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Labor Market Transitions of Young Women over the Early Life Course: A Multistate Life Table Analysis

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Abstract

Using detailed panel data on school, work, and family formation history of youth (i.e., NLSY 1979–1991), we examine the dynamic process of labor market transitions women make during young adulthood. Transitions between the states of the labor force (i.e., employment, unemployment, and out of the labor force) are analyzed using multistate life tables, in which labor market and family transitions are estimated simultaneously. The age-pattern, life-cycle variation, and racial differences in employment and nonemployment transitions are the main interests of this study.

We find that black women in the aggregate are less likely to be employed (or in the labor force) and more likely to be nonemployed than white women during early adulthood (i.e., at ages 16–34). With first childbirth controlled, a higher proportion of black women than white women are in the labor force during the same period, as past studies have shown. But, we find that the proportion employed is actually lower among blacks than among whites because a higher proportion of blacks are unemployed. Even though the racial differential in employment decreases with age among women with more than a high school education, it persists among women with a high school education or less.

By estimating the conditional probabilities of transitions between states of the labor force, this study shows that the major component of the racial differential in employment (or in nonemployment) is in the process of entering employment either from the unemployment or the out-of-the-labor-force state: black women, if in the labor force, are less likely to be employed and more likely to withdraw from the labor force, if unemployed, than their white counterparts. As a summary measure, our life table analysis shows that black women spend considerably more time nonemployed and less time employed than white women over the early life course.

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INTRODUCTION

The rapid increase in women's participation in the labor force has been one of the marked socioeconomic trends in the United States and in other developed countries during the second half of the 20th century (Nakamura et al. 1979; Oppenheimer 1970; Smith 1979; Smith and Ward 1985; Sweet 1973; Young 1990). Particularly dramatic has been the rise in participation by young women during their childrearing years over the last two decades in the United States (Bianchi and Spain 1986; Leibowitz and Klerman 1994; U.S. Bureau of Census 1990). This increase has been accompanied by almost simultaneous changes in other aspects of women's life course such as declines and delays in first marriage and first birth and increases in divorce rates (Bianchi and Spain 1986; Cherlin 1992; Sweet and Bumpass 1987).

Not only the rate but also the pattern of women's participation in market work has changed such that their attachment to work now rivals that of men (Bianchi and Spain 1986; Bielby 1992; Gerson 1985; Masnick and Bane 1980; Waite 1981). Women now participate in market work in a more consistent pattern and are more likely to work full-time rather than part-time when they do participate, and, further, they tend to return to work after interruption (due to marriage and/or childbearing) at a higher rate than before (e.g., Blau and Ferber 1986; Martin and Roberts 1984; Mott and Shapiro 1983; Smith and Ward 1985). Women are now more career-oriented from the early stages of their work lives and tend to invest more time in building their own work careers accordingly (Mott and Shapiro 1983; Parnes et al. 1978).

Increased educational attainment, expansion of job opportunities with changing industrial and occupational structures in society, a decreasing wage gap between male and female workers, and economic pressures have facilitated the increased participation of women in market work (Bianchi and

Spain 1986; Oppenheimer 1970; Smith and Ward 1985). Rising educational attainment among younger cohorts of women may have increased the economic "costs" of not working outside the home or has altered their "tastes" for market work, since more educated women tend to command higher wages if they work (Bianchi and Spain 1986).

In addition to these economic factors and incentives for participation in market work, social and historical changes in the institution of the family—as reflected in consistent increases in marital disruption and in the proportion of mother-only families during the same period—might have also led young women in recent cohorts to become increasingly aware of the importance of their own work careers as alternatives to their traditional family roles (e.g., marriage and childbearing) (Bumpass 1990; Oppenheimer 1988).

With the increasing proportion of young women participating in market work, early work careers are now acquiring more important implications than before for other aspects of women's early adult life and later socioeconomic achievements (e.g., Goldin 1983; Hogan 1981; Oppenheimer 1988; Osterman 1980). Market work, in fact, now has greater social and economic functions for women than before. Market work provides women with economic independence, the importance of which is increasing as women's family life—with the increased risk of marital disruption—has now become less secure than before (Castro-Martin and Bumpass 1989; Dechter 1991; Smock 1992). Paid employment has also assumed a greater marriage market function for women by providing social networks that extend the perimeter of the individual's social life (Oppenheimer 1988). Increasing economic independence through paid employment, on the other hand, has exerted a delaying effect on marriage by subsidizing longer searches in marriage markets and by reducing the economic penalties associated with non-marriage (Oppenheimer 1988).

In addition, sociological studies of the early life-course transition suggest that events in the early stages of life are important determinants of socioeconomic attainments in subsequent stages of the

life course (Hogan 1981; Shavit, Matras and Featherman 1990). With regard to the impact of early work experience on later achievement, Osterman (1980), for example, finds that, for youth, early job instability in the so-called "moratorium" period has an adverse impact on the chances of later employment.

In view of the growing importance of market work in structuring women's life course, it is important to know more than we currently do about their early work lives. This study addresses these issues by examining young women's labor market transitions[1] over the early life course. Women's work life, in this study, is conceptualized as a process of continuous-time transitions between the states of the labor force (e.g., employed, unemployed, out of the labor force) and, thus, as alternating spells of stay in those states over the life course. With such a view of women's work life this study moves beyond the conventional "static" approaches to women's labor force activities to a "dynamic" analysis of the longitudinal patterns of women's entry into and exit from employment in the labor market. We use detailed school, work, and family history data to examine the process of labor market transitions for young women mostly in their twenties and early thirties. The entire process of young women's transitions from school to work and between work and non-work—after completion of school—are followed through the early life course as they occur in a close relationship with the process of family formation (i.e., first marriage and first birth).

We are especially concerned with the age pattern, life-cycle variation, and racial differences in young women's labor market transitions. The process of youth's labor market transitions, into which school-to-work transitions are incorporated, is age-graded as more youth complete schooling and enter the world of work as they age. We examine the overall age pattern of labor market transitions for young women conditional on school enrollment status. Our analysis focuses on life-course transitions between work and non-work made by women after completion of school, even though the school-work transitions will be incorporated into our multistate model as a component. Women's labor market

transitions are closely linked to their family formation processes. We investigate how and to what extent women's labor force participation and attachment vary with their current family status. Women's family status is jointly defined by their first marriage and first childbirth status as these two events constitute the major family formation events for young women in their twenties and thirties. We compare whites and blacks with respect to the age pattern and life-cycle variation in labor market transitions.

The plan of the study is as follows. First, we present a conceptual overview of the process of labor market transitions for young women. Next, data and analytical strategies (i.e., multistate life table models) are discussed. Empirical results are presented and discussed in the remaining sections.

CONCEPTUAL OVERVIEW

Early Adulthood as a Context for the Analysis

Early adulthood is a period of transition in which a sequence of life-course events occurs. Completion of schooling, first full-time employment, first marriage, and first birth are among the most salient events that occur during this period. The life-course transitions made in early adulthood are *multidimensional*: youth enter multiple lines of adult activity—from school to work to marriage and parenthood—during a relatively short period of time (Elder 1985). Young women's labor market transitions are embedded in the multidimensional context of the early life-course transitions.

Studies of the early life course also inform us that the transition from school to work or the acquisition of an adult role is not a single process but involves, quite often, *multiple transitions* between school and work and/or between work and non-work after school (Hogan 1981; Hogan and Astone 1986; Osterman 1980). Multiple events rather than a single event are, therefore, characteristic of the early life-course transitions. The transition from school to work, which has been noted as the first step toward adulthood, often involves multiple transitions back and forth (Coleman 1983; Mare, Winship,

and Kubitscheck 1984), especially among women. Frequent movements into and out of the labor force are the norm rather than the exception among young workers (Freeman and Wise 1982). In light of the multiplicity, the transition to adulthood is better described as a process than as an event (Hogan and Astone 1986).

In short, the process of labor market transitions, especially among young women during their early adulthood, is characteristically multiple and multidimensional. A rigorous study, then, should properly take into account the complex nature of the process. The multiplicity of the labor market transitions among youth, for instance, requires us to look at multiple transitions into and out of the labor market over the life course, rather than a single transition that occurs at one point in time, if we want a complete picture of the process. Analyses of unidirectional transitions (e.g., exit from or entry into employment), on which past studies often relied for their conclusions, would provide us with only a partial picture. Obviously data limitation was one of the reasons for the limited studies of the past. Longitudinal data are needed to follow up individuals for these multiple events that occur over time.

Interdependence between Women's Work and Family Transitions

Work and family constitute two major interrelated domains of women's life course. The examination of how and to what extent young women's labor force activity interacts with their changing family status is one goal of this study. Marriage and childbearing, among other factors, are closely linked to the pattern of women's labor force activities (Cain 1966; Bowen and Finegan 1969; Hout 1978; Mott 1972; Smith-Lovin and Tickameyer 1978; Smith 1979; Stolzenberg and Waite 1977; Sweet 1973).

Upon completion of school, most, if not all, young women pass through years of decision on their work careers and family formation. Most married women are confronted by the "double burden" of responsibilities for home and market work. An informed study of women's labor market transitions and attachments, thus, cannot be done without taking into account the interrelationship between

women's work and family life (Becker 1965; Franz 1985; Moen 1985). It is argued that transitions in those two domains of women's life are "dynamically interdependent" such that changes in one domain often spur or deter changes in the other (Tuma and Hannan 1984).

The interdependent relationship between the two domains of women's life, i.e., work and family, has been quite challenging and has induced many past research efforts to disentangle the causal nexus between them. To deal with the interdependence between women's family and work transitions, researchers often select their samples on women's family status at one point in time (e.g., married women) to examine labor market transitions in a given period of time, i.e., one year or two. By doing so, it is implicitly assumed that controlling for a qualitative variable's value (e.g., marriage) at one time deals adequately with the dynamic interdependence between the variable and the other qualitative variable (e.g., labor force participation). Tuma and Hannan (1984:ch.5), however, showed that, with the research design and sampling as described above, biases are often very large when the qualitative variable under study (i.e., labor market status) changes more rapidly than the other qualitative variable (i.e., marital status). One suggested way of dealing with the problem is to set up a multistate transition model in which the states are jointly defined in terms of the values of the two qualitative variables.[2]

In the past, researchers have also used simultaneous equation models to represent the reciprocal nature of the causal relationship between women's work and family formation processes (e.g., Cramer 1980; Hout 1978; Marini 1978, 1984a; Schultz 1978; Smith-Lovin and Tickameyer 1978; Waite and Stolzenberg 1976). The simultaneous equation modeling of the two interdependent processes using cross-sectional data, however, is not without limitations (Alexander and Riley 1981; Cramer 1980; Felmlee 1984). First, those models are "static" in the sense that the endogenous variables in the equation are often static outcomes at one point in time (e.g., labor force participation and number of children) but not the processes of behavior. Second, the conventional simultaneous equation models assume reciprocal causation between the endogenous variables when joint determination is a more

reasonable assumption. As a consequence, the estimated structural parameters are not very informative about the processes of leaving and entering the labor force that underlie the observed relationships (e.g., negative relationship between women's work and child status).

A dynamic analysis using a continuous-time transition model can overcome some, if not all, of the methodological problems involved in the static approach adopted in the past (Tuma, Hannan, and Groeneveld 1979). But even with dynamic models, a causal relationship between the two interdependent processes is not easy to establish (Moen 1985). In this study, we recognize but do not solve the problem of interdependency between women's work and family transitions. Drawing on Tuma and Hannan (1984:ch.5), we instead set up and estimate *multistate* transition models in which women's work and family status are jointly defined as the states between which transitions may occur. We will try to examine how and to what extent the pattern and the rate of women's labor market transitions vary with their changing family status over the life course.

Age and Labor Market Transitions

Age has a good many implications for young women's labor market transitions. First of all, a woman's age is a good indicator of life stage, in particular of her marital and child status, as the process of family transition in society is more or less age-graded (Hogan and Astone 1986). Women's family status has independent and direct effects on their decision to participate in market work. Age has been also observed to be positively associated with women's attachment to market work (Moen 1985; Waite 1981); this may be so because age is closely correlated with positive factors for women's work attachment, in which we can include, among others, psychological maturity (Mott and Shapiro 1978; Osterman 1980), accumulation of work-related resources and human capital (Mare et al. 1984), and movement into primary-sector firms (Thurow 1975).

Age, according to Mare et al. (1984), is positively associated with employment probability because educational composition of the out-of-school youth varies with age in a positive direction.

That is, the older the out-of-school youth, the higher his educational attainment and the more stable is his employment patterns. On the other hand, at the individual level, proponents of the "aging stability" hypothesis (see Glenn 1980; Lorence and Mortimer 1985) posits that attitudes and values become more stable with age. Lorence and Mortimer (1985) find that whereas job involvement is quite volatile in the initial stage of a person's work career, it becomes more stable as workers grow older. Young adults may be spending a productive "search" period for a best job or best role for their later life stage, which will be followed by a more stable employment period. Osterman (1980) describes youth as passing through two stages during early adulthood: a *moratorium* period in which non-work and peer group activity are more important than work, and then a *settling down* period in which a steady job is important and desired. While the hypothesis has been mostly tested on male data, the question is would the same hypothesis hold for young women? If it does, then we should observe decreasing rates of transition out of employment as women age into their late twenties and early thirties.

Women's pattern of labor market transition is different from men's because of women's typical family obligations, among others, that vary with their changing family status over the life course (Moen 1985). Depending on the stage of the life course (e.g., after marriage or childbirth), nonemployment may become a likely and meaningful alternative state in which some women may settle as they age. If so, then the same age stability should also apply to the transition out of nonemployment. Some women may become economically less active as they stay out of the labor force for a long time and become less likely to (re)enter the labor force as they age (e.g., Sorensen 1983). In other words, as women pass through the early "moratorium" period, the proportion of "stayers" (either in the employment or in the nonemployment state) would increase and "movers" would decrease, and, as a consequence, the rate of transition between employment and nonemployment would decrease over time. We hypothesize here a bidirectional age stability in the dynamics of young women's labor market transitions.

Family Formation and Labor Market Transitions

The dynamics of young women's labor force activity are closely linked to the process of family formation. As such the dynamics of women's work and non-work transition cannot be adequately understood without considering the dynamics of women's family formation process (Moen 1985). Marriage and childbearing, in particular, are clearly the most salient life-course events that influence women's decisions about their labor force activity. These life-course events, whether they occur in an orderly or disorderly fashion, mark the stages of the life course and constitute the changing contexts in which women's labor force transitions are to be made (Bielby 1992; Willekens 1987). The context determines the choice set or set of options from which women may choose. Women entering motherhood, for instance, may change their behavior with respect to fertility, labor force behavior, and time budgeting (Willekens 1987). Furthermore, the meaning and value of women's non-market time vary with their family status. For married women with children present, the alternative to market work can be clearly defined (e.g., homemaking, taking care of children, etc.) at least at the theoretical level. But for unmarried women without children, it is rather ambiguous.

Considering that among the sample members who are mostly in their twenties and early thirties, the most prevalent family formation events are the first marriage and the first childbirth, we focus on the two transition events; such restrictions also have the advantage of not confounding possible effects of subsequent marital and child birth events on the employment transition. Past studies indicated that first marriage and first childbirth, in particular, have the most depressing effect on women's labor force activities (Cramer 1980; Desai and Waite 1991; Hout 1978).

We will examine how women's labor force activity varies with changing family status over the life course and how the variation differs between whites and blacks. The depressing effects of marriage and childbirth on women's participation in market work, for instance, are well established in past studies. But those observations were often based on cross-sectional proportions of women employed or not employed by marital and/or child status at one point in time; the proportion of women

employed at one point in time, however, is an outcome of continuous movement of women in and out of employment. Static studies based on cross-sectional data are less informative about the underlying process. Is the higher proportion of married women observed to be not working due to their total withdrawal from the labor force or due to their frequent movement in and out of employment? The former and latter assumptions imply two quite different underlying processes for the observed proportions of women working and not working by family status.

Based on a longitudinal observation of women's work careers, Rosenfeld (1980) found that being married and/or having children significantly increases the probability of discontinuity in employment in women's work lives. Although wives and mothers—especially those with young children—have increasingly joined the labor force, Moen (1985) finds that married women's participation is more likely to be accompanied by casual and intermittent employment. We expect that changes in family status (e.g., transition to first birth) are negatively associated with the probability of women staying employed and positively associated with the probability of being not employed over the life course.

Racial Differences in Labor Market Transitions

Racial differences in the pattern and the rate of women's labor market transitions over the early life course are expected from (1) observed differences in the rate and the age pattern of school and family transitions (Bennet, Bloom, and Craig 1990; Hogan 1981; Lichter, LeClere, and McLaughlin 1991), (2) different labor market conditions that the potential entrants might face due to occupational segregation by race, residential segregation, and suburbanization of jobs, i.e., spatial mismatch (Farley 1984; Farley and Bianchi 1987; Lichter 1988; Osterman 1980), and (3) racial differences in observable and unobservable individual characteristics such as education, ability, and preferences for market work (Mare et al. 1984).

Black youth, on average, are more likely to drop out of school early and enter the labor force. Those early dropouts would face more difficulty in securing stable employment (Clark and Summers 1982; Mare et al. 1984; Wilson, Tienda, and Wu 1991), which would lead to black disadvantage in employment opportunities during the early stage of adulthood out of school.

In addition, black women tend to become mothers much earlier than white women, although they tend to marry later than whites. For example, about 50 percent of black women in the NLSY sample are expected to have their first child by age 22, whereas whites do so by age 28. About 50 percent of black women in our sample are expected to first marry by age 28, whereas the age for white females is 23. These racial differences in the age pattern of family transitions imply differential durations of stay in each stage of the life cycle. That is, blacks on average stay never-married longer than whites although they enter motherhood far earlier than whites. Observed racial differentials in the proportion employed and not employed reflect, at least in part, those differences in the family formation process between whites and blacks.

The differential age pattern of family formation between whites and blacks leads us to expect the age pattern of labor market transitions to be different between the two racial groups as women's family and work transitions are closely linked. We will examine the role of the differential family formation process in structuring racial differences in young women's experience of employment and nonemployment. We focus on the role of women's first childbirth status in differentiating employment experiences of blacks and whites.

Although the presence of children typically constrains women's labor force activities, the constraining effect of children may differ between whites and blacks (Sweet 1973: ch.4; Wallace 1980:34–36). Using 1960's data, Bowen and Finegan (1969) and Cain (1966) found that black wives tended to participate in the labor force at a higher rate than white wives (after controlling for age, family income, and education), even when their children were under six years of age. Recently,

however, there has been a significant increase in labor force participation among white mothers (whether married or unmarried) with young children (Wallace 1980; Goldin 1983; Smith and Ward 1985; Blau and Ferber 1986). While past studies relied, in most cases, on the 1960's and 1970's data, the old evidence on the racial differential needs to be updated with more recent data from the 1980s.

In particular, recent studies of the youth labor market document substantial increases in nonparticipation among black youth. That may be a result of at least two behaviorally different processes. Black youth may be more reluctant to enter the labor force in the first place, as the "blacks' higher reservation wage" hypothesis asserts (e.g., Holzer 1986). Or they may be more likely to withdraw from the labor force once separated from a job, as the "discouraged worker" hypothesis posits (e.g., Clogg and Sullivan 1983; Lichter 1988). The former assumption implies lower rates of exit from out of the labor force, either to employment or to unemployment, among blacks than among whites, whereas the latter assumption implies higher rates of transition from unemployment to out of the labor force among blacks than among whites.

MODELING THE PROCESS: MULTISTATE LIFE TABLE ANALYSIS

To model the dynamic process of labor market transitions we employ multistate life tables. The multistate life table is an appropriate tool to estimate the rates of transitions between multiple states simultaneously. Multistate life tables have been applied to studies of marital status, labor force participation, and interregional migration (Schoen 1988; Tiemeyer 1991, 1992). One advantage of using multistate labor force life tables is that they provide measures of gross flows between labor force statuses without imposing the conventional assumption of unimodality on the process. Thus, they can be used with female data (Schoen and Woodrow 1980). Other advantages of adopting multistate (increment and decrement) life tables are that they—unlike single and multiple decrement life tables—allow transitions into and out of the labor force (or employment) to be estimated

simultaneously, and that the consequences of the transitions can be fully appreciated; subjects may return to the labor force or move on to another state (e.g., school). Multistate life tables allow us to describe and summarize compactly labor force transitions experienced by the subjects as they move from one family status to another over the early life course (see Teachman 1983; Willekens 1987).

The Construction of a Synthetic Cohort

The estimates of multistate life table functions are based on the experience of a "synthetic" cohort, which is constructed by combining the age-specific experiences of all sample members. Out of the weekly school-work histories of individuals available in the NLSY data, we construct an age-specific history of state occupancy for each individual, where age is measured in weeks. We rearrange each age-specific individual state-history into an age-specific matrix of origin by destination, from which we compute age and origin-specific transition rates to be used to construct multistate life tables (Keyfitz 1986; Namboodiri and Suchindran 1987; Tiemeyer and Ulmer 1991).

In constructing a synthetic cohort, information on life experiences at younger ages are contributed by younger birth cohorts while information on life experiences at older ages are contributed by older cohorts. This means that, while each sample member will contribute as many observations as the age-period during which he/she is in the survey, the number of observations will vary by age. Especially life experiences at the youngest ages (e.g., 14 through 16) and the oldest ages (e.g., 30 through 32) are constructed from relatively few observations. To that extent our estimations at those ages will be less reliable. Nevertheless, given that ordinary life tables are constructed from age-specific rates of mortality and not directly from individual data, the multistate life tables based on the life experiences of a synthetic cohort are a close representation of what actually happens and will happen to the sample members over time.

Definition of the "States": Two-State or Three-State Model?

Major dimensions of young women's labor force activity can be defined by movement into and out of the labor force (Felmlee 1984; Lynch 1986). According to the CPS definition of labor force status, those who are employed or unemployed are defined to be *in the labor force* while the rest are *out of the labor force*. For young workers, however, researchers question the reliability of the "unemployment" status (Sweet 1973). Clark and Summers (1982), among others, argue that the distinction between unemployment and being out of the labor force for youngsters is questionable and suggest that most persons without work might be regarded as being not employed. So the suggested model is a model with two states: *employment* and *nonemployment*.

Flinn and Heckman (1982b), on the other hand, question the validity of the proposed two-state model and claim that the "out of the labor force" and "unemployment" statuses are not an artificial distinction even for young workers. Their claim is based on their empirical finding that, controlling for heterogeneity, the exit rate from unemployment to employment exceeds the exit rate from out of the labor force to employment. They argue that the two processes are behaviorally different and "unemployed" is a valid status for young workers. What Heckman and Flinn suggest is thus a three-state model: *employment*, *unemployment*, and *out of the labor force*.

Fortunately, in multistate life table analysis, we don't have to choose, a priori, between a two- and three-state model. Most of the multistate life table functions (e.g., proportion of people in each state and state-specific life expectancies) are additive. And the additive relationship among elements of life table functions allows us to combine, a posteriori, any two elements to construct various measures of labor force activities.

By adding schooling as a distinct and exclusive state to the three-state model, we can formulate a four-state labor force transition model with the following states: (1) *enrolled* in school; (2) not enrolled but *employed*; (3) not enrolled and *unemployed*; (4) not enrolled and *out of the labor force*. Employment status is ignored if the individual is enrolled in school. Thus, schooling status takes a

precedence over employment status. The rationale for this is that a youth's labor force activities while in school are mostly temporary and still uncommitted (Osterman 1980). In this study, we focus on labor force activities after temporary or permanent completion of schooling.[3] Figure 1 diagrams the basic four-state model. The four-state model can be easily extended into an eight-state model with first childbirth incorporated as a subdividing family event. Figure 2 diagrams the extended eight-state model for labor market and first birth transitions.[4] No new principles are involved when the state space is extended so as to accommodate the subdivision of each state by first childbirth event. The extended model allows us to examine how labor market transitions vary between the stages before and after first childbirth.

Figure 1 here. Figures 1 to 13 are not available in an electronic format. If you need copies of the figures in Discussion Paper 1062-95 please contact IRP publications. The address is:

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Figure 2 here. Figure 2 is not available in an electronic format. If you want to obtain a copy of figure 2 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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DATA, MEASURES, AND STATISTICAL METHODS

Data

The data for this study come from the National Longitudinal Surveys of Youth (NLSY) for 1979–1991. The NLSY has conducted interviews yearly since 1979. We use thirteen waves of the NLSY (CHRR 1993b). The NLSY cohort is a sample of 12,686 males and females who were 14 to 21 years of age at the time of the base-year survey (1979). The NLSY sample was designed to be representative of the corresponding cohort (of a particular sex, race, and age) in the noninstitutionalized civilian population of the United States at the time of the initial survey (CHRR 1993a). All civilian sample selection was accomplished through a multistage stratified area probability sample of dwelling units and group quarter units (CHRR 1993a).

The 12,686 NLSY cohort includes three independent probability samples of youth: (1) a cross-sectional sample of youth from each race/ethnicity (Hispanic, black, non-black, non-Hispanic) living in the United States in 1979 and born January 1, 1957, through December 31, 1962 (N = 6111); (2) a supplemental sample which oversamples civilian Hispanic, black, and economically disadvantaged non-Hispanic, non-black youth (N = 5295); and (3) a military sample to represent those youth who serve in the military as of September 30, 1978 (N = 1280). As one of our major purposes is to get population-based measures of labor market transitions using life tables, we need to select our sample to be a national representation of young women. Accordingly, black and white female respondents from the cross-sectional sample are selected, to which black females from the supplemental sample are added to increase the size of the black sample. Our sample is thus expected to represent the population of civilian, noninstitutionalized, young white and black women ages 14–21 as of January 1, 1979, living in the United States; the resulting sample size is 2477 for whites and 1472 for blacks (405 from the cross-sectional sample + 1067 from the supplemental sample), totaling to 3949.[5]

Life Table Measure of Labor Market Transitions

Using the multistate life table models we estimate the proportion of women in each state at each age (i.e., state prevalence). We cover ages 16 through 34. We are interested in the age pattern of young women's labor force activity: how and to what extent the proportion of women in each labor force status varies with age and race.

We also estimate conditional probabilities of transition from the origin state to the destination state at each age. For example, we estimate probabilities of transition from employment or from out of the labor force to each destination state (including the current state occupied) conditional on the state occupied at each age. The conditional probability of transition out of employment, in particular, can be used as a measure of the degree of attachment to market work. How and to what extent such attachment to market work varies with age and by race is another interesting research question to be addressed. Further, by examining the conditional probabilities of transition from "unemployed" to "out of the labor force" state, we can test the "discouraged worker" hypothesis about the higher proportion of black youth observed not participating in the labor force. The hypothesis posits that youth tend to withdraw from the labor force if they face difficulties in finding a job and that the tendency is more conspicuous among black youth than among white youth.

We will also estimate expected time to be spent in each state (i.e., state life expectancy). We examine how and to what extent whites and blacks differ in the proportions of time spent employed, unemployed, or out of the labor force. An advantage of the dynamic analysis is that we get the three measures of labor force activity (i.e., prevalence, transition rates, and duration) as they are determined by a common set of underlying forces of transition (i.e., transition rates).

The expected life-time in each state is a function of the initial stock of population at the starting age and the multistate transition probabilities (i.e., increments and decrements). Thus, group differences in the life expectancies can be decomposed into components associated with each of the local transitions between origin and destination states in the model (Tiemeyer, 1992). Using the same

school, work, and first childbirth life table models, we decompose black-white differences in the expected life-time enrolled in school, employed, and not employed. To that end, we repeatedly reestimate the life table for black women after successfully substituting each of the age-specific white transition rates for blacks. A complete decomposition would require substitution of 8 X 8 = 64 local transition rates. Our initial estimation of the transition probabilities showed that the major components of the racial differential are the transitions into and out of employment—that is, transitions (1) from out of the labor force to employment; (2) from unemployment to employment; and (3) from employment to unemployment. We concentrate on those major components in our substitution analysis. We will assess the extent to which the observed racial differentials in the life expectancies can be explained by racial differentials in the first birth rates (e.g., differential rates of first childbirth between whites and blacks). To prevent the effects of the major substitutions from being compounded with differential fertility and school-to-work transitions, we first substitute whites' rates of first childbirth and school-to-work transitions for blacks' rates and then substitute the three major components in the order listed above.

Drawing on the same state life expectancy estimates, we briefly compare young men and women with regard to their life-course experiences of school, work, and family transitions as they are reflected in the total lifetime expected to be spent in each state of the labor force. The issue, here, is how the racial differentials in employment and nonemployment of youth differ between males and females.

Statistical Methods[6]

The description of the dynamic process of $Y(t)$ centers around the conditional probability that the process occupies state j at time t given that it was occupying state i at time s, where $0 \leq s \leq t$. The estimated probabilities, then, show the probability for a randomly selected woman to make a transition from state i to state j within a unit time interval (i.e., a week), which can be also conditioned on her child status at each age. These conditional probabilities are known as *transition probabilities* and often

are denoted as $p_{ij}(s,t)$. For the estimation of $\boldsymbol{P}$ matrix whose element is $p_{ij}(s,t)$, we rely on observed age- and state-specific transition proportions, denoted here as $\boldsymbol{M}_x$, to represent the unobserved quantity $\boldsymbol{R}(t)$, the instantaneous transition rates (see Keyfitz 1986; Namboodiri and Suchindran 1987). More specifically, the $\boldsymbol{M}_x$ matrix contains elements m_{xij} ($i \approx j$), the age-specific observed proportion of transitions from state i to j, and takes the form:

$$\boldsymbol{M_x} = \begin{bmatrix} m_{x11} & -m_{x12} & \ldots & -m_{xij} \\ -m_{x21} & m_{x22} & \ldots & -m_{x2j} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ -m_{xi1} & -m_{xi2} & \ldots & m_{xij} \end{bmatrix}$$

where the rows, indexed by i, represent origin states, and the columns, indexed by j, destination states. The $\boldsymbol{M}_x$ matrix is a $k \times k$ square matrix, where the off-diagonal elements, $-\boldsymbol{m}_{xij}$, represent the proportion of individuals in state i at age x who transit to state j between ages x and $x+1$, and the diagonal elements, $\boldsymbol{m}_{xii}$, represent the proportion who transit out of state i to one or another state different from i between ages x and $x+1$. For each age-in-weeks we observe we have the $\boldsymbol{M}_x$ matrix. That is, there are as many $\boldsymbol{M}_x$ matrices as there are ages-in-weeks covered. Given $\mathbf{M}_x$, we can construct $\mathbf{P}_x$ using the formula

$$\boldsymbol{P}_x = \boldsymbol{(I + hM_x/2)^{-1}(I - hM_x/2)} \tag{1}$$

assuming linearity in the survivorship function within a unit age interval (a week), where $\boldsymbol{I}$ is an identity matrix and $\boldsymbol{h}$ is the number of time units between age x and $x+h$. The $\boldsymbol{l(x)}$ matrix of age and state-specific survivorship since the radix age is constructed by multiplying $\boldsymbol{l(0)}$, a $k \times k$ identity matrix

(where *k* is the number of states in the state space) by each successive ***P(x)*** matrix. And we can also express ***l(x)*** as

(2) $$\boldsymbol{l(x) = l(x-1)*P(x)}.$$

Given that ***l(0)*** = ***I***, an identity matrix, we also know that ***l(x)*** can be computed by cumulative multiplication of ***l(0)*** by ***p(x)***.

The ***l(x)*** matrix represents the proportion of survivors in each labor force status at exact age *x* given the status occupied at the radix age. It is the product of the initial stock of people in each (labor force) state and cumulative transition (or survival) proportions between radix age and exact age *x* (see equation (3) below). For example, let the radix age be 18 and *x* be age 20. Then, the elements of ***l(x)*** matrix, $l_{ij}(x)$, represent the proportion of survivors into state *j* at age 20 among those who were in state *i* at the radix age, 18. Thus we can estimate what proportion of those not employed (*i*) at age 18 ultimately make transitions into employment (*j*) and what proportion still remain as not employed (*i*) by age 20. Assuming there are only two states (*i* and *j*) and no death occurs, by definition, $l_{ij}(x) + l_{ii}(x) = 1$. This implies that the survivorship columns are additive (Schoen and Woodrow 1980), and this additivity principle applies equally to other life table functions such as the person-years lived (***L(x)***) and life expectancies (***e(x)***). In general, the elements of ***l(x+n)***, then, represent the flow of persons among labor force statuses and to censored states between ages *x* and *x*+*n*. Remember that in the multistate life table, the survival proportions are not a product of unidirectional transitions from origin to destination state, but an outcome of continuous inflows and outflows between transient states within a given interval, i.e., ages *x* and *x*+*n*. The net flow equations that give rise to $\boldsymbol{l_i(x+n)}$ can be expressed as follows:

(3a) $$l_j(x+n) = l_j(x) + d_{ij}(x+n) - d_{ji}(x+n)$$

(3b) $$l_i(x+n) = l_i(x) + d_{ji}(x+n) - d_{ij}(x+n).$$

The first flow equation says that the number (or proportion) of persons in state *j* (e.g., employed) at age *x*+*n* (e.g., 20) is equal to the number of persons employed at age *x*, plus the number of persons making transitions from nonemployment to employment, minus the number of persons making transitions out of employment between ages *x* and *x*+*n*.

The number of person-years (weeks in our study) lived in each status during a unit time interval is determined using the linear approximation

(4) $$L(x+h) = 1/2(l(x) + l(x+h)) .$$

In this study we are also interested in state prevalence for women's labor force activity. That is, we want to know what proportion of women are employed, not employed, or enrolled in school at each age. The state prevalence for state *i* is measured with

(5) $$SL_i(x),$$

which is a vector defined by summing the columns of $L_i(x)$. Elements in $SL_i(x)$ represent the residence times in each state experienced by a stable population between the ages *x* and *x*+*h* (Schoen and Woodrow 1980; see also Crimmins, Hayward, and Saito 1994).[7]

One advantage of multistate labor force life tables can be readily seen by the equation specified for the prevalence measures; that is, our prevalence measures are based on occurrence/exposure rates in the population exposed to the risk of experiencing transitions in labor force status (see equation (4)).

Thus, multistate labor force life tables reflect "the implications of a clearly specified set of behavioral rates (e.g., transitions into and out of the labor force)" (Schoen and Woodrow 1980:297) and provide detailed measures of the flows between labor force states.

In the multistate life table, we similarly use as a summary measure the expected length of sojourn time in state *j* between times *s* and *t*, given occupancy of state *i* at age *x*, known as *state life expectancy*. For example, we can estimate the expected length of time a randomly chosen woman remains (un)employed within a given age interval, say, between ages *x* and *x*+*n* conditional on her initial status at age *x*. Let $\boldsymbol{E}(s,t)$ be a matrix whose (i,j)th element, $e_{ij}(s,t)$, represents the expected sojourn time in state *j* between ages *x* and *x*+*n*, conditional on occupancy of state *i* at age *x*. Then, $\boldsymbol{e(x)}$, the matrix of state life expectancies, is calculated as:

(6) $$\boldsymbol{e}_x = \boldsymbol{T}_x / \boldsymbol{l}_x$$

where $\boldsymbol{T}_x$ is the number of person-years lived in state *i* beyond age *x* by the cohort who survived to exact age *x*, and $\boldsymbol{T}_x$ is given by $\boldsymbol{T}_x = \boldsymbol{\Sigma}_{y|y \geq x} \boldsymbol{L}_y$. A useful summary measure,

(7) $$\boldsymbol{Se(x)},$$

is a vector containing the state life expectancies for a stationary population at age *x*.

To summarize, life table measures of labor force activity specifically aimed at in this study include (1) the population proportion of young women in each labor force state between ages 16 and 34; (2) conditional probabilities of transitions between states at each age; and (3) expected life time to be spent in each state (between ages 16 and 34). Cumulative experience of unit time transitions can be measured with the $\boldsymbol{l}_x$ functions, i.e., survival proportion in each state between ages *x* and *x*+*n* given state

of occupancy at age *x*. These measures will be estimated conditional on women's first childbirth status at each age.

EMPIRICAL RESULTS

Population Proportions of Women Active in the Labor Force States

The Overall Age Pattern of School-Work Transitions. Figure 3 shows life table estimates of the proportions of young women active in each state at ages 16 through 34 for whites (top) and blacks (bottom). Table 1 presents those proportions at each discrete age.[8] Figure 3 is intended to give a sense of the overall age pattern in the proportion of young women active in each state. In Figure 4 we put the measures for whites and blacks together to make black-white comparisons easier.

Whites and blacks show a very similar overall age pattern in school enrollment, even though white women are enrolled in school (mostly in college) in slightly higher proportion during their early twenties (e.g., 19 through 24). The rate of exit from regular schooling is fastest between ages 18 and 19, and by age 19, more than 50 percent of young women—whether white or black—are out of school. By age 22, less than a quarter of the same cohort remains enrolled in school. As the age patterns of school enrollment are similar between whites and blacks, the proportions of white and black women who are out of school should also be closely comparable, especially for ages older than 24.

Figure 5 shows two measures of labor force activities among young women who are out of school: the proportion employed and the proportion in the labor force. The proportion of women in the labor force includes both those who are employed and those who are unemployed following the conventional CPS definition. The complement of the first measure (i.e., percentage employed) is the proportion not employed (i.e., percentage unemployed + percentage out of the labor force), while the

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Table 1 here. Tables 1 to 11 are not available in electronic format. If you want to obtain copies of tables 1 to 11 from Discussion Papers 1062-95 please contact IRP publications. The address is:

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Figure 4 here. Figure 4 is not available in an electronic format. If you want to obtain a copy of Figure 4 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Figure 5 here. Figure 5 is not available in an electronic format. If you want to obtain a copy of Figure 5 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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complement of the second measure (i.e., percentage in the labor force) is the proportion who are out of the labor force. The difference between the first and the second measure, which should be always positive by definition, is the proportion unemployed.

Before age 19 the proportion of women employed and in the labor force shows a steep age-gradation reflecting the rapid school-to-work transition process around that age interval. After age 19, 75 to 85 percent of white women and 50 to 70 percent of black women are in the labor force, with the percentages generally increasing with age. The percentage employed ranges from 50 (at age 19) to 85 percent (at age 34) among whites and from 35 (at age 19) to 65 percent (at age 34) among blacks. The figure shows considerable racial differentials in the proportion employed at all the ages, which ranges from 30 percent to 8 percent between ages 19 and 34. The early difference is large but it decreases with age up to 28 and then slightly increases again.[9] We can easily see that blacks' proportion unemployed is much larger than whites' proportion, especially at younger ages. Thus, a good portion of the racial differential in employment is attributable to the relatively high rate of unemployment among blacks.

Differences by Education Attainment Level

Education has been observed to be one of the most important variables explaining women's labor force activities in terms of both participation and employment. Women with higher education tend to participate in a higher proportion and, once in the labor force, are more likely to be employed than women with lower education. Here we examine how women's labor force activities vary with educational attainment level and how the effect of education differs between whites and blacks. To that purpose, we divide the sample into two educational groups: the low-educated with education =< 12 and the high-educated with educational attainment > 12 and estimate the multistate life table for two educational groups separately.

Figure 6 shows the life table proportions of out-of-school women employed and in the labor force for whites and blacks by educational attainment level (top panel for education =< 12; bottom panel for education > 12).

Among low-educated women, whites are both employed and in the labor force in higher proportions than blacks between ages 19 through 34. The racial differentials both in employment and in participation are larger at younger ages but decrease with age (up to 30) due to blacks' gradual convergence to whites' proportions. We observe the racial gap increasing again after age 30.[10] The racial differential in employment is larger than that in participation, indicating that the proportion of women unemployed is larger among blacks than among whites, which shows little variation with age; compare the width of the band between lines for employment and for participation.

Among the high-educated women, we observe large initial differences between whites and blacks both in employment and in participation at younger ages. But the initial differences almost disappear by age 28 due to blacks' swift convergence to whites' proportions. Blacks' participation rates even slightly exceed whites' rates at older ages (e.g., 28–34). Note also that, even among the high-educated women, the proportion unemployed among blacks is considerably larger than that among whites at ages up to 28.

Between ages 19 and 34, the proportion of women employed shows a considerable within-race difference by educational attainment. There exists, approximately, a 15–20 percent difference in the proportion employed between the high- and low-educated groups of women with a larger difference being observed among blacks. As expected, white women with more than a high school education are the most likely to be employed, and black women with a high school education or less are the least likely to be employed. The proportion of black women employed varies positively with age, especially up to age 30. Among the low-educated blacks it increases from about 32 percent to about

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60 percent; among the high-educated blacks it increases from about 40 percent to a peak of 80 percent at around age 30.

As a result of the interactive influence of education and age, the racial differential in employment not only depends on the level of educational attainment but also varies with age. It is larger among the low-educated than among the high-educated and, within educational group, larger at younger ages than at older ages.

Age Pattern of Family Transitions among Whites and Blacks. Due to a close interrelationship between women's work and family status, the prevalence of women in each labor force state at each age must be closely related to the age pattern of family transitions among the cohort of young women. Figure 7 presents the proportion of women in each family status jointly defined by marital (i.e., never-married vs. ever-married) and first childbirth status (i.e., before and after the first childbirth) at each age. Figure 8 shows life table proportions of women ever-married and of women who had their first child between ages 16 and 34.

The rates of first marriage and first birth show quite different age patterns between whites and blacks. The major difference is in the larger proportion of black women entering unwed motherhood early. In contrast, the proportion of women ever-married is much lower among blacks than among whites at ages 16 through 34. The median age for first marriage (i.e., the age by which 50 percent of the population experiences the event) is 23 for whites and 28 for blacks. By age 34, about 85 percent of white women are expected to experience their first marriage, while only 60 percent of black women are expected to do so. On the other hand, the first childbirth rate shows a completely different age pattern. A much higher proportion of black women experience first childbirth at younger ages than white women. The median age for first childbirth for black women is 22 whereas it is 27 for white women.[11] A quarter of black women in the sample have already become mothers by

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Figure 8 here. Figure 8 is not available in an electronic format. If you want to obtain a copy of Figure 8 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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age 19 and the rate increases quickly during the early 20s. The low rates of participation in the labor force among younger black women should be closely related to their high rate of first childbirth.

Differences by First Childbirth Status. In Figure 9, we present estimated proportions of women employed and in the labor force controlling for first childbirth status at each age. At the bottom of each figure we also present marginal and conditional differences in the proportion employed between whites and blacks. We observe, not surprisingly, that for both races child status makes a big difference in the proportion of women employed. The difference ranges from about 20 percent to 40 percent for whites and from about 20 percent to 30 percent for blacks. The differences in both employment and participation by first childbirth status are larger among whites than among blacks.

With first child status controlled, black-white differences in employment become much smaller. But they are larger among women before than after first childbirth. Racial differentials in employment after first childbirth are close to zero, and at ages 21 through 32 black mothers' rate of participation seems to be even slightly higher than that of white mothers at the same age. This result is consistent with the findings in past studies (Cain 1966; Bowen and Finegan 1969; Mott and Shapiro 1978; Sweet 1973). But a more important finding relates to the role of *unemployment* in black-white differences in the "observed" rate of participation before and after first childbirth; that is, the higher rate of participation among black women after first childbirth is in fact due to higher rates of black unemployment (at all the ages 19–34). As can be seen in Figure 9, after as well as before the first birth, more black women than white women are in the labor force but are unemployed (see also Mott and Shapiro (1978) for a similar finding on older NLSY cohorts).

Differences by Marital Status. Figure 10 presents life table proportions of out-of-school women who are employed, by marital status. First, whites' proportion employed shows a large difference by marital status: unmarried women are employed in a much higher proportion than

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Figure 10 here. Figure 10 is not available in an electronic format. If you want to obtain a copy of Figure 10 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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married women. But among blacks, in contrast, there exists no considerable differences in employment rates by marital status except for the early difference up to age 21. The figure shows a huge racial gap in employment among unmarried women—more than 20 percent between ages 19–34, a large part of which should be due to the high rate of first childbirth to unmarried black women. Among married women, the racial differential is much smaller and shows a gradual decrease with age (up to 30).

Conditional Probabilities of Transition between Labor Force States

We now turn to conditional probabilities of transition between labor force states (i.e., employment, unemployment, and out of the labor force). Transitions between states can be described in two directions: inflow and outflow proportions. The former focuses on the destination state and asks what proportion of people in the destination state come from each origin state; whereas the latter focuses on the origin state and asks what proportion of the people in the origin state flow out into each destination state in a given interval of time.

In this study, taking the *outflow* approach, we estimate the probabilities of transition to other labor force states between ages x and x+1, *conditional* on the state occupied at age x. Those probabilities are also called "survival proportions" or "survivorship" in multistate life table analyses. Using these transition probabilities, we can examine, for example, what proportion of the women in employment state at age 20 survives into employment (i.e., remain employed), unemployment, or out of the labor force state between ages 20 and 21.[12]

Transitions from Employment. Table 2 contains the estimated proportions of women employed (at age x) who make transitions into employment and into other states—unemployment and out of the labor force—for whites and blacks separately. The top row lists the four destination states including

the current state occupied: employment, unemployment, out of the labor force (*OLF*), and enrolled. The survival proportions under the employment column represent the extent of attachment

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to employment by the cohort of young women employed at each age. Similarly, the proportions under the OLF column represent the proportion of the cohort that makes transitions from employment to out of the labor force between ages *x* and *x*+1. We cover ages 16 through 33.

The overall age pattern of the survivorship in the employment state supports the posited *age stability hypothesis*. As young women age into their early thirties, their attachment to employment gradually increases. At each age, however, white women are more likely to be staying employed than black women within the one-year interval; the average is .75 for whites and .67 for blacks.[13] According to our life table estimation, about 75 percent of white women employed (at age *x*) are expected to be still employed one year after (at age *x*+1), whereas about 67 percent of black women employed at age *x* are expected to be so.

The estimated proportions under the unemployment column tell us that about half of the black-white differential in employment survivorship is attributable to blacks' higher rates of transition to *unemployment*. The racial differential in employment survivorship, however, seems to decrease with age. At almost all the ages, black women are two to three times more likely to make transitions to *unemployment* from the *employment* state. The racial differential is more pronounced at younger ages than at older ages. The results show that black women experience less stable employment especially at younger ages (e.g., 16 through 24) than their white counterparts. The racial differential among teenagers (ages 16–19) is especially pronounced, ranging from .15 to .27 in contrast to .02 to .07 point difference after age 24.

Table 3 reports the same survivorship in employment estimated with women's first childbirth status controlled (using the extended model in Figure 2). We present white-black differences by first childbirth status (i.e, A-B and C-D columns) and differences by first childbirth status for whites and blacks (i.e., A-C and B-D columns). With the first child status controlled, white women, on average, appear to be staying employed in higher proportions between ages *x* and *x*+1 than black women (.77

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vs. .72 and .64 vs. .62 before and after first childbirth respectively). But we observe any sizable racial differential only among younger women—that is, among women aged 16 through 23 before first childbirth and among women aged 16 through 20 after first childbirth. At older ages, black-white differences fluctuate around 0 in a small magnitude indicating that there are no significant racial differences in the survivorship in employment. The depressing effect of first childbirth on attachment to employment seems to be larger among whites than among blacks. Note also that the difference by first child status consistently decreases with age for both races.

A more complete picture of the process can be captured by looking at the continuous-time path of the survivorship within a given interval. Figure 11 presents a continuous-time survivorship in employment for black and white women employed at age 24.[14] To control for the impact of first childbirth we estimate survivorship before and after the first childbirth. Among women before first childbirth, blacks' survivorship in employment decreases faster than whites' survivorship. Whites' survivorship stabilizes at around .70 while blacks' survivorship does so at around .65 after two years since the start of the process. Among women after first childbirth, in contrast, the reverse seems to be true; that is, whites' survivorship in employment decreases slightly faster than blacks' survivorship. Both stabilize at around .55 in two years (104 weeks). Thus, black-white differentials in young women's employment survivorship depends, to a large extent, on first childbirth status.

Transitions from Out of the Labor Force. In our framework, labor force transitions are defined to be bidirectional. Thus for a complete description of the process we need to examine the reverse transition, that is, transition from *out of the labor force* to *employment* state. Table 4 presents one-year cumulative survivorship in *OLF* state at each age for whites and blacks. Again the proportions under the *OLF* column represent the proportion of women still staying out of the labor force at age x+1, given that they were out of the labor force at age x.

Figure 11 here. Figure 11 is not available in an electronic format. If you want to obtain a copy of Figure 11 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 4 here. Table 4 is not available in an electronic format. If you want to obtain a copy of Table 4 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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At almost all the ages, black women are more likely to stay out of the labor force in one-year intervals than white women. The average proportion of white women surviving in *out of the labor force* state within a year is .37 while for black women it is .45. White women show an age variation in the survivorship in *OLF*; that is, as they age, their probability of staying out of the labor force increases consistently from .26 to about .42 between ages 17 and 32 (see also Sorensen, 1983). For black women we don't observe such a linear age pattern in the survivorship: it decreases and then increases again within the same age interval. Thus, our hypothesis of bidirectional age stability in labor market transition is supported among whites but not among blacks.

Whites, at all ages, have a higher probability of (re)entering employment from *OLF* (i.e., *OLF* to employment transition) than blacks given that they were out of the labor force. The average probability is .57 for whites and .42 for blacks. That is, whites are more likely than blacks to successfully reenter the labor force with a job once they are out of the labor force. A related process is the transition to unemployment (from *OLF*), in which blacks show higher rates than whites (.11 vs. .05). Among those who actually leave the *OLF* state, an average of 8 percent of white women make transitions to unemployment rather than to employment, while an average of 24 percent of black women do so. That is, given that they transit out of the *OLF* state at all, the destination is three times more likely to be unemployment if the woman is black than if she is white.

In short, black women are more likely to be staying out of the labor force at age x+1 than white women given that they were out of the labor force at age x. Even when they move into the labor force, they are more likely to end up being unemployed than whites. In other words, black women are having more difficulty than white women in successfully entering the labor force (i.e., getting employed). As a consequence, a larger proportion of black women *not employed* are in fact unemployed.

Table 5 reports the survivorship in the *OLF* state estimated with first childbirth status controlled. The pattern of the racial differential in the survivorship is completely different between

before and after first childbirth; that is, among women before first childbirth, blacks are more likely to be out of the labor force at age x+1 than whites given that they were out of the labor force at age x. But among women after first childbirth, blacks are less likely to be staying out of the labor force than whites; that is, the higher proportion of black women observed (in Table 4) staying out of the labor force is in large part due to their higher rate of first childbirth at younger ages.

For both whites and blacks, first childbirth greatly increases the survivorship in the *OLF* state but the increase is larger for whites than for blacks; that is, black survivorship in the *OLF* state is less affected by first childbirth. Figure 12 graphically shows the underlying process for what we have observed in Table 5: (1) young women are much slower in leaving the *OLF* state after than before first childbirth; (2) black women, before first childbirth, are slower in leaving the *OLF* state but they are actually faster after first childbirth than white women.

Transitions from Unemployment. The outflow proportions from both the employment and *OLF* states that we have examined showed that black women are more likely to make transitions to unemployment from both the employment and the *OLF* state. An important question is how long do black women stay unemployed once they become unemployed? To answer the question, we now examine the conditional survivorship in the *unemployment* state for whites and blacks at each age. Table 6 presents the results.

An average of 12 percent of black women and 5 percent of white women are estimated to be staying unemployed at age x+1 given that they were unemployed at age x. The racial differential in unemployment survivorship is also reflected in the lower proportion (average = .47) of unemployed blacks making transitions into employment compared to their white counterparts (average = .64) within the one-year interval.

Table 5 here. Table 5 is not available in an electronic format. If you want to obtain a copy of Table 5 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Figure 12 here. Figure 12 is not available in an electronic format. If you want to obtain a copy of Figure 12 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 6 here. Table 6 is not available in an electronic format. If you want to obtain a copy of Table 6 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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For the transition out of unemployment, destination state matters as well. Compare the proportions outflowing into the *OLF* state between whites and blacks. Black women's proportions are considerably higher than white women's at all ages (except at age 30). An average of 30 percent of unemployed whites and 39 percent of unemployed blacks are estimated to withdraw from the labor force. The racial differential is especially large during the late teens and early twenties (e.g., at ages 16–23). Under the assumption that the "unemployed" state is reliable and valid, the results support the often-cited "discouraged worker" hypothesis of blacks' unfavorable labor market experiences.

Figure 13 presents 52-week continuous-time survival proportions in unemployment at age 24. The projected lines show the expected racial differential in the duration of unemployment spells. Black women, regardless of first childbirth status, tend to stay unemployed longer than white women. For example, the median number of weeks unemployed (i.e., the number of weeks by which 50 percent of those unemployed exit the state) are 9 and 5 weeks for whites whereas they are 12 and 14 weeks for blacks before and after the first childbirth, respectively. Regardless of first childbirth status, black women tend to stay unemployed longer than white women during early adulthood.

Active Life Expectancies in the States of the Labor Force

State life expectancies are a summary measure of the whole process of labor market transition in that they are a cumulative function of the proportion of the cohort in each state (i.e., the proportion of the cohort in the state at each age) and the cohort's continuous transitions in and out of the state (i.e., conditional probabilities of transition between ages x and x+1).

Table 7 presents state life expectancies estimated by our multistate labor force transition model in which women's first childbirth status is incorporated. The total life time in our model is 936 weeks, which covers ages 16 through 34, i.e., 18 years. As expected from the high rate of first childbirth, black women spend far more life time between ages 16 and 34 as mothers than white women do: 536 weeks (or 57.25 percent of the life-time covered) for blacks vs. 376 weeks (or 40.17

Figure 13 here. Figure 13 is not available in an electronic format. If you want to obtain a copy of Figure 13 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 7 here. Table 7 is not available in an electronic format. If you want to obtain a copy of Table 7 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 7 continued. Table 7 is not available in an electronic format. If you want to obtain a copy of Table 7 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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percent of the life-time covered) for whites. Our life table estimates show that blacks spend more than half of their early adulthood as mothers. The racial difference is about 160 weeks, more than 3 years. Obviously black women's early entry into first parenthood and thus longer life time that they spend in bearing and rearing children should adversely affect their labor force activity. The total life time employed is about 499 weeks (53 percent) for whites and 411 weeks (44 percent) for blacks—a difference of 88 weeks. Whites spend about 30 weeks (3 percent) of their time as unemployed and about 180 weeks (19 percent) staying out of the labor force, while blacks spend about 73 weeks (8 percent) and 238 weeks (25 percent) of their time as unemployed and out of the labor force respectively.

Because our primary concern is with the out-of-school labor force transitions, we need to adjust for the life-time spent in school to make the black-white differences more comparable, even though they are not so large: whites spend 12.33 more weeks in school than blacks. The adjusted figures show that whites spend about 70 percent of their out-of-school life-time (i.e., 734 weeks) in employment, while the rest of the time (i.e., 30 percent) is spent in either the *unemployed* or the *out of the labor force* state. Blacks, in contrast, spend 57 percent and 43 percent of their out-of-school time (i.e., 722 weeks) employed and not employed respectively. The adjusted racial difference in the percentage of the time spent employed is about 13 percent.

Adjusting for First Childbirth Rate. Women's first childbirth is negatively associated with their schooling and employment experiences. As such, the life-time spent in each labor force state must be affected by the rate of the first childbirth transition; this suggests that part of the observed racial differential in the proportion of time spent employed should be due to the differential rates of first childbirth between white and black young women. An interesting question, then, would be how the life expectancies for blacks would change if their first childbirth rate were the same as that of whites. To

answer the question, we reestimated the life table for blacks after substituting whites' age-specific first birth rate for blacks.[15]

The adjustment for first childbirth rate improves blacks' experience in schooling and employment to some extent; that is, blacks' life-time in school increases by about 9 weeks to make black-white differences in life time enrolled in school even smaller (i.e., 3 weeks). The life-time spent in the employed state increases by the same amount. This means that about that much increased time in school and in employment (i.e., 18 weeks) is saved out of the time that otherwise would have been spent either unemployed or out of the labor force. We observe about a 15-week decrease in the time spent out of the labor force by blacks. But overall, adjustment for the first birth transition does not bring any substantial improvement in the number of weeks employed or not employed for blacks.[16]

The Effect of Education. To examine the impact of educational level on labor force transitions, we estimate the life table separately for lower and higher educational groups within race. The lower educational group includes women who have completed no more than the 12th grade, as of the last interview date in 1991, while the higher educational group includes women with an educational level greater than 12th grade.

Table 8 presents the state life expectancies for whites and blacks estimated separately for each educational group. Educational groups show large differences in the first childbirth transition for both whites and blacks. Low-educated white women spend more than half (475 weeks) of their time during their early adulthood as mothers, whereas high-educated white women spend less than a third (i.e., 27 percent or 257 weeks) of their time as mothers. For blacks, the corresponding proportions are 65 percent (611 weeks) for the low-educated and 47 percent (437 weeks) for the high-educated. For both whites and blacks, high- and low-educational groups show more than a 20 percent difference in the time during early adulthood spent as mothers. Educational attainment makes a significant

Table 8 here. Table 8 is not available in an electronic format. If you want to obtain a copy of Table 8 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 8 continued. Table 8 is not available in an electronic format. If you want to obtain a copy of Table 8 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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difference in young women's work life as can be seen in the proportions of out-of-school time spent employed. For whites they are 65 percent (of 821 weeks) vs. 79 percent (of 590 weeks) for the lower- and high-educated women, while they are 42 percent (of 804 weeks) vs. 73 percent (of 606 weeks) for the low- and high-educated black women. Racial differentials are much larger among the low-educated than among the high-educated (23 percent vs. 6 percent), and educational group differentials are much larger among blacks than among whites (i.e., 31 percent vs. 14 percent). This tells us that black women with a high school education or less fare worst among the racial and educational attainment groups in terms of employment experience during early adulthood (see Tiemeyer 1993 for similar findings for males).

The most notable fact that emerges from the disaggregate analysis by educational level, then, is that racial differentials in labor force experiences vary to a great extent with the level of educational attainment; that is, racial differentials in employment are far more pronounced in the low educational group than in the high educational group. High-educated blacks compete closely with their white counterparts in terms of the expected time to be spent in employment.

Adjustment for the differential rate of first birth brings high-educated blacks' expected number of weeks employed (456 vs. 464 weeks) and out of the labor force (105 vs. 106 weeks) even closer to those of their white counterparts. For the low-educated black women, the adjustment does increase their expected number of weeks employed from 388 weeks to 395 weeks, a 7-week increase which is a far cry from the large initial difference of 126 weeks (after adjustment for the difference in the length of schooling). We should also note that blacks, regardless of educational level, are expected to be unemployed for more than two times the number of weeks that whites are unemployed (i.e., 92 vs. 42 weeks among the low educational group and 49 vs. 20 weeks among the high educational group).

Statistical Decomposition of Racial Differences in State Life Expectancies

Table 9 reports the results from the substitution analysis. The rows of the table in panel A show new total life expectancies estimated from each successive substitution. Rows in Panel B show the percentages of the original black-white differences attributable to each relevant component. If there were no interactions between the component transition rates, then the new estimates with successive substitution should increase or decrease monotonically. But because of potential interaction between component transitions, we don't observe strict monotonic changes in the life expectancies.

First, the first childbirth rate explains the bulk (i.e., 75 percent) of the total difference (13.11 weeks) in time enrolled in school between whites and blacks, while it explains 11 percent and 28 percent of the total difference in the time employed and the time out of the labor force respectively (the first row in panel B). Controlling further for the school-work transition rates does not significantly increase the time spent by blacks either employed or out of the labor force (the second row in panel B).

The most important component of the black-white differences in employment is the transition from out of the labor force to employment, whereas the transition out of employment either to unemployment or to out of the labor force does not significantly change the observed racial differentials (not shown). The first component is responsible for an additional 62 percent of the total difference in the expected time spent in employment and an additional 72 percent of the life time to be spent out of the labor force (compare the 3rd and the 4th row in panel B).

In short, black-white differences in the time employed are in large part due to blacks' lower rate of transition from the out of the labor force to the employment state (i.e., low rate of a successful entry into the labor force). This suggests that blacks may be more reluctant to enter the labor force in the first place or more likely to be unemployed once they enter the labor force; that is, they may be more likely to make an unsuccessful entry into the labor force or have more difficulty in getting

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employed once not employed. These two possibilities can be examined by further controlling for black-white differences in the unemployment to employment transition rate.

The result shown in the fifth row in panel B supports our assumption. The unemployment to employment transition explains the additional 25 percent of the total difference in employment and the additional 34 percent of the total difference in unemployment above and beyond the preadjusted components. But note that unemployment differentials are not explained by those major components; up to 25 percent of the differential between blacks and whites still remains unexplained. The results are consistent with previous findings on black-white differentials in labor force experience; that is, the major component of the racial differential in employment lies in blacks' difficulty in accessing employment rather than in the reverse transition, i.e., transition out of employment. While previous findings on the racial differential are in most case based on male data, our results show that the same finding holds for young women.[17]

Racial Differences in State Life Expectancies by Sex. Table 10 presents the estimated state life expectancies for whites and blacks by sex. The data for males come from Tiemeyer (1993).[18] Labor market experiences for both males and females are significantly conditioned by educational attainment. Our life table estimates are disaggregated into three educational groups: less than high school, high school, and more than high school education. Table 11 presents the estimated state life expectancies by educational attainment.

Table 10 shows that the racial differential in the life-time employed is of the similar magnitude for women as for men. That is, net of time enrolled in school, blacks spend 13–15 percent less time employed than whites. That is, white and black males spend 86 percent and 73 percent of their out-of-school life-time employed respectively; white and black females spend 69 percent and 54 percent of their out-of-school life-time employed respectively.[19] Whites and males spend more time either enrolled or employed between ages 15 and 32 than blacks and females respectively. White

Table 10 here. Table 10 is not available in an electronic format. If you want to obtain a copy of Table 10 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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Table 11 here. Table 11 is not available in an electronic format. If you want to obtain a copy of Table 11 from Discussion Paper 1062-95 please contact IRP publications. The address is:

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females spend more time in school than black females by about 22 weeks, and white males spend more time in school than black males by about 23 weeks.

Even though blacks (of both sexes), on average, leave school earlier than whites, the estimated state life expectancies show that time spent *employed* is shorter for blacks than for whites. The absolute difference in time employed between whites and blacks is about 80 weeks for females and about 63 weeks for males. Because whites are both enrolled and employed longer than blacks, the racial differential in time *nonemployed* is even larger: about 102 weeks for females and about 87 weeks for males.

The observed racial differentials in the expected life-time spent employed or nonemployed may be accounted for by many factors. But blacks' earlier school leaving and entry into parenthood, and less accumulation of job-related skills due to intermittent and unstable employment patterns relative to whites', may be the major factors behind their unfavorable labor market experiences. Educational attainment, among others, has been considered one of the most determinantal factors for youth's labor market achievements. We estimated the state life expectancies for each educational group separately. Table 11 presents the results.

The results in Table 11 show that racial differentials in time employed are larger among the less-educated than among the more-educated. Black-white differences in the proportion of the out-of-school life-time employed is 21 percent among female high school dropouts, while they are 12 percent among female high school graduates and only 6 percent among those with more than a high school education. The absolute number of weeks employed shows a large racial differential especially among the less educated: 158 weeks among high school dropouts and 89 weeks among high school graduates. Note that black high school dropouts spend only 28 percent of their out-of-school life-time employed and the rest of the time nonemployed, whereas their white counterparts spend about 50 percent of their out-of-school life-time employed, and the rest of the time nonemployed. Among males, we observe a

14 percent difference in the proportion of out-of-school life-time employed between white and black males with a high school education or less. The absolute number of weeks employed shows large racial differences: 117 weeks among high school dropouts and 100 weeks among high school graduates. Among males with more than a high school education, the racial differential is much smaller (6 percent). Note also that the absolute difference is only 8 weeks between whites and blacks. As in the case of females, black male high school dropouts spend considerably less time (only 60 percent) employed, whereas their white counterparts spend 74 percent of their out-of-school life-time employed.

We can draw a couple of inferences on black-white differences in labor market experiences. The results show, first, that in the aggregate blacks spend significantly less time employed and more time nonemployed out of school than whites whether they are males or females. Second, the results also show that racial differentials in time employed among young men and women depend to a large extent on the level of educational attainment: they are large among the low-educated (i.e., high school or less) and smaller among the high-educated (i.e., more than a high school education). The results imply that the racial differentials in time employed among young men and women are not explained by compositional differences in educational attainment between whites and blacks. Even with educational attainment held constant, the racial differential persists especially among the less-educated youth.

What are the underlying processes that are responsible for blacks' disadvantage in employment in the labor market? While we have already shown, in the previous section, that the major component in the racial differentials is in the process of entering employment (either from unemployment or out of the labor force), Tiemeyer (1993) reports a similar result for males; that is, a large proportion (43 percent) of the racial differential in time "stably employed" is accounted for by the "other" (i.e., nonemployment) to employment transition, followed by the "stable employment" to the "other" transition (33 percent).

SUMMARY AND CONCLUSIONS

We have examined the dynamic process of labor market transitions for young women over the early life course. Various dynamic measures of labor force activity were used to describe young women's early work lives, which included population proportions in each state of the labor force, rates of transitions between those states, and expected time to be spent in each state. Our findings based on those dynamic measures can be summarized as follows.

While the proportion of young women enrolled in school shows no significant difference between whites and blacks (Figure 4), the proportions employed and in the labor force show a considerable racial differential. Black women are less likely to be employed or in the labor force than white women during early adulthood (Figure 5). But at the same time the magnitude of the racial differential varies with age, life-stage, and educational level. We observe a larger racial gap in the percentage employed among the younger and the low-educated (high school or less) women (Figure 6).

We find that black-white differences in the proportions of women economically active (i.e., employed or being in the labor force) are closely related to racial differences in the rate and the pattern of family transitions, especially with first childbirth. Black women enter first motherhood earlier and in a higher proportion than whites (Figures 7 and 8). When the first childbirth was incorporated into our life table model, the racial differential was reduced to a great extent. Among women after first childbirth, we observe a higher proportion of blacks than whites participating in the labor force, even though blacks' proportions actually employed are still lower than whites (Figure 9).

The current stock of women employed or not employed implies a couple of underlying processes of labor market transitions in the population. The lower proportion of black women employed at age $x+1$, for example, can be a result of either (a) a smaller initial stock of black women employed at age x and their immobility between employment and nonemployment, or (b) a higher proportion of women exiting employment and a lower proportion of women reentering employment

between ages *x* and *x*+1. Or it could be a result of a combination of (a) and (b). Conditional probabilities of transition estimated using our multistate life table model provide insights into the alternative processes possibly underlying the observed proportions of black and white women employed and not employed at each age.

The proportion of women surviving in the employment state at age *x*+1, given that they were employed at age *x*, can be used as a measure of *attachment to employment*. The estimated survival proportions showed that black women are more likely to exit employment in a year than white women (Table 2). More blacks than whites become unemployed or withdraw from the labor force in one-year intervals given that they were employed. When first childbirth status is controlled, however, we observe any sizable racial differentials only among women under ages 22–23. Black women tend to experience less stable employment than white women at younger ages. Before first childbirth, black women tend to exit employment at a higher rate than whites, but after the first birth, black-white differences in exit rates almost disappear (Figure 11).

For both whites and blacks the estimated survival proportion in employment supports the "age stability" hypothesis; that is, young women, once employed, tend to be less likely to leave employment as they age. The hypothesis holds even when we control for first childbirth status (Table 3). First childbirth significantly lowers the probability of women remaining employed for both whites and blacks. But the depressing effect of first childbirth steeply decreases with age for both racial groups.

What happens once young women exit employment? Do they stay out of the labor force for a long time or do they reenter employment quickly? How do whites and blacks differ in the rate of getting reemployed or of reentering the labor force? The marginal proportion of black women reentering the labor force (i.e., exiting the *OLF* state) seems to be lower than whites (Table 4). But again, racial differentials largely depend on women's child status; that is, before first childbirth, blacks are less likely to exit the *OLF* state, whereas, after first childbirth, they are more likely to exit the *OLF*

state than whites at ages 18 through 32 (Table 5; Figure 12). First childbirth status increases the proportion remaining in the *OLF* state to a great extent for whites and to a lesser extent for blacks.

What proportion of white and black women eventually get (re)employed once they are in the labor force? The estimated conditional probabilities of transition from out of the labor force to employment show that black women are less likely to reenter employment than whites once they are out of the labor force (Table 5). When they actually enter the labor force, blacks are two to three times more likely to be unemployed before they get employed or withdraw from the labor force again. In other words, unsuccessful entry into the labor force is far more likely among black women than among white women. In addition, once they are unemployed, black women are less likely to be (re)employed than whites are (Table 6). And a higher proportion of unemployed blacks tend to withdraw from the labor force, supporting the "discouraged worker" hypothesis in explaining higher rates of nonparticipation among black youth.

We find that blacks spend considerably more time nonemployed than whites (57 percent vs. 70 percent of their out-of-school time) (Table 7). The racial differential in state life expectancy varies to a great extent with educational level. It is far more pronounced among low-educated women, whereas high-educated blacks compete closely with their white counterparts (Table 8). The major components in the racial differentials in time employed or nonemployed are black women's lower rates of transition from out of the labor force to employment and from unemployment to employment (Table 9). This suggests that the major source of the black-white differentials in labor market experience is in the process of (re)entering employment (from nonemployment) rather than in the process of exiting employment to nonemployment. Blacks' disadvantage in employment is the same among males as among females (Table 10). The expected life-time to be spent employed shows large racial differentials especially among the low-educated males and females (Table 11). We thus suspect that blacks' employment chances, especially if they are low-educated, are constrained by labor market

structural factors (e.g., racial discrimination, sectoral allocation, etc.) to a greater extent than low-educated whites' employment chances are.

Notes

[1]By "labor market transition," we mean the movement of women between the states of the labor force (i.e., employment, unemployment, and out of the labor force).

[2]For example, women's labor force status may be defined in combination with their family status (e.g., married and employed, married and not employed, unmarried and employed, and unmarried and not employed), and transitions would be allowed to occur between those multistates. In that way, changes in one variable (marital status) would be dynamically linked to changes in the other variable (labor force status) over time. The multistate models will be discussed in detail in the following chapters.

[3]By temporary completion of schooling we are referring to any long-term intervening period between school enrollments excluding summer vacations.

[4]A simultaneous consideration of marital and childbirth status is impossible due to technical difficulties in estimating a multistate life table with more than ten transient states. We focus on the first childbirth transition as the most constraining family factor for women's work.

[5]The distributions of NLSY female respondents by sample type and by race in the 1979 survey are as follows (CHRR 1993a):

Female total = 6283

	White*	**Black**	Hispanic
Cross-Sectional Sample (Subtotal = 3108)	2477	405	226
	Poor White	**Black**	Hispanic
Supplemental Sample (subtotal = 2719)	901	1067	751
	White	Black	Hispanic
Military Sample (subtotal = 456)	342	89	25

***** Bold faced subsamples are selected into our analytical sample.

[6]For the presentation and discussion of the multistate life table functions in this section, we rely on Tiemeyer (1992) and on Namboodiri and Suchindran (1987:ch.9). The symbols used closely follow those in Tiemeyer (1992).

[7]For these summary statistics to be computed we need to define another matrix $\boldsymbol{Q}$, a *kxk* square matrix where each main diagonal element, q_{ii}, represents the population distribution in state *i* at time 0 (or radix age)—starting population distribution—and all off-diagonal elements are 0 and where *k* is the number of states defined in the model. Then, in modeling the stable population, we need to post-multiply the life table functions (e.g., $\boldsymbol{l(x)}$, $\boldsymbol{L(x)}$) with the $\boldsymbol{Q}$ matrix (see Tiemeyer 1992). Then we can easily get such summary vector matrices as $\boldsymbol{Sl(x)Q}$, $\boldsymbol{SL(x)Q}$ by summing the columns of $\boldsymbol{l(x)Q}$ and $\boldsymbol{L(x)Q}$.

[8]The proportions active in each state at each age are computed from the SL_xQ functions in the multistate life table, which measure the sojourn time in each state by a stable population between ages *x* and *x+h*. For point estimates for each exact age, we sum and average the SL_xQ function over 26 week intervals around the exact age (i.e., 13 weeks before and 13 weeks after the exact age). This should be an approximate of the population distribution at the mid-point of the age interval (see Tiemeyer 1993:63).

[9]But the life table measures at the youngest and oldest ages (esp. age 33) are less reliable and so we shouldn't give too much weight to the differences after age 33.

[10]But we are less confident about the result because life-table estimates at the oldest ages are less reliable.

[11]The median ages do not represent the median ages in the population but in the sample, because the data are censored at age 34.

[12]Life-table estimates of the conditional probabilities are based on the Markovian assumption

and thus do not take into account previous history. But the life tables provide an excellent way of summarizing a synthetic cohort experience of labor force transitions at each age. The multistate life table is a closed system and the conditional transition probabilities add to a unity. Using the $P(t, t+1)$ matrices for successive unit (i.e., age-in-weeks) intervals, we compute $P(t, t+n)$, for integer n, by multiplication:

$$P(t, t+n) = P(t, t+1)P(t+1, t+2)...P(t+n-1, t+n)$$

where n, here, is 52 representing one-year experience.

[13]Because of the small number of observations at the youngest ages (16–18) we only include ages 19–33 for estimation of averages.

[14]The projected survival curves are based on the l_x matrices (i.e., survival proportions) where x runs from 1 through 104. The survival proportions at each time point are a function of the initial stock of people (here, 1.0) and the inflow proportion from other transient states into employment net of outflow proportions from employment to other states in the state space.

[15]Group differences in the proportion employed/not employed and in the state life expectancies can be decomposed into differences in each of the local transition rates between states in the multistate life table. In the following section, we present the results from our more detailed decomposition of the racial differentials.

[16]This result may be, in part, due to early exits from employment to out of the labor force (i.e., transition 2 to 4 in Figure 2) by women expecting childbirth. That is, in our extended transition model, first childbirth transitions are most likely to occur while women are out of the labor force. If so, then, adjusting for differential first childbirth rate would increase the expected life-time spent in the OLF state before first childbirth (state 4) but not that in employment either before or after first childbirth (states 2 and 6).

[17]But as a cautionary note, the transition from out of the labor force to employment may have

different behavioral implications for women than for men; that is, the low rate of that particular transition among black women may have a different meaning than that among black men.

[18]In Tiemeyer (1993), the "states" of the life table model are defined differently from ours. His model has six states: (1) school only; (2) school/work; (3) work only; (4) stable employment; (5) military enlistment; (6) other (i.e., either unemployed or out of the labor force). States (1) and (2) correspond to the *school enrollment* state; states (3), (4), and (5) correspond to the *employment* state; and state (6) corresponds to the *nonemployment* state in our model. For a comparison, we rearranged Tables 5.1 and 5.4 in Tiemeyer (1993) so that they match our life table models. In addition, since unemployment and out of the labor force states are not distinguished in Tiemeyer (1993), we collapsed those two categories into a "nonemployment" state for comparison's sake.

[19]The age period covered in Tiemeyer (1993) is between 15 and 32. So we adjusted our life table estimates to cover the same age range.

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