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Determinants of quit behavior among managerial and professional women

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DETERMINANTS OF QUIT BEHAVIOR AMONG
MANAGERIAL AND PROFESSIONAL WOMEN

by

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Determinants of Quit Behavior Among Managerial and Professional Women

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

ABSTRACT

This thesis examines the effects of personal, human capital and job related characteristics on the quit decision of managerial or professional level women. In addition, perceptual or equity factors, such as crowding within grade level and functional area, relative time to promotion and pay compared to others in the firm, were modeled. The micro-data are from the personnel files of a large manufacturing firm. Three types of analysis were conducted. The first was a logit analysis of a cross-sectional sample of the managerial/professional women in this firm. The second was a logit analysis of a pooled cohort sample of these women, during their second full year after hire. The third examination of the data used a proportional hazard analysis, compensating for the selection bias, due to censored data, inherent in quit studies. The relative advantages and disadvantages of the three techniques are discussed. Empirical results of the proportional hazards model show that such job related factors as recent promotion, salary, grade level and favorable performance ratings significantly reduce quits, with promotion having the strongest effect. Personal factors such as marriage and children also reduce the managerial/professional woman's propensity to quit.

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I. INTRODUCTION

A. BACKGROUND

The costs of training and developing employees have risen dramatically in the last decade, making it important to reduce voluntary turnover. While turnover has been an area of interest for management, research on the causes of this problem among women are not prevalent. Most studies have focused mainly on the behavior of men, representing primary wage earners. As women have entered the labor force in greater numbers and in expanded roles, it becomes important to examine their quit behavior, as well. Studies of job turnover examine one or several theories that relate personal or productive characteristics, job conditions or economic factors to propensity to quit. Most models use a utility maximization formulation where the individual quits if it is perceived that the conditions of a new job (or value of leisure or of effort in the home) outweigh the value of the current job plus the costs of quitting.

Previous research has shown that quit behavior is related, among other things, to age. Younger workers, who do not have a great deal of time or specific training invested in the job, are more likely to quit than older workers. Another explanation for the higher probability of quits among younger workers is job matching. This theory relates quits to a

mis-match between a worker's expectations of the job and the actual job characteristics. Quits for reasons of poor job-matching are primarily observed among younger workers, who lack experience in the work force, and among those with short tenure in a firm. On the other hand, education, pay, seniority, low injury risk and promotion potential have all been found to reduce quit propensities. The economic environment plays a role, with turnover high in times of prosperity, when the job market is expanding, unemployment is not a threat, and the potential for better pay, conditions and promotion opportunities are perceived to exist. Expectancy, or valence, theory contends that workers will quit if (1) they are not rewarded equitably for their effort, and (2) if there is no expectation that continued participation with that firm will reward them any better than alternative employment. For men, marriage and the arrival of children appear to be stabilizing factors, encouraging them to remain with their jobs.

Studies that contrast men's behavior with women's have focused on marriage and children, pay differentials and evidence of job crowding. Many women demonstrate an interrupted career pattern, often quitting for marriage and child bearing, supporting the theory that their salaries are secondary to the husband's for family support. Men tend to quit more often to change jobs, while women more often quit to leave the labor market, finding higher value for their

productive effort in the home. Crowded occupations, such as clerical or secretarial work, have disproportionate numbers of women, lower pay and higher turnover. It is not clear whether self-selection due to socialization or discrimination is the major cause of women's over representation in crowded occupations. Some studies relate the amount of specific training to crowding, theorizing that crowded occupations provide less firm-specific training. This results in lower pay, increases the attractiveness and number of alternative jobs and the eases leaving and reentering the labor market. The resulting turnover allows employers to justify the decision not to invest specific training in women, and the cycle continues.

The quit relationships discussed above form some of the theoretical bases for research. These theories will be related to findings in the studies discussed in the next section, as well as to the results of this study.

B. RESEARCH QUESTION

The primary research question is to identify what personal, human capital and job related factors influence women to voluntarily quit their jobs. Quitting can be either to leave the workforce or to move on to other employment. Personal factors can be such characteristics as race, marital status, and number of children. Human capital factors include education, field of study and previous work experience. Job

related factors encompass those aspects of the current job which may be associated with quit behavior, such as: promotions, pay, training, size and type of department, tenure, job performance ratings, and certain expectation factors (future salary level, potential for promotion to the next higher grade, perception of inequitable treatment). A secondary issue is relating the findings to the various theories which attempt to explain quit behavior.

The major problems encountered when attempting to do research in this area are finding good, comprehensive data at the individual worker level, and modeling factors such as crowding, promotion expectation, pay equity, and job matching. As labor turnover costs rise and more companies rely on computers for personnel records, the quality and quantity of available data have improved dramatically. The program capabilities of computers have been enhanced, lowering costs and making advanced techniques such as logit, probit and hazard function analysis more readily available.

C. SCOPE OF THE THESIS

Previous research has not fully investigated the quit behavior of managerial/professional level women. The main thrust of this study will be to analyze determinants, of quit behavior for managerial and professional women. Data from the personnel files of women employed in a large manufacturing firm will be used, and promotion expectation, pay equity and

job crowding factors encountered by women in this company will be modeled. Model estimates will allow calculation of elasticities of the various factors as they influence quit behavior.

There will be three levels of analysis: 1) a cross-sectional model of all women employed as of 1981; 2) a pooled cohort model of all women in their second year of employment; 3) a proportional hazards model. The major advantage of this study is the use of micro-data, allowing differentiation of personal and job characteristics which are not available in aggregate data sets.

There are several limitations to this study. Data are not available on age, geographic area/unemployment rates, whether the individual left to find another job or to exit the workforce, previous employment experience or training. These limitations, effects and proxies are discussed more fully in the data/methodology chapter.

D. STUDY ORGANIZATION

The study is organized in the following chapters:

- Literature Review--will discuss and critique previous work in this area. This chapter is organized by type of data used, theory examined, methodology and findings.
- Methodology and Data--will describe the data, model development, influences of other studies, and discuss methods to overcome limitations in the data. The three estimation techniques chosen will be discussed, along with their advantages and disadvantages.

- Analysis/Results--a presentation and interpretation of the findings. Results will be related to the expectations discussed in the previous section, and results of previous studies.

- Conclusions--a summary of findings, strengths and weaknesses of this study, and recommendations for follow-on studies.

II. LITERATURE_REVIEW

The contributions of this thesis center around the benefits of the data set. The data are firm specific, on an individual level, and cover not only a large sample, but a span of time. Since women are the gender of interest in this study, the literature review attempted to emphasize other studies concerned with the quit behavior of women.

Firm specific data have not been readily available, thus most studies focused on panel studies for individual level quit information, or aggregate data to examine generalized theories. Only two studies were found which used firm specific individual data to study women's quits. Unlike the present study, they did not focus on managerial and professional level women.

A. FIRM SPECIFIC STUDIES

The first of the two studies of female quits, by Suzanne Federico, et al. [Ref. 1], used pre-employment questionnaires and personnel records to test the response to met salary expectations of 96 women employed at a credit union. Their model used valence theory as its basis, with tenure (months of employment) as the dependent variable in a linear regression analysis. Their theory contends that workers will quit when they believe they are not well rewarded for their work, and if there is no improvement anticipated.

The right hand side variables included age at application, marital status, number of children, age of children, years education and the differential between the expected salary and the salary achieved at the time of the study. The authors stress that salary increases are not a function of longevity, but performance alone. Never-the-less, there may be some simultaneity bias if performance, and thus pay, will improve with tenure. Tenure was positively associated with met salary expectations, salary and number of children. The authors stated:

> It seemed that females who achieved a higher salary level due to better job performance, tended to remain with the firm for longer employment periods. Maybe these females felt that management appreciated their efforts, as manifested by higher achieved salaries, which could have been perceived by them as equitable rewards relative to expended effort. [Ref. 1:p. 564]

This finding supports their valence theory. The authors concluded that the positive influence on tenure of children was due to the increased economic pressures of family responsibility. [Ref. 1: p. 565] Tenure was found to be negatively associated with age, education and marital status (with single and divorced women moving more frequently). The education factor was attributed to poor job matching between skills and job requirements, and not to presence of other opportunities for higher educated women. This study did not include any factors that might be seen to draw women away from their jobs, (such as the presence of outside opportunities or employment climate), nor did it include variables related to

present job responsibilities or previous employment history (which were available). It also included right side variables with high correlations:

> The woman's age, the number of their children, the age of her youngest child, and her marital situation at the time of application, however, were . . . all mutually, positively, and significantly correlated. [Ref. 1:p. 565]

The study did not control for this high level of correlation through any interaction terms, thereby possibly overstating the effect of the variables. As will be discussed more fully in a later chapter, tenure is a censored variable so the hazard model, which accounts for the censoring among those who have not left the firm, is more appropriate.

The second firm specific study of women's quit behavior by Matthews, Collins, and Cobb [Ref. 2] used phone interviews and personnel records of women and men air traffic controllers who had quit. They applied an analysis of variance technique to determine gender differences in quit behavior. Their method is not rigorous and is subject to selection bias, since it only studied those who had quit. They found four self-professed reasons for attrition: training difficulties, family, other employment, and perceived discrimination.

> Training difficulties were cited by about one-third of the women and one-half of the men . . . Most of the women who reported leaving ATC work due to marriage, pregnancy, or to care for children, stayed out of the labor market either wholly or partly. [Ref. 2:p. 539]

This last finding is in contrast to the Federico study, which found that increased family responsibility increased job

participation. This study found that men quit mostly to go to other employment, and that 18 percent of the women and none of the men gave sexual discrimination as a reason for leaving [Ref. 2:p. 539].

Three other firm specific studies were found, one of which does not directly address the quit behavior of women, but uses a dummy variable for gender differences. The other two deal with attrition in the military.

Weiss [Ref. 3] used micro-data (individual level data) to study newly hired semiskilled production workers at two manufacturing facilities. He employed a

> Standard model of quit behavior. A worker quits his current job (the job at which the data were collected), if his expected utility from some alternative job offer, or from leisure, exceeds his expected utility on his current job by enough to overcome the worker's pecuniary and non-pecuniary costs of quitting. [Ref. 3:pp. 374-375]

Weiss' results are not particularly relevant to this study, as his model represents gender differences as not behaviorally related, but as an intercept shift difference. This is surprising since two of his referenced studies show that gender differences are substantial enough to make pooling male and female data questionable. However, Weiss used a gender dummy variable, finding no statistically significant differences in the general propensity to quit. He did, however, find that interacting gender with race produced a higher likelihood for white males to quit in the southern plant, and attributed this to better outside job

opportunities. His work is interesting in that he uses newly hired workers to avoid the simultaneity problems associated with the correlation between the error term in the equation that determines tenure and the variables on the right hand side of his quit equation. Since many of the variables that determine tenure are also included in the specification of the quit equation, tenure is an endogenous variable, with potentially high correlation between the error terms in the tenure and quit equations. This results in a high probability of bias in the estimated coefficients in the quit equation. [Ref. 3:p. 374] He believes using newly hired workers also avoids problems, such as the tendency found in other studies for firms to invest more specific training in men, leading to steeper wage profiles for this group, and, to higher quit probabilities for women, who do not receive the training or higher pay. [Ref. 3: p. 372] Weiss' cohort technique will be used in this study. Among the results of his probit analysis are:

1. Better educated workers did not have a higher propensity to quit in spite of the possibility of improved alternatives. [Ref. 3:p. 386] (Weiss used two education variables. One was a dummy for completing high school, used to measure "stick-to-it-iveness". The other was the usual variable measuring years of education.) This may be due to the stated high wages paid at the firm due to union activity, making this firm the best alternative.

2. Being married is negatively correlated with quits. This supports Federico's finding that family responsibilities increase tenure, and Weiss' own analytical model that includes marriage as a "cost of quitting" factor [Ref. 3:p. 377].

3. Workers who were unemployed when hired are more likely to quit than workers who came directly from another job [Ref. 3:p. 385]. Weiss attributes this to job matching and utility maximization, where an employed worker will find out all he or she can about a new job, and weigh the differences carefully, before quitting the other employer for the new job. This tends to improve the "match", and the workers utility, thereby reducing quits at the new job.

4. Surprisingly, Weiss found that more complex jobs increased the probability that a worker will quit, evidently reducing job satisfaction [Ref. 3; p. 386]. Complexity was defined in terms of the length of time it took to train a new employee in the job.

Weiss provided no information as to whether more complex jobs for these semi-skilled production workers had higher levels of risk or repetition associated with them. He did propose that this might be a job matching problem, and that putting better educated people in the more complex jobs might improve satisfaction (workers are not screened for particular jobs--just placed as they are hired and vacancies arise).

The last two firm specific studies either did not use women in the data pool, or did not include a dummy variable to analyze for gender differences in behavior. They both examine quits in the military.

The first, like Weiss' study, focuses on attrition among those "newly hired", or recruits in their first six months in the service. It uses only males in the data pool. Like Weiss, the Buddin study [Ref. 4] uses probit analysis and includes a dummy variable for high school completion, along with the usual years of education variable. Because Buddin had access to military personnel files, he was able to include

variables relative to family background and previous employment. He compares his results for early attrition in the military to findings by other studies for civilian quits. Buddin found that increases in age for new recruits increases the probability of early attrition.

> The age effect on early attrition reported . . . is sharply at odds with previous findings, which reveal a decline in civilian separations as an individual grows older. [Ref. 4: p. 24]

Weiss also found a negative relationship between age and quits in his study. Buddin attributes this result to the services attracting "labor market lemons" [Ref. 4: p. 24], those young men who were misfits in the civilian labor market. Like Weiss, Buddin found that completion of high school sharply reduced the likelihood of early attrition. [Ref. 4: p. 50] Among his other results were:

1. A low number of previous employers (job stability) had a negative effect on attrition. Younger high school graduates with one previous employer were dramatically less likely to attrite than older non-graduates with four previous employers. [Ref. 4:p. 30]

2. Job dissatisfaction had no significant impact on attrition, unlike studies on civilian quits. [Ref. 4: p. 51]

This is not really surprising since recruits are generally led to expect a great deal of dissatisfaction during their initial training. Buddin goes on to state that the differences between his findings and those of civilian studies can rest either with some inherent difference in the young men who chose military life or with the nature of the institution itself.

The last firm specific study also studies attrition in the military, but focuses on non-pecuniary aspects of quits. Warner and Goldberg [Ref. 5] use a utility maximization model. They combine the discounted expected future earnings in the military and those of alternative occupations along with what they term "taste factors", or the valuation of the non-pecuniary aspects of military and civilian life, into what they term "the annualized cost of leaving". [Ref. 5: p. 27] They then control for personal and job characteristics in a probit analysis. Their study used information on all Navy enlisted personnel who made reenlistment decisions between 1974 and 1978. While this group includes women, it is not clear whether the authors used only men in their group, or neglected to include a gender variable in their analysis. They discovered that sea-duty, a factor that had a strong positive effect on quits, was readily off-set by increases in pay. They calculated that the negative reenlistment effect a ten percent increase in sea-duty can be off-set by a two percent increase in pay. [Ref. 5: pp. 33-34] A finding consistent with the previous studies cited was that married personnel stayed with the organization at a higher rate than their single counterparts. [Ref. 5: p. 32] They postulate that married personnel value their fringe benefits (many related to family care) more highly than single people. One conclusion of their work was that young people have a high time discount rate, so that deferred forms of compensation,

such as pensions, do not reduce attrition as well as immediate compensation, such as pay, bonuses and promotions.

B. GENDER DIFFERENCES IN QUITS

There are a number of studies that examine the differences between male and female job quitting behavior. The earlier studies tend to use aggregate data, with the later studies focusing on individual level data, often provided by the National Longitudinal Surveys.

1. Types of Quits

One of the earliest and most frequently quoted studies is by William F. Barnes and Ethel B. Jones. [Ref. 6] This study analyzes aggregate data from the Bureau of Labor Statistics using linear regression, with quit rates as the dependent variable. This is the first work to differentiate between quits to exit the labor force and quits to change jobs. They hypothesize that women have fewer opportunities to enter high paying jobs due to greater wage discrimination, and therefore have a lower quit rate to change jobs. [Ref. 6: p. 441] In addition,

> A shorter expected employment period for women due to the interruption of work in the market by work in the home reduces the gain in earnings from alternative employment and decreases the female quit rate [to change jobs]. [Ref. 6:p. 440]

Conversely, they beleive that

> marriage, pregnancy and child care increase the female's productivity in the household, encouraging her to quit and withdraw from the labor force. [Ref. 6:p. 440]

The study, which differentiates groups by two-digit industry, uses only age and wage variables in the analysis. They reference the human capital work of Gary Becker [Ref. 7] and Donald Parsons [Ref. 8] to support use of the wage variable as an appropriate proxy for specific training, expecting it to be negatively related to quits. The authors applied a chow test to their regression results and found that women's behavior is different from men's behavior, and thus it is not appropriate to pool the populations [Ref. 6: p. 448]. This suggests that studies, such as Weiss, which uses a gender dummy, and Warner and Goldberg, which apparently pools data without a gender dummy, are not correctly estimating the determinants of the quit behavior of men and women. Barnes and Jones found that both younger and older women quit more often to exit the labor force; young men quit to change jobs, and older men quit to exit the labor force (retirement). A noticeably higher quit rate is demonstrated by young men, while overall, women have a higher quit rate than men. [Ref. 6: p. 450] One finding of particular interest is that an increase in earnings reduces the female quit rate almost three times as much as the male quit rate. [Ref. 6: p. 447] While this study is fairly simplistic in its method and the variables used, compared to the techniques available today, it was a leader in differentiating the reasons for male and female job quitting behavior. Barnes and Jones provided a jumping-off point for follow-on studies which examine the underlying reasons in more detail.

2. Trends

In an interesting exchange of findings, Armknecht and Early [Ref. 9] found that since 1959 women have been quitting less to leave the labor force. While the overall propensity to quit has remained the same, there have been secular changes in workers' motivation to quit. Barnes and Jones [Ref. 10] also found that since 1959 the increasing presence of women in the workforce has served to reduce their quit rates, but contend that:

> Since Armknecht and Early's work on the determinants of quit rate levels across industries includes years of poor employment opportunities and of good opportunities, we urge that unless the cyclical impact of a group's role undermining the level of quit rates across industries is recognized, changes in the behavior of workers that are cyclical in nature may be attributed to secular causes. [Ref. 10:p. 56]

Armknecht and Early, picking up the gauntlet in a a follow on study, using the same data as in their previous work, respond:

> There is a clear trend in the effect of women on the quit rate even after correction for cyclical variation. Over the last 14 years their upward pressure on quits has been reversed and now they exhibit lower than average propensities to quit. [Ref. 11:p. 58]

3. Coefficient Swapping

The next two studies use an interesting coefficient "swapping" technique to measure the differences in male and female quit behavior.

The first, by Viscusi [Ref. 12], uses individual level data, to resolve an apparent ambiguity in quit studies.

> While industries with larger percentages of female employees generally have been associated with higher levels of quitting, these findings for samples of 47-52 two-digit industries [Note: such as the first cited study by Barnes and Jones.] are somewhat different from those found in other samples. Indeed, analysis of 95 three-digit industries by Viscusi (1979) reveals no significant sex effect on aggregate quit behavior. [Ref. 12:p. 388]

Viscusi applies logit analysis to data on 3,000 men and 2,000 women from the University of Michigan Panel Study of Income Dynamics [Ref. 12:p. 389] to estimate the effects of personal and job characteristics on quit behavior. The mean quit rate for women is roughly twice that of men. [Ref. 12: p. 390] However, when Viscusi estimated the quit rate by experience levels, he found that women in their first year quit twice as often as men, but that "once past the initial work period, women are more stable employees than are male workers" [Ref. 12: p. 391] with a quit rate of 5.9 compared to 6.4 for men. The results of his regressions show that, as in Barnes and Jones, pooling data for the sexes, or merely using a gender specific dummy variable, is not appropriate, as women's quit behavior is substantially different than that of men. [Ref. 12:p. 392] Among his findings are:

1. Marriage and children are stabilizing factors for both men and women (similar to Federicos' and Warner and Goldberg's findings), and that the effect is stronger for women. [Ref. 12:p. 394]

2. Female quit behavior is about as responsive as male's to age (elesticities of -0.77 and -0.83 respectively). If retirees are removed from the sample then men show a much greater stability with age than women (-1.33 vs. -0.68). [Ref. 12:p. 393]

3. Both men and women are about equally responsive to financial incentives. As financial incentives improve, quits decrease. [Ref. 12:p. 395]

4. The most important variable was the dummy 'Tenure1', which differentiated between less than and more than one year on the job. While this showed that both men and women were more likely to quit with less than one year on the job, the effect was much stronger for women. Viscusi found that women with less than one year on the job were three times more likely to quit than women with more than a year on the job. [Ref. 12:p. 394]

5. The overall quit difference between women and men, estimated at the group means, shrinks to 0.043, which is about half of the previous difference. This could be equalized by an additional wage premium of $1.31 per hour. [Ref. 12:p. 396]

Given these results, Viscusi then uses three variants of the "swapping" technique mentioned earlier.

1. ". . . Women continue to have their personal characteristics, but now have the male coefficient vector. If women behaved in the same manner as men, how would their quit propensities be affected?"

2. ". . . Women have their sex's coefficient vector, but they have the males' average characteristics and jobs. If women had the male set of characteristics, would their quit behavior be diminished?"

3. ". . . Isolated job-specific differences in the explanatory variables [while keeping experience variables along with personal characteristics]. If women had the same types of jobs and lived in the same regions as did men, but otherwise had their own personal characteristics and quit equation coefficients, would the quit difference be narrowed?" [Ref. 12:pp. 395-396]

Following the different combinations explained above, Viscusi's results show that:

1. "If women behaved as did men, the difference in their quit rates would increase as women would display greater turnover". (0.060 compared to 0.043) In addition, it would take a wage increase of $1.72 per hour to now equalize male and female quit behavior.

2. "Similarly, if female employees behaved in the manner predicted by the female quit equation, but had the mean value of the male's personal characteristics, they would quit less than would men, and would have to incur a $1.37 wage decrease to equalize their quit behavior."

3. "Finally . . . Female quit behavior is altered only by assuming that they have the same types of jobs and live in the same regions as do men. These job differences alone eliminate differences in quit rates." [Ref. 12: p. 396]

Viscusi concludes that men's and women's quit propensities are more similar than other studies indicate. The most important effects are found in the "Tenure1" variable, which captures the effects of human capital investments in specific training, learning about the job and the periodic labor force attachments of women. Once past this initial period, male and female quit rates are roughly identical. [Ref. 12:p. 397] He goes on to state that,

> Almost the entire predicted male-female quit difference and half of the actual difference can be explained by differences in their jobs and regional economic conditions. If women had the same job characteristics and the same percentage with more than one year of experience at the firm, their predicted quit rate would be below that for men and their mean quit rate for the sample would be equal to that of men after adjusting for these influences. [Ref. 12: p. 397]

In a study of women's quit decisions in the United Kingdom, Shorey [Ref. 13] uses the "swapping" method in the Viscusi study, above, to replicate Viscusi's findings with aggregate instead of individual level data.

Shorey uses the Barnes and Jones differentiation of quits into unemployment to estimate two models for men and women. He sees wages as the central decision variable from

the standpoint of industry demand and worker supply; "Once this is set, all other decision variables are determined simultaneously" [Ref. 13: p. 213]. Shorey then uses an instrumental variables approach to approximate wages based on exogenous variables from the firms profit equation. Substituting these into the quit equation, he estimates the parameters using industry quit rates as the dependent variable. He states that his estimates will be consistent, but inefficient. [Ref. 13: p. 217] His results show that women are more sensitive than men to the internal wage rate. A firm can control women's quits by wage adjustments. A ten percent increase in women's pay will decrease their quit probability by seventeen percent [Ref. 13: p. 219]. Men, on the other hand, are more responsive to labor market signals outside the firm, to which the author attributes higher male wages:

> . . . the fact that male workers appear to be much more sensitive to external wage movement would, Ceteris Paribus, force the firm to pay a higher wage to retain male labour than would be required to retain female labour. [Ref 13: p. 222]

Among his other findings: quits into inactivity are positively affected by age, marital status and shiftwork; women are less likely to quit low quality jobs than men, and firm/plant size is the biggest factor (influencing quits upward as they get larger) related to inter-industry differences. Shorey then uses the same process as Viscusi to examine differences between male and female quit behavior.

His first finding, like Barnes and Jones and Viscusi, is that the nature of their quit decisions is different, and that pooling data on men and women is not statistically appropriate. [Ref. 13:p. 221] He then finds that:

> Evaluated at the means, women are 37% more likely to quit than men, needing a 23% increase in pay to equalize their behavior.
>
> 1. If women react as men do (male coefficients, female characteristics), their quit rate would be 127% higher than the men's rate. This would require a 48% wage increase for women to equalize behavior.
>
> 2. If women had male characteristics and reacted as women (female coefficients), the quit rate would be substantially lower than men's (50% lower). This would require a 86% wage decrease to equalize behavior.
>
> 3. Finally, if women had the same market characteristics as men, but their own personal characteristics, women would be 62% less likely to quit. This would require a better than 100% decrease in wages to equalize behavior. [Ref. 13:pp. 224-225]

These results are a replicatiron of those by Viscusi. In closing Shorey states:

> The principal conclusion from our analysis is that there are sex specific differences in quit behavior. The casual mechanisms behind the male and female quits decisions appear to be very different. Overall, however, this difference would lead to a lower quit rate for female workers, Ceteris Paribus . . . in terms of explaining why the quit rate for female workers is above that for male workers, the important conclusion of our empirical work is that it is the inferior market characteristics of female workers that dominate. In particular the lower wage paid to female labour significantly increases the female quit rate. [Ref. 13: p. 226]

4. Personal_VS_Job_Related_Variables

The last four studies in this section all use individual level data to analyze quit behavior. This

advantage enables them to differentiate more clearly between personal and job related characteristics and their effects on quits.

A study by Blau and Kahn [Ref. 14] uses the National Longitudinal Surveys of young men and women to examine race and sex differences in quits. They believe that previous studies, which largely use aggregate data, overemphasize differences in quitting behavior since they cannot control for personal and job related differences. [Ref. 14: p. 565] This study is novel in that it examines the returns to quitting to determine whether the anticipated gains are realized. Their conceptual framework takes a more positive view of quitting, from the standpoint of the current employer.

> Other things equal, the more attractive one's current job relative to the expected job characteristics associated with potential offers (including nonmarket work), the less likely either employed or unemployed search is to take place; in addition, the more attractive one's current job relative to the alternatives, Ceteris Paribus, the less likely a searcher is to find an acceptable job offer, given that employed search takes place. Thus the relative attractiveness of one's current job should negatively influence quitting. [Ref. 14:p. 565]

This emphasis on the current job characteristics and experience is more in line with the focus of this thesis. They select, as here, only voluntary quits. Since they are dealing with young people, they do not need to control for quitting due to retirement, as is necessary in the cross-sectional model in this study. Some of their findings (using probit analysis) are:

1. Tenure and current wage are strongly associated with reducing quits for all race and sex groups. [Ref. 14: p. 569]

2. Contrary to expectations from other studies cited, marriage and children increase quits for women and decrease quits for men [Ref. 14:p. 570]. It seems that for these young women, family responsibility increases the value of their time in the home more than it creates an economic necessity to bring in income.

3. Mean levels of quit rates, as well as predicted levels, were higher for women than for men. The authors used the coefficient swapping technique of Viscusi and Shorey to find, as they did, that women's quit rates would drop if they had the same mean characteristics as men, would increase if they had their own characteristics but behaved as men, and would be 16% to 28% lower than the men's quit rate if they faced the same job characteristics. [Ref. 14:p. 572]

The authors go on to make a case for using their results to examine statistical discrimination in the workplace. They then examined whether or not quitting to move on to another job actually improved a workers utility, from a strictly wage maximization point of view.

> The findings suggest that when young people change their jobs voluntarily, they improve both their current wage and their long-run earnings prospects, the latter measured by median income in the current occupational category. [Ref. 14:p. 575]

> Further, our findings do not support the dual labor market view that blacks (and possibly women) move from one unsatisfactory job to another without experiencing upgrading . . . Further, women's short-run and long-run returns to quitting were higher than those of men. Thus, the dual labor market view does not appear to be supported. [Ref. 14:pp. 576-577]

This last finding was interesting in that many other studies seemed to assume that job conditions, and possible discriminatory practices, were constants across workplace

alternatives for women. This assumption seemed to explain why women do not quit to change jobs as often as do men.

The next section will look at a study on the effects of fringe benefits. Mitchell [Ref. 15] examines the effect of fringe benefits on labor mobility. She notes that previous writers suggest that fringe benefits serve as a deterrent to quits as they are not transferrable between jobs. "Unfortunately, empirical confirmation of this prediction is as yet tenuous, since aggregate data often used in these studies are measured inaccurately and aggregate equations are plagued by simultaneity bias." [Ref. 15: p. 187] Her data come from the Michigan Survey Research Center's Quality of Employment Survey, consisting of observations of 530 males and 252 females measured in 1973 and 1977. She uses a probit technique with the dependent variable equal to 1 if a job change has occurred. The results do not differentiate voluntary quits from layoffs or discharges, or whether the worker quit to change jobs or leave the workforce. Her findings include:

1. Fringe benefits deter quits. A male worker with a pension plan is ten percent less likely to quit than his counterpart without a pension [Ref. 15:p. 291].

2. As in other studies, wages have a negative effect on quits for both sexes. However, when the fringe benefits variables are included in the equation the effect of wages is halved. "Thus, the deterrent effect of wages on quits found in previous studies which omit fringes may be overstated." [Ref. 15:p. 294]

3. Quit patterns differ by sex. Women are less responsive than men to loss of fringe benefits. Pensions, in particular, highlight this difference. While pensions have negative effect for both genders, the effect is half as strong for women and is never significant. [Ref. 15: p. 292]

The author proposes three explanations for this last finding: "(1) females are often covered by spouses' pension plans; (2) a woman usually receives more in benefits from a spouse's plan than from her own; and (3) female's shorter lifetime market attachment and lower lifetime earnings streams lower the expected benefit of a pension promise." [Ref. 15: pp. 293-294] In closing, Mitchell states that pensions deter mobility for both men and women, while other fringes, such as medical and life insurance, profit-sharing, and stock ownership plans do not have as strong an impact. [Ref. 15: p. 297]

The last study in this section is also the most recent and perhaps uses the most sophisticated estimation procedure. This work by Meitzen [Ref. 16], uses a data set of pooled firm specific data provided by the Equal Opportunities Pilot Programs Employers' Survey. This data set consists primarily of low-skilled workers with not more than 2.5 years of employment [Ref. 16: p. 155] (Like the studies by Weiss and Buddin, already reviewed). Meitzen cites the study by Viscusi that found the first year of employment to be the most important in differentiating between male and female quit rates as a catalyst for his focus on the early years with a

firm [Ref. 16: p. 152]. Meitzen uses a Gompertz continuous time hazard function. This technique takes into account the fact that a complete history is available only for those who have quit the firm, but that those who remain with the firm have incomplete tenure histories. Meitzen calls this "censored on the right" [Ref. 16: p. 154]. A maximum likelihood procedure is used to estimate the coefficients. The hazard function is the ratio of a density function of quits, $f(t \mid \underline{X})$, and a cumulative distribution function of stayers, $1-F(t \mid \underline{X})$, where $\underline{X}$ is a vector of explanatory variables. His variables (X)

> . . . can be put into one of four categories: GENERAL: general firm characteristics that are not directly related to the worker; SPECIFIC: firm characteristics that are specifically related to the worker (e.g., wage rate); WORKER: personal characteristics of the worker; and MARKET; local labor market characteristics. [Ref. 16: p. 153]

His results show that men and women, even though their quit rates are so similar in this sample (0.242 for men and 0.248 for women) [Ref. 16: p. 155], behave differently; separate models are warranted at the five percent significance level. Other major findings are:

1. Tenure. The tenure variable is significant and negative for males and significant and positive for females. The result for women is contrary to that found in Blau and Kahn, discussed earlier. Meitzen attributes this difference to job matching theories, postulating that women do not have "well developed labor market preferences or expectations" due to intermittent labor force participation and traditional role models. [Ref 16: p. 158] This would result in longer learning periods about the job resulting in the positive tenure effect. Meitzen supposes that it also takes some time on the job

to become aware of discrimination, pointing out that the average topwage for men is $5.80 compared to $4.71 for women. [Ref. 16:p. 158]

2. Age. Like Federico, Weiss, and Barnes and Jones, Meitzen found age to have a negative effect for both men and women. For men, the effect was just barely significant. Meitzen attributes this to the nature of the sample, in that older, low-skilled, recently hired workers are likely to be frequent movers. These workers are what Buddin called labor market lemons, when he found older recruits to have a greater quit propensity. For women, Meitzen found a stronger negative effect: 30% lower quit propensity for a 35, vice 25 year old woman. [Ref. 16:p. 161]

3. Wage. For men, the author found that wage levels had a significant negative effect on quits; an increase of ten cents per hour would decrease quits by 1.5%. For women the wage variable was not significant. However, when he used a variable denoting the presence of wage progressions in the job, he found both male and female quits to have a significant negative response. This response was stronger for women (reduce quits 30% for men, 39% for women). [Ref. 16:p. 163]

C. OTHER STUDIES

This last section examines two studies which have only men in their study populatiron. I will not go into them in depth, only mentioning aspects of variables or technique relevant to my study.

Solnick, in a 1986 study of 8424 white males employed at a large manufacturing firm [Ref. 17], examined the effect of recent promotions on quit behavior. His hypothesis is that the internal labor market is segmented into groups that have differing probabilities for advancement, which affects quits. What we in the Navy would identify as "front runners". Following on the contention by Weiss that tenure is an

endogenous factor in may quit equations, Solnick restricts his sample to employees with from three to 25 years of service. This reduces quits influenced by the job matching theories and those related, in later years, to retirement and failing health. [Ref. 17: p. 9] Solnick employed both an ordinary least squares and a logit analysis of the data. Both estimation techniques produced coefficients of the same sign and significance. [Ref. 17: p. 15] Solnick used a dummy variable to identify those who had been promoted the year before the year examined. His results show that recent promotion significantly reduces the probility of a quit by about one percentage point. He goes on to show that high performance ratings and change in salary also significantly reduce quits. "Thus the major management rewards (and signals to employees) all have a significant impact on the quit probability". [Ref. 17: p. 14] Solnick concludes that,

> The results clearly support the first hypothesis: A significant negative relationship was estimated between recent promotion and quit probability. The estimated coefficient indicated a sizeable effect; those promoted had almost a one point lower probability of quitting than those who were not promoted. The average quit rate of those promoted is .014, compared with .023 for those not promoted. [Ref. 17:p. 17]

In a study by Bartel [Ref. 18], the effect of non-wage job attributes on quits is examined. Where Mitchell looked at fringe benefits, or the deferred forms of monetary compensation, Bartel examines working conditions, and evaluates the wage equivalent of these conditions. Viscusi modeled some of these conditions in his study, but he had to

infer the conditions from aggregate data on the workers occupation. Bartel has the advantage, with her data from the National Longitudinal Studies (NLS), of having working conditions specific to the individual. [Ref. 18: p. 579] Bartel pools the results of several samplings of the NLS data and uses probit analysis to estimate the effects of working conditions. The conditions she models are:

1. Bad working conditions: extremes of temperature, humidity or noise. Presence of toxics or injury risk.
2. Strength: the job demands physical strength.
3. Stress: the job is stressful (this is not defined).
4. Repetition: the job involves repetitive work.
5. Variety: The job requires a variety of duties, or control over an entire activity or the work of others. [Ref. 18:p. 582]

These last two were combined as they were strongly negatively correlated. This last variable was similar to that examined by Weiss who found that its presence on jobs increased quits. Her results show:

1. Bad working conditions: increase quits and are significant for all groups but young white collar workers.
2. Strength: has no effect for older men, but actually reduces quits for young men. Evaluated at the mean, young men working in a job requiring strength quit 25% less than other young men. This is equivalent to a 50-75% wage increase.
3. Stress: was not significant, nor was it in the expected direction.

4. Repetition/Variety: actually increases quits for young men by about 47%; equivalent to a 136% wage decrease. For older men this reduces quits 16%-23%; equivalent to a 43%-59% wage increase.

5. Fringe Benefits: young men are not as responsive as older men to fringe benefits. A ten percent increase in fringe benefits will reduce quits only 1.4%-2.2% for young men (less than the wage effect). For older men the increase will reduce quits 9.7%-11.3% (greater than the wage effect). [Ref. 18:p. 585]

The result for stress, since it is a tenuous factor, is not surprising. Bartel's results for repitition/variety support Weiss' findings on "job enrichment", but only for younger men (which Weiss used exclusively in his study). The response by older men is in support of job enrichment theory and suggests a development of self-concept and identity with "supervisory" positions as workers become more mature. Her findings on fringe benefits fully supports the Warner and Goldberg study, which found a high discount rate for younger men in evaluating the worth of pensions and other fringes.

Bartel went on to examine whether quitting to move to another job increased the worker's utility, finding:

> . . . both young and older quitters experienced an increase in job satisfaction relative to stayers, but for different reasons. The young quitters had an increase in wages and a decrease in job repetitiveness (relative to stayers), whereas the older quitters had constant wages, a decline in in the level of bad working conditions, and an increase in job repetitiveness (relative to stayers). [Ref. 18:p. 589]

The studies reviewed in this section agree that quit behavior is substantially different for men and women. It appears that even in the face of large average differences, controlling for job characteristics can account for almost all

of the quit difference. For women, the effect of family responsibilities differed the most. These studies used blue collar workers, where there are larger differences in jobs and women's attitudes toward work, and where the value of their time in the home may be more traditionally regarded. This study looks at the behavior of managerial and professional women, where the nature of the job should not be too different from a man's (certainly it relies more on educational qualifications and generally transferrable skills and less on physical capabilities and specific training), and perhaps women at this level have less traditional self-concepts.

III. DATA AND METHODOLOGY

This section will discuss the nature of the data, model development and present the three estimation techniques used. The sections describing the three estimation techniques will include the specific characteristics of the three samples selected.

A. DATA

The data come from the pooled personnel files of a large U.S. manufacturing firm. The plants are located in several unidentified regions, so the controls for unemployment rates, or other specific geographic characteristics found in several of the studies previously described, are not possible here. The firm is large enough, however, that its professional workforce is hired in a nation-wide labor market, minimizing the likelihood of any regional bias.

This study looks only at the quit behavior of women within this firm. Previous studies [Ref. 17] have examined male quit behavior, making information available for some of the comparative variables used in the models. The samples for all three techniques are limited to women who are good performers (selected for average or better performance ratings) to reduce the likelihood of an involuntary quit ("You can't fire me, I quit."). The samples are also restricted to employees with at

least one year of service, but less than twenty years, to minimize the effects of higher turnover due to poor job matching at the lower end, and the effects of retirement or poor health at the higher end. Quit rates increase dramatically with high tenure for the reasons just mentioned. Since there were no data on age for this sample, the sample restriction was based on years of service. Reasons for quitting were not available, so this study is unable to differentiate between quits to leave the work force and quits to change jobs. All women in the sample have at least a Bachelor's Degree. The sample was additionally restricted to the years between 1976 and 1983, since quit data were available only for those years.

Employee's age, type of previous job experience, fringe benefits, disamenities of the job, extent of specific or general training, whether the worker came from a previous job or was entering the work force upon employment with the firm, and information on spouse employment are also not available.

B. THE MODEL

As in many of the studies mentioned in the literature review section, the model for quits in this study is one of utility maximization. Actual and perceived costs and benefits of the current job are weighed against the known and suspected costs and benefits of alternative employment (whether in another job, in the home, or leisure time). A quit will

occur if the net advantages of alternative employment out weigh the net advantages of the current job. There are several levels of variables available to this study that contribute to the decision, a complete listing of them can be found in Table 1. Their anticipated effects are as follows:

1. Personal Factors--These are expected to affect the costs of quitting, driving up the costs and reducing quits. They are: marital_status(yes/no); single_parent (yes/no); number_of_children under 18 (therefore dependent on the wage earner for support); and children under 18(yes/no).

2. Human Capital Factors--These are expected to affect the kinds of alternative employment available. The better the alternatives in comparison to the return the worker perceives to her productive effort, the more likely she is to quit. Education(Masters, Doctorate represented by two dummy variables); Field_of_Study(represented by 14 dummy variables); years of previous_experience and its square (calculated as the difference between date degree received and date hired); whether degree(s) received_after_hire (yes/no).

3. Job Specific Variables--These are expected to represent economic and satisfaction/dissatisfaction measures of current employment. Salary; Performance_Rating (dummies representing four levels of evaluation after deleting the bottom rating, 5 is the highest); Area in which the person works (dummy variables for control, manufacturing, personnel, research, marketing or admin); Supervisor (yes/no); salary grade level; job_tenure and its square; status(whether or not the worker is considered managerial/professional level, i.e. exempt from the Fair Labor Standards Act [FLSA]); and a dummy variable for whether the worker had been promoted recently (this varies among models).

4. Perceptual Variables--These variables represent the perceived equality of treatment of female employees relative to males, or the degree of crowding within paygrade(women occupying only junior positions) or functional area(women kept in certain jobs). Relative salary(a ratio of mean women's salary to men's, by paygrade); relative_promotion(the ratio of the mean time for women since the last promotion, to that of men, by paygrade); grade_crowding(the ratio of the number of

TABLE 1

EXPLANATORY VARIABLES

PERSONAL CHARACTERISTICS		
1. MARITAL STATUS	1 = MARRIED	0 = SINGLE
2. CHILDREN	1 = CHILDREN	0 = NONE
HUMAN CAPITAL YARIABLES		
3. PREVIOUS EXPERIENCE		
4. PREVIOUS EXPERIENCE SQUARED		
5. MASTERS DEGREE	1 = MASTERS IS HIGHEST DEGREE	0 = NOT
6. DOCTORATE	1 = PhD IS HIGHEST DEGREE	0 = NOT
7. MATH	1 = IF APPLICABLE FIELD OF STUDY	0 = NOT
8. COMPUTER	1 = IF APPLICABLE	0 = NOT
9. ACCOUNTING	1 = IF APPLICABLE	0 = NOT
10. FINANCE	1 = IF APPLICABLE	0 = NOT
11. BUSINESS	1 = IF APPLICABLE	0 = NOT
12. TECHNICAL	1 = IF APPLICABLE	0 = NOT
13. CHEM. ENGINEER	1 = IF APPLICABLE	0 = NOT
14. ELEC. ENGNR	1 = IF APPLICABLE	0 = NOT
15. MECH. ENGNR	1 = IF APPLICABLE	0 = NOT
16. OTHER ENGNR	1 = IF APPLICABLE	0 = NOT
17. CHEMISTRY	1 = IF APPLICABLE	0 = NOT
18. PHYSICS	1 = IF APPLICABLE	0 = NOT
19. BIOLOGY	1 = IF APPLICABLE	0 = NOT
20. OTHER SCIENCE	1 = IF APPLICABLE	0 = NOT
JOB SPECIFIC YARIABLES		
21. SALARY		
22. PERF. RATING 3	1 = IF HIGHEST RATING	0 = NOT
23. PERF. RATING 4	1 = IF HIGHEST RATING	0 = NOT
24. PERF. RATING 5	1 = IF HIGHEST RATING	0 = NOT
25. PROMOTED	1 = IF PROMOTED PREVIOUS YEAR	0 = NOT
26. SUPERVISOR	1 = IF CURRENTLY SUPERVISOR	0 = NOT
27. GRADE	FROM 1 TO 11	
28. TENURE		
29. CONTROL	1 = IF APPLICABLE AREA WORKED	0 = NOT
30. MANUFACTURING	1 = IF APPLICABLE	0 = NOT
31. PERSONNEL	1 = IF APPLICABLE	0 = NOT
32. RESEARCH	1 = IF APPLICABLE	0 = NOT
33. MARKETING	1 = IF APPLICABLE	0 = NOT
34. STATUS	1 = FLSA EXEMPT	0 = NOT
PERCEPTUAL YARIABLES		
35. REL. SALARY	MEAN PAY OF WOMEN/MEAN PAY OF MEN	
36. REL. PROMOTION	MEAN TIME FOR WOMEN/MEAN TIME FOR MEN	
37. GRADE CROWDING	NUMBER OF WOMEN IN GRADE/NUMBER OF MEN IN GRADE	
38. FUNC. AREA CROWD	NUMBER OF WOMEN IN AREA/NUMBER OF MEN IN AREA	
YEARS		
39. HIRED 77	1 = IF HIRED THAT YEAR	0 = NOT
40. HIRED 78	1 = IF HIRED THAT YEAR	0 = NOT
41. HIRED 79	1 = IF HIRED THAT YEAR	0 = NOT
42. HIRED 80	1 = IF HIRED THAT YEAR	0 = NOT
43. HIRED 81	1 = IF HIRED THAT YEAR	0 = NOT

women in a salary grade to the number of men); and functional area_crowding(the ratio of the number of women in a functional area to the number of men). If these are not perceived as inequities then they will have no effect on quitting. These variables could also represent an advantage to women if they believe they are treated better than their comparison group, or perceive an advantage to either working with other women or being more visible in a less crowded grade or functional area. The expected effect would be that women in more crowded functional areas would receive less training, lower pay and, therefore, exhibit higher turnover rates. Women crowded into lower paygrades may perceive this as an inequity, causing higher quit rates. Relative salary is questionable in it's effect. At the lower paygrades, women and men receive equivalent pay. Only at the higher paygrades, where there are fewer women in this firm, are there large differences in pay. If this high-end difference is perceived as an inequity through out the firm, then the effect would be to increase quits. The relative promotion variable, again, is questionable in effect, as women exhibit lower mean time to promotion than do men.

C. DATA ORGANIZATION

This thesis uses three distinct analyses of the data set in order to study turnover of women in the subject firm. First, a cross section of women employed at a point in time was extracted from the data set. Logit analysis was used to analyze quit behavior in this sub sample. Second, a pooled cohort sample of all women in their second year after hire was created. Logit analysis was again used to analyze quit behavior for this subsample. Third, the most recent seven years of the data set were analyzed using a proportional hazards model.

1. Cross-Sectional Analysis

This is the first and least complicated of the models. The sample is a cross-section of the women employed by the

firm as of 1 January 1981. A quit was observed if the worker voluntarily left the organization during 1981.

Cross-sectional models are common in this field of study, especially the earlier studies such as Barnes and Jones [Ref. 6], Federico [Ref. 1], and Armknecht and Early [Refs. 9, 11]. Cross-sectional models are most appropriate when age, tenure and experience effects (among others) can be controlled. Such factors tend to be stabilizing effects, except for age for newly hired workers, which increases quits (Weiss [Ref. 3], Buddin [Ref. 4]). In the case of this study, where many pertinent variables are unobserved and have potentially varying effects through out the sample, the cross-sectional model is lease appropriate, but is estimated for comparison purposes with the cohort analysis and the proportional hazards analysis. Two models were estimated for this subsample.

Model A Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables) [Basic Model]

Model B Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables, Perceptual Variables)

These models are estimated for both the total subsample, and for the managerial/professional group, alone. This last group is defined as those women classified as Fair Labor Standards Act exempt (status = 1).

2. Cohort Analysis

This model is taken from a pooled cohort sample of all women hired after 1976 who are in their second year after

hire. This period was selected to minimize the effects of job matching mistakes, which are usually resolved within the first year. Examining a group of new workers also reduces the effects of specific training and pay effects due to tenure (Weiss [Ref. 3]; Buddin [Ref. 4]; Meitzen [Ref. 16]).

Again, this sample analyzes voluntary quits. A quit is observed if the worker leaves the firm during her second year of employment. The salary variable of interest is the first salary paid, which is adjusted by year to make the figures commensurate in earning power. The adjustment is made with the consumer price index, dividing the starting salary by the index. This model also includes dummy variables to control for the effect of year hired. The remaining variables are essentially the same as in the cross-sectional model.

As in the cross-sectional estimations, a basic model and a model containing the perceptual variables (less the functional areas which are collinear with the variable for functional crowding), were estimated for two groups. The groups were all women in their second year after hire and only those women who were FLSA exempt (or managerial/professional). The models are:

Model A Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables, Year Hired) [Basic Model]

Model B Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables, Year Hired, Perceptual Variables)

3. Proportional Hazards Analysis

Meitzen [Ref. 16] discusses the problems associated with quit studies, specifically that the data are censored. A quit within a firm is essentially a single, non-repeatable event for the individual. For those who quit the firm in a given year, their histories are complete. For those who remain with the firm for another year, their histories are not complete, and are censored artificially by ending them with the cut-off date of the data available. Like Meitzen, this study elects to use a proportional hazards model to estimate the quit function.

> . . . the proportional hazards model of Cox (1972), which can be described as semiparametric or partially parametric. It is parametric insofar as it specifies a regression model with a specific functional form; it is nonparametric insofar as it does not specify the exact form of the distribution of event times. In this sense, it is roughly anagolous to linear models that do not specify any distributional form for the error term. [Ref. 19:p. 14]

The model is estimated with a partial likelihood method which produces estimators ". . . asymptotically unbiased and normally distributed. They are not fully efficient because some information is lost by ignoring the exact times of event occurrence." [Ref. 19: p. 34] The article goes on to say that this is a small loss and does not tend to bias the results. Since the timing problem with quits is not the sequence in which they are observed, but breaking the continuous element of time into discrete elements of years, this is not a concern for this study, which identifies quits by year.

For this model the dependent variable is not quitting, but tenure at the firm. However, the event of interest is a quit, so the model can be interpreted equivalently to the logit regressions. Some assumptions were made about the perceptual variables used in this model. The assumptions were that while time may affect the ratios, the period of time examined in the sample (76-82) was short enough that the ratios remained constant. Therefore the ratios used in the cross-sectional model were employed for the hazard model. All other variables are based on values observed in the year of the quit, or in 1983, for those who had not quit. As in the cross-sectional and cohort analyses, two models were estimated for the same two groups:

Model A Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables) [Basic Model]

Model B Quits = f(Personal Characteristics, Human Capital Factors, Job Specific Variables, Perceptual Variables)

All models were estimated with SAS programs, developed by the SAS Institute, Inc., Box 8000, Cary, North Carolina 27511.

IV. EMPIRICAL RESULTS

This section will discuss coefficient interpretation, present the estimated models and comment on the findings for the three methods of analysis.

A. INTERPRETATION

For the cross-sectional and cohort models, the interpretation of the coefficients is dependent on where the function is evaluated (the probability of a quit selected). These models are estimated with the logit process where the underlying function is not linear. Therefore, the greatest effect of the coefficient will be observed when the probability is 50 percent. As the quit rates do not exceed 11 percent for these women, interpretation at the 50 percent level would give misleading results. Instead, the sample mean quit rates will be used as the baseline quit probability for interpretation. The effect of a one unit change in a continuous variable is roughly equal to:

$$(\text{probability of quit}) = Pr(Q) * (1-Pr(Q)) * (\beta)$$

Where β is the estimated coefficient of the continuous variable.

For dummy variables this relationship is not strictly accurate. The correct method would be to estimate the probability of a quit using the mean values of all variables, once with the dummy equal to one and once with it equal to

zero. The difference in the probabilities is the true effect. Given the number of variables in the models, this analysis will use the continuous variable method of interpretation. This method, while an approximation, is far simpler and usually produces very similar results.

For the hazard function, interpretation is fairly simple. Again, because the underlying probability distribution function is not linear, the effect of changes in explanatory variables depends upon the probability at which the function is evaluated. Because the probability is allowed to vary over time, and no mean rate is calculated, I will use an average of the cohort and cross-sectional rates when comparing the results. The percentage change in the quit probability for continuous variables is given by:

$$\text{percent quit probability} = (e^{\beta} - 1) * 100$$

For comparison purposes, the percent change will be multiplied by the average quit rate to get the change in the probability at a level near the actual quit rates. For dummy variables, I will give the effect relative to the alternative case. For example:

$$\text{MARSTAT} = -.2245 \qquad e^{-.2245} = .7989$$

Or, the effect of being married on quitting is 80 percent of the effect of not being married. Another way of looking at it is a women who is not married is 1.253 times more likely to quit (i.e., 25.3% greater likelihood) than a women who is married (1/.7989). When presenting interpretations of dummy

variables for hazard models, the table will show the relative effect. In the case of marital status the table would show .7989.

The coefficients have been transformed for all three techniques, using the above methods, for the exempt, or managerial/professional women in Model B. The transformed coefficients can be found in the far right column of the appropriate tables below.

B. RESULTS

This study set out to examine the effect of various attributes on the quit probability of managerial and professional women. Analysis from this point will concentrate on the exempt status results. Since the managerial/professional group made up most of the sample in the total group, and most of the estimations did not show a significant difference between the groups in quit behavior: The only model that showed a significantly different effect for this group was the hazard function, model B.

1. Cross-Sectional Results

Table 2 presents the means of the explanatory variables. Only 19 percent of these women had children, with only 17 percent of the exempt group having children. This sub-sample represents women of all ages, and stages in their careers, making this figure surprisingly low. Most of these women had only a Bachelor's degree, and few were supervisors.

TABLE 2

MEAN VALUES FOR CROSS-SECTIONAL MODEL

VARIABLES	TOTAL SAMPLE	MANAGERIAL/PROF. ONLY
DEPENDENT		
QUIT	.0771	.0833
EXPLANATORY		
1. MARRIED	.5420	.5354
2. CHILDREN	.1883	.1688
3. PREVIOUS EXPERIENCE	1.4593	1.4578
4. TENURE	6.1335	5.2688
5. MASTERS DEGREE	.2380	.2708
6. DOCTORATE	.0668	.0813
7. SALARY	22.3012	22.4049
8. PERF. RATING 3	.3801	.3740
9. PERF. RATING 4	.3878	.3823
10. PERF. RATING 5	.1438	.1480
11. PROMOTED IN 80	.4007	.4281
12. SUPERVISOR	.1635	.1490
13. GRADE	3.7611	3.8417
14. CONTROL	.1378	.1302
15. MANUFACTURING	.2200	.2240
16. PERSONNEL	.0505	.0469
17. RESEARCH	.1224	.1345
18. MARKETING	.2000	.2135
19. MATH	.0668	.0646
20. COMPUTER	.0231	.0260
21. ACCOUNTING	.0685	.0719
22. FINANCE	.0111	.0135
23. BUSINESS	.1498	.1291
24. TECHNICAL	.0462	.0542
25. CHEM. ENGINEER	.1267	.1313
26. ENGINEER	.0591	.0656
27. CHEMISTRY	.1884	.2146
28. BIOLOGY	.0762	.0833
29. PHYSICS/SCIENCES	.0171	.0167
30. REL. SALARY	.9821	.9768
31. REL PROMOTION	.7647	.7590
32. FUNC. AREA CROWD	.1716	.1679
33. GRADE CROWDING	.3952	.3766
34. STATUS	.8219	
TOTAL	1168	960

Seventy-nine percent of the women were given performance ratings of 3 or 4, and 40 percent had been recently promoted. These women tended to be in the lower paygrades, the average for the sample being paygrade 4 (out of 11). The quit rate was .07705 for all women, and .08333 for the exempt group.

Cross-sectional analysis measures the effects of the independent variables on quitting in 1981. These effects may actually oppose each other at different career points, as do the effects of age and tenure. As mentioned in the introduction, youth and short tenure tend to increase quits, while older employees with long tenure display lower quit rates. This study includes a tenure variable to capture some of this effect, but was unable to control for age. All variables are based on values as of 1 January 1981.

Initial estimations of the models were made using ordinary least squares regression, this method being less computer-resource consuming, and producing similar results [Ref. 17: p. 15]. this preliminary analysis was done to determine which forms of the explanatory variables best fit the model. For example, the final models use marital status and the dichotomous variable for children, since the variables for single parent and number of children were never significant. The final model also includes the relative salary variable measured as a ratio of women's mean salary to men's mean salary, this being more often significant than the weighted average ratio. The variable for

managerial/professional status was never significant, but coefficients were estimated for this group alone for comparison purposes.

The cross-sectional analysis uses the maximum likelihood Log-odds, or Logit, estimation technique, this being an appropriate form for a binary dependent variable, and simple to work with. Table 3 presents the estimated coefficients and standard errors for Model A, and are not discussed further. Table 4 presents the estimated coefficients and standard errors for Model B. The coefficients for the exempt group have been transformed as discussed in the first part of this chapter, and can be found in the far right column of the table. The exempt group results are presented by variable category.

a. Personal Characteristics

The effect of marriage on quits was small, positive, though not significant. Children had a strong, negative and highly significant on the quit probability. For this sample, marriage could represent the presence of a husband's primary income which would allow the wife to leave work, either reducing the costs of unemployed job search, or to exit the workforce. The presence of children, however clearly increases the costs of quitting and increases the mother's economic responsibility (or desire to get out of the house!).

TABLE 3

LOGIT ESTIMATES OF CROSS-SECTIONAL MODEL A

	TOTAL SAMPLE		EXEMPTS ONLY	
	ß	s.e.	ß	s.e.
INTERCEPT	1.0279	1.3900	.6416	1.4069
1. MARRIED	.1586	.2434	.3040	.2598
2. CHILDREN	-.8045**	.3951	-.9296**	.4465
3. PREVIOUS EXPERIENCE	-.2418**	.0952	-.2527**	.1048
4. TENURE	-.0329	.1205	-.0186	.1298
5. MASTERS DEGREE	-.0011	.3235	.0309	.3391
6. DOCTORATE	-2.1125*	1.1364	-1.8848*	1.1584
7. SALARY	-.1261	.0959	-.0875	.1013
8. PERF. RATING 3	-.7550**	.3501	-.8246**	.3626
9. PERF. RATING 4	-1.1110***	.3681	-1.1407***	.3787
10. PERF. RATING 5	-1.3380***	.4882	-1.5176***	.5254
11. PROMOTED IN 80	-.2831	.2683	-.3461	.2830
12. SUPERVISOR	-.9614*	.5064	-.6819	.5215
13. GRADE	.3773	.2485	.2444	.2645
14. CONTROL	.3131	.4192	.2622	.4670
15. MANUFACTURING	-.8598**	.4298	-.6613	.4488
16. PERSONNEL	-.7828	.7950	-.5188	.8135
17. RESEARCH	-.2422	.5199	-.0129	.5371
18. MARKETING	-.2726	.3911	-.1224	.4178
19. MATH	.3601	.5137	.1937	.5792
20. COMPUTER	.4981	.6384	.6211	.6692
21. ACCOUNTING	-.1996	.5602	-.2057	.6307
22. FINANCE	-.9717	1.1724	-.8715	1.1924
23. BUSINESS	-.5002	.4545	-.3313	.4954
24. TECHNICAL	-.5579	.8449	-.5413	.8649
25. CHEM. ENGINEER	.0002	.5266	.0072	.5559
26. ENGINEER	.3168	.5413	.1458	.5792
27. CHEMISTRY	-.7099	.5288	-1.1599*	.6013
28. BIOLOGY	-1.3872*	.8054	-1.4488*	.8213
29. PHYSICS/SCIENCES	-6.3697	23.2257	.	.
30. REL. SALARY				
31. REL PROMOTION				
32. FUNC. AREA CROWD				
33. GRADE CROWDING				
34. STATUS	.0999	.4177		
	CHI SQUARE	d.f	CHI SQUARE	d.f.
	92.27	31	80.14	30
	N = 1168		N = 960	

* = .10
** = .05
*** = <.01

TABLE 4

LOGIT ESTIMATES OF CROSS-SECTIONAL MODEL B

	TOTAL SAMPLE		EXEMPTS ONLY		
	ß	s.e.	ß	s.e.	transformed
INTERCEPT	7.2199	4.8031	5.3349	5.0097	
1. MARRIED	.1776	.2423	.3309	.2584	.0253
2. CHILDREN	-.7577*	.3940	-.8924**	.4455	-.0681
3. PREVIOUS EXPERIENCE	-.2279**	.0945	-.2408**	.1039	-.0184
4. TENURE	-.0343	.1217	-.0192	.1329	-.0015
5. MASTERS DEGREE	.0248	.3256	.0645	.3441	.0049
6. DOCTORATE	-1.7985	1.1284	-1.6812	1.1445	-.1284
7. SALARY	.2722	.3856	.2281	.3937	.0174
8. PERF. RATING 3	-.7485**	.3505	-.8136**	.3629	-.0621
9. PERF. RATING 4	-1.0472***	.3689	-1.0699***	.3809	-.0817
10. PERF. RATING 5	-1.2660***	.4875	-1.4460***	.5264	-.1104
11. PROMOTED IN 80	-.2824	.2714	-.3428	.2874	-.0262
12. SUPERVISOR	-1.0355**	.4978	-.7489	.5141	-.0572
13. GRADE	-1.0139	1.1124	-.7948	1.1488	-.0607
14. CONTROL					
15. MANUFACTURING					
16. PERSONNEL					
17. RESEARCH					
18. MARKETING					
19. MATH	.4773	.4941	.2712	.5560	.0207
20. COMPUTER	.4115	.6161	.7562	.6402	.0577
21. ACCOUNTING	-.0644	.5126	-.0993	.5722	-.0076
22. FINANCE	-.8674	1.1509	-.7841	1.1624	-.0599
23. BUSINESS	-.4196	.4349	-.2483	.4707	-.0190
24. TECHNICAL	-.7025	.8394	-.5663	.8603	-.0432
25. CHEM. ENGINEER	-.1850	.4962	-.0886	.5319	-.0068
26. ENGINEER	.2308	.5179	.0925	.5595	.0071
27. CHEMISTRY	-.7813	.5093	-1.1481**	.5823	-.0877
28. BIOLOGY	-1.4031*	.7917	-1.3891*	.8087	-.1061
29. PHYSICS/SCIENCES	-6.4018	22.3565	-6.4935	-.----	-.4959
30. REL. SALARY	-8.6118	8.2604	-6.9090	8.4919	-.5276
31. REL. PROMOTION	-2.3226	2.9141	-1.9465	3.0869	-.1486
32. GRADE CROWDING	-.9127	1.0098	-.4103	1.0828	-.0313
33. FUNC. AREA CROWD	2.9125	2.0510	2.1481	2.2281	.1640
34. STATUS	.1146	.4134			
	CHI SQUARE	d.f	CHI SQUARE	d.f.	
	90.51	30	78.68	29	
	N = 1168		N = 960		

* = .10
** = .05
*** = <.01

b. Human Capital Variables

The effect of previous experience was the only significant variable, reducing quits by more than one percentage point. There were variations in quit rates across fields. Majors in biology or chemistry were significantly less likely to quit than other majors.

c. Job Specific Factors

Performance ratings had a strong, significant and trended effect on reducing quits. Trended effects show that the higher the rating the lower the quit rate. These factors, controlled by management, seemed to be highly rewarding. The salary effect was not in the direction expected, with higher salaries associated with more quits. This occurred only when the relative salary variable was included, and seems to indicate some interaction between them. Recent promotion, supervisory status, and higher grade level all had negative coefficients, although these effects were not significant in this analysis.

d. Perceptual Variables

None of these variables, unique to this study, were significant. The relative salary variable and the grade crowding variable worked in the expected direction. As women's salary increases, relative to men's their quit rate will decrease. As the number of women increase in a grade level, relative to men, quits will decrease. The relative promotion variable does not work in the expected direction.

As the mean time to promotion to the next higher grade increases relative to men, quits are estimated to decrease. Since women tended to be promoted more quickly than men, this variable may reflect a concern by women that they are receiving preferential treatment (perhaps to meet some equal opportunity goal). The functional area crowding variable showed that as the numbers of women increase in an area, relative to men, the quit rate will increase. This may indicate that women perceive inequitable crowding in certain areas.

2. Cohort Results

For this group, quits are measured at a specific point in time. Tenure is the same for all observations, and therefore is not included as an independent variable. Table 5 presents the means for the explanatory variables. Slightly fewer of the women in this analysis were married than in the previous analysis (47% to 53%). The percentage of women with children in this cohort analysis with children was about half that of the cross-sectional analysis (9% to 19%). Since the cohort analysis selected for the second year after hire, this group is probably younger than that of the cross-sectional analysis, so the difference is not unexpected. This subsamble has fewer supervisors and a much higher incidence of recent promotion than the cross-sectional subsample. The mean quit rate is .1069 for the total group, and .1056 for the

TABLE 5

MEAN VALUES FOR COHORT MODEL

VARIABLES	TOTAL SAMPLE	MANAGERIAL/PROF. ONLY
DEPENDENT		
QUIT	.1069	.1056
EXPLANATORY		
1. MARRIED	.4782	.4783
2. CHILDREN	.0947	.0923
3. PREVIOUS EXPERIENCE	1.4404	1.4374
4. PREV. EXP SQ	12.4365	12.4963
5. TENURE		
6. MASTERS DEGREE	.2119	.2168
7. DOCTORATE	.0777	.0797
8. SALARY	7.4168	7.4616
9. PERF. RATING 3	.3597	.3573
10. PERF. RATING 4	.4019	.4042
11. PERF. RATING 5	.1342	.1364
12. PROMOTED	.6914	.7063
13. SUPERVISOR	.0286	.0218
14. GRADE	2.2534	2.1811
15. CONTROL	.1328	.1343
16. MANUFACTURING	.2820	.2720
17. PERSONNEL	.0211	.0210
18. RESEARCH	.1342	.1364
19. MARKETING		
20. STATUS	.9741	
21. MATH	.0347	.0357
22. COMPUTER		
23. ACCOUNTING	.0770	.0783
24. FINANCE	.0143	.0147
25. BUSINESS	.1165	.1161
26. TECHNICAL	.0511	.0511
27. ENGINEER	.3086	.3070
28. SCIENCE	.2555	.2545
29. REL SALARY	.9752	.9775
30. REL. PROMOTION	.9609	.9586
31. GRADE CROWDING	.5330	.5385
32. FUNC. AREA CROWD	.4137	.4155
33. HIRED 77	.1240	.1252
34. HIRED 78	.1342	.1336
35. HIRED 79	.1608	.1629
36. HIRED 80	.2030	.2042
37. HIRED 81	.2854	.2825
TOTAL	1468	1430

managerial/professional group alone. The year hired variables show an increasing quit rate for the women being hired in later years.

Preliminary OLS regression revealed few of the year hired variables as individually significant. However, they were significant as a group. The chow test to exclude these variables resulted in an F-statistic significant at the .0590 level. The college majors were aggregated slightly differently in this analysis than they were in the cross-sectional models, as none of the engineering or sciences majors were individually significant (c.f. Tables 2 and 5).

Table 6 presents the estimated coefficients and standard errors for Model A, and is not discussed further. Table 7 presents the estimated coefficients and standard errors for Model B. The coefficients for the exempt group have been transformed as discussed in the first part of this chapter, and can be found in the far right column of the table. The results for the exempt group are presented by variable category.

a. Personal Characteristics

For this group, both marriage and children serve to reduce quits. The effect for marriage is highly significant, while the effect for children was only significant for the total group. Apparently, among short tenure women, marriage rather than children significantly effects quitting, opposite to the effect estimated in the cross-sectional analysis.

TABLE 6

LOGIT ESTIMATES OF COHORT MODEL A

	TOTAL SAMPLE		EXEMPTS ONLY	
	ß	s.e.	ß	s.e.
INTERCEPT	.8000	.8518	.4125	1.0468
1. MARRIED	-.6825***	.1902	-.6605***	.1927
2. CHILDREN	-.7007*	.4326	-.6152	.4344
3. PREVIOUS EXPERIENCE	-.0314	.0889	-.0232	.0996
4. TENURE				
5. MASTERS DEGREE	-.5244*	.2956	-.4680	.2977
6. DOCTORATE	-.6774	.6067	-.6295	.6227
7. SALARY	.0819	.1559	.0550	.1787
8. PERF. RATING 3	-.8691***	.2611	-.9089***	.2698
9. PERF. RATING 4	-.6795***	.2615	-.6571**	.2661
10. PERF. RATING 5	-.8038**	.3519	-.7992**	.3560
11. PROMOTED	-1.2188***	.2144	-1.1968***	.2155
12. SUPERVISOR	.5152	.4678	.3514	.5464
13. GRADE	-.2854*	.1704	-.2842	.2063
14. CONTROL	-.3014	.3841	-.2069	.3907
15. MANUFACTURING	.0046	.2653	-.0803	.2723
16. PERSONNEL	.8002	.5496	.7896	.5514
17. RESEARCH	-.2767	.3564	-.2893	.3571
18. MARKETING				
19. MATH	.2176	.4784	.1786	.4787
20. COMPUTER				
21. ACCOUNTING	-.2419	.4777	-.3709	.4859
22. FINANCE	.4862	.7443	.3561	.7502
23. BUSINESS	-.1049	.3449	-.2429	.3584
24. TECHNICAL	-.3111	.4961	-.3468	.4998
25. ENGINEER	-.3250	.3488	-.2852	.3575
26. SCIENCES	-.3617	.3047	-.3877	.3086
27. REL. SALARY				
28. REL. PROMOTION				
29. GRADE CROWDING				
30. FUNC. AREA CROWD				
31. STATUS	-.5347	.7994		
33. HIRED 77	-.0537	.3571	.0294	.3664
34. HIRED 78	.2298	.3425	.3108	.3540
35. HIRED 79	-.1087	.3441	-.0621	.3535
36. HIRED 80	-.2479	.3410	-.1793	.3503
37. HIRED 81	-.5339	.3345	-.5420	.3530
38. PREVIOUS EXPER. SQ	-.0059	.0096	-.0057	.0094CHI
	CHI SQUARE	d.f	CHI SQUARE	d.f.
	101.79	30	96.60	29
	N = 1468		N = 1430	

* = .10
** = .05
*** = <.01

TABLE 7

LOGIT ESTIMATES OF COHORT MODEL B

	TOTAL SAMPLE		EXEMPTS ONLY		
	ß	s.e.	ß	s.e.	transformed
INTERCEPT	7.2213	6.1956	13.3444*	7.6668	
1. MARRIED	-.7034***	.1904	-.6880***	.1930	-.0657
2. CHILDREN	-.7266*	.4335	-.6088	.4357	-.0581
3. PREVIOUS EXPERIENCE	-.0218	.0991	-.0055	.1003	-.0005
4. PREV. EXP. SQ	-.0062	.0097	-.0069	.0096	-.0007
5. MASTERS DEGREE	-.5116*	.3001	-.4421	.3023	-.0422
6. DOCTORATE	-.8297	.6850	-.7628	.7325	-.0728
7. SALARY	.1057	.1527	.0123	.1819	.0012
8. PERF. RATING 3	-.8707***	.2601	-.8937***	.2693	-.0853
9. PERF. RATING 4	-.6992***	.2591	-.6559**	.2640	-.0626
10. PERF. RATING 5	-.8332**	.3492	-.8038**	.3538	-.0767
11. PROMOTED IN 80	-1.2049***	.2106	-1.2017***	.2116	-.1147
12. SUPERVISOR	.5382	.4591	.2656	.5461	.0254
13. GRADE	-.5532**	.2682	-.5351*	.2834	-.0511
14. CONTROL					
15. MANUFACTURING					
16. PERSONNEL					
17. RESEARCH					
18. MARKETING					
19. MATH	.2209	.4795	.1626	.4816	.0155
20. COMPUTER					
21. ACCOUNTING	-.5433	.3974	-.6176	.3981	-.0590
22. FINANCE	.2571	.7012	.2009	.7040	.0192
23. BUSINESS	-.1799	.3357	-.2976	.3465	-.0284
24. TECHNICAL	-.2743	.4967	-.3078	.5001	-.0294
25. ENGINEER	-.3486	.3403	-.3355	.3513	-.0320
26. SCIENCE	-.3183	.2935	-.3537	.2986	-.0338
27. REL. SALARY	-6.5071	5.5102	-11.2587*	6.7430	-1.0749
28. REL. PROMOTION	.6626	2.6810	-.9144	2.7378	-.0873
29. GRADE CROWDING	-.8317	.7686	-.8099	.7765	-.0773
30. FUNC. AREA CROWD	.4695*	.2520	.5098**	.2515	.0487
31. STATUS	-.5969	.8820			
32. HIRED 77	-.0539	.3562	.0282	.3657	.0027
33. HIRED 78	.2291	.3422	.3152	.3549	.0301
34. HIRED 79	-.1115	.3423	-.0685	.3525	-.0065
35. HIRED 80	-.2484	.3398	-.2046	.3497	-.0195
36. HIRED 81	-.5267	.3328	-.5554	.3517	-.0530
	CHI SQUARE	d.f	CHI SQUARE	d.f.	
	102.97	30	99.87	29	
	N = 1468		N = 1430		

* = .10
** = .05
*** = <.01

b. Human Capital Variables

None of the variables in this category were significant.

c. Job Specific Variables

As in the cross-sectional analysis, performance ratings had a strong, significant and trended effect in reducing quits. Along with these, promotion and grade (the salary grade occupied in the second year after hire; from 1 to 11) had strong, significant effects in reducing quits. Being in a higher grade seemed a stabilizing factor for these women. Management recognition of good performance through high performance ratings and promotion were rewarding, as these factors also strongly reduces quits.

d. Perceptual Variables

For the cohort group, relative salary and functional area crowding were both significant. The relative salary variable, however did not perform in the expected direction (as it did in the cross-sectional model). The effect of the relative salary variable to dramatically increase quits is so strong that it results in an effect larger than the mean quit rate. The functional area crowding variable reduces quits as women move into an area. The crowded areas result in a stronger propensity for women to quit as it becomes more crowded. The relative promotion variable, although not significant, again does not work in the expected direction for the exempt group. The mean time to

promotion for women in the cohort group tended to be slightly shorter than the time for me. As with the cross-sectional group, this variable may be reflecting a feeling of preferential treatment.

3. Proportional Hazards Model

This model, by definition, estimates the effect of the variables on the instantaneous quit rate. These effects are conditional on the woman remaining with the organization for as long as she has. A simple hazard rate can be approximated by dividing the number of women quitting in a given year of employment by the number of women remaining in the population. For the exempt subsample this is:

TABLE 8
SIMPLE HAZARD RATE

Year	Population	Quits	Rate (%)
1	1743	119	6.83
2	1624	151	9.29
3	1437	94	6.38
4	1379	40	2.90
5	1339	20	1.49
6	1319	16	1.21
7	1303	5	.29

This simple hazard rate is biased, in that it will tend to decline with tenure, because employees with the highest propensity to quit leave first, and those that remain have lower quit propensities. The model, by compensating for these effects gives a more accurate estimation of the explanatory variables than either the cross-sectional or cohort logit analyses. While it is easy, and appropriate, to

compare the logit results of the cohort and cross-sectional models, it is difficult to compare the estimated coefficients of those two models with the proportional hazard estimates. The hazard model produced more significant variables, supporting this study's contention that the cross-sectional model had some time effects obscuring the true effect of some of the variables. The estimated coefficients in the hazard analysis also tended to work in the expected direction, with salary for the first time showing a tendency to reduce quits. Since this model observes individuals in each year in the data set, examination of means is not meaningful, nor provided.

Table 9 presents the estimated coefficients and standard errors for Model A, and is not discussed further. Table 10 presents the estimated coefficients and standard errors for Model B. The coefficients for the exempt group have been transformed as discussed in the first part of this chapter, and can be found in the far right column of the table. The results are presented for the exempt subsample for Model B.

a. Personal Characteristics

Marriage and children both showed a strong, significant effect in reducing quits, as expected. Contrary to the logit estimations, this effect was stronger for marriage than for children.

b. Human Capital Variables

Women receiving their degree after hire, showed a strong significant tendency to remain with the firm. The

TABLE 9

PROPORTIONAL HAZARD ESTIMATES FOR MODEL A

	TOTAL SAMPLE		EXEMPTS ONLY	
	ß	s.e.	ß	s.e.
1. MARRIED	-.2049**	.1017	-.2182**	.1028
2. CHILDREN	-.5286***	.1902	-.5223***	.1925
3. PREVIOUS EXPERIENCE	-.0434	.0367	-.0343	.0375
4. PREVIOUS EXP. SQ	.0010	.0020	.0008	.0019
5. MASTERS DEGREE	-.1911	.1626	-.1446	.1654
6. DOCTORATE	-.2090	.3485	-.2509	.3564
7. SALARY	-.0998	.0687	-.1402*	.0762
8. PERF. RATING 3	-.3211**	.1348	-.3771***	.1367
9. PERF. RATING 4	-.4062***	.1455	-.4298***	.1463
10. PERF. RATING 5	-.6063***	.2030	-.6447***	.2032
11. PROMOTED	-2.1057***	.1196	-2.1013***	.1205
12. SUPERVISOR	.0746	.2650	.0676	.2861
13. GRADE	-.3000***	.0894	-.2645***	.1003
14. CONTROL	-.0171	.2028	-.0249	.2053
15. MANUFACTURING	.1031	.1544	.0645	.1569
16. PERSONNEL	-.4938	.3995	-.5023	.4000
17. RESEARCH	-.0515	.1956	-.0565	.1960
18. MARKETING	-.0729	.1584	-.0873	.1593
19. MATH	.5945**	.2465	.5501**	.2465
20. COMPUTER				
21. ACCOUNTING	-.2004	.2623	-.2450	.2644
22. FINANCE	.5577	.4033	.4805	.4040
23. BUSINESS	.2713	.1932	.1643	.1984
24. TECHNICAL	-.1006	.2837	-.1403	.2852
25. CHEM. ENGINEER	.1550	.1964	.1492	.1990
26. ELEC. ENGNR	.6598*	.3539	.6708*	.3552
27. MECH. ENGNR	.2383	.2766	.2506	.2772
28. OTHER ENGNR	.0233	.2922	-.1068	.3080
29. CHEMISTRY	-.0342	.1938	-.0527	.1945
30. PHYSICS	-.6258	1.0155	-.6003	1.0160
31. BIOLOGY	-.2527	.2090	-.3336	.2130
32. OTHER SCIENCE	-.3607	1.0142	-.4239	1.0143
33. REL. SALARY				
34. REL. PROMOTION				
35. GRADE CROWDING				
36. FUNC. AREA CROWD				
37. STATUS	.6506	.4686		
38. DEGREE AFTER	-1.4219***	.2882	-1.4075***	.3215
	CHI SQUARE	d.f	CHI SQUARE	d.f.
	452.46	33	441.35	32
	N = 1798		N = 1743	

* = .10
** = .05
*** = <.01

TABLE 10

PROPORTIONAL HAZARDS ESTIMATES FOR MODEL B

	TOTAL SAMPLE		EXEMPTS ONLY		
	ß	s.e.	ß	s.e	transformed
1. MARRIED	-.2136**	.1010	-.2245**	.1021	.7989◇
2. CHILDREN	-.5575***	.1909	-.5525***	.1930	.5755◇
3. PREVIOUS EXPERIENCE	-.0396	.0366	-.0313	.0372	-.0029
4. PREV. EXP. SQ	.0009	.0020	.0007	.0020	.0001
5. MASTERS DEGREE	-.1170	.1696	-.0567	.1719	.9449◇
6. DOCTORATE	-.4489	.3877	-.4886	.3965	.6135◇
7. SALARY	-.0865	.0706	-.1337*	.0783	-.0119
8. PERF. RATING 3	-.2991**	.1337	-.3562***	.1356	.7003◇
9. PERF. RATING 4	-.3777***	.1450	-.4049***	.1458	.6670◇
10. PERF. RATING 5	-.5736***	.2025	-.6155***	.2027	.5404◇
11. PROMOTED	-2.1383***	.1189	-2.1359***	.1196	.1181◇
12. SUPERVISOR	.1111	.2616	.1136	.2839	1.1203◇
13. GRADE	-.0561	.2644	.0428	.2820	1.0437◇
14. CONTROL					
15. MANUFACTURING					
16. PERSONNEL					
17. RESEARCH					
18. MARKETING					
19. MATH	.6417***	.2417	.5965**	.2418	1.8158◇
20. COMPUTER					
21. ACCOUNTING	-.0822	.2398	-.1384	.2415	.8708◇
22. FINANCE	.6822*	.3945	.5970	.3951	1.8167◇
23. BUSINESS	.3440*	.1897	.2325	.1952	1.2618◇
24. TECHNICAL	-.1056	.2798	-.1314	.2821	.8769◇
25. CHEM. ENGINEER	.1618	.1957	.1645	.1995	1.1788◇
26. ELEC. ENGNR	.6319*	.3558	.6604*	.3578	1.9356◇
27. MECH. ENGNR	.2583	.2809	.2884	.2834	1.3343◇
28. OTHER ENGNR	.0646	.2898	-.0600	.3062	.9418◇
29. CHEMISTRY	-.0492	.1885	-.0775	.1889	.9254◇
30. PHYSICS	-.6586	1.0137	-.6642	1.0148	.5147◇
31. BIOLOGY	-.2962	.2038	-.3840*	.2072	.6811◇
32. OTHER SCIENCE	-.3669	1.0143	-.4350	1.0145	.6473◇
33. REL. SALARY	23.6276**	10.3543	21.9632**	10.5260	3.28E+08
34. REL. PROMOTION	-4.2531	3.0727	-3.6712	3.1164	-.0927
35. GRADE CROWDING	2.1543**	.8552	2.1243**	.8805	.7006
36. FUNC. AREA CROWD	-.5991	.8999	-.5232	.9116	-.0387
37. STATUS	.8150	.5116			
38. DEGREE AFTER	-1.3655***	.2891	-1.3860***	.3214	.2501◇

CHI SQUARE	d.f	CHI SQUARE	d.f.
456.52	32	444.81	31
N = 1798		N = 1743	

* = .10
** = .05
*** = <.01

◇ = DUMMY VARIABLE

estimated effects of both previous experience and a doctorate are to reduce quits, although the effects were not significant. A masters degree, on the other hand, is positively related to quits, though not significant. This indicates that women in this firm gain degrees to complement their job areas and enhance their worth to the present firm. The fields of study had various effects with only electrical engineering and biology showing significant effects (to increase and reduce quits, respectively).

c. Job Specific Variables

Salary, promotion and performance ratings all showed strong, significant effects in reducing quits. For performance ratings, this effect was trended, as in the other models. The promotion effect was the strongest and most highly significant. Apparently, management recognition of good performance is seen to dramatically reduce quits.

d. Perceptual Variables

Relative salary, while significant, has an inordinately strong effect in the direction opposite to that expected. Increases in women's salary relative to men's increases quits. Grade crowding is also significant and works in the direction expected. As a grade becomes more crowded, women quit with greater frequency. Women in this firm are over-represented in the lower paygrades, with this group apparently driving the effect. The relative promotion variable, though not significant, again does not work in the

expected direction, with longer time to promotion for women increasing quits. Functional area crowding also shows a non significant effect of increasing quits as an area becomes more crowded.

V. CONCLUSIONS

The most significant and remarkable effects through out the models were seen in the personal and job specific characteristics. Marriage and children generally reduce quits. For women at this level family responsibilities are seen to increase the costs of quitting. It appears that women at the higher levels of the work force have a higher reservation wage, with family concerns serving to increase the value of their time in the workplace, rather than the value of their time at home. It could be that, at these levels, women prefer to hire someone else to take care of the work in the home that is traditionally their responsibility (i.e., laundry, cleaning, etc.) and, instead, maintain their careers.

The job specific characteristics were, throughout the models, more significant and stable in their effects, than any others. The effect of management recognition and reward on quits was impressive. Performance ratings, with their strong and trended effect were especially interesting. As performance ratings were more favorable, they increasingly reduced quits; the highest ratings producing the strongest effect. The promotion variable supports Solnick's [Ref. 17] conclusion that a recent promotion serves to retain people in the firm. For women, this effect is dramatic. In the proportional hazards model, a woman who has <u>not</u> been recently

promoted has a 6.5 times greater probability of quitting than a woman who has been recently promoted (1/.1181). Also in that model, salary and earning a degree after joining the firm both had a negative effect on the probability of quitting, indicating women tend to earn a degree that will complement their current job, and enhance their qualifications for advancement within the firm.

The perceptual variables that this study tried to model were disappointing. They were difficult to interpret, and, in retrospect, the effects of uncrowded and crowded areas were probably conflicting. I think more work can be done in this area. A better approach would be to assign a dummy variable for crowded and uncrowded, rather than the ratios used in this study.

If this study could be carried on from this point it is recommended that the analyst begin, and remain, with the proportional hazards method, attempting to better capture the effects of the perceptual variables.

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