An Analysis of Occupational Change and Departure from the Labor Force

Evidence of the Reasons that Teachers Leave

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ABSTRACT

This paper examines both the timing of exits from the teaching profession and the reasons for these exits. Approximately 67 percent of exiting female teachers leave the work force altogether. The presence of a newborn child is the single most important determinant of exits for females. The paper discusses why studies of quit behavior that simply include a person's total number of children may fail to capture the true importance of fertility behavior on a female's quit decision. It also examines the return rates of departing teachers and compares the exit behavior of teachers to that of nonteachers.

I. Introduction

The labor supply decisions of elementary and secondary school teachers during the early stages of their careers have received considerable attention. A recent United States Department of Education Study highlights the potential importance of this issue. The study projects that, due to substantial increases in the number of school-age children, the number of public and private classroom teachers will increase by 350,000 between 1995 and 2007.[1] Moreover, the implementation

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1. This represents a twelve percent increase. See "Projections of Education Statistics to 2007," U.S. Department of Education, NCES 97-382, and the associated report "A Back to School Special Report on the Baby Boom Echo: Here Come the Teenagers."

of current proposals designed to decrease class sizes in elementary schools would increase teacher demand further.[2] Ensuring that enough teachers exist to staff schools is not, however, the only reason this issue is important. Educational quality is directly impacted by the fact that schools often have a difficult time recruiting and retaining science teachers and academically gifted teachers.

Both recruitment and retention are likely to be important in determining the size and composition of the teaching work force. Although this paper briefly examines the former, the primary focus of this work is on the latter. Scholars often attribute teacher attrition to teachers changing occupations after finding more attractive non-teaching jobs. It is intuitively appealing to believe that many exiting teachers may leave the work force altogether, however, perhaps due to changes in marital status or in the size of their families. This possibility is likely because a large percentage of starting teachers are both young and female. For example, consider the potential effects that the birth of a child could have on the labor supply decision made by an individual who is currently teaching. First, the presence of a young child is likely to make staying at home more rewarding for the parent. Second, if the decision to remain in teaching implies that daycare must be paid for, the birth of a child will also lower the effective wage of the person's teaching job.[3] Thus, the birth of a child may significantly increase the benefits of being out of the work force relative to the benefits of teaching.[4] In addition, the option of leaving the work force may be especially appealing for those in the teaching occupation because the rigid public school wage structure implies that a teacher who returns to teaching in the future will typically do so without suffering a loss in wages.[5]

Currently, little is known about the relative importance of career changes and exits out of the work force in determining teacher exits, mainly because "teacher-specific" data used in most previous studies are constructed from educational records. These data provide information about a teacher for only the years while the teacher is actually teaching in a particular school district or state.[6] This implies that the reason a person leaves teaching is not observed. Further, teacher-specific data typically contain very little personal information, including no information about marital

2. For example, a recent proposal by President Clinton would have set a maximum class size of 18 for children in first, second, and third grade. Currently, there are 480,000 first, second, or third grade classrooms in the United States with an average of 22 students in each classroom. See Hartocollis (1998).

3. The savings associated with not hiring hire daycare could be considered the pecuniary rewards associated with not working.

4. It is also possible that the financial pressures of a new child may increase the marginal utility of the income associated with teaching. This partial effect would make individuals less likely to leave teaching after the birth of a child. The true response to the birth of a child depends on the relative strengths of the various effects.

5. See Murnane (1987) who suggested that the high teacher attrition rates which are often found for females are related to the fact that women can "leave the classroom for a period of time to start a family, and still be able to return to the profession without great loss of status."
This feature may also imply that women with preferences for not working while their children are young may be more likely to enter teaching than women with other preferences.

6. For example, Murnane and Olsen (1989, 1990) used data of North Carolina and Michigan teachers, and Murnane et al. (1989). Mont and Rees (1996) used information from the state of New York. Gritz and Theobald (1996) and Theobald and Gritz (1996) used data from the state of Washington.

and fertility histories that might be important in explaining the quit decisions for this demographic group.[7]

As an alternative approach, this paper uses a sample of newly certified teachers constructed from a general longitudinal survey, the National Longitudinal Study of the High School Class of 1972 (NLS-72).[8] The drawback of using these data is that the number of teachers in this general longitudinal survey is small relative to the sample sizes available in certain teacher-specific data. However, these data allow analyses that have not previously been possible using teacher-specific data. The remainder of the paper concentrates on several questions about educational policy. Answers to these should provide a better understanding of teacher decisions and the potential effectiveness and implications of wage increases. The questions are: (1) What is the relative importance of different exit reasons in the determination of overall teacher attrition rates? (2) Do different types of teachers (for example, science teachers, teachers with high test scores, and elementary teachers) leave teaching for different reasons? (3) To what extent are marital and fertility variables related to teaching duration and the reason that individuals leave teaching? (4) To what extent do higher teaching wages have different effects on different types of exits? (5) To what extent do teachers who leave their first teaching spell return in the near future and how do return rates vary with the exit reason. (6) Finally, how do the attrition rates of teachers compare with attrition rates of nonteachers with similar levels of educational attainment?

The final question arises because policy discussions are often based to some degree on the assumption that teacher attrition rates are "high." It is important to stress, however, that this paper does not examine the extent to which teacher attrition has a harmful effect on educational quality. This is clearly an important issue for policymakers considering the policy implications of the results in this paper. For example, if teacher attrition is particularly harmful for schools, policymakers may wish to consider ways to reduce teacher attrition even if turnover in the teaching occupation is not higher than turnover in nonteaching occupations with similar educational requirements.

To a large extent, the focus of this paper is on education policy. Because of several desirable features of these data, however, the findings from this work are also likely to contribute to the understanding of job quitting behavior in general. First, the teaching and nonteaching samples consist of young workers with similar educational backgrounds who are observed at the beginning of their occupational spells. As a result, this work avoids certain sample selection problems that have been recognized in the literature on quit behavior.[9] Second, the data used here present an opportunity to

7. Also, in these data, information on an individual's teaching career is available only as long as the person remains in the particular state or school district. Thus, to the extent that teachers change geographical locations but remain in teaching, studies using these data will overstate the exit probabilities from teaching.

8. See Heyns (1988) for an early descriptive look at the teachers in these data.

9. Studies which examine workers who possess varying amounts of tenure (for example, Viscusi, 1980; Blau and Kahn, 1981; Meitzen, 1986) typically assume that tenure is exogenous. However, as recognized by Weiss (1984), tenure is endogenous and tends to be correlated with unobservable individual attributes (for example, stick-to-itiveness) that determine quit behavior. This implies that the effect of tenure and any variable correlated with tenure will be biased in these studies. Weiss (1984) uses starting workers of varying ages, but points out that this may also lead to selection bias because older workers who are observed starting new jobs may tend to have unobserved attributes that increase their quit propensity. Similar argu-

examine the relationship between family changes and quit behavior. The data are useful for this purpose because they include specific marital and children histories for each sample member and because information about individuals is available during the portion of the lifecycle in which family changes are most prevalent.[10] In studies that include respondents of widely varying ages, it is often difficult to interpret the estimated effects that children have on quit behavior because some individuals' children may be younger than school age, others may be in school but living at home, and others may have moved away from home.[11] This paper also discusses why studies of quit behavior that include only information about a female's total number of children may fail to capture the importance of fertility behavior on her quit decision even if her children are approximately the same age.[12] An alternative measure used in this paper, which indicates whether a new child has been born in the current year, is found to be the single most important predictor of female quit behavior.

Finally, the nature of the teaching occupation is also potentially important from the standpoint of understanding quit behavior. For example, understanding the effect that children have on quit behavior is complicated if employers believe that women with children (or expecting children) are more likely to quit, and, as a result, provide these women with less training than other women (because this would create different wage profiles for these women). A benefit of studying quit behavior within the teaching occupation is that these problems are unlikely to confound the analyses because the wages paid in public schools are typically determined by a rigid function that depends on only teaching experience and post-bachelor education levels.[13]

The remainder of the paper proceeds as follows. Section II discusses the data and provides a simple descriptive analysis for both teachers and nonteachers. Section III specifies a competing risks duration model which permits the examination of the relationship between individual characteristics (including marital and fertility variables), the duration of time spent in teaching and the reason that a teacher leaves the teaching occupation.[14] Section IV discusses the estimates of the competing risks model and Section V concludes.

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ments could be made about the possible biases that would exist if individuals have widely varying educational backgrounds.

10. Weiss (1984) and Meitzen (1986) chose administrative data because of their usefulness from the standpoint of dealing with other problems, but, as a result, did not have information about family histories.

11. As discussed earlier, although not theoretically certain, it seems likely that the existence of very young children would be likely to increase the quit rates for women. On the other hand, the primary effect of having children of school age may be to increase the necessity of additional income which would tend to decrease quit rates. Viscusi (1980) found a positive relationship between number of children and quitting. Interpretation of these results is difficult, however, because the mean and standard deviation of the age of his PSID sample are approximately 36 and 12 respectively.

12. Using respondents aged 14 to 24 from the National Longitudinal Surveys of young men and women, Blau and Kahn (1981) found that children have an insignificant effect on quitting.

13. Weiss (1984) also avoided these problems by using a sample of newly hired production workers (at two specific manufacturing facilities) who had the same pay schedules, promotional opportunities and fringe benefits. Brewer (1996) suggested that the rigidity in the teaching wage structure is less significant once potential teacher mobility to administrative positions within the educational system is taken into account.

14. This type of model was employed by Dolton and Van der Klaauw (1994) in studying teacher attrition in the United Kingdom, but, due primarily to data limitations, has not been used to study teacher attrition

II. Data and Descriptive Results

The first wave of the NLS-72, which was completed in 1972, includes interviews with 22,652 students who were expected to graduate from high school in that year. Thus, the individuals in the NLS-72 are essentially of the same age. Included in the first wave is information on aptitude tests such as the Scholastic Aptitude Test (SAT). Followup surveys were taken in 1973, 1974, 1976, 1979, and 1986. As a result, for each person the survey contains detailed information about work experience, education, marriage, and fertility for approximately 14 years after the person graduated from high school. Because survey waves did not occur in every year, some of the survey waves ask the individual retrospective questions which cover several years of the individual's life.

A. Teachers

Among those who participated in all survey waves and became certified to teach at some point before the end of the survey period, 832 individuals responded to a supplemental questionnaire that asked about his or her teaching experiences.[15] For 82 of these individuals, missing data made it impossible to construct a complete work history. Of the remaining 750 certified individuals, 578 choose to teach at some point during the sample period. Table 1 shows descriptive statistics for the 422 females in this group.[16] Due to the small number of males in the potential sample, this paper concentrates exclusively on the decisions of the female teachers.

Much of the remainder of the paper examines the first spell in teaching, which is assumed to end when a person chooses not to teach in a particular year. Table 1 shows that 255 female teachers are observed leaving the teaching field at some point during the sample period. The teaching spells of the other teachers are right censored.[17] The data are yearly so the exact date of exit for each person is not observed. Making the assumption that a person teaches for t years if he or she starts the tth year of teaching but does not return for the $t + 1$st year, the highest plot in Figure 1 is a Kaplan-Meier survivor function for teachers that utilizes information on both

in the United States. Gritz and Theobald (1996) allow a separate transition for leaving the public school system, accepting a teaching job in a new district, and accepting a nonteaching job in the public school system.

Single risk models do not differentiate between the different possible reasons for teacher exits. For teacher attrition research involving these types of models see, for example, Murnane and Olsen (1989, 1990), Theobald (1990), Mont and Rees (1996), Gritz and Theobald, 1996, Theobald and Gritz (1996), and Stinebrickner (1998, 1999a). Stinebrickner (1999b, 2001a, 2001b) and Van der Klaauw (1996) use dynamic, utility maximizing models to study teacher attrition.

15. The supplemental questionnaire was sent to 1,147 individuals. Of these, 102 individuals replied that they had never taught and were not certified and 213 responded to the supplement but had missed one or more of the earlier waves so that career paths could not be constructed without gaps.

16. Because this paper involves the career choices of individuals only after they become certified, which usually requires a minimum of four years of training after high school, the data contain between one and 11 years of work histories and personal information for each person. A small number of people finished college in three years. For these people, 11 years of data are observed. For most people ten or fewer years are observed.

17. For censored observations, the point of censoring (in completed years) depends on when the person started her teaching career.

Table 1
Variable Definitions and Sample Values—Female Teachers

Variable	Mean (Standard Deviation)
Number of individuals	422
Number of years individual is observed (after certification)	9.31 (1.63)
Job/occupation changes	
Number of individuals with end of teaching spell uncensored	255
Number uncensored leaving job for new job	83
Number uncensored leaving workforce altogether	172
Individual teacher characteristics	
VSAT (verbal SAT score/100)	5.32 (.48)
VSAT (verbal SAT score/100)	4.31 (.96)
MSAT (math SAT score/100)	4.54 (.90)
SCIENCE (bachelor degree in math or science)	0.05
MARR (married in a particular year)	0.59
CHILD (number of children in a particular year)	.41 (.60)
CHILD (number of children as of last year)	1.14 (1.05)
NEWCHILD (new birth in previous period)	0.08
Region	
EAST	0.22
NORTH CENTRAL	0.26
SOUTH	0.41
WEST	0.11

the censored and uncensored observations but does not include any information on covariates. The survivor function evaluated at time t shows the probability that an individual's first spell in teaching will last more than t years. Thus, approximately 53 percent of women in the sample have first teaching spells that last more than four years.[18]

The survivor function for teachers makes no distinction between individuals who leave teaching for a new occupation and individuals who leave the work force altogether. Table 1 indicates that the commonly portrayed scenario in which a teacher is "lured" away from teaching by the attractiveness of a nonteaching job is not the

18. Because the data are yearly, the wording "more than four years" could be replaced with "five or more years." This number appears to be roughly consistent with those found using teacher-specific data. For example, Murnane and Olsen (1989) find that approximately 59 percent of English teachers complete five or more years of teaching. They find that this number is higher for elementary teachers, math teachers, and social studies teachers and lower for biology and chemistry/physics teachers.

The numbers in this paper may be somewhat lower due to assumptions that are made about when a person "leaves" teaching. The extent to which individuals return to teaching after a "departure" is examined in Table 5.

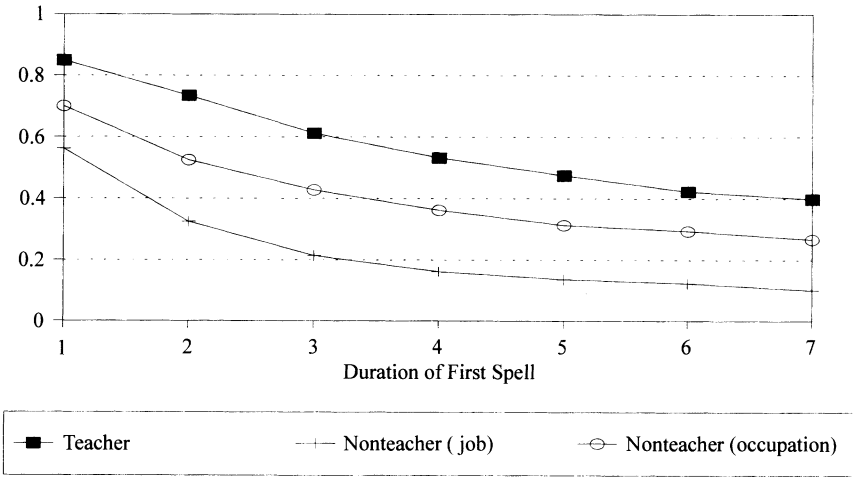

Figure 1
Kaplan-Meier Survivor Functions, Length of First Spell.

primary cause of teacher attrition. Of the 255 females for whom the end of the first spell in teaching is observed, 172 (.67) exit the full-time work force altogether and only 83 (.33) change occupations.[19]

The teacher's exit reason is determined by the person's activity in the period after departure. One theoretical explanation of the high proportion of teachers who leave the labor force altogether is that teachers who intend to change occupations may leave the labor force for a short period of time, perhaps because the search process for a nonteaching job is more efficient when the person is not working. If this is the case, then classifying exit reason in terms of the teacher's activity status in the year after the teacher leaves teaching would be problematic. However, Table 2 suggests that this is not typically the case. For example, of the 156 teachers who initially exit the labor force altogether and are observed a second year after exiting, only 16 (.10) switch to a nonteaching job in the second year after departure. Of the 119 teachers who initially exit the labor force altogether and are observed five or more years after exiting, only 22 (.18) make a transition to a nonteaching job at any point during this

19. People are considered to be "working" if they work more than 20 hours a week. Thus, the "out-of-the-work force" designation includes individuals who are working fewer than 20 hours a week. Little difference is seen if either 10 or 15 hours is used as the threshold for the "working" group. For example, the survivor function at four years is 54 percent for 20 hours, 53 percent for 15 hours, and 53 percent for 10 hours. For teachers whose exits are observed, the proportion exiting the work force is 67 percent for 20 hours, 65 percent for 15 hours, and 62 percent for ten hours. Also included in the out-of-the-work force category are individuals who leave work to return to school full time. The data indicate that returning to school full time is not a common occurrence for teachers; only eight of the 172 teachers who are observed exiting the work force enter school full time.

Table 2
Transition to Nonteaching Jobs after Exit out of Work Force

Number of Years, t	Number of Teachers Observed t or More Years after Exit to H	Number (and Proportion) of Teachers Starting a Nonteaching Job within t Years after Exiting to H
2	156	16 (.10)
3	151	22 (.15)
4	141	22 (.16)
5	119	22 (.18)
6	98	22 (.24)

The second column shows the number of teachers for which t or more years are observed in the data after the person exits the work force (H). The third column shows the number (and proportion) of those individuals who switch to a nonteaching job at some point within the next t years after exit.

period. Therefore, it seems reasonable to conclude that a large number of individuals are leaving teaching because they do not want to be in the full-time labor force.[20]

B. Nonteaching Occupations

Although the attrition rates for teachers may seem high, it is useful to view them in the context of the attrition rates of nonteachers who have similar educational backgrounds. Table 3 shows descriptive statistics for 1,028 female nonteachers from the NLS-72 who entered a nonteaching job at some point after receiving a bachelor degree. The average combined verbal and math SAT score for the nonteachers in the sample is 95 points higher than the average combined score for the teachers in the sample. A comparison of Tables 1 and 3 also indicates that teachers in the sample are more likely to be married and, on average, have more children than nonteachers.

For the teaching sample, Section IIA examined exits out of the first teaching spell. Clearly, an occupational change occurs when a teacher leaves a teaching job for a nonteaching job. However, it also seems reasonable to believe that the majority of teachers who leave their first teaching spell are also experiencing their first job

20. Other possibilities are that the teacher is laid off or leaves her job due to family relocation. Unfortunately, the data do not provide yearly information about layoffs or whether individuals changed geographic regions from year to year. This is undesirable because teaching jobs tended to be scarce during much of the period covered by the NLS-72 data, and, as a result, it is likely that some teachers who wanted to return to teaching could not. This cannot be examined directly, but 75 percent of former teachers in 1986 indicated on the teaching supplement that a lack of available teaching jobs was not an important reason for their decision to leave the teaching profession. Of the remaining 25 percent, it seems likely that some would have left teaching voluntarily, but had a difficult time returning.

Table 3
Variable Definitions and Sample Values—Female Nonteachers

Variable	Mean (Standard Deviation)
Number of individuals	1,028
Number of years individual is observed (after bachelor)	9.02 (1.56)
Job changes	
Number of individuals with end of job spell uncensored	905
Number uncensored leaving job for new job	666
Number uncensored leaving workforce altogether	239
Occupation changes	
Number of individuals with end of occupation spell uncensored	804
Number uncensored leaving occupation for new occupation	477
Number uncensored leaving workforce altogether	327
Individual teacher characteristics	
WAGE starting log weekly teaching wage	5.09 (.58)
VSAT (verbal SAT score/100)	4.80 (1.23)
MSAT (math SAT score/100)	5.00 (1.13)
SCIENCE (bachelor degree in math or science)	0.21
MARR (married in a particular year)	0.4
CHILD (number of children in a particular year)	.24 (.45)
CHILD (number of children as of last year)	.82 (1.01)
NEWCHILD (new birth in previous period)	0.05
Region	
EAST	0.25
NORTH CENTRAL	0.25
SOUTH	0.31
WEST	0.19

change after entering teaching.[21] Thus, Figure 1 compares the teaching survivor function to both the nonteaching survivor function computed on the basis of the exit from a person's first job and the nonteaching survivor function computed on the basis of the exit from a person's first occupation.[22] The occupation categories used

21. Of the teachers, 70 percent report having only one teaching job in their first teaching spell. Although it cannot be examined using these data, it seems likely that many of the remaining teachers report having new jobs after changing schools within a particular school district. These teachers would have retained the same wages and basically have the same employer.

22. In this paper, the term job change is used synonymously with employer change. Neal (1999) explores the complex process by which career changes (roughly speaking, the analog of the occupation changes in this paper) and employer changes occur for males. In the NLS-72 data, individuals are only asked about their occupation if they change employers. Thus, as in Neal (1999), changes in occupations (careers) within a particular job (employer) are not examined.

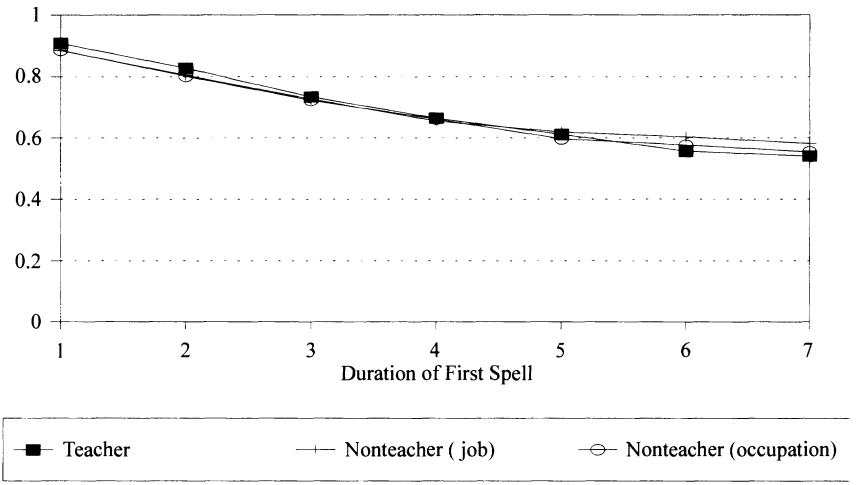

Figure 2
Kaplan-Meier Survivor Functions, Exits Out of Work force.

to construct the latter survivor functions are described in Appendix A. Figure 1 reveals that the survivor function for teachers in the sample is higher in all years than the survivor functions for nonteachers in the sample. Thus, the nonteachers in the sample tend to leave their first job/occupation spells more quickly than the teachers in the sample leave their first teaching spells.[23]

As indicated by Table 3, the end of the first job spell is observed for 905 nonteachers. Of these, 666 (74 percent) of job exits are to a different job and the other 239 (26 percent) exiting nonteachers leave the full-time work force. The end of the first occupation spell is observed for 804 nonteachers. Of these, 477 (59 percent) of occupation exits are to a different occupation and the other 327 (41 percent) exiting nonteachers leave the work force.[24]

Thus, exits out of the work force represent a much lower proportion of total exits for nonteachers than for teachers. Because the overall exit rates are higher for nonteachers, however, this does not necessarily imply that a nonteacher is less likely than a teacher to end her first spell by leaving the work force. This issue is examined in Figure 2 which shows survivor functions for teachers and nonteachers associated

23. Although not shown in Figure 1, the standard errors associated with the survivor functions in Figure 1 are relatively small compared to the differences between the survivor functions for teachers and nonteachers. For example, in Year 4, the estimated standard error is .024 for teachers, .011 for nonteachers (job spell), and .014 for nonteachers (occupation spell). The difference between the survivor functions for teachers and nonteachers in Year 4 are 37 percent (job change) and 20 percent (occupation change).
24. To see why the number of individuals who are observed exiting the work force is larger in the case of occupation change than it is in the case of job change, consider a person who holds two different jobs in the same occupation in two consecutive years and then exits the work force in the third year. She leaves her first job spell by exiting to a new job. She leaves her first occupation spell, however, by exiting the work force.

with the single risk of leaving the work force.[25] The results indicate that the probability that a person ends her first spell in a particular year by exiting the work force is very similar for teachers and nonteachers. Nonetheless, one must be careful about the interpretation of this result. As discussed in Footnote 19, only eight of the 172 (5 percent) teachers who leave the work force begin school full-time. However, 66 of the 239 (28 percent) nonteachers who exit the work force in the case of job change enter school full-time, and 79 of the 327 (24 percent) nonteachers who exit the work force in the occupational change case enter school full time. Thus, to some extent, leaving the work force has a somewhat different meaning for teachers and nonteachers. Nonetheless, the higher overall exit rates for nonteachers seen in Figure 1 are driven by the fact that nonteachers are more likely to end their first spell by making a transition to new work.

III. Independent Competing Risks Duration Model Specification

The Kaplan-Meier analysis in the previous section does not allow an examination of the relationship between observable characteristics and the length of teaching spells. A number of these relationships are likely to be of interest to policymakers. For example, many previous studies have stressed the importance of understanding the relationship between wages, test scores/academic ability, and the length of teaching spells. In addition, the data used here provide an opportunity to examine the relationship between family variables and teaching exits. The competing risks duration model described in this section allows the effect of observable characteristics to potentially vary with the exit reason.

A hazard function for discrete-time data in a single risk duration model measures the probability that a person leaves teaching for any reason in a given year, t, conditional on not having left before that year. The independent competing risks hazard model in this paper makes a furth distinction between exit to the nonteaching labor sector, N, and exit out of the labor force altogether, H.[26] Thus, in terms of modeling, the competing risks hazard model requires a separate transition intensity for N and H. Denote these transition intensities $h^N(s)$ and $h^H(s)$ respectively. Then, $h^N(s)$ represents the probability that a person will leave the teaching sector for a nonteaching job in year s conditional on not having left teaching before year s, and $h^H(s)$ represents the probability that a person will leave the teaching sector for the home option in year s conditional on not having left teaching before year s.

The functions h^N and h^H are assumed to be of the proportional hazard type. This

25. In this exercise, a teacher's spell is considered censored if she leaves her first teaching spell for a nonteaching job (because in this case the length of time that she would have stayed in teaching before exiting the work force is not observed). For nonteachers, survivor functions are estimated for both the case of job change and the case of occupation change. In the former case, the nonteacher's first job spell is treated as censored if she leaves the first nonteaching job for a new job. Similarly, in the latter case, the nonteacher's first occupation spell is treated as censored if she leaves the first nonteaching occupation for a new occupation.

26. For the nonteachers, N will represent a new job or a new occupation.

specification allows a set of exogenous individual characteristics to affect the transition intensities. However, identification issues associated with the proportional hazard model require the assumption that the transition intensities are separable functions of these individual characteristics and the teaching duration (this is known as the baseline hazard).[27] A desirable feature of this framework is the ability to allow time-varying characteristics (for example, marital status, and number of children) and censored observations. The model here is also specified to accommodate unobserved heterogeneity. This is important because estimates of the baseline hazard and estimates of the effects of included explanatory variables will be biased if true unobserved heterogeneity exists but is not controlled in the model.[28]

Let X_{is} be the vector of observable individual characteristics (including the wage) for the sth year of the first teaching spell for person i.[29] Some elements of X_{is} are constant across time (for example, standardized test scores, subject area) while other elements are time-varying (for example, marital status and the number of children). Let the unobserved heterogeneity term ε_i^N be person i's permanent unobserved taste or distaste for working in the nonteaching sector and let the permanent unobserved heterogeneity term ε_i^H be person i's unobserved taste or distaste for not working.[30] Then given values of X_{is}, ε_i^N, and ε_i^H, the transition intensities can be written as

$$(1) \quad h_i^j(s|X_{is}, \varepsilon_i^j) = \exp(\beta^j X_{is} + \varepsilon_i^j)\, g^j(s), j = N \text{ and } H$$

where β^j measures the effect of the various observable factors on the transition intensity of i, and $g^j(s)$ is the baseline hazard of i, which is assumed to have a flexible nonparametric form of the type used by Meyer (1990) and Dolton and Van der Klaauw (1995).[31] The coefficients β^N, β^H, the distributions indicating the importance of the unobserved heterogeneity terms, and the parameters of the baseline hazard functions $g^N(s)$ and $g^H(s)$ will be estimated using maximum likelihood.[32]

Likelihood contributions can be written in terms of the transition intensities in Equation 1. To see this, let the total years of teaching before exit, t, be a realization of a random variable T and the actual exit reason, r, be a realization of the random variable R where T and R are defined as:

27. Identification of the competing risks model is examined by Han and Hausman (1990), Heckman and Honore (1989), and Lancaster (1990).

28. See Heckman and Singer (1984). This result is due to changes which occur over time in the composition of individuals remaining in teaching. In particular, the percentage of remaining teachers with an unobserved propensity to stay in teaching will increase with duration. Thus, exit rates calculated without unobserved heterogeneity would understate the exit rates that would occur if the composition of the remaining teachers had remained unchanged from the initial sample.

29. Note that it is the observed wage(s) for person i that is included in the model. Thus, the wage effects are identified directly by the data. This differs from Dolton and Van der Klaauw (1994) who use a predicted wage at each time period. The use of a predicted wage necessitates the existence of at least one exclusion restriction—that is, one variable that enters the wage equation but does not enter the hazard equation.

30. For example, the unobserved heterogeneity terms could represent unobserved permanent characteristics of the person or the effect that unobserved school characteristics have on a person's desire to work in a nonteaching job.

31. $g^j(s) = \delta_1^j I(s = 1) + \delta_2^j I(s = 2) + \delta_3^j I(s = 3) + \delta_4^j I(s = 4) + \delta_5^j I(s = 5) + \delta_6^j (s = 6) + \delta_7^j I(s \geq 7)$ where I is an indicator function which is equal to one if its argument is true.

32. The distributions of the unobserved heterogeneity are assumed to be normal and mean zero with estimable variances which represent the importance of heterogeneity in the model.

(2) $T = \min(T^N, T^H)$

(3) $R = \text{argmin}_{(R)}(T^R: R = N \text{ or } H)$

where T^N represents the length of stay in teaching before an exit to N in the absence of the risk of exit to H, and T^H represents the length of stay before an exit to H in the absence of the risk of exit to N. We will assume that the random variables T^N and T^H are independent. In this case, the model is an independent competing risks model.

To establish the likelihood contribution of person i, first consider the case where the person started his or her tth year in teaching but, because of censoring, it is not observed whether the person returned to teaching for his or her $t + 1$th year. In this case, the person taught at least $t - 1$ years before exiting so the likelihood contribution conditional on the unobserved heterogeneity terms, $L_i(X_i, |\varepsilon_i^N, \varepsilon_i^H)$, is the probability that T^N and T^H are both greater than $t - 1$.[33] Dolton and Van der Klaauw (1994) show that this can be written as

$$(4)\quad L_i(X_i, |\varepsilon_i^N, \varepsilon_i^H) = \Pr(T^N > t - 1, T^H > t - 1) = \Pr(T^N > t)\Pr(T^H > t)$$
$$= \exp\left\{-\sum_{s=1}^{t} h_i^N(s|X_{is}, \varepsilon_i^N)\right\} \exp\left\{-\sum_{s=1}^{t} h_i^H(s|X_{is}, \varepsilon_i^H)\right\}$$

where the independence assumption of T^N and T^H allows the joint probability to be written as a product of marginal probabilities.

Now suppose the spell for person i is not censored. In this case, the person started his or her tth year of teaching but left for reason r some time before the start of the $t + 1$th year. Thus, the likelihood contribution is the probability that the person decides to leave teaching for reason r after teaching between $t - 1$ and t years. For example, suppose a person leaves for a nonteaching job ($f = N$). Then,

$$(5)\quad L_i(X_i, |\varepsilon_i^N, \varepsilon_i^H) = \Pr(t - 1 < T < t, R = N) = \Pr(t - 1 < T^N < t, T^H > T^N).$$

Having $t - 1 < T^N < t$ indicates that, in the absence of option H, the person would choose to leave teaching for a nonteaching job at some point during year t. The term $T^H > T^N$ ensures that the person does not choose to leave the labor force altogether before choosing to leave for a nonteaching job.

If it is assumed that the baseline hazard is constant during a year, this can be written as:

$$(6)\quad L_i(X_i, |\varepsilon_i^N, \varepsilon_i^H) = .5(\Pr(t - 1 < T^N < t, T^H > t - 1)$$
$$+ .5(\Pr(t - 1 < T^N < t, T^H > t).$$

Due to the independence of T^N and T^H, the first term can be written as the product of $\Pr(t - 1 < T^N < t)$ and $\Pr(T^H > t - 1)$ and the second term can be written as the product of $\Pr(t - 1 < T^N < t)$ and $\Pr(T^H > t)$. The first term in either product can be written as:

33. Let X_i represent the vector $(X_{i1} \ldots, X_{it})$.

$$(7)\quad \Pr(t-1 < T^N < t) = \left[\exp\left\{-\sum_{s=1}^{t-1} h_i^N(s|X_{is}, \varepsilon_i^N)\right\} - \left(1 - \exp\left\{-\sum_{s=1}^{t} h_i^N(s|X_{is}, \varepsilon_i^N)\right\}\right)\right]$$

and from Equation 4 the second terms in the product can be written as:

$$(8)\quad \Pr(T^H > t) = \exp\left\{-\sum_{s=1}^{t} h_i^N(s|X_{is}, \varepsilon_i^H)\right\} \text{ and } \Pr(T^H > t-1) = \exp\left\{-\sum_{s=1}^{t-1} h_i^H(s|X_{is}, \varepsilon_i^H)\right\}$$

If the person leaves teaching for the home option, the likelihood contribution is similar.

The unconditional likelihood contribution is found by integrating the conditional likelihood contribution over the joint density, f, of unobserved heterogeneity.[34]

$$(9)\quad L_i(X_{is}) = \int\int L_i(X_{is},|\varepsilon_i^N, \varepsilon_i^H) f(\varepsilon_i^N, \varepsilon_i^H) d\varepsilon_i^N d\varepsilon_i^H$$

Given the unconditional likelihood contributions, the likelihood function is the product of the individual likelihood contributions over the entire sample: $L = \prod L_i$,[35] The maximum likelihood estimates are those values which maximize L.

IV. Results from the Estimation of the Competing Risks Model

The competing risks model of Section III is estimated for both female teachers and female nonteachers. Although the NLS-72 provides time-varying wage data, the survey was not designed to provide wages in every year, and most individuals have one or more missing wages. As a result, the model is estimated using the starting wage in a person's spell. Especially for teachers, this does not seem particularly restrictive because starting wages should provide a good representation of the overall level of pay at a particular teaching job.[36] Of the 422 teachers in Table 1, 109 had some missing starting wage or demographic information. Of the 1,028 nonteachers in Table 3, 256 had some missing starting wage or demographic information. The model was estimated using the remaining 313 teachers and 772 nonteachers.

34. For this application, ε_i^N and ε_i^H are assumed to be independent, normal random variables with means of zero and estimable variances.

35. The likelihood contribution used in the likelihood function is actually a simulated version of Equation 9. $L_i(X_{is}) = 1/D\sum_{d=1}^{D} L_i(X_{is},|\varepsilon_i^{N,d}, \varepsilon_i^{H,d})$ where $\varepsilon_i^{N,d}$ and $\varepsilon_i^{H,d}$ represent the dth draw from the distributions of ε_i^N and ε_i^H respectively.

36. This is supported by Stinebrickner (2001a) who found strong serial correlation in the wages paid by a particular teaching job in these data. It seems quite possible that the relationship between starting wages and overall level of pay would be more heterogeneous across jobs in the nonteaching sector.

The descriptive statistics for these subsamples are virtually identical to those shown in Table 1 and Table 3, and, as a result, are not shown.[37]

The results for teachers are shown in Columns 1 and 2 of Table 4. For the nonteachers, the model is estimated for the case of occupational change and the results are shown in Columns 3 and 4 of Table 4. Recall that the transition intensities are of the proportional hazard form shown in Equation 1. From the standpoint of interpretation, this implies that a positive coefficient on a particular variable for a particular exit reason implies that a person with a higher value of that variable will be more likely to leave the first spell for that reason than a person with a lower value of that variable.

A. Results for Female Teachers

1. Wage Effects

Because not all teachers begin their first teaching spell in the same year, starting wages have been adjusted to reflect price changes that occur over time. Even after this adjustment, however, there are plausible reasons that wages could be correlated with the error components of the hazard model which capture the unobserved determinants of teaching exits. As one example, the unobserved wages associated with nonteaching job alternatives are likely to influence the decision to exit teaching for a nonteaching job and are likely to be positively correlated with the teaching wage that a person receives. As another example, the prices of consumption goods, such as childcare, are likely to influence the decision to exit the work force and are also likely to be positively correlated with teaching wages. In addition, unobserved nonprice determinants of quit behavior, such as attitudes towards work, attitudes towards child raising, and the availability of quality childcare may also vary across geographic locations, and, as a result, could also be correlated with teaching wages. In an effort to address some of these potential sources of bias, wages have also been adjusted to reflect the price level in an individual's geographic region and a series of region indicators has been included in the competing risks specification.[38]

37. Focusing on the individuals with no missing data avoids the additional complexity and assumptions that are required to deal with the missing data problem. There is no obvious reason to believe that the individuals with missing data are different from the other individuals, and results did not change substantially when methods to deal with missing data were implemented. See Stinebrickner (1999) for an overview of possible methods for estimating duration models with missing data.

38. Unfortunately, although the NLS-72 includes the geographic region of a person's high school, this information is not included for any of the follow-up waves. Table 4 was created under the assumption that the individual lives and works in the same geographic region as she did in high school. It is possible to examine the robustness of model estimates to this assumption because individuals were asked how far from their high school they lived in 1979 and 72 percent of all respondents reported living less than 200 miles from their hometown. Thus, it seems likely that the majority of female teachers live and work in the same geographic region as in high school. Nonetheless, the model was reestimated excluding the individuals who lived more than 200 miles from their high school. The results in this case were very similar to those in Table 4. The model was also estimated using wages that were adjusted to take into account price differences in communities with populations of less than 50,000 (48 percent of teachers), between 50,000 and 500,000 (37 percent of teachers), and greater than 500,000. These results were also very similar to Table 4. The results from the specifications that use the region and community size information were also very similar to the results from the specifications in which this information was not used.

Table 4
Duration Model Estimates—Female

Individual Characteristics	Teachers		Nonteachers	
	New Occupation Estimated (Standard Error)	Home Estimated (Standard Error)	New Occupation Estimated (Standard Error)	Home Estimated (Standard Error)
WAGE	−.992 (.452)**	−.700 (.312)**	−1.60 (.268)**	−.791 (.157)**
VSAT	.017 (.204)	.243 (.126)*	.0573 (.085)	.225 (.086)**
MSAT	.181 (.229)	−.069 (.131)	−.067 (.090)	−.028 (.088)
SCIENCE	1.187 (.703)*	.523 (.450)	.278 (.159)	−.242 (.178)
ELEM	−.410 (.341)	−.123 (.232)		
MARRIED	−.269 (.344)	.662 (.265)**	.097 (.131)	.212 (.159)
CHILD	−.344 (.388)	−.034 (.175)	−.007 (.126)	.006 (.151)
NEWCHILD	−1.599 (1.143)	2.058 (.245)**	−.263 (.363)	1.650 (.181)**
NORTH CENTRAL	−.118 (.462)	−.245 (.274)	.204 (.202)	.010 (.177)
SOUTH	.141 (.435)	−.486 (.275)*	.410 (.192)**	.114 (.180)
WEST	−.484 (.655)	−.085 (.349)	.290 (.214)	.133 (.201)
Standard deviation of ε^{j-1}	.875 (.759)	.429 (.463)	.899 (.329)*	.043 (.457)
Baseline hazard				
δ_1	−2.515 (.802)**	−2.984 (.460)**	−2.101 (.314)**	−2.440 (.194)**
δ_2	−2.733 (.662)**	−2.719 (.399)**	−1.893 (.205)**	−2.536 (.219)**
δ_3	−2.549 (.622)**	−2.554 (.399)**	−2.323 (.255)**	−2.505 (.225)**
δ_4	−2.690 (.659)**	−2.784 (.419)**	−2.652 (.336)**	−2.809 (.291)**
δ_5	−2.784 (.772)**	−3.367 (.531)**	−2.935 (.369)**	−2.810 (.290)**
δ_6	−3.058 (.833)**	−3.180 (.475)**	−3.158 (.467)**	−3.785 (.467)**
δ_7	−3.653 (.986)**	−3.759 (.505)**	−2.684 (.358)**	−3.180 (.300)**
Log likelihood	−608.204		−1,661.64	

Note: The numbers in parenthesis are standard errors. * indicates significance at the 10 percent level. ** indicates significance at the 5 percent level. All simulations use antithetic acceleration and 30 draws. The flexible baseline hazard is given by

$$\delta_1 I(t = 1)+\delta_2 I(t = 2)+\delta_3 I(t = 3)+\delta_4 I(t = 4)+\delta_5 I(t = 5)+\delta_6 I(=6) + \delta_7 I(t \geq 7).$$

Previous studies of teacher attrition have found that pecuniary factors are important in the decision process of teachers.[39] The negative coefficients on *WAGE* in Columns 1 and 2 of Table 4 suggest that this arises both because teachers with higher wages are significantly less likely to change occupations and because teachers with higher wages are significantly less likely to leave the full-time work force altogether.

2. *The Effect of Family Variables*

The data used here allow an examination of the relationship between family variables and teaching duration. It is important to keep in mind that individuals are likely to make labor decisions and family decisions jointly, and, as a result, the family variables are not truly exogenous. Nonetheless, Columns 1 and 2 of Table 4 strongly suggest that the family variables are very important from the standpoint of understanding why a teacher leaves teaching. The estimated coefficient associated with the variable *MARRIED* indicates that women who are married are exp(.662) = 1.94 times as likely to leave the work force as women who are not married. The estimated effect of the variable *CHILD,* which represents the number of children older than one year of age, is very close to zero. The estimated effect of the variable *NEWCHILD,* however, which indicates whether a new birth occurred for a woman since the beginning of the previous school year (that is, *NEWCHILD* represents whether a child younger than one year of age is present at the beginning of the school year), is statistically significant at all conventional levels (with an asymptotic t statistic of 8.40) and quantitatively very large. Specifically, a woman with a newborn child is exp(2.058) = 7.83 times as likely to leave the work force than a woman who does not have a newborn child. The importance of this variable can be seen by examining Figure 3 and Figure 4 which allow a comparison of the transition intensities (that is, the reason-specific hazard rates) for a teacher with no children in all years and the same teacher who has a new birth in Year 4.[40] To the extent that the decision to have a new child is endogenous, the estimated effect of a new birth may to some extent overstate the true population effect of a new child on the decision to leave teaching.[41] Nonetheless, given the magnitude of the estimated effect, the relative importance of exits out of the work force, and the large percentage of teachers who are female, it appears that a very substantial amount of teacher attrition is directly related to the birth of new children.

Part of the explanation for the finding that the *NEWCHILD* variable is an important

39. Murnane and Olsen (1989, 1990), Murnane, Singer, and Willett (1989), Rickman and Parker (1990), Grissmer and Kirby (1992), Mont and Rees (1996), Stinebrickner (1998, 1999a), and to some extent Gritz and Theobald (1996), find evidence that higher wages increase teaching duration.

40. The person used in these figures is assumed to be a nonelementary teacher with average SAT scores and an average starting wage and is assumed to be married and live in the northcentral region in all periods.

41. If women who are unhappy with their teaching jobs are more likely to have new births, the estimated effect of a new birth would overstate the true population effect because women who are having children would be more likely to leave teaching *even* if no new births occurred.

Defining the *NEWCHILD* variable as whether a new birth occurred since the beginning of the previous year may, however, lead to an understatement of the importance of the newborn children because some women may leave the workforce when they are expecting to have a child in the upcoming year. Of the 172 women who are observed exiting the workforce, 69 had a birth in the year before exiting and 22 had a birth during the year after exiting (89 had a birth in either the year before, the year after, or both).

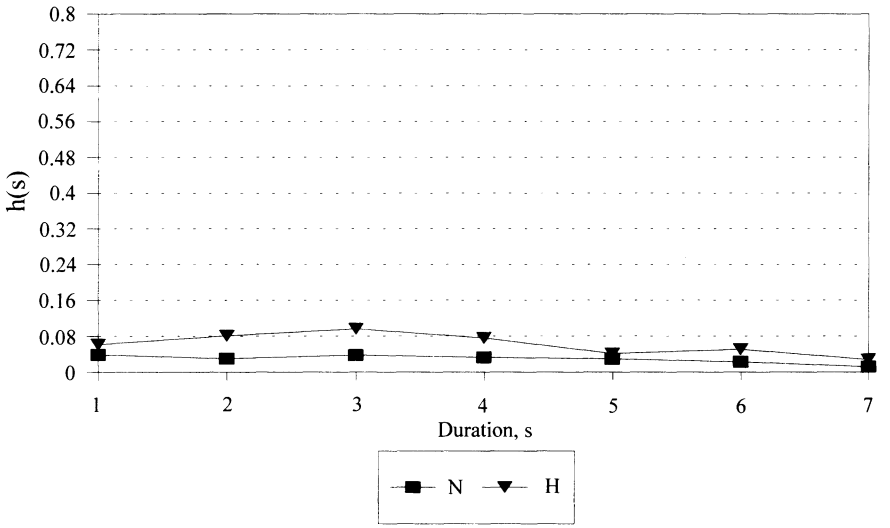

Figure 3
Transition Intensities for H and N, Teacher with No Children.

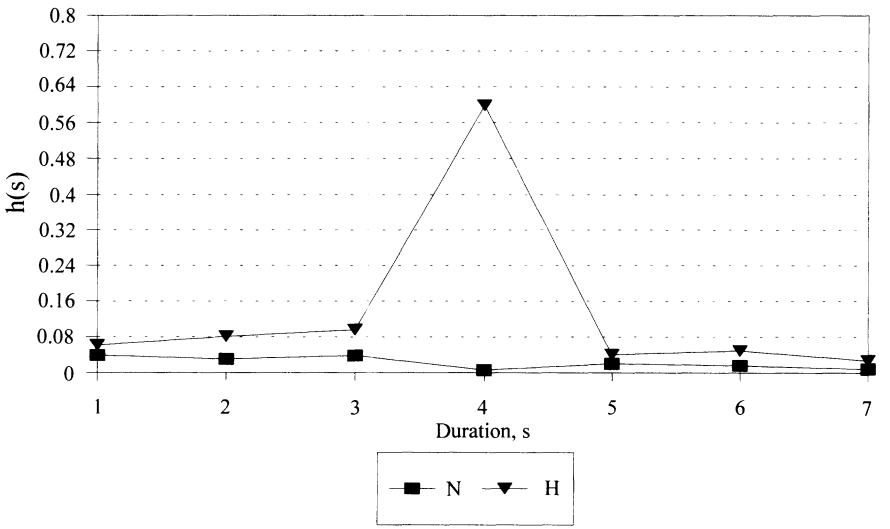

Figure 4
Transition Intensities for H and N, Teacher with NEWCHILD Year 4.

predictor of exit behavior for females but the variable *CHILD* is not, is likely to be that the benefit of staying home with a child is highest during the child's first year when it is difficult to have the child cared for by a nonfamily member. However, it is important to realize that people who are currently teaching with a certain number of nonnewborn children either chose to start a teaching spell with that total number of children or started a teaching spell with less than that total number of children but chose to continue to work when new children were born. Both scenarios suggest that individuals who are working with a value of *CHILD* greater than zero may have unobserved propensities to remain in the work force that are not representative of the set of all teachers who start a teaching spell.[42] The *NEWCHILD* variable does not suffer from this type of problem and, therefore, can provide more useful information about the importance of fertility on job quitting behavior.[43] To provide evidence of the importance of this issue, the model associated with Table 4 was reestimated including an additional variable that indicates whether the person has a single child that is older than one year of age. As expected given the previous discussion, the point estimate and t statistic associated with this variable (.036 and .122 respectively) were found to be much smaller than those for the *NEWCHILD* variable (2.02 and 8.314 respectively) which represents the presence of a single child that is younger than one year of age. In general, research on quit behavior which includes only the total number of children is likely to miss the true importance of fertility outcomes on the quit decisions of women.[44]

B. Results for Female Nonteachers

The Kaplan-Meier analysis in Section II indicates that nonteachers tend to have shorter first spells than teachers and that these differences arise because nonteachers are more likely to change jobs/occupations. Comparing Columns 1 and 2 of Table 4 with Columns 3 and 4 of Table 4 allows an examination of whether the observable characteristics that were found to be related to the duration of first spells for female teachers are also related to the duration of first spells for female nonteachers. In general, strong similarities are observed between the two sets of estimates. For example, higher wages, which are related to slower exits of both types for teachers, are also related to slower exits of both types for nonteachers. The *NEWCHILD* variable, which is extremely important in determining exists out of the work force for teachers, is also important in determining exits out of the work force for nonteachers. In both cases, the estimated effect of the *CHILD* variable (and the large majority of other

42. If this is a problem, the *CHILD* variable should be interpreted as the effect of children of age older than one for the type of people who actually end up teaching with children of this age. In this case, it does not represent the effect that would be present if a randomly chosen teacher was instantly given one or more children older than age one.

43. The variable *NEWCHILD* could suffer from a different type of endogeneity problem if women who are unhappy with their teaching jobs are more likely to have new births. If this type of endogeneity exists, however, it would seem that it would be less important.

44. The variable *NEWCHILD* could suffer from a different type of endogeneity problem if women who are unhappy with their teaching jobs are more likely to have new births. However, it would seem that, if this type of endogeneity exists, it would be less important.

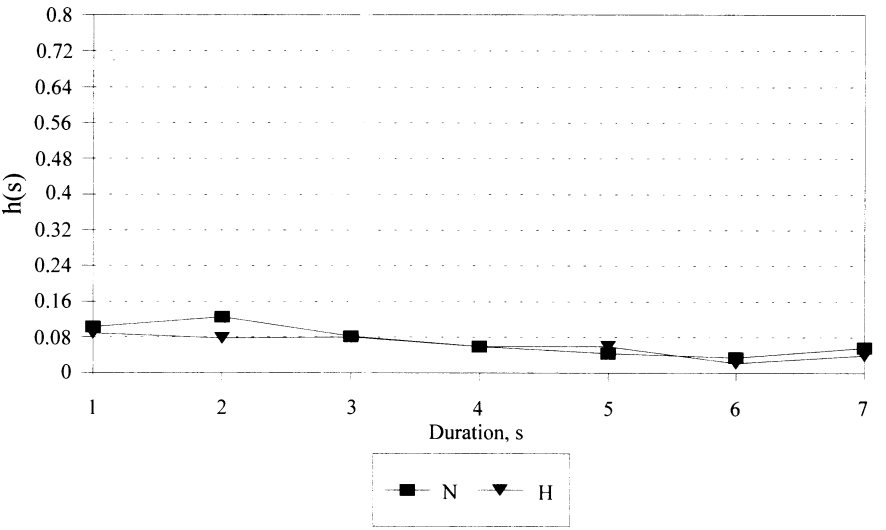

Figure 5
Transition Intensities for H and N, Nonteacher with No Children.

variables) is very close to zero. These results can be seen in Figures 5 and 6, which are analogous to Figure 3 and 4 (that is, they show transition intensities for the nonteacher with no children and the nonteacher with birth in Year 4). As expected given the descriptive results shown earlier, the transition intensity for *H* is similar in Figures 3 and 5, but the transition intensity for *N* is higher for nonteachers than it is for teachers. Comparing Figures 4 and 6 reveals that the probability of exiting the work force when a new birth occurs is .60 for the female teacher and .31 for the female nonteacher.[45]

V. Conclusions

Using data from a general longitudinal survey allows this paper to make two primary contributions to the literature on teacher attrition. First, it allows an examination of the reasons that teachers leave teaching. Second, it allows teacher attrition to be viewed in the context of attrition from other occupations with similar educational requirements.

With respect to the first area of examination, the paper suggests that the common perception that teacher attrition is primarily caused by individuals being ''lured''

45. Recall that the ''out-of-the-workforce'' designation also includes women who enter full-time school. Although only a very small number of teachers return to work full time, this is not the case for nonteachers. Nonetheless, when nonteachers who return to school full-time are treated as censored observations rather than being included in the out-of-the workforce category, the probability that the nonteacher exits the work force when a new birth occurs increases to only 32 percent.

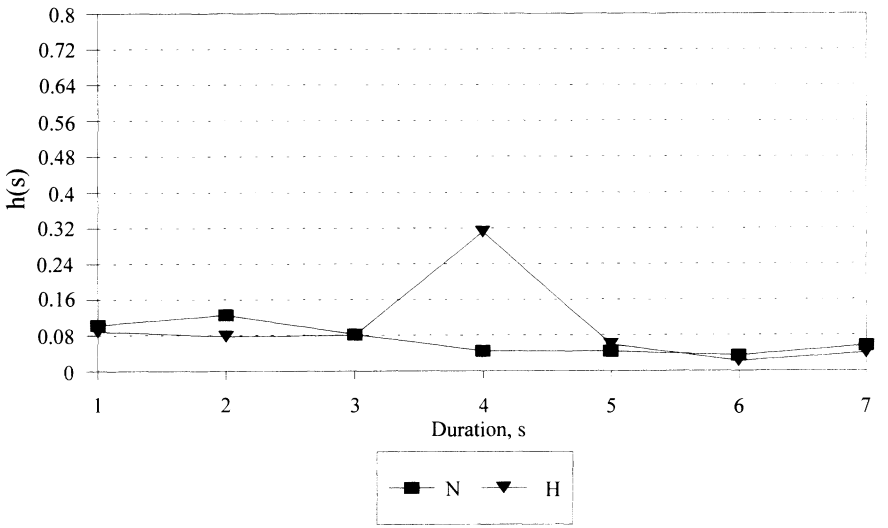

Figure 6
Transition Intensities for H and N, Nonteacher with NEWCHILD Year 4.

away from teaching by the attractiveness of nonteaching jobs is not altogether correct. Estimates from a competing risks duration model indicate that a large amount of teacher attrition is directly related to changes in teachers' family situations with the birth of new children playing an especially important role. From a policy perspective, it is important to note that the benefits of implementing an education policy aimed at increasing overall teacher labor supply depend to a large extent on whether exiting teachers would eventually return to teaching in the absence of such policy. One might expect that exiting teachers who leave the work force entirely (often to care for young children) would be likely to return to teaching in the future (perhaps when the teacher feels comfortable with child care or the child becomes school age). Table 5 indicates that 33 percent of all exiting teachers who are observed five or more years after leaving the work force return at some point within this period.[46] The return rates are somewhat similar for the subset of the women in Table 5 who leave the work force after the birth of a child.[47] However, for these teachers it seems possible that an increase in the return rates would occur after Year 6 when children become old enough to attend school. Unfortunately, this cannot be examined with these data.

Policy debates involving teachers often seem to be premised on the assumption that teacher attrition rates are unacceptably high. It is important to note that whether

46. The percentage is similar for teachers who change occupations; 35 percent of all exiting teachers who are observed five or more years after changing occupations return at some point within this period.
47. For women who exited the work force after the birth of children, the proportions in Column 2 are .167, .245, .333, .243, and .310. For women who exited the work force without the birth of children, the proportions in Column 2 are .156, .329, .379, .371, and .347. The differences are not statistically significant.

Table 5
Returns to Teaching after Exits

Number of Years, t	Number of Teachers Observed t or More Years after Exit to H	Number of Teachers Returning to Teaching within t Years after Leaving for H	Number of Teachers Observed t or More Years after Exit to N	Number of Teachers Returning Within t Years after Leaving For N
2	156	25 (.160)	76	18 (.236)
3	151	45 (.298)	71	22 (.309)
4	141	48 (.340)	66	22 (.333)
5	119	39 (.327)	63	22 (.349)
6	98	33 (.336)	54	22 (.407)

The second column shows the number of teachers for which t or more years are observed after the person leaves the work force, H. The third column shows the number (and proportion) of those individuals who return to teaching within t years after leaving for H. The fourth and fifth columns show the same for exits to the nonteaching option, N.

or not this is true is a very complex issue that depends on many important factors such as the current supply and demand of teachers and the relationship between teaching experience and teacher quality. Although this paper does not pretend to make a statement about these issues, it does provide some new information by comparing the attrition rates for teachers to attrition rates for nonteachers with similar levels of educational attainment. The results indicate that the exit rates out of teaching are somewhat lower than the exit rates out of both nonteachers' first job spells and nonteachers' first occupation spells. An examination of exit reasons suggests that this arises because nonteachers are more likely to change jobs/occupations. Exits out of the work force are similar for teachers and nonteachers. Nonetheless, for a couple of reasons, one must be cautious about concluding that the overall impact of exits from the work force is identical for teachers and nonteachers. First, as discussed earlier, teachers who are exiting the work force are less likely to be entering school full time. Secondly, in a related point, Table 6 shows that nonteachers tend to return to work more quickly after exiting the work force. For example, 47 percent of teachers and 77 percent of nonteachers who are observed five or more years after exiting the work force return to some type of work during these five years. These differences may also be due in part to the rigid pay structure in schools which decreases the chance that a teacher who returns to teaching after a long absence will suffer a significant wage loss.

It is important to note that it is likely that changes have occurred since the end of the NLS-72 sample period. During much of the sample period, teaching jobs were scarcer than they are today, and it is certainly possible that the views of women towards work and raising children have changed. Nonetheless, the results obtained

Table 6
Returns to Work after Exits—Teachers and Nonteachers

Number of Years, t	Number of Teachers Observed t or More Years after Exit to H	Number of Teachers Returning to Work Within t Years after Leaving for H.	Number of Nonteachers Observed t or More Years after Exit to H	Number of Nonteachers Returning to Work within t Years after Leaving for H
2	156	41 (.262)	308	133 (.431)
3	151	62 (.410)	281	171 (.608)
4	141	64 (.453)	261	185 (.708)
5	119	56 (.470)	232	178 (.767)
6	98	49 (.500)	205	165 (.804)

The second column shows the number of teachers for which t or more years are observed after the person exits to H. The third column shows the number (and proportion) of those individuals who return to some sort of work (teaching or nonteaching) within t years after leaving for H. The fourth and fifth columns shows same results for nonteachers.

here suggest the importance of future research and data collection efforts which include information on marital and fertility variables and also the reason of exit for teachers. Studying the decisions of teachers using data from general longitudinal surveys seems particularly appealing because it facilitates a direct comparison of the decisions of teachers and nonteachers.

Appendix

Occupation Categories

The occupation categories used in the paper are (1) managers and administrators (2) sales workers (3) clerical workers (4) craftsmen (5) operatives (6) transport equipment operatives (7) laborers (8) farmers (9) service workers (10) accountants (11) architects (12) engineers (13) farm management advisors (14) foresters and conservationists (15) home management advisors (16) lawyers and judges (17) librarians, archivists, and curators (18) mathematical specialists (19) life and physical scientists (20) operations and systems researchers and analysts (21) personnel and labor relations workers (22) physicians, dentists, and related practitioners (23) nurses, dietitians, and therapists (24) health technologists and technicians (25) religious workers (26) social scientists (27) social and recreation workers (28) college professors (29) engineering and science technicians (30) technicians except health (31) vocational and educational counselors (32) writers, artists and entertainers (33) other researcher workers.

The nonteaching occupation survivor function in Figure 1 was only slightly lower when the professional and technical worker categories (10)–(33) were combined

into a single category. For example, the probability of remaining in a nonteaching occupation for more than four years decreased from 36 percent to 33 percent. Thus, nonteachers leave their first spells more quickly than teachers even when a very broad description of occupational change is used for the nonteachers.

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