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THE EFFECT OF TUITION REIMBURSEMENT ON TURNOVER: A CASE STUDY ANALYSIS

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ABSTRACT

Tuition reimbursement programs provide financial assistance for direct costs of education and are a type of general skills training program commonly offered by employers in the United States. Standard human capital theory argues that investment in firm-specific skills reduces turnover, while investment in general skills training could result in increased turnover. However, firms cite increased retention as a motivation for offering tuition reimbursement programs. This rationale for offering these programs challenges the predictions of the standard human capital model. This paper tests empirically whether participation in tuition reimbursement programs increases employee retention using data from a non-profit institution. To document the prevalence of tuition reimbursement programs, the case study analysis is supplemented with findings from the Survey of Employer-Provided Training, 1995 (SEPT95). This paper finds that participation in tuition reimbursement programs reduces employee turnover.

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1.0 Introduction

Becker's (1964) seminal work on investment in human capital makes a fundamental distinction between general and firm-specific skills, which has implications for investment and employee turnover. Firm-specific human capital is defined as having value only to the current employment relationship, while general human capital is valuable to both current and potential employers. Becker's theory predicts that employees will bear the full cost of general skills training – either by paying for training directly or by accepting lower wages during training periods – because employers face the threat of not capturing the return on their investment due to "poaching" of trained employees by other employers. In a competitive labor market, workers have the incentive to invest efficiently in general human capital because they receive a wage equal to the value of their marginal product. In the case of investment in firm-specific human capital, employers and employees share the costs. Neither party is willing to bear the full amount due to the risk of opportunistic behavior by the other. The employer and the employee share the surplus, or rents, from the investment; the relative bargaining power of the two parties determines how these rents are allocated.

This standard theory on investment in human capital has implications for turnover. Investment in firm-specific human capital reduces turnover because rents accrue only if the employment relationship is maintained. However, this result does not hold for investments in general human capital because these skills are transferable across employers. According to Becker's theory, offering employees general skills training would increase turnover.

Despite the predictions of this theory, recent empirical studies show that firms provide general training to their workers and argue that firms bear part of the cost.[2] Tuition reimbursement programs are an example of general skills training provided by firms. Employers reimburse employees for direct costs of coursework taken at accredited academic institutions. Because instruction and degree accreditation occur at third-party institutions, skills acquired are transferable – as well as observable – to many potential employers. Hence, tuition reimbursement programs closely resemble general skills training as described by Becker.

[2] These include, but are not limited to Loewenstein and Spletzer (1999a, 1999b), Acemoglu and Pischke (1998, 1999), Autor (2001), and Cappelli (2004).

A primary reason firms give for offering these programs is to reduce turnover, which is an apparent challenge to standard human capital theory.[3] This paper examines empirically whether employees who participate in tuition reimbursement have higher retention rates using a case study analysis of workers at a non-profit institution. Results from the case study indicate that participation reduces employee turnover. Hence, the firm's motivation for offering this program is supported by this analysis: general skills training increases retention.

The remainder of this paper is organized as follows. Section 2 documents the prevalence of tuition reimbursement programs using the Survey of Employer-Provided Training, 1995 (SEPT95) and describes the typical characteristics of these programs. Section 3 reviews previous studies of tuition reimbursement, while the case study analysis is presented in Section 4. Conclusions and areas for future research are given in Section 5.

2.0 Background on Tuition Reimbursement Programs

2.1 Program Prevalence

Employer-provided tuition reimbursement programs are widespread and constitute a nontrivial part of non-wage compensation. One of the few datasets that collects information on tuition reimbursement programs is SEPT95. This survey collects information on data on employer-provided training practices for a cross section of establishments. The survey was conducted by the Bureau of Labor Statistics (BLS), part of the U.S. Department of Labor, from May to August of 1995 with the purpose of collecting nationally representative data (Bureau of Labor Statistics 2006a). The sample represents private, non-agriculture establishments employing 50 or more. The amount spent on these programs is substantial: these establishments spent $2.8 billion in 1994 on tuition reimbursement.[4] In addition, the trade magazine *Workforce Management* estimates that companies paid $10 billion toward tuition reimbursements in 2003.[5] Hence, expenditures on tuition reimbursement programs represent a significant source of investment in general skills of employees and appear to be on the rise.

[3] Increased retention is a response given by human resource professionals in interviews with the author. Cappelli (2004) and Corporate Leadership Council (2002) report the same finding.
[4] The confidence interval for this estimate is $2.6 to $3.0 billion
[5] *Workforce Management*, May 1, 2004. Copyright 2004 Crain Communications Inc.

A substantial fraction of firms offer tuition reimbursement. Results from SEPT95 show that 61 percent of establishments employing 50 or more workers offer tuition reimbursement programs. Using the 1994 National Employer Survey of Educational Quality in the Workforce (NES-EQW), Lynch and Black (1998) report that 47 percent of firms employing 20 or more employees offer tuition reimbursement programs. The estimates from SEPT95 and 1994 NES-EQW are comparable because larger establishments are more likely to offer a tuition reimbursement program (Frazis et al. 1998). Examining the access of workers to this program, over three-quarters of the employees that work in these establishments are offered tuition reimbursement by their employer. Hence, these general training programs are widespread and yet relatively unexamined in the academic literature.

Using SEPT95 allows for a comparison of establishment characteristics across those with and without a tuition reimbursement program. Seventy-five percent of respondents in SEPT95 offer a tuition reimbursement program, but 14 percent of these firms had zero expenditures on reimbursements in 1994. Unfortunately, SEPT95 does not contain information on the specifics of these tuition reimbursement programs so these data cannot be used to evaluate how plan characteristics affect participation or retention rates. However, expenditures of $0 for 1994 imply a participation rate of zero for the entire year. To be considered as having a tuition reimbursement program in this analysis, firms must indicate that they both have a program and have positive expenditures in 1994. Using this requirement, 64 percent of establishments have an *operational* tuition reimbursement program.

Table 1 shows mean characteristics of responding establishments by whether they offer tuition reimbursement. Establishments with a tuition reimbursement program, on average, offer more benefits, have higher wages, have lower separation rates, and employ more workers than firms without a program.[6] Table 2 shows how provision of tuition reimbursement programs varies by industry. Industries that are more production-intensive, such as mining and manufacturing, are more likely to offer this program. The financial, insurance, and real estate industry also has a high provision rate, which probably reflects the certifications and licensing required of employees in this industry. Establishments in retail have the lowest provision rate: only one-quarter of retail establishments offer tuition reimbursement. Table 3 shows that the

[6] Separation rate = (current employment + hires – previous employment)/(.5*(current employment + previous employment), where previous employment is the number of employees on staff three months prior to survey.

provision of tuition reimbursement across the U.S. is relatively uniform; establishments in New England and the Atlantic have slightly higher provision percentages.

Whether tuition reimbursement is provided in conjunction with other training programs can be examined empirically. If tuition reimbursement programs are offered as a complement to other training programs, rather than as a substitute, then there is likely an interaction between firm-specific and general skills training. Table 1 shows that establishments with tuition reimbursement programs are both more likely to hire trainers from outside the firm and to employ in-house trainers.[7] In addition to this finding, the degree of firm-specificity is arguable higher in production-intensive industries. These results regarding the determinants of providing tuition reimbursement are consistent with tuition reimbursement programs being used to complement investments in firm-specific human capital, thereby increasing worker productivity at the current firm. If tuition reimbursement increases firm-specific skills, making her more valuable at the current firm relative to outside employers, then participation would increase retention – supporting the firm's motivation for providing these programs. This paper examines the effect of participation in tuition reimbursement on the employee's separation propensity.

2.2 Program Characteristics

Tuition reimbursement programs typically consist of three components: 1) a maximum reimbursement amount; 2) an eligibility requirement; and 3) a reimbursement policy based on academic performance. The first characteristic is affected by the tax-advantage status of these programs. Reimbursements from employer-provided programs are exempt from income taxation under Section 127 of the U.S. Internal Revenue Code.[8] The maximum income exclusion for a single calendar year is $5,250, and reimbursements under this level are exempt from federal income tax, payroll tax, and state income tax. A 2002 survey by Eduventures of human resource professionals and managers at over 500 firms finds that 70 percent of firms offering a tuition reimbursement program cap annual reimbursement, and over half of these firms (57 percent)

[7] Firms are classified as hiring an outside trainer if they had positive expenditures for this training category in 1994; similarly for expenditures on in-house trainers (fulltime or part-time).

[8] Section 127 of the Internal Revenue Code outlines the tax-advantaged status of educational assistance plans provided by employers: "Gross income of an employee does not include amounts paid or expenses incurred by the employer for educational assistance to the employee if the assistance is furnished pursuant to a [educational assistance] program" (26 U.S.C.§ 127).

have maximums that exceed $4,000 (Eduventures 2003).[9] Table 4 shows the distribution of reimbursement maximums from the Eduventures survey. The majority of firms impose a cap below or equal to the maximum annual tax exclusion of $5,250, but a substantial fraction of firms have reimbursement maximums that exceed the tax exempt limit or have no maximum reimbursement amount. Of those imposing a cap, the most common maximum is within the $4,000 to $5,250 range, reflecting the influence of the tax exclusion.

Most firms in the Eduventures survey allow employees to become eligible for the program after six months of service; rarely do eligibility requirements exceed one year. Twenty percent of firms impose service requirements after participation. Service requirements after participation are more common in plans that have unlimited tuition reimbursement. The 2002 survey by Eduventures also reports that over 90 percent of programs have a minimum grade standard for reimbursement, typically set at a "C" or better. Many companies tie grades directly to reimbursement percentages, making the cost of participation higher for workers who receive lower grades. The tuition reimbursement program analyzed in the case study has an eligibility requirement of one year of service and does not have a service requirement after participation. The maximum reimbursement amount is $5,250 for a single year and the program only reimburses costs of tuition for participants obtaining a "C" grade or better. Hence, the case study program is typical in its reimbursement amount and requirements, making it a good candidate for case study analysis.

In addition to the above characteristics, the firm must follow guidelines set by the U.S. Internal Revenue Code for tuition reimbursements to qualify for the aforementioned tax exclusion. A firm must have a written plan for the exclusive benefit of providing employees with educational assistance, the program must meet non-discrimination clauses, and employees cannot be offered a choice between educational assistance and other forms of compensation for reimbursements to qualify for the tax exclusion. Before 1978, all employer-provided educational expenses fell under Section 162 of the U.S. Internal Revenue Code. Section 162, enacted in 1954, excludes employer-provided educational assistance from taxation as long as the coursework is "job-related". Over time, the job-related requirement became narrowly interpreted

[9] The survey was sponsored by Cenquest, a provider of managed education solutions, which helps companies create and manage tuition assistance programs (www.cenquest.com). Eduventures, who conducted the survey, is an independent research and advisory firm of corporate, post-secondary, and pre-K-12 learning markets (www.eduventures.com).

due to court case rulings, thus limiting the educational opportunities of employees in low-level positions relative to employees in higher-level positions who typically have broad job descriptions. The legislative intent of the tax exclusion in Section 127 was to provide educational opportunities at the workplace for lower-level employees – those employees who could not take advantage of educational assistance for job-related coursework because they were limited by narrow job descriptions. Not only are tuition reimbursement program interesting to study from a labor economics perspective because they clearly meet Becker's definition of investment in general skills, the tax-advantaged status of these programs makes them relevant to matters of public policy.

3.0 Literature on Tuition Reimbursement Programs

Despite the prevalence of tuition reimbursement programs, few academic studies have looked explicitly at these programs. The primary reasons given by firms as to why they offer tuition reimbursement programs are: recruitment and retention. The first reason implies that tuition reimbursement programs are a non-wage benefit. The rationale for the second reason is that tuition reimbursement programs are training programs that affect worker productivity, and thus retention.

3.1 Tuition Reimbursement Programs and Recruitment

The use of benefits as a recruiting device is prevalent in labor and personnel economics. Rosen's (1986) work on "equalizing differences" established a theory for how non-wage benefits affect the composition of workers attracted to a firm. In the case of a tuition reimbursement, workers who value continuing education are willing to trade-off wages (at some rate) for tuition payments. This tradeoff implies that the incidence of tuition reimbursement is on the worker. The tax-advantaged status increases the value of a given level of tuition benefits; the value increases with the worker's marginal tax rate.

A common reaction to these programs is to attribute their provision by firms solely to their tax-advantaged status. However, this overlooks the trade-off between wage and non-wage compensation. If total compensation reflects the value of a worker's marginal product, then

benefits and wages are substitutes at the margin. Firms offer tuition reimbursement instead of additional wages or other benefits if tuition benefits are more effective at attracting a certain type of workers. The tax-advantaged status of tuition reimbursement programs increases the value of these benefits to a worker facing a positive tax rate, but cannot explain why a firm offers tuition benefits instead of other forms of compensation.

Cappelli (2004) addresses the effect of tuition reimbursement programs on recruitment by developing a model in which provision of these programs generates a separating equilibrium in which only high-ability workers choose to work at firms with a tuition program. Using educational attainment as a proxy for ability, Cappelli tests his theory using the 1997 National Employer Survey (NES-EQW) and finds that the average education attainment of new hires is higher for firms with tuition reimbursement programs, which is consistent with his theory if educational attainment is a direct measure of ability. However, the sharp prediction of his model – all high ability types participate – is inconsistent with empirical participation rates. Participation rates in tuition reimbursement programs by employees is typically between three and five percent.[10] The Corporate Leadership Council (2002) reports that low participation rates could be due to a lack of marketing by firms. If employees lack information about the program, it cannot influence an employee's selection of employer.

Aside from the sharp prediction, the general idea of Cappelli's (2004) model is attractive because it is consistent existing studies of sorting due to non-wage benefits (Rosen 1986). The low participation rates found empirically could be reconciled in his model by thinking of workers as attaching an option value to participation: non-participants at firms that offer the program could be systematically different (i.e. of higher ability) than workers at firms that do not offer this program if high ability workers are willing to trade-off wages for the option of participating.[11] Data on how implementation of a tuition reimbursement program affects the applicant pool would be ideal to test the effect of these program on recruitment. However, this type of data is difficult to obtain. Results from the case study in Section 4 provide inconclusive evidence that implementation of a tuition reimbursement program differentially affects new hires and existing employees in terms of the impact of participation on employee retention.

[10] References include: Corporate Leadership Council, statistics from Watson Wyatt, Buddin and Kapur (2004), and conversations with HR personnel at firms with a program.

[11] Low participation rates could be explained by adding a exogenous shock that decreases the cost of participation, or by modeling heterogeneity in ability as a continuous distribution.

3.2 Tuition Reimbursement and Retention

In contrast to using tuition benefits as a recruiting device, the claim by firms that they use tuition reimbursement programs to reduce turnover does not have support in the theoretical literature. Rather, the literature predicts the opposite: provision of general skills training would increase turnover. Becker's (1964) theory of investment in human capital argues that, because general skills are fully transferable (by definition) firms risk having their trained employees poached or "cherry-picked" by outside firms if they provide workers with general skills training. The labor market is assumed to be competitive, resulting in the worker's wage set equal to the value of her marginal product. Because the worker captures the full return on the investment, Becker's theory implies that the worker bears the full cost of general training. Because the market is competitive and skills are transferable, the worker is indifferent between employers. Therefore, even if the incidence of general skills training falls on the worker, turnover would be non-decreasing in the provision of general skills training. This disconnect between the theoretical literature and the intended use of these programs by firms presents an opportunity to analyze empirically the effect of tuition reimbursement programs on retention.

There are several case studies that examine the tuition reimbursement programs offered by the U.S. Department of Defense.[12] The two studies most similar in their econometric methodology to the case study analysis in this paper are Garcia, Arkes, and Trost (2000) and Buddin and Kapur (2005), which examine the impact of tuition reimbursement on retention in the U.S. Navy. Garcia, Arkes, and Trost (2000) follow a cohort of enlistees who began service in 1992 and study the effect of participation on the probability of remaining with the Navy for at least six years. They find that participation increases the probability of staying in the Navy by nearly 13 percentage points.

Buddin and Kapur (2005) find the opposite: participation in tuition reimbursement decreases the probability of re-enlisting after four years by 16.5 percent. Buddin and Kapur criticize Garcia, Arkes, and Trost's (2000) definition of retention and instead use re-enlistment after the end of a four-year contract as the relevant measure. Buddin and Kapur (2005) argue that

[12] These include Boesel and Johnson (1988), Garcia and Joy (1998), Garcia, Arkes, and Trost (2000), and Buddin and Kapur (2002, 2005).

the time window for which enlistees have access to participation in tuition reimbursement should be held fixed, and so they limit their sample only to those enlistees who served a full four-year contract. These two studies also differ in the variables used as exclusion restrictions in their bivariate probit estimation: Garcia, Arkes, and Trost (2000) use participation in the orientation session for educational opportunities offered to enlistees, while Buddin and Kapur (2005) use the enlistee's proximity to a four-year college before enlistment and an interaction between the number of courses offered on base and the size of the base. Buddin and Kapur argue that the instrument used by Garcia, Arkes, and Trost (2000) fails the exogeneity test.[13]

While the exclusion restriction in Garcia, Arkes, and Trost (2000) is untenable, this paper does not agree with Buddin and Kapur's (2005) criticism that the window of opportunity for participation needs to be held constant for "leavers" and "stayers". If enlistees jointly determine their participation and retention decisions, constraining the duration of service to be the same across participants and non-participants imposes restrictions on the effect of the program. By using different criteria for their samples, Garcia, Arkes, and Trost (2000) and Buddin and Kapur (2005) are addressing slightly different research questions. Garcia, Arkes, and Trost (2000) examine the effect of participation on the probability of staying six years, while Buddin and Kapur (2005) analyze the effect of participation on the probability of staying a fifth year after already completing four years with the Navy. Even in the absence of these complications, generalizing results from the Armed Services to civilian workers is difficult due to the fundamentally different employment relationship.

Benson, Finegold and Mohrman (2004) present a civilian analysis of the impact of participation in tuition reimbursement on retention using a case study of a large U.S. manufacturing firm (roughly 10,000 employees). Employees at this firm have a high participation rate in the tuition program – nearly 60 percent – which may be due to the program's unlimited reimbursement of tuition, stock rewards for degree completion, and the fact that the firm strives to be a leader in the provision of continued education for its workers. This number is also inflated because it includes individuals who took only a single course rather than limiting the sample to those enrolled in a degree program. Hence, their study examines an atypical tuition reimbursement program in terms of characteristics and participation rates. Benson, Finegold and

[13] Participation in the orientation session is not random, but is positively correlated with an individual's intention to use the program, and thus also is correlated with the probability of staying in the Navy.

Mohrman (2004) use a Cox-proportional hazard model to analyze how degree completion affects the probability of leaving the firm between January 1996 and June 2000. They argue that promotion after degree completion would reduce the probability of leaving because it produces a better match between responsibilities and skills sets. However, their theory falls short of fully explaining their empirical findings. They find that promotion decreases the probability of leaving for employees who obtain a graduate degree. However, these individuals have a greater probability of leaving than non-participants. Additionally, promotion does not affect the probability of leaving for those employees earning a Bachelor's or Associate's degree. More importantly, their assumption that hazard rates are proportional might not be appropriate. They claim there is a sharp increase in the hazard upon degree completion, which suggests that the effect of participation on the separation hazard is not proportional over time.

While few studies examine tuition reimbursement programs, there have been many studies that examine the provision of general skills training by employers. These studies develop models in which a variety of mechanisms, such as asymmetric information or mobility costs, could create a wedge between wages and productivity. This wedge provides firms with an incentive to offer and pay for general skills training.[14] These studies relax Becker's assumption that labor market is competitive to explain why firms offer general training.

This paper contributes to the literature by empirically evaluating the effect of employer-provided general training – provided through tuition reimbursement programs – on employee retention. If general training decreases employee turnover then a central prediction of Becker's model is incorrect. In order to continue to use this standard theory, it would need to be amended to account for this negative relationship between general training and turnover. Allowing for general human capital and firm-specific human capital to interact is one possible modification to the standard model, which is addressed briefly in Section 4.4.

[14] These include, but are not limited to: Black and Lynch (1998), Loewenstein and Spletzer (1999*)* and Acemoglu and Pischke (1999a, 1999b), Autor(2001), and Cappelli (2004).

4.0 Case Study Program: CSP

To examine the impact of tuition reimbursement programs on employee retention, this paper analyses data from a single firm as well as from a cross-section of firms. This section focuses on the case study, presenting the program characteristics, an econometric framework, and the results. The data were obtained from a non-profit institution in the education sector, which implemented a tuition reimbursement program in September 1999. (The case study program will be referred to as CSP in the remainder of the text.) Employees considered in this analysis are staff members in supervisory and non-supervisory positions who were employed on December 15, 1999, and those who were hired between December 15, 1999 and September 1, 2001. A panel of observations was constructed based on seven "point-in-time" observations from administrative records. Individuals are observed on December 15 of each year from 1999 to 2005. The data include gender, age, and race as well as start date, job characteristics, and annual wage rates. One shortcoming of the data is that those employees who start and end employment between December 15 of one year and December 15 of the subsequent year are not included in the sample. Individual records of participation in CSP include the amount reimbursed, the degree type, and the major or area of concentration from September 1, 1999 to August 31, 2004.[15] Total expenditure on tuition reimbursement over these five years totaled over $2 million dollars (nominal) with a participation rate of 4.5 percent.

4.1 Characteristics of CSP and Descriptive Statistics

As mentioned in Section 2, employees are required to have one year of service to be eligible for CSP. Employees need to be admitted into a degree program, but the program does not need to be job-related. The intent of CSP at the case study institution is given below:

> [CSP] supports employee development by providing partial or full reimbursement of costs of courses, seminars and workshops that enable employees to improve performance in current jobs, prepare for career development, or meet requirements of degree programs related to current performance or planned career development (Administrative Guide Memo 22.11).

[15] Major or area of concentration was not available for 22 participants.

The employee's supervisor must approve the request to participate in CSP, but this is not a binding constraint since the employee can appeal directly to the benefits department for reimbursement if her supervisor does not grant the request. A staff member working full-time (more than 30 hours per week) qualifies for $5,250 in reimbursement per year; this amount is pro-rated for members working part-time. The maximum reimbursement amount was $2,000 for the first two years of the program, September 1, 1999 through August 31, 2001, but was increased to $5,250 as of September 1, 2001. CSP qualifies under Section 127 of the Internal Revenue Code, allowing reimbursements to be exempt from income and payroll taxation

Under CSP, reimbursements are only allowable for costs of tuition fees. Tuition reimbursements are made directly to the institution prior to the quarter or semester. The employee assumes responsibility of satisfactory completion of the course (grade C or better); if not, the funds must be repaid in total to the employer.

Table 5 displays sample means for workers used in the case study analysis. Participants in CSP differ from non-participating employees in terms of observable demographic and employment variables. Participants are more likely to be female, younger, identify themselves as Black, have a lower starting wage and are less likely to be in a supervisory role.[16] Of those who participate between September 1, 1999 through August 31, 2004, average total reimbursement was approximately $5,200 and participants spend an average of two years in the program. The participation rate of an employee's peers is also higher for participants. Peer groups were constructed using both the location of an employee's department and the general classification of her job to define a group of workers whose participation behavior could influence that individual employee's participation decision, such as through the dissemination of information about the program. The peer participation rate assigned to each employee does not include that particular employee's participation behavior. This variable will be used later in the paper as an exclusion restriction for the separation equation in the econometric analysis.

Tables 6 and 7 show the retention behavior of non-participants and participants. The raw data show that participants are less likely to leave in each year compared to non-participants. The largest difference in the leaving percentages occurs for the three-year time window, but the

[16] "Exempt" and "Non-exempt" refer to whether the employee is subject to the Fair Labor Standards Act of 1938 (FLSA), which establishes minimum wage and over-time pay laws for full-time and part-time workers in the private and government sectors. Workers who are non-exempt from FLSA are those paid on an hourly basis and occupy non-supervisory positions; salary of exempt workers must also meet the minimum wage.

difference still persists for the five-year mark. Whether the worker separates from the institution before five years is the outcome evaluated in this study. Unfortunately, the data do not contain information on degree completion, so the retention behavior of participants after completing their coursework cannot be directly examined. The five-year time window is used as an approximation for degree completion.

Figures 1 and 2 graphically show differences between participants and non-participants in their propensities to separate from the institution using plots of the survival functions. These survival functions use actual employment start dates, but end dates are randomly assigned for the year in which the employee leaves the institution to produce a smoothed curve.[17] The survival function of participants lies to the right of non-participants, meaning that for any year of service, participants are more likely to still be employed by the institution. Differences in survival rates are largest just before three years of service.

Figures 3 and 4 show that survival rates differ by the type of degree pursued: participants in undergraduate programs have higher survival rates than those in graduate programs. The analysis in the next section examines whether this difference between degrees persists when controlling for characteristics of the participants. While these tables and figures show lower survival rates for non-participants, a proper analysis of the effect of participation on retention needs to account for differences across individuals and the interdependence of the participation and retention decision. The next section of the paper will examine how participation affects retention using econometric analyses to control for differences in observable characteristics as well as unobservable characteristics.

4.2 Estimation

This section models the event of an employee leaving the institution using a latent variable framework. The individual compares the utility from staying with the employer to that obtained from separating. The propensity to separate from the employer is a continuous variable, but the observed outcome is binary, taking a value equal to 1 if the individual separates, and equal to 0 otherwise. The likelihood of leaving depends on observable characteristics, X,

[17] For employees hired before September 1999, length of service is measured as the difference between implementation of the program (September 1, 1999) and end date, or censoring date (December 15, 2005) when relevant.

participation in CSP, *P,* and factors unobservable to the researcher, ε. Let *S** be the underlying index – unobservable to the researcher – that determines whether the individual separates from the employer within a specified time frame:

$$S^* = X'\beta + \alpha P + \varepsilon \tag{1}$$

$$S = \begin{cases} 1 \;\; if \;\; S^* \geq 0 \Rightarrow' X\beta + \alpha P \geq -\varepsilon \\ 0 \;\; if \;\; S^* < 0 \Leftrightarrow X'\beta + \alpha P < -\varepsilon \end{cases} \tag{2}$$

If we assume ε to have a standard normal distribution, then we can estimate how worker characteristics affect the probability of separating from the institution using a probit model.

The same framework can be applied to participation in CSP because participation is also a binary outcome. Let *P** be the underlying latent variable that determines whether the individual participates, while *Z* represents individual characteristics and let *u* be unobservable characteristics. Again, the individual compares the utility from participating to that from not participating.

$$P^* = Z'\gamma + u \tag{3}$$

$$P = \begin{cases} 1 \;\; if \;\; P^* \geq 0 \Rightarrow Z'\gamma \geq -u \\ 0 \;\; if \;\; P^* < 0 \Leftrightarrow Z'\gamma < -u \end{cases} \tag{4}$$

As with the analysis of the probability of separation, determinants of participation can be examined using a probit model if *u* has a standard normal distribution.

If participation in CSP were exogenous in equation 1, then α would measure the effect of participation in CSP on the probability of separation. For participation to be exogenous, the decision to participate cannot be related to the decision to leave the employer in terms of unobservable characteristics, or cov(ε,*u*) = 0. However, because participation in CSP affects employment and promotion opportunities due to an increase in general skills, arguing that the two decisions are uncorrelated is tenuous. This paper models the two decisions jointly, allowing for participation in CSP to be endogenous in equation 1, or that cov(ε,*u*) ≠ 0. The distribution of (ε,*u*) is assumed to be bivariate standard normal with cov(ε,*u*) = corr(ε,*u*) = ρ, or that:

$$\begin{pmatrix} \varepsilon \\ u \end{pmatrix} \sim BVN\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right) \tag{5}$$

Equations 1 and 2 are estimated jointly using bivariate probit maximum likelihood estimation. Garcia, Arkes and Trost (2000) and Buddin and Kapur (2005) use this technique in their studies of the U.S. Navy. In order to estimate the model, Z in equation 3 needs to include a variable that affects the likelihood of participating, but does not affect the likelihood of leaving (i.e. not contained in X from equation 1). This paper uses an information effect or knowledge "spillover", measured by the participation rate of peers, to satisfy this exclusion restriction. Peer groups were created based on the division (18 in total) in which the employee worked and a broadly defined job classification (administrative, professional, researcher, or manager). The participation rate of peers attached to each individual does not include the participation decision of that particular individual. This rate is used as a measure of how informed an individual is about CSP.[18]

Because the sample consists of both employees hired before and after the implementation of CSP, the empirical analysis will be conducted on two groups: 1) employees hired before September 1, 1999; and 2) employees hired after September 1, 1999. The groups need to be separated because, as discussed in Section 3, implementation of CSP could affect the applicant pool. The effect of CSP on retention for future hires will be determined based on results collected from the second group, which is the measure most applicable to firms who have an established program. If a firm is considering implementing a tuition reimbursement program, the effect of CSP on current and future workers is relevant.

4.3 Results from Case Study

The first set of results estimate the effect of participation in CSP on the probability of separating from the employer (voluntarily or involuntarily) within 5 years when participation is treated as exogenous. Table 8 lists the marginal effects from a simple probit estimation with *leave* as the dependent variable. For workers hired before CSP was implemented, $S = 1$ if they separate from institution within five years measured from September 1, 1999; and = 0 otherwise.

[18] The direction of the effect in unclear: Does the participation of peers inform the individual or does participation by the individual inform her peers? While it does not matter for the purposes of this study, a robustness check was performed that assigned participation rates by workers hired before September 1, 1999 in the first year of the program (1999) to new hires. Because these new hires were not eligible to participate in the first year due to the eligibility rule while the existing employees were, the direction of this information effect is clear. By distinguishing between these two cohorts, concerns regarding whether the individual and her peer group experience the same shock to their participation probabilities are also mitigated. This alternative measure of peer participation does not affect the results.

For workers hired after implementation, $S = 1$ if separate within five years of hire date; and $S = 0$ otherwise. Individual and employment characteristics, such as age, wage, and years of service, are taken as of December 15 of the first year observed. Participation in CSP is equal to 1 if the individual ever participated in the program from September 1, 1999 through August 31, 2003. This definition of participation is used because when workers participate, they typically spend the maximum amount possible, which corresponds to a binary decision.[19]

As seen in Table 8, if participation in CSP were exogenous, participation would lower the probability of leaving by over 20 percentage points for employees hired before or after September 1, 1999. This impact on retention is equivalent to the effect of being three and a half years older, or having six additional years of experience (as of December 15, 1999) for those employees hired before September, 1999. For recent hires, the effect is similar to being four and half years older.

Table 9 separates the effect of undergraduate and graduate degrees on retention assuming exogeneity of participation. The effect of pursuing an undergraduate degree in CSP is roughly one and a half times as large as the effect of pursuing a graduate degree across the two groups. However, if participation is endogenous, these estimates of how participation in CSP affects retention are inconsistent.

Tables 10 and 11 display the marginal effects from the bivariate probit maximum likelihood estimation for employees hired before and after September 1, 1999, which allows for an interdependence between participation and retention decisions. For those hired before implementation of CSP, the probability of participation is significantly higher for females (relative to males) and Blacks (relative to those identifying themselves as White), and lower for Asians and for those with higher weekly wages. While the magnitude of the marginal effects appears small, they are influential when compared to the average participation rate of 4.5 percent. The probability of participating in CSP increases in step with the participation rate of peers. The probability of leaving is decreasing (at a decreasing rate) in age and experience, and is lower for Hispanics and Asians. At mean values, a $500 dollar increase in the weekly starting wage increases the probability of leaving by one percent.

[19] The results do not change when spending as a percent of the maximum reimbursement amount is used instead of the binary indicator.

The impact of participation in CSP on retention is estimated as negative for both groups and significantly different from zero for those hired after the program was implemented (hired after September 1, 1999). As opposed to the estimates in Table 8 when participation is assumed to be exogenous, the estimated effect of participation in CSP is only slightly negative and not significantly different from zero for those employees hired before September 1, 1999. The change in the magnitude can be attributed to the correlation between the unobservable characteristics. A negative correlation implies that individuals (those hired before September 1, 1999) who participate in CSP were those predisposed to staying at the institution.

For those hired after September 1, 1999, participation in CSP is significantly higher for workers in a non-supervisory role and is increasing in wage (Table 11). Participation in CSP has a large effect on retention: it reduces the probability of separating within five years by 50 percentage points. The correlation between the error terms is positive and significant at the ten percent level. A positive correlation implies that those individuals who are more likely to participate in CSP are more inclined to leave within 5 years.

The estimated effect of participation in CSP on retention in Tables 10 and 11 is a specification in which the type of degree pursued does not matter for separation rates. A second specification is found in Tables 12 through 15, which allows the effect to vary by degree pursued. Tables 12 and 13 give the estimate for how pursuing an undergraduate in CSP affects retention. The effect is large and negative for both groups of hires: the probability of leaving within five years is reduced by over 40 percent for those hired before September 1, 1999, and nearly 60 percent for recent hires. The correlation between the error terms is positive for both groups, meaning that those most likely to participate are those predisposed to separating from the institution.

The effects of pursuing a graduate degree in CSP on retention are listed in Tables 14 and 15. Unlike undergraduate degrees, the effect of pursuing a graduate degree differs across the two cohorts of employees. For those hired before CSP was implemented, pursuing a graduate degree increases the probability of leaving the institution by 22 percentage points; although, the effect is not statistically significant at conventional levels. The correlation between the errors is negative for this group, meaning that those who are more likely to pursue a graduate degree are also more likely to stay.

For those hired after September 1, 1999, pursuing a graduate degree reduces the probability of leaving within five years by fifty percent. Similar to undergraduate degrees, the correlation between the errors is positive. Hence, those employees pursuing graduate degrees who were hired before September 1, 1999 behave differently from the other three groups of participants.[20]

These results indicate that participation in CSP increases retention for those employees hired after the program was implemented, and for those employees hired before implementation who choose to pursue undergraduate degrees. This analysis shows that participation in CSP is endogenous: the correlation between the error terms is positive for the aforementioned groups. Because of this endogeneity, single-equation estimation of the effect of CSP on the probability of separation underestimates the impact of participation on retention due to the positive correlation between the error terms. Participation in CPS decreases the probability of separating from the employer within 5 years by 50 percentage points when participation is allowed to be endogenous, up from 20 percent point decrease in the probability of separation when participation is treated exogenously. Hence, the effect of CSP on retention is even larger in magnitude when we take into account the correlation between the unobservable factors contained in the error terms.

For those employees hired before implementation of CSP who pursue graduate degrees, CSP reduces retention. The correlation between the unobserved heterogeneity affecting participation and separation is negative for these workers, which means that those more likely to participate are less likely to separate from the institution within five years. When treated exogenously, participation appears to decrease the probability of leaving by 18 percentage points; however, when participation is modeled as endogenous, participation increases the probability of leaving by nearly 22 percentage points. Hence, participation in CSP accelerates departure from the institution for those existing employees who choose to pursue graduate degrees.

This case study finds that tuition reimbursement programs increase retention of new hires. Hence, this paper finds empirical support for the explanation given by firms for providing tuition reimbursement programs – to increase employee retention – despite the

[20] This difference could be explained by dynamics leading to the implementation of CSP, which is currently being explored.

predictions of the standard theory of human capital that provision of general training could increase turnover. It is important to note that implementation of a program appears to affect existing and future employees differentially. This difference provides some evidence that tuition programs affect the composition of a firm's applicant pool. However, this evidence is not fully conclusive due to the fact that it only applies to those workers pursuing graduate degrees. Because CSP is a typical program in terms of its characteristics, this paper's findings improve the literature's understanding of tuition reimbursement programs and their effect on retention, especially for civilian employees.

4.4 Interpreting the Results

The result that general skills decrease turnover can be interpreted within standard human capital theory if general and firm-specific skills interact, such as through complementarities. In the extreme, this necessarily holds because basic, general skills such as writing and reading are essential for further skill development. Recall that investment in firm-specific skills lowers turnover because rents from the investment are shared between the worker and firm; both parties have an incentive to continue employment because rents only accrue if the relationship is maintained. If provision of general skills training by a firm increases the stock or productivity of firm-specific skills, then general skills training could reduce turnover.

If complementarities exist between general and firm-specific human capital in production, general skills training could increase employee retention. Acemoglu and Pischke (1999a, 1999b) argue that if general and firm-specific human capital are complements, wage structures could become compressed, thereby giving firms an incentive to provide general skills training. Acemoglu and Pischke define compression in the wage structure to mean that profits from trained workers are higher than those from untrained workers.[21] With complementarities between general and specific human capital, general skills acquired through participation in tuition reimbursement could increase the productivity of firm-specific human capital, thereby increasing employee retention.

[21] Acemoglu and Pischke (1999a, 1999b) list several other market imperfections that could result in compressed wages, including search costs, mobility costs, and minimum wage laws.

The case study shows that workers who are predisposed to having a higher probability of separating from the institution are more likely to participate in the tuition program. This suggests that these workers may have intended to acquire general skills through tuition reimbursement to make a career or firm change. However, participation substantially reduces the probability of leaving within five years. This is consistent with participants accumulating firm-specific human capital during the time period before they become eligible and during participation in the program, as well as possibly due to the increase in productivity of firm-specific skills from the interaction of these skills with general skills acquired through tuition reimbursement. Because those who participate stand to gain the most from participation in terms of wage increases and promotion opportunities, tuition reimbursement programs are effective at lowering the separation rate of the most ambitious and marketable employees.

There are other mechanisms that could result in general skills training reducing turnover in the presence of firm-specific human capital. Lazear (2005) presents a model in which all skills are general, but how these skills are combined in production is specific to the firm. Hence, in his model providing general skills training is essentially equivalent to investing in firm-specific skills. Alternatively, firms could use general training as an insurance mechanism: if workers are reluctant to work at a firm which requires investment in firm-specific human capital due to the risk of wage loss in the event of involuntary separation, firms could offer general training as a way to mitigate this risk (Feuer, Glick, and Desai 1987). Additionally, if providing general skills training attracts a type of worker who values investment in human capital, these workers likely have a lower discount rate, and thus could be less likely to turnover a priori. For the case of tuition reimbursement programs, in particular, participation could increase the amount of firm-specific skills if these skills increase over time because coursework takes several semesters to complete. Service length requirements before and after participation would add to this effect (Cappelli 2004).

It is important to note that the presence of firm-specific human capital is not required for the provision of general training if other market imperfections are present (Acemoglu and Pischke 1999a, 1999b). While these rigidities, such as mobility costs, could explain why firms invest in general human capital of its workers, they cannot explain why the provision of general training reduces separation rates. Evidence from SEPT95 indicates that firms who offer tuition reimbursement programs are more likely to offer other types of training programs. Because

"high-training" firms are more likely to offer tuition reimbursement programs, this suggests that these firms rely more heavily on firm-specific skills in production. Testing this hypothesis explicitly would require developing an index of firm-specificity, which could then be related to the provision of tuition reimbursement programs.

5.0 Concluding Remarks

Tuition reimbursement programs are a type of general training commonly offered by employers. Counter to the prediction of Becker's theory of investment in human capital, firms claim that they use these programs to increase employee retention. Results from the case study show that participation in CSP substantially reduces the probability of separating from a firm: participation by those employees hired after the program was implemented reduced their probability of leaving within five years by over 50 percentage points. This result overturns the prediction of standard theory that investment in general human capital by firms increases turnover. However, the establishment-level factors that determine which firms offer this general training program suggest that it is offered to complement investments in firm-specific human capital. By allowing for an interaction between firm-specific and general human capital, the empirical finding that general training reduces turnover can be interpreted within standard theory.

A shortcoming of the case study analysis is whether the findings can be generalized to other employers and programs. While the tuition reimbursement program is typical in terms of its program characteristics, future work will examine the effect of tuition reimbursement programs on turnover rates using the cross section of establishments such as those surveyed in the SEPT95. In addition, future work will extend the case study analysis by using a hazard rate model rather than modeling separation as a binary outcome.

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Appendix: Tables and Figures

Table 1: Means of Firm Characteristics (SEPT95)	Full Sample	No Tuition Reimbursement	Offer Tuition Reimbursement
Number of Employees	668	210	926
Average Monthly Wage*	$2,966	$2,470	$3,267
One of Multiple Establishments (0 or 1)*	40.21%	31.33%	45.59%
Separation Rate	11.00%	16.89%	7.68%
Total Number of Benefits (0 to 11)	6.1	4.9	6.8
Training Programs			
Tuition Reimbursement Program	63.95%	-	100.00%
Hire In-house trainers	45.13%	23.47%	57.48%
Hire trainers from outside the firm	72.18%	50.67%	84.15%
Occupation Composition			
Managers	10.24%	8.65%	11.13%
Professionals	14.68%	8.14%	18.37%
Sales	7.80%	10.32%	6.39%
Administrative Support	13.37%	10.33%	15.08%
Service	7.97%	12.95%	5.16%
Production	45.90%	49.51%	43.87%
Number of Firms	1057	381	676

***Not available for all States (N = 838; 522 offer tuition reimbursement and 316 do not).**
Column 3 Significantly Different from Column 4 at 1% Level

Table 2: Tuition Programs by Industry (SEPT95)	% in Sample	% Offer Tuition Reimbursement
Mining	11.64%	73.98%
Construction	11.54%	50.00%
Non-Durable Manufacturing	11.54%	72.13%
Durable Manufacturing	13.25%	82.86%
Transportation/Utilities	10.50%	62.16%
Wholesale	10.12%	54.21%
Retail	9.37%	26.26%
Financial/Insurance/Real Estate	9.93%	81.90%
Services	12.11%	63.28%

Table 3: Tuition Reimbursement by Region (SEPT95)	% in Sample	% Offer Tuition Reimbursement
New England	5.62%	81.36%
Middle Atlantic	9.81%	70.87%
East North Central	19.52%	66.34%
West North Central	8.10%	68.24%
South Atlantic	16.38%	70.93%
South Central	19.62%	53.88%
Mountain	7.52%	63.29%
Pacific	13.43%	54.61%

Table 4: Distribution of Maximum Reimbursements for Tuition Programs

Less than $1,000	6.22%
$1,001 to $2,500	19.12%
$2,501 to $4,000	15.67%
$4,001 to $5,250	19.82%
$5,251 to $7,000	4.84%
More than $7,000	3.69%
No Maximum	30.65%
Observations	434

Source: Eduventures (2003)

Table 5: Sample Means (CSP)	**Non-Participants**	**Participants**
Female	**66.86%**	**73.77%**
Age	**40.8**	**34.6**
White	**68.96%**	**62.60%**
Black	**5.01%**	**10.65%**
Hispanic	7.33%	9.61%
Asian	18.70%	17.14%
Leave within 5 years	**48.32%**	**33.25%**
Weekly Wage ($2001)	**$1,485**	**$1,237**
Supervisor (Exempt)	**62.88%**	**48.31%**
Non-Supervisor (Non-Exempt)	**37.12%**	**51.69%**
Hired Before Sept. 1999	**67.86%**	**62.85%**
Years in Tuition Program	**-**	**1.96**
Tuition Spending (nominal)	**-**	**$5,213**
Participation Rate of Peers	**1.98%**	**2.49%**
Observations	8229	385

Bolded = Participants and Non-Participants different at 5% significance level

Table 6: Retention of Participants (Unconditional)

Year Hired	Number	% Leave before 3 Years	% Leave before 4 years	% Leave before 5 years
1999 or before	253	13.83%	20.95%	30.43%
2000	74	11.84%	19.74%	32.89%
2001	58	24.14%	31.03%	44.83%

Table 7: Retention of Non-Participants (Unconditional)

Year Hired	Number	% Leave before 3 Years	% Leave before 4 Years	% Leave before 5 Years
1999 or before	5621	33.45%	39.35%	44.39%
2000	1378	41.51%	51.16%	58.85%
2001	983	41.20%	50.05%	56.97%

Table 8: Probability of Separating from Employer Before 5 years

Probit Model: Pr(S=1)	Hired Before Sept., 1999		Hired After Sept., 1999	
	dF/dX	St. Error	dF/dX	St. Error
Participation in CSP	-0.217	0.027**	-0.238	0.042**
Years of Service	-0.034	0.003**	0.136	0.149
Years of Service - Squared	0.001	0.000**	-0.274	0.143
Female	0.010	0.015	0.007	0.021
Age	-0.062	0.004**	-0.050	0.006**
Age - Squared	0.001	0.000**	0.001	0.000**
Black	0.034	0.031	-0.019	0.046
Hispanic	-0.055	0.026*	-0.080	0.038*
Asian	-0.087	0.018**	-0.101	0.025**
Non-Supervisor (Not Exempt)	-0.018	0.016	-0.072	0.023**
Weekly Wage (in thousands), $2001	0.020	0.010*	-0.045	0.015**
Observations	5826		2788	
Log-Likelihood	-3565.0		-1790.1	

* significant at 5% level ** significant at 1% level

Table 9: Probability of Separating from Employer Before 5 years

Probit Model: Pr(S=1)	**Hired Before Sept., 1999**		**Hired After Sept., 1999**	
	dF/dX	St. Error	dF/dX	St. Error
Graduate Degree	-0.180	.036**	-0.204	.051**
Undergraduate Degree	-0.267	0.36**	-0.307	.066**
Years of Service	-0.034	0.000**	0.135	0.149
Years of Service - Squared	0.001	0.000**	-0.274	0.143
Female	0.010	0.512	0.007	0.021
Age	-0.062	0.000**	-0.049	.006**
Age - Squared	0.001	0.000**	0.001	.000***
Black	0.035	0.262	-0.015	0.046
Hispanic	-0.054	0.040*	-0.078	.038*
Asian	-0.087	0.000**	-0.101	.025**
Non-Supervisor (Not Exempt)	-0.017	0.311	-0.071	.023**
Weekly Wage (in thousands), $2001	0.020	0.046*	-0.045	.015**
Observations	5826		2788	
Log-Likelihood	-3563.6		-1789.4	

* significant at 5% level ** significant at 1% level

Table 10: Probability of Participating in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(CSP=1)**		**Pr(S=1)**	
Hired Before Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Participation in CSP			-0.0299	0.2291
Years of Service	0.0014	0.0010	-0.0340	.0026**
Years of Service - Squared	-0.0001	0.0000	0.0007	.0001**
Female	0.0096	.0045*	0.0071	0.0155
Age	-0.0002	0.0016	-0.0607	.0048**
Age-squared	0.0000	0.0000	0.0006	.0001**
Black	0.0273	.0120*	0.0264	0.0318
Hispanic	0.0045	0.0079	-0.0565	.0260*
Asian	-0.0127	.0046*	-0.0834	.0182**
Non-Supervisor (Not Exempt)	0.0023	0.0054	-0.0209	0.0166
Weekly Wage (in thousands), $2001	-0.0122	.0059*	0.0209	.0102*
Participation in CSP by Peers (%)	0.0100	.0019**		
Correlation Between Errors	-0.2516	0.2668		
Log-Likelihood	-4488.3			
Observations	5826			

* significant at 5% level ** significant at 1% level

Table 11: Probability of Participating in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(CSP=1)**		**Pr(S=1)**	
Hired After Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Participation in CSP			-0.5188	.0788**
Years of Service	0.0667	0.0599	0.1521	0.1476
Years of Service - Squared	-0.0279	0.0559	-0.2693	0.1419
Female	-0.0024	0.0082	0.0061	0.0209
Age	0.0010	0.0028	-0.0493	.0062**
Age - Squared	0.0000	0.0000	0.0005	.0001**
Black	0.0243	0.0201	-0.0071	0.0452
Hispanic	-0.0062	0.0125	-0.0824	.0373*
Asian	0.0078	0.0098	-0.0948	.0246*
Non-Supervisor (Not Exempt)	0.0288	.0094**	-0.0585	.0239*
Weekly Wage (in thousands), $2001	0.0121	.0056*	-0.0422	.0148*
Participation in CSP by Peers (%)	0.0148	.0033**		
Correlation Between Errors	0.5051	0.2379		
Log-Likelihood	-2317.2			
Observations	2788			

* significant at 5% level ** significant at 1% level

Table 12: Probability of Pursuing an Undergraduate Degree in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(Undergrad=1)**		**Pr(S=1)**	
Hired Before Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Undergraduate Degree in CSP			-0.4197	.0285**
Years of Service	0.0004	0.0005	-0.0335	.0026**
Years of Service - Squared	0.0000	0.0008	0.0008	.0001**
Female	0.0040	0.0026	0.0107	0.0152
Age	0.0005	0.0009	-0.0609	.0044**
Age-squared	0.0000	0.0000	0.0006	0.0001**
Black	0.0136	0.0076	0.0433	0.0313
Hispanic	0.0075	0.0057	-0.0480	0.0263
Asian	-0.0010	0.0030	-0.0829	.0176**
Non-Supervisor (Not Exempt)	0.0131	.0042**	-0.0051	0.0172
Weekly Wage (in thousands), $2001	-0.0015	0.0031	0.0215	.0102*
Participation in CSP by Peers (%)	0.0024	.0011*		
Correlation Between Errors	0.5522	0.3155		
Log-Likelihood	-4027.9			
Observations	5826			

* significant at 5% level ** significant at 1% level

Table 13: Probability of Pursuing an Undergraduate Degree in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(Undergrad=1)**		**Pr(S=1)**	
Hired After Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Undergraduate Degree in CSP			-0.5823	.0132**
Years of Service	0.0235	0.0249	0.1342	0.1477
Years of Service - Squared	-0.0191	0.0238	-0.2716	0.1419
Female	0.0035	0.0033	0.0087	0.0210
Age	0.0002	0.0012	-0.0478	.0062**
Age-squared	0.0000	0.0000	0.0005	.0000**
Black	0.03239	.0157*	0.01678	0.0443
Hispanic	0.0086	0.0080	-0.0660	0.0371
Asian	0.0021	0.0045	-0.0971	.0243**
Non-Supervisor (Not Exempt)	0.0190	.0061**	-0.0596	.0231**
Weekly Wage (in thousands), $2001	0.0024	0.0036	-0.0440	.0149**
Participation in CSP by Peers (%)	0.0029	0.0016		
Correlation Between Errors	0.8128**	0.1540		
Log-Likelihood	-2002.9			
Observations	2788			

* significant at 5% level ** significant at 1% level

Table 14: Probability of Pursuing an Graduate Degree in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(Grad=1)**		**Pr(S=1)**	
Hired Before Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Graduate Degree in CSP			0.2198	0.1951
Years of Service	0.0009	0.0007	-0.0339	.0026**
Years of Service - Squared	0.0000	0.0000	0.0008	.0001**
Female	0.0048	0.0033	0.0046	0.0152
Age	-0.0004	0.0012	-0.0588	.0046**
Age-squared	0.0000	0.0000	0.0006	0.0001**
Black	0.0116	0.0084	0.0237	0.0305
Hispanic	-0.0011	0.0052	-0.0560	.0258*
Asian	-0.0108	.0032**	-0.0790	.0180**
Non-Supervisor (Not Exempt)	-0.0097	.0034**	-0.0197	0.0164
Weekly Wage (in thousands), $2001	-0.0106	.0044*	0.0219	.0102*
Participation in CSP by Peers (%)	0.0065	.0014**		
Correlation Between Errors	-0.4449	0.2120		
Log-Likelihood	-4200.2			
Observations	5826			

* significant at 5% level ** significant at 1% level

Table 15: Probability of Pursuing an Graduate Degree in CSP and Separating from Employer before 5 years

Bivariate Probit Model	**Pr(Grad=1)**		**Pr(S=1)**	
Hired After Sept., 1999	**dF/dX**	**St. Error**	**dF/dX**	**St. Error**
Graduate Degree in CSP			-0.5024	.1087**
Years of Service	0.0402	0.0501	0.1345	0.1476
Years of Service - Squared	-0.0101	0.0068	-0.2589	0.1422
Female	-0.0050	0.0068	0.0043	0.0210
Age	0.0003	0.0024	-0.0493	.0062**
Age-squared	0.0000	0.0000	0.0005	.0001**
Black	-0.0152	0.0094	-0.0363	0.0455
Hispanic	-0.0161	0.0078	-0.0888	.0375*
Asian	0.0040	0.0077	-0.0982	.0246**
Non-Supervisor (Not Exempt)	0.0065	0.0072	-0.0734	.0232**
Weekly Wage (in thousands), $2001	0.0085	.0043*	-0.0437	.0150**
Participation in CSP by Peers (%)	0.0111	.0027**		
Correlation Between Errors	0.4913	0.2926		
Log-Likelihood	-2194.4			
Observations	2788			

* significant at 5% level ** significant at 1% level

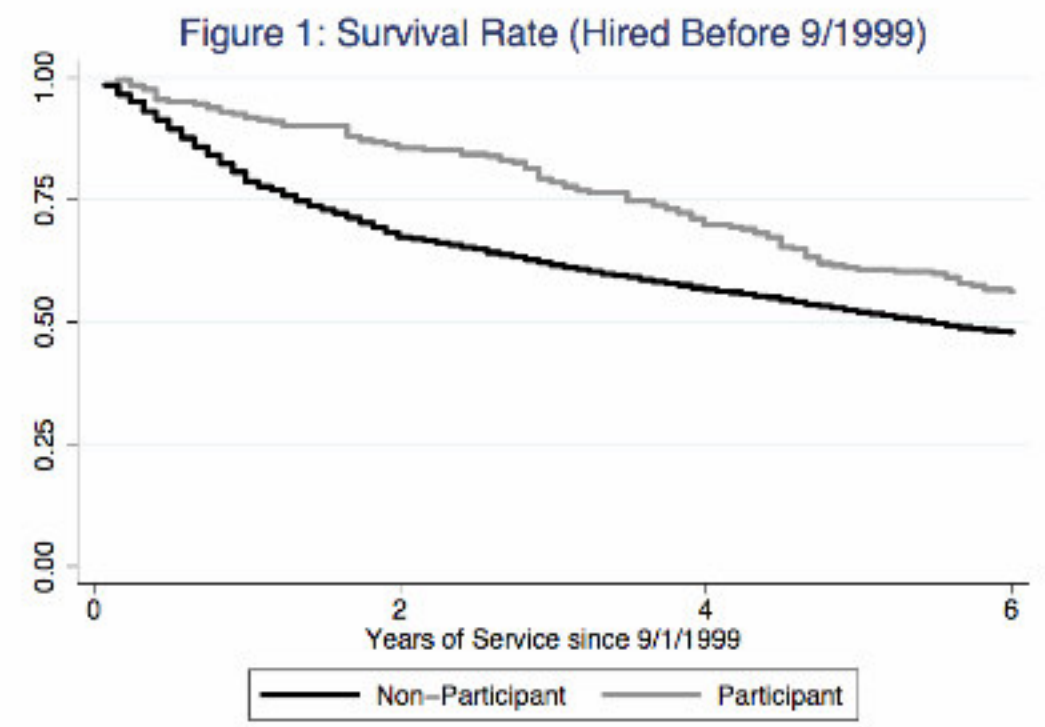
Figure 1: Survival Rate (Hired Before 9/1999)
1.00
0.75
0.50
0.25
0.00
0
2
4
6
Years of Service since 9/1/1999
Non-Participant
Participant

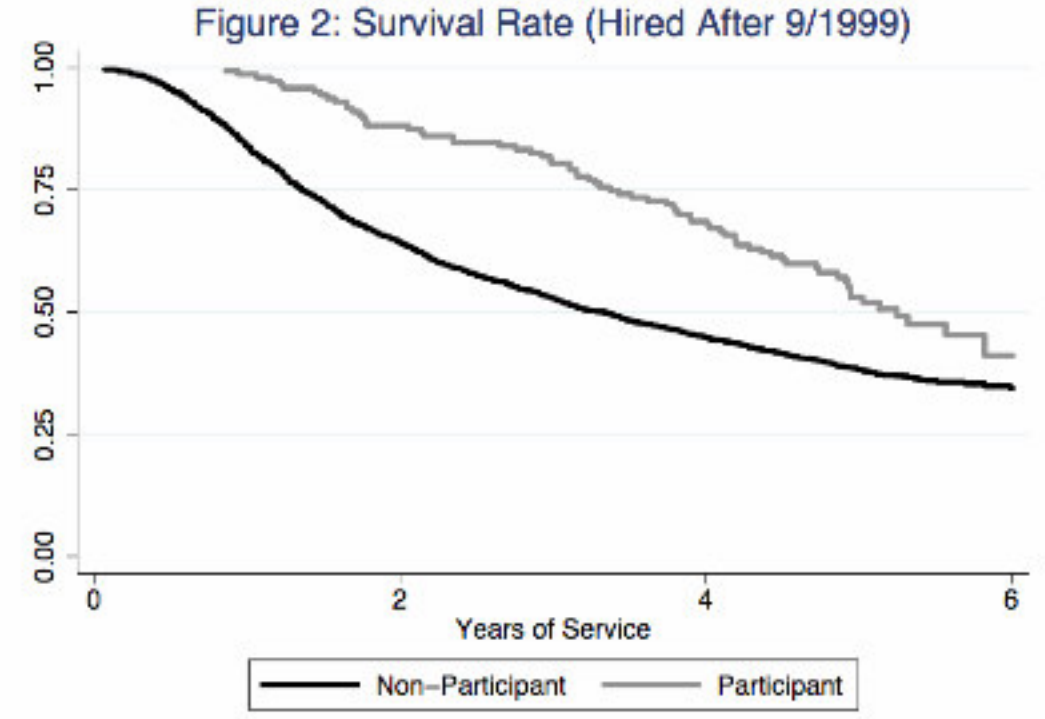
Figure 2: Survival Rate (Hired After 9/1999)
1.00
0.75
0.50
0.25
0.00
0
2
4
6
Years of Service
Non-Participant
Participant

Figure 3: Survival Rates by Degree (Hired Before 9/1999)

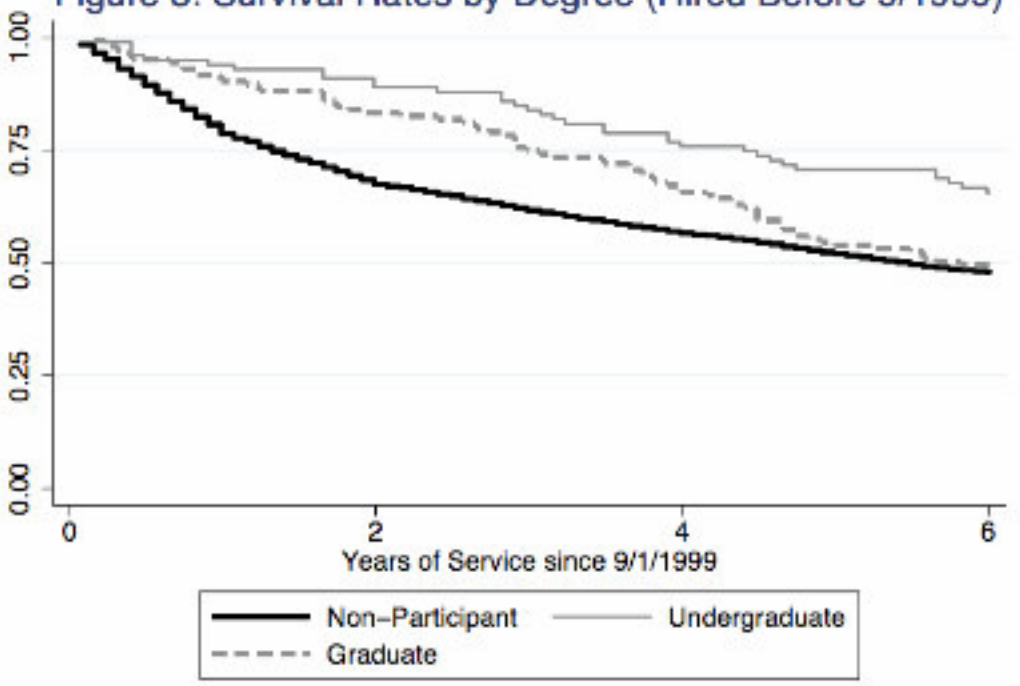

Figure 4: Survival Rates by Degree (Hired After 9/1999)