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YOU PAID FOR THE SKILLS, NOW KEEP THEM: TUITION REIMBURSEMENT AND VOLUNTARY TURNOVER

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Does investing in employees' marketable skills reduce turnover? This study uses insights from human capital theory to explain how general skill development and promotion relate to voluntary turnover. Data from 9,439 salaried employees of a large manufacturer show that participation in tuition reimbursement reduces turnover while employees are in school. Voluntary turnover increases when individuals earn graduate degrees but is significantly reduced if they are subsequently promoted.

In today's competitive and volatile global economy, where job security is difficult to offer, companies are increasingly relying on "employability" to attract, motivate, and retain knowledge workers (Craig, Kimberly, & Bouchikhi, 2002; Lawler, 2001; Rousseau, 1997). Existing turnover theories and empirical research, however, do not resolve the question central to this employment strategy: Does investing in employees' marketable skills make them more likely to stay?

Many firms appear to be making the assumption that it does, investing substantial amounts to develop employees' knowledge and skills. Estimates of company spending on employee development in the United States range from $16 billion to $55 billion, and the level of investment appears to be growing (Frazis, Herz, & Horrigan, 1995; American Society for Training and Development [ASTD], 2001). A little-studied form of development is tuition reimbursement, whereby firms pay some or all of the expenses when employees take seminars and college courses, and pursue degrees. A 1996 nationally representative survey found 75 percent of U.S. establishments with more than 20 employees and almost all large employers offered some type of tuition reimbursement benefit (Institute for Research on Higher Education [IRHE], 1997). A 1998 Hewitt Associates survey of 460 tuition reimbursement programs found that 77 percent reimbursed educational expenses (for books and travel to courses, for example) in addition to tuition, and 14 percent placed no limit on the amount of tuition that could be reimbursed (Hewitt Associates, 1999).

The large corporate investment in tuition reimbursement fits with the prevailing assumption in the business press that employee development leads to positive employee attitudes and retention (ASTD, 1999; Cappelli, 2001; Craig et al., 2002). In contrast, human capital theory, as originally formulated (Becker, 1965), would predict that firms will not pay to develop employees' general skills because such development is likely to increase employee turnover. This prediction has generated a long-standing debate among training and labor economics researchers over the relationship between development and turnover, and whether firms realize a return on their investments in employee development (for summaries, see Bartel [2000] and Bishop [1997]). Of all the forms of company-sponsored development, college courses covered by tuition reimbursement are the most likely to be seen by employees as providing marketable skills, because of the broad content and qualifications they offer (Loewenstein & Speltzer, 1998; Lynch, 1992). Some organizations have recognized the potential for turnover and instituted policies that require individuals to stay a certain length of time with the organizations or repay the cost of the classes. For example, the U.S. military obligates R.O.T.C. mem-

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bers to serve or repay their tuition benefits. However, only 16 percent of firms offering tuition reimbursement use contractual "handcuffs" to keep employees (Hewitt, 1999).

The direct effects of tuition reimbursement on turnover have received little attention in hundreds of empirical turnover studies, and two of the main models of turnover in the management literature appear ambiguous on the likely effects on retention of company-financed employee education (Griffith, Hom, & Gaertner, 2000; Hom & Kinicki, 2001; Mitchell & Lee, 2001). In this study, we used insights from a substantial body of human capital research to inform turnover theory and improve our understanding of how general skills development, through tuition reimbursement, is related to voluntary turnover. Six hypotheses were developed and tested using Cox proportional hazards regression on personnel records data from 9,439 salaried employees at a U.S. high-technology manufacturing firm from January 1996 until June 2000. As a centerpiece of its new employability policies, this company greatly enhanced tuition reimbursement benefits to employees in 1996; these benefits included a large, one-time stock bonus for those completing degrees.

LITERATURE REVIEW AND HYPOTHESES

Traditional turnover theory focuses on job satisfaction and job alternatives, or ease of movement considerations, as the two main factors predicting turnover (Bluedorn, 1982; Hom & Kinicki, 2001; March & Simon, 1958; Mobley, 1977; Mobley, Griffeth, Hand, & Meglino, 1979; Steers & Mowday, 1981). March and Simon (1958) first proposed that the ability and desire to move would influence the departure of employees. Although tuition reimbursement is not specifically addressed in this literature, education has generally been treated as increasing employees' ease of movement. Many researchers conducting turnover studies have used level of education as a control variable, assuming that it will increase individuals' ability to change jobs and therefore be likely to contribute to turnover (Bretz, Boudreau, & Judge, 1994). Today, ease of movement is considered to have both market and individual determinants that are related to employee skill levels (Gerhart, 1990). For example, Trevor (2001) found that prior education and vocational training moderated the effects of local unemployment rates and job satisfaction on turnover. When job satisfaction, unemployment rates, and pay were held constant, employees with higher education were more likely to quit (Trevor, 2001).

More recent turnover theory provides a different view of the likely effects of tuition reimbursement. Turnover has also been viewed as a process that takes place, or "unfolds," over time as a function of how embedded a person is in his or her present job (Mitchell & Lee, 2001). The unfolding model of turnover suggests that employee development plays the role of maintaining skills and reducing the likelihood of precipitating events, called "shocks," that lead to an employee's leaving a job (Lee & Maurer, 1997). Within the unfolding model, the attractiveness of other jobs is partly determined by employees' fit, or perceived compatibility, with their current jobs. Among other things, employees' goals and plans for the future should match the knowledge and skill demands of their jobs (Mitchell, Holtom, Lee, Sablynski, & Erez, 2001). Particularly for knowledge workers, who need to update skills continually, the fit between employees' career goals, job skills, and job requirements is likely to decline over time in the absence of ongoing development, leading to a reassessment of job alternatives or a turnover-inducing shock (Lee & Maurer, 1997). Although Lee and Maurer (1997) also acknowledged that employee development may need to be followed by appropriate changes in an employee's job, the unfolding model of turnover suggests that the primary effect of tuition reimbursement is to maintain fit and reduce employee turnover over time.

Given these differing perspectives on the likely outcomes when employees develop new skills, recent human capital theory and research can be applied to inform these two theories of employee turnover regarding how changes in skills and education through tuition reimbursement are likely to influence ease of movement, the match between employees' skills and jobs, and eventual turnover. In human capital theory, skills are viewed as enablers of productivity that firms compensate individuals for through wages. Becker (1965) distinguished between "general" skills that increase the marginal productivity of labor at all firms equally, and "specific" skills that increase the productivity of labor at a single firm, extremes that, he acknowledged, seldom occur in practice. As Loewenstein and Speltzer noted, "One is hard pressed to come up with good examples of training that provides skills that are useful at only one employer" (1997, 730). On the basis of this distinction, however, human capital theorists predict that providing more general skills that are useful at other firms will make employees more likely to be bid away (Becker, 1965; Bishop, 1997; Stevens, 1996). Because of the potential for firms to lose trained workers to their competitors, Becker, and others who followed, predicted that a firm would only provide

general skills training if an employee were willing to bear the cost of training by accepting a lower initial wage.

Although empirical support has been found for a number of Becker's human capital predictions, the research clearly shows that companies do pay to develop their employees' general skills without paying below-market wages during development (Barron, Berger, & Black, 1997; Barron, Black, & Loewenstein, 1993). This evidence leaves open the question of whether developing general skills results in increased turnover. Lynch (1991) found that employees who participated in some form of company-sponsored classes outside the workplace were more likely to leave their jobs. In contrast, Loewenstein and Speltzer (1997) found no link between participation in college-based classes and turnover rates. These inconsistent results suggest additional work is needed to understand the relationship between tuition reimbursement programs and turnover. We argue that the effects of tuition reimbursement on turnover depend on whether or not employees earn degrees and whether or not they are promoted afterward.

A Degree as a Signaling Mechanism

Human capital research has shown that education increases employees' skills and future earning potential (Mincer, 1988). However, this research has also shown that the wage effects of education are more closely tied to completing a degree than to simply staying in school. Research into the wage effects of education generally has shown that academic credentials are more accurate predictors of earnings than years of education, indicating that graduation is a signal to employers of a worker's potential productivity (Arkes, 1999; Woo, 1986). The same signaling phenomenon likely affects the impact of tuition reimbursement on ease of mobility. General skills acquired by employees make them more employable elsewhere, depending on whether or not potential employers understand the value of those skills (Acemoglu & Pischke, 1998, 1999). In comparison to a degree, skills gained through an individual college course or outside seminar are more difficult for potential employers to recognize and value, and are thus not very likely to generate new job opportunities (Strober, 1990). This suggests that an employee has an incentive to complete a degree when participating in tuition reimbursement.

Employees also see company-financed development as a benefit in itself, and the perceived benefit is likely to be particularly high for tuition reimbursement programs since they are voluntary and employees get to choose which courses they take (Nordhaug, 1989; Maurer, Pierce & Shore, 2001). As a result, while employees are receiving tuition reimbursement, they may be reluctant to change jobs if doing so would mean giving up this benefit or disrupting their studies (Shaw, Delery, Jenkins, & Gupta, 1998). After employees have earned degrees through tuition reimbursement, however, their circumstances change significantly. They no longer receive tuition reimbursement benefits, so the costs of switching employers decrease. More importantly, these individuals have obtained new credentials that are powerful signals to prospective employers of their capabilities (Acemoglu & Pischke, 1999; Spence, 1974). Therefore, we predict:

Hypothesis 1. Employees who participate in tuition reimbursement without earning degrees will be less likely to leave voluntarily than employees who do not participate in tuition reimbursement.

Hypothesis 2a. Employees who earn degrees through tuition reimbursement will be more likely to leave voluntarily than employees who participate in tuition reimbursement without earning degrees.

Hypothesis 2b. Employees who earn degrees through tuition reimbursement will be more likely to leave voluntarily than employees who do not participate in tuition reimbursement.

The Importance of Promotion

Human capital theory also suggests that individuals decide whether to stay with a firm in part on the basis of whether their jobs provide the best fit with and returns on their skills (Bishop, 1997; Liu, 1984). Thus, a key issue for those who have invested their time and effort in further education is whether their firms recognize this effort and provide an opportunity to use the new skills by, for instance, promoting the employees to new jobs. Multiple studies have found that promotions are negatively correlated with turnover (e.g., Carson, Carson, Griffeth, & Steel, 1994; Johnston, Griffeth, Burton, & Carson, 1993). Most of this research, however, has not controlled for the wage increases that often accompany promotions. In a notable exception, while controlling for wages Trevor, Gerhart, and Boudreau (1997) found that promotions were positively related to voluntary turnover, which they attributed to promotions acting as a signal of individual ability to other firms. However, other studies have not replicated this result, finding evidence that promotions reduce turnover independent of wages (Lyness & Judiesch, 2001).

From a human capital perspective, promoting employees after they have earned degrees should have a negative effect on turnover, when wages are controlled for, because the employees' job requirements will better match their newly acquired skills (Pergamit & Veum, 1999). As individuals accumulate general skills through tuition reimbursement, they may outgrow their current jobs, making other alternatives more attractive. A promotion means their existing firm has recognized their new skills and found them new responsibilities that are a closer match to their capabilities. Promotions are a way of re-establishing fit between employee skills and job requirements, and they should reduce the attractiveness of other job opportunities, independent of wages (Liu, 1984). If job alternatives from tuition reimbursement depend on earning a degree, then the effects of a promotion on turnover should be stronger for an employee whose promotion followed a degree than for an employee who took classes without attaining a degree or did not participate in tuition reinbursement, since the perceived mismatch with the latter's current position is likely to be greater. Thus, we predict:

Hypothesis 3. When wages are controlled, employees who earn degrees through tuition reimbursement and are then promoted will be less likely to leave voluntarily than employees who earn degrees through tuition reimbursement and are not subsequently promoted.

Hypothesis 4a. When wages are controlled, the effect of promotion on reducing the likelihood of voluntary turnover will be greater for employees who earn degrees and are then promoted than for those who do not participate in tuition reimbursement and are promoted.

Hypothesis 4b. When wages are controlled, the effect of promotion on reducing the likelihood of voluntary employee turnover will be greater for those who earn degrees and are then promoted than for those who take part in tuition reimbursement without earning degrees and are promoted.

The human capital arguments underlying these six hypotheses represent refinements to existing models of turnover that are potentially important for understanding the role of employee development. First, human capital theory provides a basis for distinguishing among the impacts of different development activities on turnover by predicting that those leading to general skills create more external job opportunities than those leading to specific skills. Second, it predicts that those external job opportunities depend on how new skills are signaled to potential employers, suggesting that turnover theory should differentiate between simply taking classes, and earning a degree through tuition reimbursement. Finally, human capital theory indicates the importance of matching individuals' job requirements to their capabilities, suggesting that as employees acquire further skills, firms need to change their responsibilities accordingly, or the employees are more likely to leave their jobs.

METHODS

Sample

The effects of tuition reimbursement on voluntary turnover were tested using all permanent, salaried, U.S. employees (n = 9,543) of a large, high-technology manufacturing firm who were active in January 1996. The salaried workforce consisted primarily of engineers, additional technical personnel, and their managers. Employees who were laid off and rehired during the study period were excluded, along with employees who had incomplete data, leaving 9,439 employees available for analysis. In 1996, the firm significantly enhanced a preexisting tuition reimbursement program to include 100 percent reimbursement. Employees were given a few hours per week off the job for study and permitted to pursue any degree or professional development program without restriction. When an employee completed a degree, he or she also received a bonus, of $5,000 in company stock for a two-year junior college or associate's degree, and of $10,000 for a bachelor's or graduate degree. The completion bonus was not tied to a retention contract or subject to vesting. The program was intended to upgrade employee skills and to attract and retain top managerial and technical talent in a cyclical industry with regular large-scale layoffs. However, the tuition reimbursement program was not integrated into existing jobs and career planning, and participation in the program was not tied to promotion or an implicit promise of promotion.

Measures

Turnover. Turnover was coded from electronic personnel records and categorized as either voluntary (quitting), or involuntary (being laid off or terminated). The company studied, which has a cyclical business and a history of layoffs, underwent two waves of downsizing during the study period. The first was in 1997, when total turnover was 9.1 percent of the salaried employees active in 1996, and the second was in 1999, when a further 17.3 percent of 1996 employees left. By comparison, in

years without layoffs (1996 and 1998), total turnover was 3.9 percent. Table 1 presents annual voluntary and total turnover rates between 1996 and 2000 for all salaried employees active in January 1996. Voluntary turnover rates remained relatively stable, ranging from 1.7 to 2.6 percent per year. This relatively low voluntary turnover rate is due to the nature of the industry and the fact that significant downsizing during this period had increased the average tenure of employees to 17.8 years with the company. Voluntary turnover was coded 1 if an employee quit the company during the study period and 0 if the employee was still active in June 2000. Employees who left the company involuntarily during the study period were treated as "censored" cases and included in the Cox regressions (Hosemer & Lemeshow, 1999; see "Analyses," below). The duration of employment was coded as the number of months between January 1996 and either the date that an employee left the company or June 2000.

Tuition reimbursement. Four dummy variables for tuition reimbursement participation were coded from company records on employee enrollments and types of degrees earned by employees. The first dummy variable was coded as 1 if an employee took at least one class through tuition reimbursement in 1996–2000 and 0 if the employee did not take any reimbursed classes. We could not discern from our archival data whether an employee intended to take only a single class or was actively enrolled in a degree program, and we made no distinction between these two cases. For the 9,439 employees analyzed, 4,496 employees (47.6%) took at least one class through tuition reimbursement. A second dummy variable was then coded 1 if an employee earned a degree through tuition reimbursement and 0 for all others. A total of 902 employees (9.6 percent of all employees) earned degrees and received the stock bonuses. Most of the people in our sample who earned degrees began their studies before the tuition reimbursement program was upgraded in 1996. Although this fact diminishes potential range restriction problems arising from the length of time it takes to earn a degree, the number of degrees earned increased steadily, from 151 in 1996 and to 260 in 1999.

The final dummy variables identified the level of degree earned. In our highly educated sample of engineers and managers, more than half (59.6%) of the most recent degrees earned were graduate level; 22.7 percent were bachelor's degrees, and 17.6 percent were two-year associate's degrees. Although human capital theory generally does not differentiate between types of degrees, there is some evidence that employers tend to place higher value on graduate degrees (Spilerman & Lunde, 1991; Woo, 1986). Graduate degrees have been shown to generate significantly higher earnings than undergraduate degrees when years of education completed are controlled for, suggesting that completing a graduate degree signals higher-level, scarcer skills to potential employers (Arkes, 1999). Therefore, employees who earn graduate degrees

TABLE 1
Turnover Rates by Year for Employees Active in January 1996[a]

Variables	1996	1997	1998	1999	2000[b]
Active employees	9,439	9,069	8,244	7,919	6,546
All turnover[c]					
Number	370	825	325	1,373	237
Percentage	3.92	9.10	3.94	17.34	3.62
Voluntary turnover					
Number	185	189	141	207	98
Percentage	1.96	2.08	1.71	2.61	1.50
Voluntary turnover by tuition reimbursement group[d]					
Did not participate	3.91%	2.87%	1.43%	2.13%	0.79%
Took classes without attaining degree	0.11	1.45	1.70	2.39	1.15
Associate's or bachelor's degree	0.00	1.45	1.18	1.49	0.91
Graduate degree, not promoted	1.28	1.82	3.97	7.71	5.67
Graduate degree, then promoted	0.00	0.60	1.20	1.82	3.09

[a] Employees terminated and rehired during the study period were excluded.
[b] January through June 2000.
[c] Includes layoffs, early retirements, and terminations.
[d] Percentages for the groups do not sum to the total annual quit rates because the groups vary in size.

may see additional job alternatives and opportunities to improve their jobs by leaving their company. To test whether degree level affected our results, we coded separate dummy variables for (1) graduate degrees and (2) bachelor and associate degrees. For 70 employees who earned more than one degree during the study period, the most recent degree was used to code the dummy variables.

Employees may enroll in tuition reimbursement for many different reasons, but our data suggested that they most often chose degrees related to their careers. Information on degree field was available for 892 (over 90%) of the degrees awarded. A total of 482 (54.0%) were in business, and 234 (26.2%) were in science or engineering. Other work-related degrees included 96 (10.8%) in industrial and environmental science, and 15 (1.7%) in human resources. Only 65 degrees (7.3%) appeared not directly applicable to jobs at the firm. These included prenursing, prelaw, education, Spanish, and art.

Promotion. A dummy variable to indicate whether an employee received a promotion, defined as an increase in job grade, between 1996 and 2000 was coded as 1 ("promoted") or 0 ("not promoted"). This company did not offer within-grade pay raises other than adjustments for inflation. Over the 54-month study period, 3,405 employees (36.1%) received promotions, and 601 (6.4%) were promoted two or more times. Less than 1.0 percent of employees received more than two promotions during the study period, and the maximum was four promotions.

We also coded dummy variables to test whether receiving a promotion moderated the effects on voluntary turnover of taking classes without earning a degree or earning a degree through tuition reimbursement. The dummy variables were coded in two ways. For those who participated in tuition reimbursement but did not attain degrees, a dummy variable was coded 1 if they were promoted during 1996–2000, and it was coded 0 otherwise. This dummy variable effectively tested whether an employee experienced both of these events (tuition-reimbursed classes that did not lead to a degree, and a promotion), regardless of the sequence in which the events occurred. Of the 3,594 employees who took classes without earning degrees, 42.3 percent were promoted during the study period, compared to 32.1 percent of nonparticipants. Earning a degree, however, is associated with a specific date (graduation), which could be compared to the date that a promotion was recorded in an employee's personnel file. A dummy variable was coded 1 for those who earned degrees through tuition reimbursement and received promotions *after* graduation, and it was coded 0 for all others in the sample. Finally, additional dummy variables were coded by the same method to examine the effects of a subsequent promotion by degree type. Roughly one-third of employees who earned graduate degrees (30.1%), and slightly more employees who earned associate's or bachelor's degrees (36%), were promoted afterward.

Control variables. Tenure was coded from personnel records as the number of years between an employee's original start date and the beginning of the study period, in January 1996. Tenure ranged from less than a month to 49 years, averaging 17.8 years. Research has shown job and organizational tenure to be significant factors in predicting participation in voluntary development activities and subsequent turnover (Griffeth et al., 2000; Kozlowski & Hults, 1987; Noe & Wilk, 1993). Employees with lower tenures were more likely to participate in tuition reimbursement and more likely to quit. For example, 17.5 percent of employees with less than 10 years tenure earned degrees through tuition reimbursement, compared to 6.8 percent of employees with 10 years or more with the company. Over the 54-month study period, 21.5 percent of employees with less than 10 years tenure quit the company, compared to 4.3 percent of employees who had been at the company more than 10 years.

We controlled for *job grade* in our analyses using seven dummy variables taken from electronic personnel records of the grade an employee held in January 1996. Eight job classifications were identified in the employee data, representing one grade of salaried shop employees, three grades of engineers, and four grades of managers. A midlevel engineer grade was excluded as a reference category. Job grade was included as a control variable as employees in lower job grades generally had more opportunities for promotion.

Salary growth was defined as the difference between an employee's salary in 1996 and his or her last observed salary, divided by the length of time elapsed between the employee's receiving the two salaries. For employees still active at the end of the study period, salary growth was calculated as the difference between salaries in January 1996 and June 2000 divided by 4.5 years. Salary at termination was used for those who left the company during the study period. The average time between the two salary observations was 3.8 years, and the average salary growth was $2,055 per year for all employees. Wages of degree earners increased by an average of $2,893 per year over the study period, compared with $2,336 for employees who took classes without attaining degrees and $1,695 for nonparticipants. *Salary level* was defined as the last observed salary for an employee, measured in

thousands of dollars. The average pay for all salaried employees active in 1996 was $69,094. We included salary level and growth in the model to control for the potential wage effects of receiving a promotion on voluntary turnover (Lyness & Judiesch, 2001; Trevor et al., 1997).

Analyses

Cox proportional hazards regression analysis (hereafter referred to as Cox regression) was used to test the relationships between tuition reimbursement, promotions, and voluntary turnover. Cox regression is an increasingly popular approach for analyzing organizational turnover (e.g., Hom & Kinicki, 2001; Trevor, 2001; Somers & Birnbaum, 1999). Instead of approaching quitting a job (or "voluntary turnover") as a simple quit versus did not quit event, Cox regression includes information on the duration of employee retention. Using a measure of duration permits the estimation of the conditional probability of the occurrence of an event (here, leaving) over time, which is called a hazard function. Cox regression tests whether independent variables contribute to the predictive power of a multivariate hazard function (Hosemer & Lemeshow, 1999; Morita, Lee, & Mowday, 1993).

The Cox regression model was based on the assumption that the independent variables and covariates affected turnover at a constant rate over time (Hosemer & Lemeshow, 1999; Morita, Lee, & Mowday, 1989, 1993). That is, the hazard functions for groups of employees needed to be proportional at each level of the covariates. We checked the assumption of proportionality by comparing estimates of hazard functions graphed for each level of the variables used to predict voluntary turnover. Visual inspection revealed that the hazard functions were relatively straight and nonoverlapping for the different levels of each variable. This observation indicated that the assumption of proportionality had been met. The full Cox regression model is specified in Equation 1; $h(t)$ is the baseline hazard function, and the $\boldsymbol{X}$s are the predictors.

$$h(t{:}x) = h(t)\exp\left[b_1(X_{\text{controls}}) + b_2(\boldsymbol{X}_{\text{took classes}}) + b_3(\boldsymbol{X}_{\text{degree}}) + b_4(\boldsymbol{X}_{\text{promoted}}) + b_5(\boldsymbol{X}_{\text{degree then promoted}}) + b_5(\boldsymbol{X}_{\text{took classes without degree X promoted}})\right] \quad (1)$$

We entered the control variables for tenure, job grade, salary level, salary growth, and promotion in model 1. In model 2 we tested Hypotheses 1, 2a, and 2b by entering the dummy variables for taking classes and earning a degree through tuition reimbursement. In model 3 we replaced the variable for earning a degree with two separate dummy variables for (1) graduate degree and (2) associate's or bachelor's degree. Hypotheses 3, 4a, and 4b were tested in model 4 by adding the dummy variables for taking classes without attaining a degree and receiving a promotion, and earning a degree and receiving a subsequent promotion. In model 5 we repeated the test from model 4, replacing the variable for all degree earners with two dummy variables for earning an associate's or bachelor's degree and being promoted afterwards, and earning a graduate degree and being promoted afterward.

RESULTS

Descriptive statistics and correlations are presented in Table 2. Cox regression results are presented in Table 3. The raw coefficients in Cox regression are interpreted as odds ratios, and we have

TABLE 2
Descriptive Statistics and Correlations[a]

Variable[b]	Mean	s.d.	1	2	3	4	5	6	7	8	9
1. Quit	0.09	0.28									
2. Tenure	17.83	9.64	−.27								
3. Salary level	69.09	18.92	−.12	.22							
4. Salary growth	2.05	1.57	−.05	−.33	.40						
5. Promoted 1996–2000	0.36	0.48	−.02	−.35	−.00	.55					
6. Took classes[c]	0.48	0.50	−.04	−.26	−.04	.24	.22				
7. Associate's/bachelor's degree	0.04	0.19	−.03	−.08	−.15	.03	.11	.20			
8. Graduate degree	0.06	0.24	.06	−.20	.02	.19	.16	.26	−.05		
9. Associate's/bachelor's, then promoted	0.01	0.11	−.03	−.07	−.10	.06	.15	.12	.59	−.03	
10. Graduate, then promoted	0.02	0.13	−.01	−.13	.01	.17	.18	.14	−.03	.54	−.02

[a] n = 9,439. Values greater than .02 are significant at $p < .05$. Values greater than .03 are significant at $p < .001$.
[b] Tenure is in years. Salary level and salary growth are in thousands of dollars.
[c] Includes degree earners.

TABLE 3
Results of Cox Regression Analysis[a]

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variables[b]	*b*	Exp(*b*)	*b*	Exp(*b*)	*b*	Exp(*b*)	*b*	Exp(*b*)	*b*	Exp(b)
Tenure	−1.27	0.28***	−1.32	0.27***	−1.30	0.27***	−1.31	0.27***	−1.30	0.27***
Grade 1: Production	−0.49	0.61*	−0.48	0.62*	−0.48	0.62*	−0.47	0.63*	−0.45	0.64**
Grade 2: Engineer 1	−0.37	0.69	−0.44	0.64	−0.44	0.65	−0.43	0.65	−0.42	0.66
Grade 4: Engineer 3	1.04	2.84***	0.97	2.65***	0.94	2.56***	0.96	2.62***	0.95	2.59***
Grade 5: Manager 1	0.76	2.14***	0.64	1.90***	0.60	1.82**	0.64	1.89***	0.61	1.85***
Grade 6: Manager 2	1.27	3.57***	1.13	3.10***	1.09	2.99***	1.13	3.09***	1.10	3.00***
Grade 7: Executive 1	2.53	12.49***	2.32	10.18***	2.30	10.00***	2.31	10.11***	2.29	9.92***
Grade 8: Executive 2	3.67	39.05***	3.54	34.48***	3.55	34.84***	3.56	35.07***	3.56	35.18***
Salary level	−0.05	0.96***	−0.05	0.96***	−0.05	0.95***	−0.05	0.96***	−0.05	0.95***
Salary growth	−0.30	0.75***	−0.25	0.78***	−0.25	0.78***	−0.24	0.78***	−0.25	0.78***
Promoted	−0.31	0.73**	−0.31	0.73**	−0.31	0.73**	−0.36	0.70**	−0.38	0.69**
Took classes			−0.81	0.45***	−0.81	0.45***	−0.91	0.40***	−0.92	0.40***
Earned degree			0.32	1.37**			0.60	1.82***		
Associate's/bachelor's degree					−0.43	0.65			−0.10	0.90
Graduate degree					0.57	1.76***			0.82	2.27***
Took classes X promoted							0.28	1.32	0.29	1.34
Degree, then promoted							−0.82	0.44**		
Associate's/bachelor's, then promoted									−0.81	0.45
Graduate, then promoted									−0.71	0.49*
Global χ^2		1,279.06***		1,403.62***		1,422.16***		1,420.50***		1,440.21***
$\Delta\chi^2$				105.14***		121.71***		13.83***		11.84**

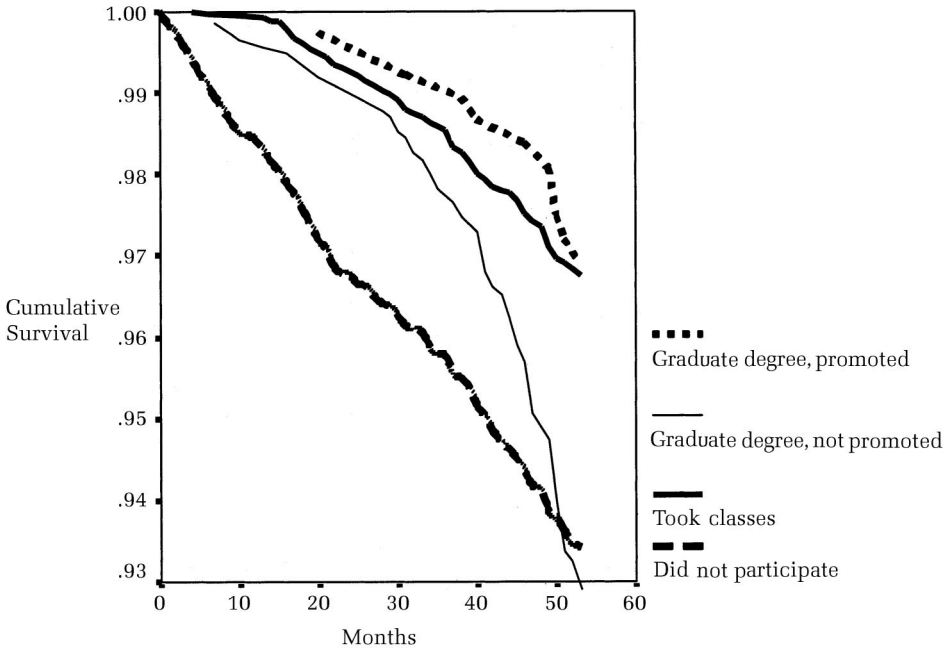
[a] The sample size is 9,439. The percent censored (cases) is 91.3.
[b] The value for tenure is standardized. Salary level and growth are in thousands of dollars.
[c] Includes degree earners.
*$P < .05$
**$P < .01$
***$P < .001$

presented exponentiated coefficients here to ease interpretation. Exponentiated coefficients greater than 1 indicate a positive relationship with voluntary turnover, and exponentiated coefficients lower than 1 indicate a negative relationship. Wald statistics and change in chi-square statistics are presented as significance tests. Employees who did not quit during the study period are included in the analysis as censored cases (Hosemer & Lemeshow, 1999).

Model 1 in Table 3 shows that the control variables for tenure, job grade, promotion, and salary level, and salary growth were all significant ($p < .01$). Salary growth, salary level, and organizational tenure were all negatively related to voluntary turnover, indicating that longer-tenured employees with higher salaries were less likely to quit. An exponentiated coefficient of .73 ($\Delta\chi^2 = 9.20$, $p < .01$; Wald statistic = 9.07, $p < .01$) for receiving a promotion indicates a negative relationship with voluntary turnover. Employees who received promotions were 27 percent less likely to quit the company over the study period than those employees who did not receive promotions, with salary growth, salary level, job grade, and tenure controlled for.

Two dummy variables for taking classes and for earning a degree through the tuition reimbursement program were added in model 2. Hypothesis 1, predicting that employees who took classes without attaining degrees will be less likely to quit than employees who did not enroll in tuition reimbursement, was supported. The exponentiated coefficient of .45 ($\Delta\chi^2 = 104.28$, $p < .001$; Wald statistic = 98.28, $p < .001$) indicated that employees who participated in tuition reimbursement between 1996 and 2000 without attaining degrees were 55 percent less likely to quit the company than nonparticipants. Figure 1 illustrates this finding, showing the line representing the Kaplan-Meier survival function for employees taking classes without attaining degrees is always above the survival function for nonparticipants and indicates less likelihood of turnover. These multivariate survival functions represent the probability that employees in each group will remain with the firm

FIGURE 1
Survival Function Stratified by Tuition Reimbursement Experience



voluntarily over time (Hosemer & Lemeshow, 1999).

Hypotheses 2a, which predicts that employees who earned degrees through tuition reimbursement will be more likely to quit than employees who took classes without attaining degrees, was supported by a positive and significant coefficient for earning a degree. Since both these groups of employees took classes, this comparison was based on the exponentiated coefficient for earning a degree of 1.37 ($\Delta\chi^2 = 6.60$, $p < .01$; Wald statistic = 6.88, $p < .01$), which indicated that employees who earned degrees were 37 percent more likely to quit than tuition reimbursement participants who did not earn degrees. However, when we broke degree earners down into graduate and undergraduate degrees in model 3, we found this effect was driven exclusively by employees who had earned graduate degrees. Supporting Hypothesis 2a, graduate degree earners were 76 percent more likely to quit the firm than employees who took classes without attaining degrees (exp $b = 1.76$, $\Delta\chi^2 = 17.56$, $p < .01$; Wald statistic = 19.19, $p < .001$). In contrast, earning an associate's or bachelor's degree was not significant, indicating that these employees were no more likely to quit than employees who took classes through tuition reimbursement but did not earn degrees.

Hypothesis 2b predicts that degree earners will be more likely to quit than nonparticipants. Since these groups differed both on whether employees took classes and whether they earned degrees, we calculated this result by summing these two coefficients and taking the exponent of the result for an odds ratio of .61 (see the Appendix for details). Hypothesis 2b was not supported, as results from model 2 indicated that employees who earned degrees (regardless of type) through the company were 39 percent less likely to quit than employees who did not participate in tuition reimbursement. This result is driven by the significant retention effect while individuals were studying, which outweighed the greater likelihood of quitting after degrees were earned. When degree earners were split between those who earned graduate degrees and those who earned associate's and bachelor's degrees, the results again indicated that these effects are driven by employees who earn graduate degrees. Summing the coefficients for taking classes and earning graduate degrees in model 3 yielded an odds ratio of .79, indicating that employees who earned graduate degrees were 21 percent less likely to quit than nonparticipants (see the Appendix). The coefficient for earning a bachelor's or associate's degree was not significant, indicating that these employees were no more or less likely to quit than employees who took classes without attaining degrees, who were 55 percent less likely to quit than nonparticipants.

Hypothesis 3 predicts that receiving subsequent promotions will moderate voluntary turnover for employees who earn degrees through tuition reim-

bursement. Consistent with Hypothesis 3, model 4 indicated that employees who were promoted after earning degrees through tuition reimbursement were 56 percent less likely to quit than employees who earned degrees through tuition reimbursement and were not subsequently promoted (exp $b = 0.44$; $\Delta\chi^2 = 9.29$, $p < .01$; Wald statistic = 7.82, $p < .01$). Results from model 5 indicate that this finding again depends on whether or not employees earned graduate degrees. The coefficient for receiving a promotion following a graduate degree was significant (exp $b = 0.49$; $\Delta\chi^2 = 5.56$, $p < .05$; Wald statistic = 4.73, $p < .05$), indicating that employees who earned graduate degrees were 51 percent less likely to quit if they were promoted afterwards than if they were not promoted afterwards. There was no significant interaction effect, however, for receiving a promotion after earning an associate's or bachelor's degree.

Hypothesis 4a, predicting that a promotion following a degree has a greater negative effect on voluntary turnover than receiving a promotion without participating in tuition reimbursement, was supported by a negative and significant interaction for earning a degree and receiving a promotion. To compare employees who earned degrees and were then promoted with nonparticipants who were promoted, the coefficients for taking classes, earning a degree, and receiving a promotion after earning a degree were summed and exponentiated for an odds ratio of .33 (see the Appendix). Employees who were promoted after earning degrees were 67 percent less likely to voluntarily leave the company than employees who did not participate in tuition reimbursement and were promoted. Once again, results from model 5 indicate that this finding depends on whether or not employees earned graduate degrees. Employees who were promoted after earning graduate degrees were 55 percent less likely to quit than employees who were promoted but did not take part in tuition reimbursement (see the Appendix). In contrast, the coefficient for receiving a promotion after earning an associate's or bachelor's degree was not significant, indicating that promotion did not have a greater effect on the retention of the employees who earned these degrees than on that of nonparticipants.

Hypothesis 4b predicts that promotions will have a greater negative effect on retention for those who earned degrees than for those who took classes without attaining degrees. Supporting Hypothesis 4b, results from model 4 show that taking classes without attaining a degree and receiving a promotion does not produce a significant interaction, while receiving a promotion after earning a degree, as discussed above, does have a significant interaction effect. Comparing these groups required summing the coefficients for earning a degree and receiving a promotion after earning a degree to create an odds ratio of .80 (see the Appendix). Employees who were promoted after earning degrees were 20 percent less likely to quit than those who took classes and were promoted. The results from model 5 also indicated that this finding depended on the level of degree an employee earned. The significant coefficient for earning a graduate degree and receiving a subsequent promotion supported Hypothesis 4b, since there was no significant interaction between taking classes without attaining a degree and receiving a promotion. The coefficient for receiving a promotion after earning an associate's or bachelor's degree, on the other hand, was not significant, and did not support Hypothesis 4b.

Finally, results from model 5 can also be interpreted to show progressive change in the effects of graduate study through tuition reimbursement as an employee first takes classes, then attains a degree, and then seeks a promotion. An employee who took any type of class (graduate or undergraduate) through tuition reimbursement was 60 percent less likely than a nonparticipant to quit the company. If an employee earned a graduate degree, then the risk of voluntary turnover increased significantly. For example, among employees who had not been promoted, those who earned graduate degrees were 127 percent more likely to quit than employees who took classes but had not completed degrees. While receiving promotions after earning graduate degrees significantly reduced the likelihood that these employees would quit, the effect of earning graduate degrees was so strong that they were still more likely to quit than promoted employees who were still in school. Summing the coefficients for earning a graduate degree and receiving a promotion after earning a graduate degree and taking the exponent of the result yielded an odds ratio of 1.12, which indicated that employees who were promoted after earning graduate degrees were 12 percent *more* likely to quit than employees who took classes without earning degrees and were promoted (see the Appendix). However, over the whole study period, employees who earned graduate degrees and were not promoted were still less likely to quit the firm than nonparticipants. These findings are illustrated in Figure 1, which shows that the survival function for employees who earned graduate degrees and were promoted as the top line, or least likely to quit. The survival function for employees who earned graduate degrees and were not promoted lies below that of employees who took classes without attaining degrees and above that of nonparticipants. Employees earning

associate's or bachelor's degrees are not shown since they were statistically no different from participants who did not earn degrees.

DISCUSSION

The results of this study support the use of insights from current human capital theory to predict the effects of tuition reimbursement on employee turnover. First, our study indicated that when participants attain advanced degrees, the rate of turnover rises dramatically, demonstrating the important signaling function these credentials have to potential employers. Completing graduate degrees increased the likelihood that employees would then quit by over 75 percent when those employees were compared to those still taking classes. Interestingly, employees earning associate's or bachelor's degrees were no more or less likely to quit than those who took classes without attaining degrees. While these differences between the effect of different degree types fits with previous research showing advanced degrees to be more strongly related to wage growth, the fact that attaining associate or bachelor degrees was not related to increased turnover was unexpected (Arkes, 1999; Woo, 1986). Second, the fact that promotions had a much greater negative effect on turnover after employees earned graduate degrees suggests that the match between employees' skills and their job responsibilities may influence the comparative attractiveness of job opportunities when the employees gain new marketable skills. Again, however, this effect was found only for employees who earned graduate degrees. Although additional research is needed to better understand the differences between the types of degrees and the generalizability of our findings, these results show that human capital theory's insights regarding general skills, signaling, and job matching might be usefully integrated into models of turnover to explain more broadly how employee development affects an individual's decision to stay with or leave a firm.

Our study has important implications for the predominant theories of employee turnover. For example, we found that skill development is a process that has variable effects over time, which is consistent with human capital theory. Traditional turnover research has tended to use education as a demographic variable and has not examined the dynamic interaction of skills, job requirements, and career development. This omission is particularly problematic given today's emphasis on company-provided employee development and lifelong learning. The turnover literature has shown that human capital in the form of vocational training and education affects ease of movement for employees (e.g., Trevor, 2001). Human capital theory helps predict how changes in skills and education once an individual is employed might affect turnover. Applying human capital theory to traditional turnover models suggests the need to distinguish between the period when tuition reimbursement leads to employee retention because an employee may have to forego a company-financed education if he or she leaves, and the period when the employee has completed the degree and the signaling potential of the new credential has facilitated ease of movement. This distinction would make it easier to reconcile the traditional turnover theories with the growing body of research showing that providing development has positive effects on employee attitudes (Bartlett, 2001; Birdi, Allen, & Warr, 1997; Meyer & Smith, 2000; Tansky & Cohen, 2001). Tuition reimbursement should enhance ease of movement by raising education levels, yet a program that finances individuals taking often expensive courses of their own choosing may also lead to increased satisfaction (Norhaug, 1989). This literature, along with our findings, suggests that tuition reimbursement may act through both of the key drivers in traditional turnover theory—ease of movement and job satisfaction—but that the effects are in opposite directions and vary in intensity depending on whether individuals have completed their studies.

Many of our findings are consistent with aspects of the unfolding model of turnover, including its conceptualization of turnover as a process in which the likelihood that an employee will quit a company varies over time depending on critical events (Lee, Mitchell, Holtom, McDaniel, & Hill, 1999; Mitchell & Lee, 2001). We found that the effects of participation in tuition reimbursement on turnover varied over the time during which an employee first took classes, then earned a degree, and finally did or did not receive a promotion. The unfolding model also specifies that fit (perceived compatibility) between employees and jobs plays a role in turnover. That is, employees' career goals and plans for the future, among other things, must be compatible with their immediate jobs (Mitchell et al., 2001). In fact, Lee and Maurer suggested that the existence of development programs, including tuition reimbursement, should be "closely connected to a firm's human resource planning efforts and an individual's career planning activities" (1997: 268). This idea aligns closely with human capital theory on job matching and also fits well with our finding that receiving a promotion after earning a graduate degree reduces the likelihood of quitting.

These results have significant implications for the role that employee development plays in the unfolding model. In two of the paths originally theorized by Lee and Mitchell (1994), assessment of job opportunities plays a role in determining a quit decision. Assessment of job opportunities along these paths (job search and evaluations induced by either shocks or dissatisfaction) is conceptualized as the subjective probability of obtaining another job (Lee et al., 1999). Human capital theory provides a framework that explains why earning a graduate degree through tuition reimbursement changes an employee's perceptions of job alternatives and contributes to increased likelihood of quitting along certain paths. In addition, although Lee and Maurer (1997) focused somewhat on employee development as a way of maintaining fit over time, our results suggest that earning a graduate degree without a subsequent promotion may actually reduce fit and be a shock that leads an employee to re-evaluate a present job as he or she proceeds on a path toward quitting.

Future Research

While this study is an important step forward in understanding the effects of general skill development, and tuition reimbursement in particular, on voluntary turnover, it also leaves several questions open for future research. First, we did not distinguish among employees' motives for enrolling in tuition reimbursement or among the types of courses they pursued. Employees have a variety of reasons for enrolling in development, including supportive company policies and colleagues, social interaction, preparing for more interesting assignments, and keeping pace with changing work demands (Kozlowski & Hults, 1987; Maurer & Tarulli, 1994; Noe & Wilk, 1993). Recent theoretical work by Maurer, Pierce, and Shore (2002) suggests that employees' decisions to participate in development that primarily benefits themselves, such as college courses, are motivated by positive outcomes they desire. While it appears that employees most commonly participate in voluntary development and adult education to benefit their careers (Fujita-Starck, 1996; Kozlowski & Hults, 1987; Maurer & Tarulli, 1994; Noe, 1996), turnover may vary according to whether employees choose degrees to develop skills in their current fields or to facilitate transitions to different fields.

Second, our finding that nonparticipants were the most likely group to quit was contrary to human capital theory. This finding suggests another potential avenue for future investigation around the social exchange that may be created when employees feel their company is providing them with valued benefits. Although models of development generally do not include turnover as an outcome, they predict that employees will respond to development opportunities with positive attitudes toward the company that offers the development, which suggests that employees who participate in development will be less likely to leave (Birdi et al,, 1997; Maurer & Tarulli, 1994; Noe, Wilk, Mullen, & Wanek, 1997). The combination of attaining a degree at company expense and receiving a promotion may be an especially potent combination of benefits. The promotions communicate to employees that their firm values them and recognizes the time and effort that goes into earning a degree. The strength of this combination of benefits leads employees to reciprocate through positive attitudes and retention and explains the strong interaction between earning a degree and receiving a promotion.

Finally, additional research should also address how company practices might enhance retention of employees who are in school and, more importantly, mitigate turnover when employees earn graduate degrees. For example, the effects of tuition reimbursement participation on turnover might depend on whether or not employees' schooling is part of an integrated development plan. In this company, the tuition reimbursement program was not linked with career planning, and no efforts were made to guide the educational choices of employees. It is possible that providing employees information about the strategic needs of a company and the areas where there might be career opportunities might affect the likelihood of retaining these employees when they earn graduate degrees. Firms might also be better able to retain employees by integrating schoolwork with employees' job duties and challenging them to apply their new skills.

Study Limitations

This study has several limitations. It investigated only one type of employee development, so care should be taken when extending our results beyond tuition reimbursement. Human capital theory suggests that new skills are likely to increase turnover only if the skills are general and known to alternative employers. We do not know whether other types of development that enhance general skills, such as in-house computer network certification or apprenticeship programs, operate in the same manner. Additional research is needed to determine how gaining skills through other forms of development relates to turnover.

The company underwent two major layoffs dur-

ing the study period, raising questions about how the business conditions affected the relationship between development and retention. Significant downsizing throughout the industry during this time may have contributed to the consistently low voluntary turnover rate at this firm, by reducing external job opportunities. The loss of job security, which is common in today's economy, may at the same time have heightened the employees' awareness of the benefits of increasing their marketable skills through use of tuition reimbursement. In a company experiencing higher rates of turnover and job dissatisfaction, the effects of earning a graduate degree would be likely to be even stronger (Trevor, 2001).

The nature of our sample and the ability of the studied employees to self-select into the tuition reimbursement program may also limit the generalizability of our findings. Our sample consisted of full-time salaried engineers and technical managers, who value keeping their skills current and participating in voluntary development activities more than nontechnical and nonsalaried employees (Dubin, 1990; Kozlowski & Hults, 1987). Employees who enroll in voluntary development activities also tend to be young and career-oriented, with high self-efficacy and learning motivation (Maurer & Tarulli, 1994; Noe & Wilk, 1993; Warr & Birdi, 1998). Although these attributes, which may be even more common among employees pursuing graduate degrees, may make them more inclined to quit when they earn degrees, they also suggest that it is especially critical for firms to retain these employees. We controlled for some individual differences through wages (a common proxy for skill levels) and job grade, but there may be other unobserved differences between participants and nonparticipants that we did not take into account. Moreover, individual differences between employees who earned graduate degrees versus undergraduate degrees may have contributed to the difference in turnover rates.

Replicating these findings across companies may depend on company policies and factors in work environments, such as perceptions of manager and peer support, that are significant predictors of participating in development activities (Maurer & Tarulli, 1994; Noe & Wilk, 1993). The company we studied places an unusually high priority on offering development opportunities to employees. Its tuition reimbursement program is quite generous and is widely seen as a valuable benefit by employees. The completion bonus is an unusual aspect of the company's program and suggests caution in generalizing from our results. Although most of the degree earners in our sample had begun their study prior to the new program, the introduction of the completion bonus likely increased incentives to stay with the firm to finish their degrees. On the other hand, the receipt of the bonus should not impact our findings regarding the relationships between earning a degree, promotion, and turnover. In fact, if employees view a bonus as just compensation for their new skills, a promotion would be even more important for retaining employees in an organization without such a bonus.

Finally, participation in tuition reimbursement, and leaving a job, are individual decisions that vary with the characteristics and attitudes of individual employees, and using archival data prevented us from assessing individual attitudes and motivations. Our large sample minimized the likelihood that these individual factors would skew the results. However, future research should address questions such as whether more dissatisfied employees use tuition reimbursement to gain new credentials in order to exit a firm, and whether employees who earn degrees and are subsequently promoted are more committed to their organization.

Managerial Implications

Understanding how tuition reimbursement affects employee turnover is particularly important for companies today as general skill development has become a central part of employability policies intended to help retain employees and gain their commitment in an era of reduced job security (Bagshaw, 1997; Baruch, 2001; Waterman, Waterman, & Collard, 1995). Employability policies offer an implicit bargain in which a company fosters the long-term viability of an individual's career independent of the organization in exchange for commitment (Finegold, Benson, & Mohrman, 2002). The essential quality of an employability policy, however, is that it must provide employees with skills that are in high demand at other firms. This fact has led to the somewhat paradoxical situation in which firms attempt to retain employees by providing them with skills that increase their attractiveness to other employers (Capelli, 2000).

Our study shows that tuition reimbursement has an overall positive effect on employee retention. This positive effect is due in large part to the significantly lower turnover that occurs while employees are taking classes, which alone might be enough to justify company expenditure on tuition reimbursement since it typically takes many years of part-time study for an employee to complete a degree. In addition, we found that the combination of financing employees to earn further qualifications and subsequent promotions that recognize the

new skills they have acquired can be a very effective retention tool, resulting in voluntary turnover rates 55 percent lower than for those employees who were promoted but did not take part in tuition reimbursement.

It is important for companies to differentiate among types of employees when forming their workforce strategies (Lawler & Finegold, 2000). For individuals who enter a firm who are not already college graduates, a tuition reimbursement program appears to be a particularly effective means to encourage the more ambitious to invest the time needed to improve their skills. For those in our study who obtained associate's or bachelor's degrees, tuition reimbursement enhanced retention while they were studying and was not associated with an increase in turnover when they completed their degrees. In contrast, while tuition reimbursement also increased retention for those studying for advanced degrees, employers should guard against losing valued employees once they attain graduate degrees by attending to the match between their new skills and their jobs, and by managing their expectations and careers (Noe, 1996). But what can managers do for those individuals they can't promote? Additional research is needed to see if lateral moves or stretch assignments that expand job duties might also have retention effects by better matching work tasks to skills. Until then, managers need to take care when employees earn advanced degrees to provide those they wish to retain with recognition and new opportunities to use their skills. Otherwise, a firm may be paying to facilitate the exit of some of its most skilled and highly motivated employees.

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APPENDIX

Summary of Calculations

To compare employees who took classes and earned degrees with employees who did not participate in tuition reimbursement (Hypothesis 2b), the following equation was used:

$$\exp h(t)[(-.81)(1)_{\text{took classes}} + (.32)(1)_{\text{degree}}] = \exp h(t)(-.49) = .61.$$

To compare employees who took classes and earned graduate degrees with employees who did not participate in tuition reimbursement (Hypothesis 2b):

$$\exp h(t)[(-.81)(1)_{\text{took classes}} + (.57)(1)_{\text{graduate degree}}] = \exp h(t)(-.24) = .79.$$

To compare employees who took classes, earned degrees, and were subsequently promoted with employees who did not participate in tuition reimbursement and were promoted (Hypothesis 4a):

$$\exp h(t)[(-.91)(1)_{\text{took classes}} + (.60)(1)_{\text{degree}} + (-.81)(1)_{\text{degree, then promoted}}] = \exp h(t)(-1.13) = .33.$$

To compare employees who took classes, earned graduate degrees, and were subsequently promoted with employees who did not participate in tuition reimbursement and were promoted (Hypothesis 4a):

$$\exp h(t)[(-.91)(1)_{\text{took classes}} + (.82)(1)_{\text{graduate degree}} + (-.71)(1)_{\text{graduate degree, then promoted}}] = \exp h(t)(-.81) = .45.$$

To compare employees who took classes, earned degrees, and were subsequently promoted with employees who took classes without earning degrees and were promoted (Hypothesis 4b):

$$\exp h(t)[(.60)(1)_{\text{degree}} + (-.82)(1)_{\text{degree, then promoted}}] = \exp h(t)(-.22) = .80.$$

To compare employees who took classes, earned degrees, and were subsequently promoted with employees who took classes without earning degrees and were promoted (Hypothesis 4b):

$$\exp h(t)[(.82)(1)_{\text{graduate degree}} + (-.71)(1)_{\text{graduate degree, then promoted}}] = \exp h(t)(.11) = 1.12.$$

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