ratio for *pre_02* should be significantly less than one. Because turnover rates among 18- to 20-year olds may have changed across these years for reasons other than the change in eligibility rules, I control for the average monthly turnover rate for all 21-year-old employees at the firm. 21-year-olds represent an appropriate control group because they are very close in age to the employees in the sample, but they were not impacted by the change in eligibility requirements.

The results are presented in Table 6. As shown in Column 1, the hazard ratio for *pre_02* is not significantly different from 1, indicating that plan eligibility does not affect turnover behavior of employees under age 21. The contribution factor (i.e., the percentage by which an individual's earnings are multiplied to determine the annual contribution) during this period ranged from approximately five percent to almost six- and-a-half percent (see Table 2), which

represents an implicit "raise" in the form of deferred compensation for eligible employees. Yet, it appears employees in this age category either do not consider the deferred component of pay when making stay or quit decisions, or else apply a sufficiently large discount to deferred compensation so as to mute the retention effects of this additional pay. As reported in Column 2, neither males nor females in the under-21 age group are affected by eligibility, as indicated by the insignificant hazard ratio on the interaction between *pre_02* and *female*. These results are consistent with those in Table 5 showing that eligibility has no association with turnover of young employees.

4.3.2 Tenure eligibility requirement

I examine whether the tenure cutoff for eligibility influences turnover by testing whether there is a discontinuity in turnover rates after reaching the 12-month employment requirement.[30] As before, the empirical difficulty is estimating the effect of the eligibility rule apart from the effect of tenure, which itself is expected to be associated with reduced turnover. To address this issue, I use a difference-in-difference design to compare the difference in turnover rates before and after 12 months of tenure for employees who are otherwise eligible (i.e., are over 21 and work at least 20 hours per week) and employees who are not. That is, the control group for this test is employees who are not otherwise eligible, and thus are not affected by the tenure eligibility requirement. The interaction term *over_12xeligible* is the difference-in-difference estimator, and a retention effect associated with this eligibility rule would be reflected by a hazard ratio significantly less than 1.

As reported in Column 1 of Table 7, the estimated hazard ratio is less than one but is not significant, suggesting that eligibility among employees around the tenure cutoff does not

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[30] Once an employee becomes eligible he or she receives written communication from the firm about the deferred compensation plan, and therefore additional retention effects may arise due to increased visibility and awareness of the plan.

influence turnover decisions. Turnover rates are particularly high among employees with low tenure, and these employees may not expect to be with the firm long enough to become vested in any contributions they received, thus muting any potential retention effect. Alternatively, notwithstanding efforts to provide materials about the plan, these employees simply may not be aware of their eligibility status either before or after reaching the 12 month requirement. To further examine whether the retention effect varies with employee characteristics, Columns 2 and 3 report hazard ratios for 3-way interactions of *over_12xeligible* and indicators for older than 30 and female, respectively. Although the effect of the 12 month eligibility requirement does not differ across young and old workers, Column 3 provides weak evidence that turnover rates among female employees after the 12 month cutoff are lower for eligible employees than for non-eligible employees.

4.3.3 Annual hours worked eligibility requirement

The third eligibility criterion is working 1,000 hours within each plan year. I test the effect of this requirement by examining voluntary turnover rates for employees who either received a grant in the prior year or did not, based on being just above or below the 1,000-hour cutoff.[31] In using this design, I assume that receiving a grant increases an employee's awareness of the plan, and increases the employee's expectation of receiving a grant in the future. For this test, I focus on the subsample of employees who met the age and tenure requirements as of the end of the previous year, so that whether an employee received a grant is only a function of hours worked relative to the cutoff. In addition, to focus on the discontinuity, the analyses use

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[31] Note that this is a somewhat different test than for Tables 5–7. Tables 5–7 estimate the effect of eligibility in the current year on turnover rates, whereas the tests for Table 8 estimate the effect of eligibility in the prior year (i.e., whether or not an employee received a grant). While both age and tenure (which primarily determine eligibility in the previous two tables) can easily be measured at the monthly level, hours worked is only measured annually. Therefore, to cleanly define eligible vs. ineligible employees with respect to the hours worked cutoff, I require hours worked data for the *completed year*, which is why for this test I examine the effect of prior-year eligibility on voluntary turnover.

only employees whose prior-year hours worked is within a window around the 1,000-hour cutoff (Imbens and Lemieux, 2008). The assumption motivating these tests is that, after controlling for the number of hours worked within a given window, employees above the cutoff are substantively similar to those below the cutoff.[32] While this assumption is more likely to hold the smaller the window size, there is a tradeoff of comparability between "treatment" and "control" subjects and sample size as the window gets larger. Following Imbens and Lemieux's (2008) suggestion for RD analyses, I report results for different window sizes.

The estimated results from this RD analysis are reported in Table 8. The variable of interest is *above_1000$_{t-1}$*, an indicator equal to one if the employee was above the hours cutoff in the prior year (and therefore received a grant), and zero otherwise. In addition to including control variables for other determinants of voluntary turnover, I include squared and cubed prior-year hours worked to control for the continuous variation in this forcing variable as flexibly as possible. Although the estimated effect for the lagged 1,000-hour indicator is negative across window sizes, the relationship is significant only for window size of +/- 150 hours ($p < .1$) and +/- 200 hours ($p < .05$).[33] The estimated hazard ratios using the +/- 200 hours window suggest that eligibility to receive a grant in the prior year reduces the rate of turnover by nearly 35% for employees near the eligibility cutoff. For a benchmark hazard rate of 7% monthly, these hazard ratios suggest an increase in expected employment duration of nearly eight months, representing a roughly 54% increase in expected employment duration. As in Table 5, this estimated effect is large compared to the effect of an additional dollar of hourly wage. In sum, the results in Tables

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[32] In interviews, managers indicated that whether an employee worked 1,200 hours or 800 hours (i.e., my largest window size) did not represent a meaningful distinction, as both levels were well below the full-time threshold.

[33] Restricting these tests to only include employees within a relatively small window of hours worked significantly reduces the sample size for these tests. That the hazard ratio for *above_1000$_{t-1}$* is similar across windows and is increasing in significance as the sample increases suggests that the tests relying on the smaller windows may suffer from a lack of statistical power.

5–8 provide support for Hypothesis 1's prediction that eligibility is associated with reduced voluntary turnover. This effect is stronger for women and for older workers. Moreover, plan eligibility appears to be most important for employees at the margin of the 1,000-hour cutoff.

4.4 Effect of contribution amounts on voluntary employee turnover

I next examine the moderating effect of contribution amounts on the relationship between eligibility and turnover. The amount of money contributed to the profit-sharing plan varied from year to year, and the contribution size rose dramatically starting in 2007 due to an increase in the percentage of profits used to compute contributions. Total contributions were 10% of profits prior to 2007, and 15% from 2007 onwards. This change resulted in a substantial increase in total contributions, and therefore in the contribution factor determining individual grants as well. Since the total amount contributed to the plan is a function of firm profits, the effect of eligibility on turnover is likely to vary with employees' expectations of the portion of profits that will be allocated to the plan. Employees are given detailed quarterly reports of firm performance, including profits, so it is likely employees can form reasonable expectations of annual profits throughout the year. I proxy for employees' expectations of annual contributions using actual dollar contributions to the plan, scaled by contributions in 1999.[34] The scaling produces an index that captures plan contributions relative to 1999 contributions (the first year with available data). In addition to the change in percentage of profits contributed to the plan, in 2007 the firm shortened the vesting schedule by one year due to a change in ERISA requirements for tax-qualified retirement plans, and also began investing new contributions exclusively in the ESOP plan.

To control for changes in turnover rates over time that are due to factors other than changes in the deferred compensation plan, I use a difference-in-difference research design to

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[34]I also use actual current and prior year plan contribution percentages and find similar results.

compare the change in turnover rates before and after 2007 for both eligible and non-eligible employees. If changes in plan characteristics influence turnover rates, I expect the effects to exist only for eligible employees. Table 9 reports results from hazard analyses designed to test the effect of contribution size, as well as the effect of other changes in plan characteristics on employee turnover. I first examine the average effect of the combined 2007 changes (i.e., the increase in contribution size, the shorter vesting schedule, and the exclusive focus on the ESOP) by estimating voluntary turnover rates as a function of an indicator variable equal to one for the years 2007 and later, and zero otherwise. As reported in Column 1, the coefficient on the interaction term *eliglex2007* is significantly less than 1, indicating that the combined changes in plan characteristics increased the association between eligibility and reduced voluntary turnover. Whereas eligibility in the pre-2007 period is associated with a turnover rate reduction of almost 12%, for 2007 and later eligibility is associated with a turnover reduction of approximately 24%. To disentangle the effects of contribution size from the other changes, I include an additional interaction variable *contributionxeligible* in Column 2 to investigate whether the eligibility effects vary with contribution size. When I include both interactions, it is apparent that the entire turnover reduction associated with plan changes is due to increased contribution levels, with no significant effect from the other changes. The estimates in Column 2 imply that doubling contribution size compared to the baseline level in 1999 increases the effect of eligibility on turnover rates by an additional 4.6%.

Because a change in the vesting period in particular may have different effects depending on where the employee stands in relation to the vesting schedule, I estimate the model separately for employees with tenure between 12–36 months and employees with tenure between 36–84 months. The results in Columns 3 and 4 suggest that a shorter vesting schedule does not impact

the relationship between eligibility and turnover decisions regardless of tenure. Taken together, the evidence in Table 9 supports Hypothesis 2's prediction that contribution levels moderate the effect of eligibility on voluntary turnover.

4.5 The association between unvested holdings and voluntary turnover

I test Hypothesis 3 by estimating Cox hazard models of voluntary turnover rates as a function of the value of unvested holdings. I again control for underlying variables that determine grant size and are likely to be correlated with turnover rates. Grant size in a given year is a function of whether the employee is eligible for a grant and the wages earned during the year. Although I can rely on the discontinuities associated with eligibility to provide variation in the value of unvested holdings, variation also results from differences in contribution rates and differences in the return on plan assets across time. In addition, the value of unvested holdings varies across time for a given employee as the portion of holdings that are vested changes and as the vesting requirements are achieved.

I estimate separate hazard models for each position to investigate whether the effects of unvested holdings varies across organizational levels. In addition, I eliminate employees who are already fully vested (i.e., employees over age 62 and employees with tenure over 7 years). Columns 1 through 4 of Table 10 report hazard ratios for CSAs, hourly managers, assistant general managers, and general managers, respectively. Column 1 shows that an additional $1,000 of unvested holdings reduces the rate of voluntary turnover by almost 26% for CSAs. Control variable results are also generally consistent with expectations and previous tests. However, as seen in Columns 2 through 4, there is no significant relationship between the value of unvested holdings and voluntary turnover for higher-level employees. As discussed earlier, employees in hourly manager and higher positions differ substantially from their CSA counterparts in terms of

age, tenure, wage, and hours worked. These differences may create other, more powerful retention incentives that crowd out the effect of unvested holdings. For example, the higher wages associated with promotions may exceed what employees with these skills can obtain elsewhere. If current pay provides sufficiently powerful incentives for higher-level employees to stay, unvested holdings may provide little incremental retention incentive. Alternatively, the quality of outside opportunities available to employees above the CSA level may be substantially greater, increasing the likelihood that a job change more than compensates higher-level employees for forfeited holdings. Another possibility is that after accumulating sufficient tenure to be promoted, employees in higher positions recognize a superior fit with the firm, and therefore are reluctant to leave (e.g., Jovanovic, 1979; Mitchell et al., 2001). Consistent with the latter explanation, voluntary turnover rates are dramatically lower for employees above the CSA level. Thus, for employees above the CSA level, there may simply be less scope for deferred compensation to influence turnover decisions to begin with.

Because vested holdings are highly correlated with unvested holdings and potentially provide countervailing incentives to separate from the firm (i.e., an employee cannot cash out of his or her vested holdings until after leaving the firm), I include vested holdings as an additional control in models 5 through 8. As before, unvested holdings are associated with lower CSA turnover rates, but have no significant association with reduced turnover of higher-level employees.[35] In addition, I find no significant relationship between vested holdings and voluntary turnover, suggesting that employees do not tend to leave the firm in order to access vested plan holdings. These results provide mixed support for Hypothesis 3. While unvested

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[35] Contrary to expectations, Column 8 of Table 10 reports that unvested holdings are associated with *increases* in turnover rates among general managers. Due to the relatively small sample size for this test and the high correlation between vested and unvested holdings, it is possible that this represents a spurious result due to multicollinearity. When either unvested or vested holdings are included in the model separately, there is no significant association with turnover for general managers.

holdings are significantly associated with reduced voluntary turnover among CSAs, there is no association for higher-level employees.

4.5.1 Investment of plan holdings

Table 11 investigates whether retention effects differ depending upon whether plan contributions are invested in company stock or diversified mutual funds. I conduct tests similar to those in Table 10, but replace total unvested holdings with separate variables for holdings invested in the firm's ESOP and holdings invested in diversified funds. For CSAs, $1,000 of unvested ESOP holdings is significantly associated with a turnover rate reduction of nearly 32%. In contrast, the hazard ratio for unvested mutual fund holdings is closer to one (indicating a 12% reduction in turnover rate) and is not significant at conventional levels (p = .10). This evidence suggests that among CSAs, the retention effects of unvested holdings are driven primarily by the holdings invested in employer stock. However, consistent with the total holdings results in Table 10, I do not find a significant relationship for either unvested ESOP or mutual fund holdings when examining employees above the CSA level. In Columns 5 through 8, I control for the value of total vested holdings and find similar results.[36] In particular, although the hazard ratio for unvested diversified holdings is less than one (p < .10), the effect of unvested ESOP is larger and the difference in these hazard ratios is highly significant (p < .01 level). The results in Table 11 suggest that deferred compensation that is invested in company stock is particularly effective for reducing employee turnover. This finding is consistent with Hypothesis 4 and supports claims

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[36] In Table 11 Columns 5-8 I control for total vested holdings rather than controlling separately for vested ESOP and mutual funds due to concerns with multicollinearity. The correlation between vested ESOP and mutual funds is particularly high, and VIFs for the separate vested components are both over five. When vested ESOP and mutual fund holdings enter the model individually, both components of unvested holdings are significantly negatively associated with voluntary turnover. In addition, vested ESOP holdings are not significantly associated with turnover, while vested mutual fund holdings are significantly positively associated with voluntary turnover. Because the focus of Table 11 is on the effect of investment allocation for *unvested* holdings, I do not conduct further analysis of the components of vested holdings.

that broad-based equity plans are especially beneficial for achieving retention objectives (e.g., Oyer and Schaefer, 2005).

4.6 Additional analyses

4.6.1 The timing of turnover decisions around year-end grants

In addition to the plan characteristics discussed above, the timing of deferred compensation grants may also influence retention incentives. An employee must remain with the firm through the end of December to receive a grant. In addition, employees must stay an additional year to receive an additional grant. These requirements result in a discontinuous drop in the cost of voluntary turnover for eligible employees following the month of December. In untabulated analyses, I test for whether employees delay quitting until immediately after qualifying for a year-end grant. Seasonal differences in turnover rates are likely to exist even absent the incentives from the deferred compensation plan, particularly around the holiday period in December. To account for this, I implement a difference-in-difference design using logistic regression to test whether turnover probabilities are higher in January compared to December for eligible versus ineligible employees. The key assumption for this test to be valid is that eligible and ineligible employees have similar seasonal preferences for quitting, absent the deferred compensation plan.

Consistent with employees responding to the retention incentives implicit in the timing of the deferred compensation grants, I find that the increase from December to January in the log-odds of quitting is approximately 17% more for eligible employees than for ineligible employees ($p < .01$). This result is consistent with Russell (2006), who finds that employees delay quitting by up to three months to receive an annual performance bonus. This finding provides additional evidence that employees respond to a deferred compensation plan's retention incentives, and

suggests that the timing of contributions within a plan may play a role for determining the overall retention effects of the plan.

4.6.2 The level of vesting and the decision to stay until the next grant

Employees who are more vested in the plan may be more likely to delay turnover long enough to receive an additional grant. This may result because the marginal benefit of staying just long enough to receive an additional grant is higher for higher levels of vesting. I test this conjecture using a subset of employees who are active as of January, and estimate a logistic regression of the probability an employee remains with the firm until December as a function of the number of vesting years accumulated. Although the number of vesting years is highly correlated with tenure (Spearman correlation = .77), I include higher order expressions for both tenure and hours worked to control for the continuous variation in these measures. I rely on the discontinuities related to the calculation of vesting years to identify the effect of vesting apart from the effect of tenure, and on the large sample (over 90,000 observations) to help overcome multicollinearity problems.

In untabulated analyses, I find that an additional vesting year (corresponding to an additional 20% vested stake in the year-end grant) is associated with roughly 7.5% lower odds of quitting before receiving the next year-end grant ($p < .01$), after controlling for tenure. Moreover, I find that the effect of additional vesting years does not persist beyond the point of full vesting, consistent with the retention effect being driven by the characteristics of the deferred compensation plan rather than the effect of accumulated tenure *per se*.

5. Conclusion

This study utilizes detailed personnel records from a large retail firm to examine the retention effects of deferred compensation plan characteristics. I rely on eligibility cutoffs for plan participation to identify discontinuities in employees' retention incentives related to the plan. I find that plan eligibility is associated with a statistically significant decrease in the rate of voluntary turnover of low-level employees. Among these employees, plan eligibility is associated with a decrease in voluntary turnover of between 15–35%. However, the eligibility effect depends upon the specific eligibility requirement, the size of contributions, and employee characteristics. In additional tests, I find that the value of unvested plan holdings is associated with reduced turnover rates among low-level employees, and this effect is stronger when unvested plan assets are invested in company stock. In contrast, I do not find a significant, negative relationship between unvested holdings and voluntary turnover for higher-level store employees. Collectively, my results suggest that employees may respond to the retention incentives implicit in deferred compensation plan characteristics, but that the strength of these incentives is determined both by specific plan characteristics (e.g., eligibility criteria, level of contributions, and investment allocation of plan assets) and employee characteristics (i.e., discount rates and position in the organizational hierarchy).

An important limitation of my study is the use of data from a single large firm in an industry characterized by very high turnover, and therefore generalizing these results to other firms in different settings should be done with caution. Nevertheless, focusing on a single firm allows me to capture personnel data and plan characteristics at a level of detail unavailable in any broad-sample dataset. Using detailed, employee-level data, as well as having access to plan

documentation to identify discontinuities in retention incentives, allows me to construct powerful tests of the effects of plan characteristics on voluntary turnover.

This research has implications for academics studying the retention effects of deferred compensation. Prior research has generally examined whether the *existence* of a deferred compensation plan is associated with reduced turnover, but my results suggest that the *characteristics* of a plan determine retention incentives at the employee level. In addition, the findings of this study should interest practitioners designing deferred compensation plans, as I document that employee characteristics moderate the relationship between deferred compensation and voluntary turnover. This suggests that a "one size fits all" approach to designing deferred compensation plans may not result in the desired retention effects among all employee groups.

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Table 1:
Vesting schedule

This table presents the vesting schedule applicable to plan holdings. Vesting percentages are applied to an employee's entire account, rather than to a specific grant. Starting in 2007, the permissible vesting schedule was shifted up one year due to a change in the Pension Protection Act; this change applies to plan holdings received in 2007 and later. Vesting percentages are based on the accumulation of "years of Service" which is defined as the number of calendar years in which an employee works at least 1,000 hours.

Years of service	Vesting % for grants prior to 2007	Vesting % for grants 2007 and later
Less than 2 years	0%	0%
2 years	0%	20%
3 years	20%	40%
4 years	40%	60%
5 years	60%	80%
6 years	80%	100%
7 years or more	100%	100%

Table 2:
Descriptive statistics

This table presents mean (Median) values of select variables for even sample years. *Tenure* is number of months since employee was hired. *Wage* is measured in year 2000 dollars, and is scaled by the median value for Customer Service Associates (CSA) in 2000. *Weekly Hours* is the average number of hours worked each week, and a value of 20 corresponds to the 1000-hour annual requirement for eligibility. *Eligible* is an indicator for whether the employee meets requirements to receive a contribution under the deferred profit-sharing plan. *Age requirement*, *Tenure requirement*, and *hours requirement* represent indicator variables for whether age, tenure, and hours-worked eligibility requirements are met, respectively. *Contribution %* is the factor by which eligible earnings are multiplied to determine annual contributions under the deferred profit-sharing plan.

	Panel A: CSAs				
Year	2000	2002	2004	2006	2008
#Employees	9,545	11,049	12,284	13,099	13,674
Female	0.65 (1)	0.62 (1)	0.6 (1)	0.61 (1)	0.6 (1)
Age	30.25 (23)	30.04 (23)	29.76 (22)	30.43 (23)	32.13 (25)
Tenure	14.93 (10)	17.48 (9)	19.34 (9)	21.9 (10)	32.05 (19)
Wage	1 (1)	.97 (.96)	.93 (.91)	.96 (.94)	1.01 (.99)
Weekly Hours	24.41 (23.96)	24.2 (23.87)	26.07 (25.74)	26.25 (25.88)	28.88 (29.4)
Eligible	.31 (0)	.22 (0)	.24 (0)	.26 (0)	.39 (0)
Age requirement	1 (1)	.59 (1)	.58 (1)	.60 (1)	.68 (1)
Tenure Requirement	.47 (0)	.45 (0)	.45 (0)	.48 (0)	.66 (1)
Hours Requirement	.61 (1)	.60 (1)	.68 (1)	.68 (1)	.73 (1)
Contribution %	5.82	4.88	6.49	6.79	10.7

Table 2: Continued

Panel B: Hourly Managers					
Year	2000	2002	2004	2006	2008
#Employees	2,104	2,791	3,056	3,193	1,569
Female	0.71 (1)	0.68 (1)	0.65 (1)	0.63 (1)	0.62 (1)
Age	35.93 (35)	36.59 (36)	36.84 (36)	37.37 (37)	36.9 (36)
Tenure	26.31 (34)	36.76 (38)	46.72 (43)	54.86 (50)	57.34 (48)
Wage	1.27 (1.27)	1.31 (1.31)	1.31 (1.28)	1.35 (1.31)	1.46 (1.47)
Weekly Hours	41.26 (42.12)	41.81 (42.36)	42.99 (43.62)	43.19 (44.19)	45.08 (46.52)
Contribution %	5.82	4.88	6.49	6.79	10.7
Panel C: Assistant Managers					
Year	2000	2002	2004	2006	2008
#Employees	188	162	132	161	587
Female	0.4 (0)	0.39 (0)	0.39 (0)	0.37 (0)	0.44 (0)
Age	36.12 (36)	37.19 (37)	37.49 (38)	37.42 (37)	37.63 (36)
Tenure	22.53 (24)	34.10 (32)	35.03 (28)	39.14 (29)	57.20 (45)
Wage	1.99 (2.01)	2.06 (2.08)	2.05 (2.12)	2.12 (2.15)	2.09 (2.08)
Weekly Hours	46.71 (48.14)	46.77 (47.88)	47.62 (48.29)	46.26 (47.16)	46.49 (47.63)
Contribution %	5.82	4.88	6.49	6.79	10.7
Panel D: General Managers					
Year	2000	2002	2004	2006	2008
#Employees	515	558	553	583	576
Female	0.52 (1)	0.5 (1)	0.47 (0)	0.45 (0)	0.41 (0)
Age	39.31 (38)	40.09 (39)	40.47 (40)	40.71 (41)	41.06 (42)
Tenure	34.85 (36)	53.82 (60)	70.91 (84)	84.12 (100)	93.55 (102)
Wage	2.34 (2.5)	2.39 (2.39)	2.42 (2.35)	2.84 (2.87)	2.83 (2.87)
Weekly Hours	45.77 (46.22)	45.22 (46.01)	45.67 (46.17)	45.62 (46.32)	47.12 (47.64)
Contribution %	5.82	4.88	6.49	6.79	10.7

Table 3:
Correlation tables

This table presents correlations among variables used in the empirical analyses. Variables are defined in Table 2. Pearson correlations are presented above, and Spearman correlations below the diagonal. All correlations are significant at the .01 level or below.

	Female	Age	Hourly wage	Weekly hours	Tenure	Vested holdings	Unvested holdings
Female		0.13	-0.02	0.03	0.11	0.03	0.01
Age	0.16		0.15	0.21	0.38	0.23	0.15
Hourly wage	0.05	0.46		0.30	0.29	0.35	0.18
Weekly hours	0.04	0.31	0.54		0.31	0.29	0.30
Tenure	0.10	0.34	0.63	0.37		0.57	0.17
Vested holdings	0.09	0.38	0.56	0.42	0.58		0.09
Unvested holdings	0.06	0.23	0.35	0.32	0.40	0.58	

Table 4:
Effect of employee turnover on store performance

This table presents results of regressing annual profit margin adjusted for plan contributions on proxies for employee retention and control variables. *Log age* is calculated as the number of years since the store opened. *Unemployment* is the average monthly unemployment rate during the year computed at the county level. *GM turnover* is an indicator equal to 1 if the general manager turned over in the current year, and 0 otherwise. *Square feet* is square footage of the store divided by 100. *Parking* is number of parking spaces. Coefficients for square feet and parking have been multiplied by 100 for ease of exposition. *Store type* is an indicator representing one of two store formats. *Income* is the average household income at the zip code level, in thousands of dollars. *Turnover* is the annual store turnover count divided by average employees in a store. *Turnover eligible* is the annual turnover count for eligible employees divided by average employees in the store. *Training%* is the ratio of payroll spent on employees during their training period to total payroll. *Average tenure* is the average employee tenure in the store in years. Standard errors are clustered at the store level. Robust t-statistics are in parentheses.

VARIABLES	(1) Operating margin	(2) Operating margin	(3) Operating margin	(4) Operating margin
log_age	0.007**	0.007**	0.006*	0.006**
	(2.208)	(2.177)	(1.761)	(1.971)
unemployment	0.008***	0.008***	0.009***	0.008***
	(8.230)	(8.282)	(8.566)	(7.732)
gm_turnover	-0.005*	-0.003	-0.003	-0.004*
	(-1.865)	(-1.079)	(-1.417)	(-1.755)
sqft_100	0.005**	0.004**	0.004**	0.005**
	(2.516)	(2.450)	(2.455)	(2.575)
Parking	0.002***	0.002***	0.002***	0.002***
	(2.767)	(2.907)	(2.882)	(2.762)
Store type	-0.008	-0.008	-0.008	-0.006
	(-1.542)	(-1.558)	(-1.523)	(-1.163)
Income	0.001***	0.001***	0.001***	0.001***
	(7.012)	(7.124)	(7.297)	(7.113)
turnover	**0.001**			
	(0.250)			
turnover_eligible		**-0.024*****		
		(-2.721)		
training_pct			**-0.310*****	
			(-4.424)	
avg_tenure				**0.003****
				(2.223)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,503	1,503	1,503	1,503
R-squared	0.194	0.200	0.211	0.200

*** p<0.01, ** p<0.05, * p<0.1

Table 5:
Effect of plan eligibility on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Eligible* is an indicator equal to 1 if an employee is over 21 years old (for years after 2002), has tenure >= 12 months, and works at least 20 hours/week, and equal to 0 otherwise. *Unemployment* is the county-level unemployment rate, measured monthly. *Older* is an indicator variable equal to one if an employee is over 30 years old. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1)	(2)	(3)	(4)	(5)
Eligible	**0.630*****	**0.815*****	**0.846*****	**0.926*****	**0.987**
	(-43.154)	**(-18.679)**	**(-15.215)**	**(-4.831)**	**(-1.040)**
Female	0.970***	0.983**	1.003	1.026***	1.006
	(-4.308)	(-2.518)	(0.502)	(3.690)	(0.970)
hourly_wage	0.709***	0.870***	0.893***	0.892***	0.888***
	(-35.917)	(-15.780)	(-13.032)	(-13.172)	(-13.710)
Age	0.998***	0.998***	0.997***	0.997***	1.002***
	(-6.151)	(-5.859)	(-9.955)	(-10.004)	(4.398)
Tenure		0.965***			
		(-58.225)			
unemployment	0.963***	0.968***	0.972***	0.972***	0.972***
	(-12.533)	(-11.366)	(-9.853)	(-9.901)	(-9.992)
eligiblexfemale				**0.871*****	
				(-7.748)	
Older					0.917***
					(-5.371)
eligiblexolder					**0.648*****
					(-23.515)
Higher order tenure and hours controls	No	No	Yes	Yes	Yes
Year and month fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	139639	137850	137850	137850	137850
Pseudo R-squared	0.0102	0.0133	0.0159	0.0159	0.0163

*** p<0.01, ** p<0.05, * p<0.1

Table 6:
Effect of age-21 requirement on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. The sample for this test includes only employees ages 18-20 for the years 1999-2004. All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Pre_02* is an indicator variable equal to one if the year is less than 2002. *Turnover_21* is the average turnover rate for 21-year-old employees and is measured monthly. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1)	(2)
pre_02	**1.017**	**1.073**
	(0.314)	**(1.004)**
Female	0.939	0.960
	(-1.621)	(-0.926)
pre_02xfemale		**0.910**
		(-1.147)
turnover_21	1.030***	1.030***
	(2.587)	(2.579)
hours_per_week	0.984***	0.984***
	(-5.177)	(-5.165)
hourly_wage	0.668***	0.666***
	(-6.636)	(-6.739)
Age	0.907**	0.907**
	(-2.492)	(-2.485)
unemployment	0.911***	0.911***
	(-5.422)	(-5.419)
Month fixed effects	Yes	Yes
Observations	52,469	52,469
Pseudo R-squared	0.0134	0.0134

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7:
Effect of tenure-based eligibility requirement on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. The sample for this test includes only observations in the 12-month period around the 12-month tenure cutoff for eligibility (i.e., +/- six months). All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Over_12* is an indicator for whether tenure is greater than 12 months. *Eligible_12* is an indicator for whether, in the absence of a tenure requirement, an employee would be eligible to receive deferred compensation. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1)	(2)	(3)
over_12	0.774***	0.792***	0.657***
	(-4.020)	(-2.995)	(-4.392)
eligible_12	0.899***	0.892**	0.891**
	(-3.101)	(-2.484)	(-1.972)
over_12xeligible	**0.973**	1.018	1.151
	(-0.400)	(0.176)	(1.167)
over_12xover_30		0.940	
		(-0.679)	
eligiblexover_30		1.015	
		(0.272)	
over_12xeligiblexover_30		**0.918**	
		(-0.656)	
over_12xfemale			1.280**
			(2.411)
eligiblexfemale			1.015
			(0.201)
over_12xeligiblexfemale			**0.778***
			(-1.721)
Female	0.946*	0.947*	0.912*
	(-1.684)	(-1.668)	(-1.792)
hourly_wage	0.754***	0.754***	0.754***
	(-5.941)	(-5.935)	(-5.931)
Age	0.978***	0.979***	0.978***
	(-18.298)	(-14.118)	(-18.302)
unemployment	0.988	0.988	0.988
	(-0.917)	(-0.922)	(-0.913)
Year and month fixed effects	Yes	Yes	Yes
Observations	48,530	48,530	48,530
Pseudo R-squared	0.0181	0.0181	0.0181

*** p<0.01, ** p<0.05, * p<0.1

Table 8:
Effect of hours worked eligibility requirement on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. The sample includes only employees on either side of the 1000 hour cutoff in the prior year. Window sizes range from +/- 50 to +/- 200 hours. All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Above 1000$_{t-1}$* is an indicator for whether the employee worked more than 1,000 hours in the prior year and thus received a deferred compensation grant. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1) +/-50 hours	(2) +/-100 hours	(3) +/-150 hours	(4) +/-200 hours
Above 1000$_{t-1}$	**0.847**	**0.694**	**0.673***	**0.656****
	(-0.525)	**(-1.377)**	**(-1.863)**	**(-2.285)**
Male	0.950	1.022	1.015	0.968
	(-0.292)	(0.175)	(0.143)	(-0.363)
Hourly wage	0.796	0.782***	0.745***	0.771***
	(-1.621)	(-3.426)	(-4.622)	(-5.569)
Hours per week	0.947***	0.951***	0.950***	0.948***
	(-4.037)	(-5.417)	(-6.611)	(-8.105)
Age	0.987***	0.988***	0.989***	0.988***
	(-2.576)	(-3.363)	(-3.852)	(-4.566)
Tenure	0.995	0.997	0.997	0.996
	(-0.820)	(-0.824)	(-1.020)	(-1.624)
Unemployment	1.067	0.982	0.992	0.979
	(0.985)	(-0.392)	(-0.212)	(-0.680)
Higher order lagged hours controls	Yes	Yes	Yes	Yes
Year and month fixed effects	Yes	Yes	Yes	Yes
Observations	686	1243	1698	2161
Pseudo r-squared	0.0727	0.0372	0.0298	0.0264

*** p<0.01, ** p<0.05, * p<0.1

Table 9:
Effect of plan changes on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Year_2007* is an indicator for observations in year 2007 (the year of the plan changes) and later. *Contribution* is the size of annual contributions in dollars, scaled by the value at the beginning of the sample period. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1)	(2)	(3)	(4)
			Tenure between 24 and 36	Tenure between 36 and 84
Eligible	0.884***	0.960	1.091	1.329***
	(-9.527)	(-1.240)	(1.576)	(2.792)
year_2007	0.691***	0.949**	0.892**	0.735***
	(-37.215)	(-2.562)	(-2.369)	(-2.962)
contribution		0.876***	0.906***	1.017
		(-17.889)	(-5.463)	(0.453)
eligiblex2007	**0.861***	**1.003**	**1.090**	**1.103**
	(-7.491)	**(0.060)**	**(1.101)**	**(0.707)**
contributionxeligible		**0.950***	**0.932***	**0.879***
		(-3.187)	**(-2.680)**	**(-2.814)**
Male	1.015*	1.018**	1.051***	0.976
	(1.870)	(2.223)	(3.099)	(-0.706)
hourly_wage	0.764***	0.742***	0.719***	0.763***
	(-30.039)	(-30.483)	(-16.134)	(-11.303)
hours_per_week	0.979***	0.979***	0.973***	0.965***
	(-49.638)	(-47.348)	(-28.171)	(-16.790)
Age	0.995***	0.997***	0.984***	0.981***
	(-14.637)	(-7.252)	(-24.567)	(-18.665)
unemployment	0.940***	0.944***	0.932***	0.941***
	(-21.494)	(-19.319)	(-11.779)	(-5.271)
industry_turnover	1.034***	1.001	1.028**	1.059**
	(5.516)	(0.194)	(2.053)	(2.209)
Higher order tenure and hours controls	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Observations	122,784	120,700	32,702	10,904
Pseudo R-squared	0.0123	0.0126	0.0201	0.0273

*** p<0.01, ** p<0.05, * p<0.1

Table 10:
Effect of unvested holdings on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. The sample includes only employees who are not yet fully vested (i.e., employees under age 62 with less than 7 years of service). All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Unvested* and *vested holdings* represent the dollar value of total vested and unvested plan holdings (in thousands), respectively. Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1) CSA	(2) hourly manager	(3) assistant manager	(4) general manager	(5) CSA	(6) hourly manager	(7) assistant manager	(8) general manager
Unvested holdings	0.739***	0.999	0.983	1.188	0.731***	1.007	0.980	1.193*
	(-12.565)	(-0.029)	(-0.201)	(1.611)	(-11.632)	(0.228)	(-0.227)	(1.682)
Vested holdings					1.023	0.983	1.011	1.049
					(0.992)	(-0.768)	(0.185)	(1.085)
Female	1.002	0.932**	0.758**	0.701	1.002	0.931**	0.758**	0.730
	(0.328)	(-2.466)	(-2.274)	(-1.279)	(0.328)	(-2.468)	(-2.274)	(-1.127)
hourly_wage	0.895***	0.934***	0.904***	0.906***	0.895***	0.935***	0.904***	0.900***
	(-12.559)	(-5.587)	(-3.493)	(-2.600)	(-12.601)	(-5.556)	(-3.500)	(-2.827)
Age	0.998***	0.994***	1.014**	0.979	0.998***	0.994***	1.014**	0.975*
	(-5.606)	(-4.527)	(2.439)	(-1.530)	(-5.584)	(-4.472)	(2.383)	(-1.668)
Unemployment	0.970***	0.955***	0.928*	1.100	0.970***	0.955***	0.928*	1.114
	(-10.370)	(-3.630)	(-1.829)	(0.860)	(-10.382)	(-3.640)	(-1.824)	(0.997)
Higher order tenure and hours controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,651	10,979	1,738	624	135,651	10,979	1,738	624
Pseudo R-squared	0.0161	0.0326	0.0638	0.111	0.0161	0.0326	0.0638	0.113

*** p<0.01, ** p<0.05, * p<0.1

Table 11:
Effect of investment allocation on voluntary turnover

This table presents results of estimating Cox proportional hazard models of the rate of voluntary monthly turnover. The sample includes only employees who are not yet fully vested (i.e., employees under age 62 with less than 7 years of service). All coefficients are exponentiated to represent hazard ratios. Values below one represent a reduced rate of turnover, and values above one indicate an increased rate of turnover. A value of one indicates no effect on turnover. *Unvested esop* and *unvested_diversified* represent the dollar value of total unvested holdings (in thousands) invested in company stock and diversified mutual funds, respectively. *Vested_holdings* represent the dollar value (in thousands) of total vested holdings (the sum of company stock and diversified mutual funds). Standard errors are calculated by clustering at the employee level. Robust z-statistics are in parentheses.

VARIABLES	(1) CSA	(2) hourly manager	(3) assistant manager	(4) general manager	(5) CSA	(6) hourly manager	(7) assistant manager	(8) general manager
unvested_esop	**0.679***	**0.975**	**1.005**	**1.216**	**0.667***	**0.985**	**1.002**	**1.217**
	(-9.891)	**(-0.453)**	**(0.050)**	**(1.441)**	**(-9.551)**	**(-0.268)**	**(0.021)**	**(1.466)**
unvested_deversified	**0.884**	**1.045**	**0.914**	**1.128**	**0.880***	**1.047**	**0.916**	**1.141**
	(-1.643)	**(0.475)**	**(-0.417)**	**(0.568)**	**(-1.700)**	**(0.501)**	**(-0.409)**	**(0.631)**
vested_holdings					**1.028**	**0.984**	**1.008**	**1.049**
					(1.218)	**(-0.735)**	**(0.123)**	**(1.085)**
Female	1.002	0.932**	0.759**	0.702	1.002	0.932**	0.759**	0.731
	(0.321)	(-2.458)	(-2.256)	(-1.275)	(0.321)	(-2.461)	(-2.256)	(-1.124)
hourly_wage	0.895***	0.934***	0.904***	0.905***	0.895***	0.935***	0.904***	0.900***
	(-12.488)	(-5.580)	(-3.497)	(-2.600)	(-12.538)	(-5.552)	(-3.502)	(-2.824)
Age	0.998***	0.994***	1.014**	0.978	0.998***	0.994***	1.014**	0.975*
	(-5.589)	(-4.520)	(2.436)	(-1.538)	(-5.562)	(-4.467)	(2.384)	(-1.659)
Unemployment	0.970***	0.955***	0.928*	1.103	0.970***	0.955***	0.928*	1.117
	(-10.372)	(-3.635)	(-1.811)	(0.887)	(-10.386)	(-3.644)	(-1.808)	(1.016)
Higher order tenure and hours controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,651	10,979	1,738	624	135,651	10,979	1,738	624
Pseudo R-squared	0.0161	0.0326	0.0639	0.111	0.0161	0.0326	0.0639	0.113

*** p<0.01, ** p<0.05, * p<0.1