The Dynamics of Self-Employment Over the Life-Cycle: An Entry-Exit Decomposition Analysis[1]

George Deltas
University of Illinois
1206 South Sixth Street
Champaign, IL 61820
United States
Phone: (217) 333-4586
e-mail: deltas@uiuc.edu
http://www.staff.uiuc.edu/ ~deltas

GiSeung Kim
LG Economic Institute
20 Yoido-dong, Youngdungpo-gu
Seoul, 150-721
Korea
Phone: (82-2) 3777-0413
e-mail: gs-kim@lgeri.co.kr

July 2003

Abstract

In this paper we use a novel approach to decompose differences in the self-employment probabilities of various socio-economic groups into differences in their entry rates into self-employment and exit rates from self-employment. This decomposition is based on the estimated Markov transition probabilities into and out of three employment states: non-employment, wage/salary employment, and self-employment. The analysis utilizes data from the March supplement of the Current Population Survey. We concentrate on differences in self-employment rates due to gender, race, and educational attainment. We demonstrate that the effect of differential entry rates (relative to the effect of differential exit rates) varies both across groups and over the life-cycle. The empirical findings are consistent with some models of self-employment but not with others. In particular, gender differences in the incidence of self-employment are due to higher female exit rates and are more consistent with conscious career choice rather than with barriers to entry into self-employment. Race differences in self-employment are due to a black-white gap both in entry and exit rates. However, the entry rate gap becomes progressively smaller over the life-cycle, possibly because African-Americans are able to relax liquidity constraints through life-time savings. Finally, differences in the self-employment rates of college and high school educated individuals appear at mid-life and are due exclusively to differences in entry rates. This is consistent with the human capital accumulation hypothesis which postulates that the opportunities for self-employment of educated individuals are enhanced by their experience in the salary sector.

JEL Classification Codes: J23, J24.
Keywords: Entrepreneurship, Small Business, Markov Transition Models.

[1]We would like to thank Heather Antecol, Kevin Hallock, Craig Olson, and seminar participants in the Econometric Society North American Summer Meetings (Maryland, 2001), Korean Economic Association Annual Meetings (Seoul, 2002), Society of Labor Economics Annual Meetings (Baltimore, 2002), SUNY at Stony Brook, and the University of Illinois for helpful comments and discussion. Financial support from the University of Illinois' College of Commerce and CIBER is greatfully acknowledged. All errors are our own.

1 Introduction

Small firms and entrepreneurial activities are playing an increasingly important role in the economy. Self-employed workers comprise approximately 10% of the labor force, operate a large fraction of businesses, and provide jobs for one-tenth of all wage workers.[1] However, the propensity for entrepreneurial activity varies greatly over the population, with women, blacks, and lesser educated individuals being less likely to be self-employed than others. Identifying the sources of these differences is important for increasing our understanding of this sector and for guiding public policy.

Numerous studies have investigated how the incidence of self-employment varies across demographic groups and how the likelihood of becoming an entrepreneur depends on a number of socio-economic variables. The majority of these studies, however, tend to look at the proportion of people who are entrepreneurs at any given point in time and documents that some groups, e.g., white males or older educated individuals, are more likely to be self-employed than other groups.[2] Only a few of these studies measure the extent of turn-over in the self-employment group.[3] Further, to the best of our knowledge, Fairlie (1999) and Kuhn and Schuetze (1998) are the only two studies that investigate, in work that differs methodologically from ours, the relative contribution of entry and exit rates in the self-employment propensities of different groups.[4] For instance, it is not known whether white

[1]See Becker(1984) and Haber, Lamas, and Lichtenstein (1987). A person is defined here as self-employed in a given year if, during his/her longest job in that year, he (or she) was working for himself (or herself) in either an incorporated or an unincorporated business or was a farmer. Entrepreneurship and self-employment will be used interchangeably in this paper.

[2]A non-exhaustive sample of recent work along these lines includes Dunn and Holtz-Eakin (2000), Blanchflower and Oswald (1998), Hout and Rosen (1999), Rees and Shah (1986), and Bernhardt (1994). For a comprehensive literature review, see Kim (2000).

[3]These studies include Evans and Leighton (1989), Evans and Jovanovic (1989), Blanchflower and Meyer (1994), Carrasco (1999) and recent work by Jones and Riddell (2000), Moore and Mueller (1998) and Lin, Yates, and Picot (1998).

[4]Fairlie's (1999) work concentrates on the differences of entry and exit rates between blacks and whites.

males are more likely to be self-employed because they are more likely to enter into self-employment (compared to other groups) or because they are more likely to succeed in self-employment once they enter (again, compared to other groups). Similarly, we do not know whether older educated individuals are more self-employed because they tend to be more successful or because they are more likely to pursue entrepreneurial activities.[5]

We address the above issues by studying the transitions in and out of self-employment using data from the Current Population Survey. We adopt a simple, time heterogeneous, Markov process framework in which transitions between employment states depend on the current state of workers and the economy. We distinguish between three states: non-employment, wage/salary employment, and self-employment, and estimate the impact of entry and exit rates on the probability that an individual of any given set of characteristics is self-employed at any given age. Using a novel partial decomposition approach, we are able to show to what extent differences between any two groups are due to differences in exit rates from self-employment or due to differences in entry rates into self-employment. We are also able to determine how the transition probabilities vary over a person's life-cycle, for example, whether differences between groups are more pronounced in the early, rather than the late, years of their life. In other words, we investigate whether groups, such as white males, gain their advantage because of an "early start" or have an advantage that persists over the life-cycle, or whether the relative contribution of entry (or exit) rates changes over the life-cycle.

Kuhn and Schuetze (1998) investigate the extent to which changes in the steady-state probability of self-employment between the 80's and 90's are due to changes in entry rates and changes in exit rates. Unlike our work, Kuhn and Schuetze (1998) do not consider a person's life-cycle employment profile or the impact of socio-economic factors on the entry and exit rates; they rather focus on the steady-state proportion of wage/salary employed and self-employed.

[5]We define "success" as persistence into self-employment to avoid any issues that might arise from the use of self-reported income data (which are widely perceived to be somewhat inaccurate) and the need to account for outside opportunities. Simply put, an individual is considered successful in entrepreneurial activities if these activities yield to him higher utility than wage/salary employment.

This paper concentrates on differences in self-employment rates due to gender, race, and educational attainment. We find that early differences in the self-employment rates between men and women are due to differential entry rates. Later in the life-cycle, differential exit rates account for the entire gender difference. More concretely, consider a person endowed with the male entry probabilities and the female exit probabilities. This person would have a self-employment rate that is essentially identical to that of men when his age is under 30, intermediate to that of men and women when his age is between 30 and 35, and essentially identical to that of women when his age is over 35. These results show a lack of entry barriers into self-employment for women, at least when one does not differentiate between different types of self-employment. The male-female difference is, for the most part, due to the choice of women who are self-employed to leave self-employment for (primarily) other types of paid employment. The effect of marital status and the presence of children in the household also impacts the two genders differentially and in ways that are consistent with the traditional division of labor in a household.

We document that the low propensity of African-Americans to be self-employed is, to a large extent, due to a "late" start: by age 35, the probability of a non-black to be self-employed is 3.5 times that of a black individual (controlling for a set of other characteristics).[6] The relative gap declines somewhat for older individuals: by age 60, the proportion of non-blacks who are self-employed is only twice that of blacks. The relative reduction in the black/non-black gap for older individuals is driven exclusively by a narrowing in the difference between their relative entry rates: by age 60, blacks are nearly as likely as other individuals to enter into self-employment. The differential in exit rates persists unabated throughout the life-cycle. This pattern might be driven by two factors: (i) the disparity in financial wealth of blacks and whites and (ii) the lower incidence of self-employment by the *parents* of African-Americans. Young African-Americans are severely liquidity constrained relative to young whites and therefore are not likely to pursue self-employment (see Fairlie

[6]In our study, we distinguish between three race categories: white, black, and other. The "white" and "other" category have similar profiles with regards to self-employment probabilities.

and Meyer, 1996). As those black Americans who desire self-employment accumulate savings over their lifetime, their proclivity to enter approaches that of other Americans. In addition, by the time people reach middle-age, the impact of parental background on the propensity to enter self-employment is likely to wane.

Finally, we confirm that better educated individuals are more likely to be self-employed. This finding is consistent with the Lucas (1978) model in which human capital enhances an individual's managerial ability and, hence, increases the propensity to be self-employed. It is also consistent with the empirical research of Rees and Shah (1986), Fujii and Hawley (1991), and Bates (1990). We find, however, that any education effects become apparent only for middle-aged and older individuals: for individuals under the age of 40, the incidence of self-employment is the same regardless of educational attainment. Furthermore, the difference in self-employment rates arises exclusively from differential entry rates: better educated individuals are equally likely to fail as entrepreneurs as the rest of the population; however, better educated individuals (age 40 and above) are more likely to enter self-employment. We believe that this pattern arises from differential accumulation of human capital by the two groups. In the early stages of their careers, college graduates enter jobs that allow them to accumulate human capital. In turn, this capital allows them to enter into types of self-employment that they would not have been able to pursue in the absence of prior work experience. In contrast, high school graduates enter jobs which provide a lesser amount of human capital. Thus, their possibilities for self-employment do not expand at the same rate as those of college graduates. On the other hand, the exit rates from self-employment are the same for both groups throughout their life-cycle because they are determined not only by the relative success when self-employed, but also by their opportunities in the salaried sector. It is, indeed, likely that college graduates earn more in self-employment than high school graduates (and progressively more so in the later years of their life), but their forgone income in the salaried sector is also higher than that of high school graduates (and becomes progressively more so in the later years of their life).

This paper is organized as follows. Section 2 briefly describes the Current Population

Survey and the construction of our data set. Section 3 presents the results of our pooled cross-section analysis in which we estimate, using our entire twelve-year sample, the probability of self-employment as a function of individual characteristics and macro-economic conditions. Section 4 outlines our Markov framework and investigates, on the basis of estimation results, the extent to which differences in self-employment arise from differential entry or from differential exit rates. The paper concludes with some remarks on the significance of our results.

2 Description of the Data

2.1 The CPS data set

The Current Population Survey (CPS) is a survey of approximately 60,000 households conducted monthly by the Bureau of the Census for the Bureau of Labor Statistics and collects demographic, social, and economic information about the U.S. population. The March survey is the most comprehensive of all monthly CPS surveys and forms the basis of our data set. The CPS includes a long list of employment information, including employment status, earnings, hours of work, occupation, industry, and class of worker. It also includes a number of demographic and socio-economic characteristics such as age, gender, race, marital status, educational attainment, school enrollment, income, previous work experience, health, employee benefits, and work schedules.

The CPS has the form of an overlapping panel. Any given individual in the sample is interviewed for a total of eight months, divided into two equal periods: he is in the sample for four consecutive months, leaves the sample during the following eight months, and then returns for another four consecutive months. Under this system, 75 percent of the sample is common from month to month and 50 percent from year to year (for any given month). This procedure provides a substantial amount of month-to-month and year-to-year overlap in the sample, thus providing better estimates of change and reducing discontinuities in the

series of data without burdening any specific group of households with an unduly long period of inquiry./footnoteMoser (1986), Poterba and Summers (1986), Clark and Summers (1978) use monthly CPS datasets to study labor transitions. The sampling pattern implies that 50% of the individuals sampled in any March survey have also been surveyed in the previous March survey.[7] The rest are surveyed for the first time.

2.2 Sample Period and Variables

We constructed a multi-year overlapping panel using the annual (March) demographic files for the period from 1983 to 1999. Our unit of observation is the individual. We define the cohort of year t to consist of the individuals who were sampled for the first time during year t. Each cohort is a two-year panel and was constructed by matching data from adjacent CPS surveys by the Household ID number (H-IDNUM, a variable that is included in the data set expressly for matching purposes), the line number variable, and other demographic variables, such as age, race, and gender. We obtained a total of twelve cohorts.[8]

The definition of the variables used in our analysis is reported in Table 1. We distinguish between three employment states on the basis of the longest job of the individual during the year before the survey year: *non-employment* (*EmplSt*=0) if the person is unemployed or not in the labor force,[9] *wage/salary employment* (*EmplSt*=1) if the person is a government

[7]In practice, only about 37% of the surveyed individuals are in contiguous March surveys because individuals move, refuse to participate in the survey, become deceased, or can not be traced. As we discuss below, our conclusions are not likely to be affected by this attrition process (see Peracchi and Welch, 1995, for a discussion of issues regarding attrition and cross-section matching in the CPS). We also recognize the likelihood of reporting errors in the CPS (see Poterba and Summers, 1986, 1995), but this is not likely to be as severe of an issue with the annual data relative to the monthly CPS.

[8]Four pairs of CPS surveys (1985-1986, 1993-1994, 1994-1995 and 1995-1996) could not be matched because of changes in the rotation groups.

[9]That is, his or her "class of worker (COW)" category is "Not in universe, children, or in Armed Forces," or "never worked." These correspond to CPS Class of Worker (at longest job last year) codes 0 and 8. Note that we lump unemployment and not-in-labor force into a single category (as is done in a number of other

or private employee,[10] and *self-employment* (*EmplSt*=2) if he has been self-employed in an incorporated or an unincorporated firm or farm.[11] Our data set includes individuals of 18 through 67 years of age at the time that they were first surveyed. We divide our sample into ten mutually exclusive age groups, those between 18 to 22 years of age, 23 to 27 years of age, and so on until those between 63 to 67 years of age. A dummy variable corresponds to each of these age groups. The marital status classification in the CPS data identifies four major categories: single (never married), married, widowed, and divorced. These terms refer to the marital status at the time of enumeration. We created two dummy variables based on these categories. One is a dummy that takes the value of 1 if the subject is married (and zero otherwise). The other takes the value of 1 if the subject is divorced. The dummy variable *male* takes the value of 1 if a respondent is male (and zero otherwise). We distinguish, using a set of dummy variables, between five levels of educational attainment: less than a high school graduate, high school graduate, some college, college graduate, and post-graduate school. The population is divided into three groups on the basis of race: White, Black, and Other. The "Other" group includes the American Indian/Aleut Eskimo, Asian, and Pacific Islander categories. To investigate the effect of children on an individual's entrepreneurship decision, we created a children dummy that indicates the presence of children under the age of six in the household.

Finally, we incorporated in the data set two macro variables that are likely to impact the decision to enter into self-employment: the real interest rate and the unemployment rate. The values of these economy-wide variables are reported in Table 2. Summary statistics for

papers) because in practice it may be hard to make a meaningful decision between these two states (see Clark and Summers, 1978, for supporting evidence with regards to the CPS data and Flinn and Heckman, 1983, for an opposing view).

[10]Wage/Salary employment corresponds to CPS Class of Worker at longest job (last year) codes 1 (private sector employee), 2 (Federal government employee), 3 (state government employee), 4 (local government employee), and 7 (employed without pay).

[11]Self-employment corresponds to Class of worker CPS codes 5 (self-employed, incorporated) and 6 (unincorporated self-employed or farmer).

the remaining variables used in the analysis are reported in Table 3.[12]

3 Cross-section Analysis of Self-employment Levels

Before we proceed to the systematic analysis of the transitions into and out of self-employment, we establish some key features of our data set. In particular, we estimate the incidence of self-employment over a person's life-cycle across different socio-economic groups and show to what extent self-employment rates differ across groups. The decomposition of these differences in the incidence of self-employment across groups into differences in their entry and exit rates is the focus of the transition analysis in the following section.

The probability that an individual is self-employed at any point in his life depends on a number of personal characteristics and the state of the economy. We estimate the probability that an individual is self-employed using a logit regression. Our sample for this cross-section regression consists of all respondents who were sampled in *two* consecutive years using the data obtained from their first interview, i.e., an individual is included in our data set only once, even though that individual has been sampled twice. This choice of the sample is made so as to obtain results that would be comparable with those obtained in the transition analysis of the next section, since the transition analysis can only utilize observations of individuals who are sampled in consecutive years. In this section, we exclude all respondents who are not employed, that is, we estimate the probability of being self-employed *conditional* on being employed.[13]

[12]We investigated whether there exist any systematic differences between the summary statistics of individuals who are sampled for the first time and those of individuals who are sampled for the second time. The biggest difference between the two groups is in the percentage of employed who are self-employment, which is higher for the latter group (10.3% compared to 11.8%). The differences between the two samples, in terms of the means of the other variables, were much smaller. There is, of course, no way of knowing the extent that the attrition rate impacts our results.

[13]Regressions based on the individuals that were sampled only once yield comparable results. This, along with the fact that the summary statistics for the two groups are similar, suggests that the results of the

The first set of regressions, reported in Table 4, is relatively parsimonious in that they do not allow for the effect of any personal characteristics on self-employment to vary over the life-cycle. Model 1 presents the results using the full set of regressors; Model 2 excludes the macro variables; while Model 3 includes only the variables of the greatest interest. Consistent with previous results, the probability of self-employment is increasing with age and education and is higher for men, whites, and married women compared to other groups.

The second set of regressions, reported in Tables 5, allows for the effect of an individual's characteristics on self-employment to vary over the life-cycle through a fully flexible specification in which every regressor is interacted with the full set of age group dummies. It also reports the p-values for the tests of whether the coefficients of a particular characteristic vary over the life-cycle. It is apparent from this second set of test results that the parameter values associated with some characteristics are broadly constant over a person's life. Restricted versions of the model in which we constrain the parameters of some socio-economic variables to be constant across the age groups yield results that are similar to those of the fully flexible specification.[14]

The results of Table 5 need to be interpreted with caution. The fact that the coefficient of a characteristic is broadly constant throughout a person's lifetime does not imply that this characteristic has a constant effect on the probability that the person is an entrepreneur; the marginal effect of that characteristic would vary over the life-cycle because the parameters of the age group dummies are non-zero. The impact of individual characteristics on the probability of being an entrepreneur can best be seen with the help of Figure 1. In this figure, described in detail below, we plot the predicted probabilities that a "benchmark" individual is self-employed as a function of his age. This benchmark individual is a white

transition analysis are not likely to be qualitatively affected by the attrition rate in the CPS survey.

[14]In particular, we constructed the restricted regressions as follows: We have re-estimated the model constraining the parameters of all regressors with a test p-value of more than 0.5 to be the same for all age groups. We have also computed the p-values for the test of whether the parameters of the remaining characteristics vary over the life-cycle. Finally, we re-estimated this model allowing only the parameters of the regressors with p-values of less than 0.1 in the "interim" regression to vary across age groups.

male who graduated from college at age 22, married at age 28, and never divorced. The unemployment and interest rates are set to be equal to the average rates in our sample period and the value of the time trend is equal to 1998. The probability that this benchmark white male has a child under the age of six is set to equal the expected value of the corresponding probability for such a white male. This is done so as to "spread" the impact of children in the probability of self-employment over the entire life of the benchmark person. Figure 1 shows that the probability that this benchmark individual is self-employed is increasing steadily with his age.

In Figure 1 we also plot the probability of self-employment of (i) a female, (ii) an African-American, and (iii) a high-school graduate, each with otherwise identical characteristics as the benchmark individual.[15] As in the case of the benchmark white male, the probability that each of these three individuals has a child under the age of six is set to the expected value of the corresponding probabilities for these individuals.[16] Females are less likely to be self-employed and the difference appears to widen in absolute terms over the life-cycle. The difference between an African-American male and the (white) benchmark is dramatic, particularly in a person's middle age. The difference narrows somewhat for individuals in their sixties, but even at that point, an African-American male has a propensity to be self-employed that is about half of that of his white counterpart. In contrast, the difference between a high-school graduate and the (college educated) benchmark is relatively small and changes sign over the life-cycle. Young (age 34 or lower) high school graduates are more likely to be self-employed than otherwise identical college graduates, while the reverse is true for older individuals.

The above analysis reveals that there are substantial differences across socio-economic

[15]Though we do not provide standard errors for the differences in the probabilities of any two groups (for this or any other figure), these differences should be statistically significant since the differences in the parameter estimates for these groups are statistically significant (as it can be readily seen from Table 5).

[16]Using the unconditional on any characteristics probability of a child for all of the series in Figure 1 yields results that are observationally equivalent.

groups in the likelihood that a person is an entrepreneur and that these differences are not, in general, constant over the life-cycle. However, it does not reveal whether they arise because of differences in the entry rates into entrepreneurship, or differences in the exit rates from entrepreneurship, or both. Decomposing these differences into differences in exit and/or entry rates is important because it may help in identifying the underlying factors that cause them. In the next section, we perform such a decomposition of differences in the incidence of self-employment across groups into differences in their entry and exit rates. For this purpose, we adopt a Markov process framework, in which transitions depend on the current state of workers and the economy. This framework is described next.

4 Analysis of Employment Transitions

4.1 Modeling Framework

In this section, we outline the econometric methodology that we employ to analyze the transitions in and out of self-employment. We also outline our methodology of decomposing intra-group differences in self-employment rates into differences in entry rates and differences in exit rates.

For notational convenience, let the occupational status of a person at any period t be described by a stochastic process $\{E_t\}$ that takes values in a finite discrete state space denoted by $\mathbf{S} = \{0, 1, 2\}$ where the value of 0 means that the person is not employed in period t (i.e., he is either unemployed or not in the labor force), the value of 1 means that he is a wage/salary worker (in period t), and the value of 2 means that he is an entrepreneur.[17]

[17]We can not account for transitions out of the sample, i.e., transitions into the not observed/deceased category. These are individuals who refuse to participate in the second survey, individuals who the Census fails to locate, or individuals who pass away. Even though there is no way of knowing the extent to which this attrition rate affects our results, we expect (on the basis of the discussion in footnote 12) that this effect to be small.

We assume that the transition probabilities of a person h from a state i to a state j depend only on the current state, the value of personal characteristics and economic conditions, x_{ht}, and the person's current age, τ. This assumption is driven by the nature of the CPS dataset.[18] In particular, we assume that

$$Pr(E_{t+1} = j | E_t = i) \;=\; \frac{exp(\beta'_{ij\tau}\, x_{ht})}{\sum_{k=0}^{2} exp(\beta'_{ik\tau}\, x_{ht})}, \qquad i \;\&\; j \in \mathbf{S} = \{0, 1, 2\} \tag{1}$$

where $\beta_{ij\tau}$ is a vector of coefficients and x_{ht} is a vector of co-variates.[19]

We estimate the set of equations in (1) via three standard multinomial logit regressions to obtain the estimates, $\hat{\beta}_{0j\tau}$, $\hat{\beta}_{1j\tau}$, and $\hat{\beta}_{2j\tau}$, of the corresponding parameter vectors.[20] These parameter vectors are, in turn, used to calculate the estimated transition probabilities, which in general, will be a function of personal characteristics and economic conditions. That is, the transition probabilities will be a function of the socio-economic group an individual belongs to. Denote the transition probability for a member of socio-economic group G at age τ from state i to state j by $P^G_{ij\tau}$.

[18]Given that there is decreasing hazard for departures from either employment or non-employment (see, for example, Even 1987, Blank 1994, and Heckman and Willis 1977) the Markoff probabilities will understate the likelihood of leaving a state for those who have resided in the state for a only a small number of periods but overstate it for those who have resided in that state for a longer time period. However, the expected length of a spell may be similar to that obtained from longer panels and estimation procedures that allow for duration dependence.

[19]The estimation of different indexes for each state of origin incorporates the notion that individuals who reside in each state are drawn from different populations, even after conditioning on the observed characteristics (see Heckman and Willis, 1997).

[20]Implicit in our estimation methodology is the assumption of a single transition during period t. Due to the choice of our dataset, we can not consider the possibility that a worker may switch employment categories more than once in any given year. In the case of multiple switches, a worker is classified according to the type of his longest-held job for that year. Therefore, as with most of the literature, all durations calculated using the estimates in this paper are discrete spell durations. If one is willing to assume that hazard rates are constant within a period, then one could use the adjustment in Eberwein (2002) to calculate continuous spell durations, i.e., expected durations in an employment state that recognize the possibility of multiple transitions between samplings.

From the predicted transition probabilities, $P^G_{ij\tau}$, we reconstruct the predicted probability that a member of a group G is in state i at age τ, $\pi^G_{i,\tau}$, using the recursive relation

$$\pi^G_{i,\tau} \;=\; \sum_{j=0}^{2} P^G_{ji\tau} \cdot \pi^G_{j,\tau-1}$$

where π^G_{i,τ_0} is the proportion of members of group G who are in state i at some "initial" age τ_0. These would be the steady-state labor state probabilities if the life-time transition probability profile were fixed for a generation. This would differ from current labor state probabilities if past transition probabilities differ from those in the sample.[21] In our study $\tau_0 = 18$ which allows us to construct the entire life-history of a person.[22] We are interested in the proportion of members of group G who are self-employed at age τ conditional on them being employed at age τ. This proportion, S^G_τ, is given by

$$S^G_\tau = \frac{\pi^G_{2,\tau}}{\pi^G_{1,\tau} + \pi^G_{2,\tau}} \tag{2}$$

We are also interested in how this (conditional on employment) proportion of self-employed differs across groups.

In particular, consider two groups, G and Γ. The difference between the self-employment probabilities of two groups at age τ ($\pi^G_{i,\tau}$ and $\pi^\Gamma_{i,\tau}$) is due to differences the two groups' initial proportion of self-employed (π^G_{i,τ_0} and π^Γ_{i,τ_0}) and differences in their transition probabilities. In order to determine the relative importance of differences in the transition probabilities from each of the three states in generating any gap in the self-employment rates of the two groups, we define the following two hypothetical groups. The first group, γg, is endowed with the transition probabilities from wage/salary employment or from non-employment of group Γ and the transition probabilities from self-employment of group G. The second group,

[21] This approach has also been used by Peracchi and Welch (1994). Deltas and Kim (2001) compare the difference between the transition-based and cross-section based employment probabilities using South Korean data to determine how the future employment profile of that labor market will compare to the current one.

[22] We do not use any lower age as the "initial" age because of the lack of transitions among the three states for very young individuals.

$g\gamma$, is endowed with the transition probabilities from wage/salary employment or from non-employment of group G and the transition probabilities from self-employment of group Γ. We refer to the transition probabilities from self-employment as the "exit" probabilities, because they include the probability of exiting from self-employment. We refer to the transition probabilities from the other two employment states as the "entry" probabilities because they include the probabilities of entering into self-employment. Therefore, the group γg is endowed with the entry probabilities of group Γ and the exit probabilities of group G, while conversely the group $g\gamma$ is endowed with the entry probabilities of G and the exit probabilities of Γ.

We compute the probability that a hypothetical member of γg is in state i recursively from

$$\pi^{\gamma g}_{i,\tau+1} \;=\; \pi^{\gamma g}_{0,\tau} \cdot P^{\Gamma}_{0i\tau} \;+\; \pi^{\gamma g}_{1,\tau} \cdot P^{\Gamma}_{1i\tau} \;+\; \pi^{\gamma g}_{2,\tau} \cdot P^{G}_{2i\tau}$$

where $\pi^{\gamma g}_{i,\tau_0} = \pi^{\Gamma}_{i,\tau_0}$. Similarly, we calculate the probability that a member of group $g\gamma$ is in state i recursively from the relationship

$$\pi^{g\gamma}_{i,\tau+1} \;=\; \pi^{g\gamma}_{0,\tau} \cdot P^{G}_{0i\tau} \;+\; \pi^{g\gamma}_{1,\tau} \cdot P^{G}_{1i\tau} \;+\; \pi^{g\gamma}_{2,\tau} \cdot P^{\Gamma}_{2i\tau}$$

where $\pi^{g\gamma}_{i,\tau_0} = \pi^{G}_{i,\tau_0}$.

From these state probabilities, we construct the corresponding probabilities of self-employment conditional on employment, $S^{\gamma g}_{\tau}$ and $S^{g\gamma}_{\tau}$, as

$$S^{\gamma g}_{\tau} = \frac{\pi^{\gamma g}_{2,\tau}}{\pi^{\gamma g}_{1,\tau} + \pi^{\gamma g}_{2,\tau}}$$

and

$$S^{g\gamma}_{\tau} = \frac{\pi^{g\gamma}_{2,\tau}}{\pi^{g\gamma}_{1,\tau} + \pi^{g\gamma}_{2,\tau}}$$

Observe that, by definition,

$$S^{G}_{\tau} - S^{\Gamma}_{\tau} \equiv (S^{G}_{\tau} - S^{g\gamma}_{\tau}) + (S^{g\gamma}_{\tau} - S^{\Gamma}_{\tau}) \tag{3}$$

If $S^{g\gamma}_{\tau}$ is very close to S^{G}_{τ}, then the difference between the two groups (at age τ) is mostly

due to differences in their entry rates (into self-employment).[23] In contrast, if $S_\tau^{g\gamma}$ is very close to S_τ^Γ, then the difference between the two groups (at age τ) is mostly due to differences in their exit rates (from self-employment).

Similarly, we can write

$$S_\tau^G - S_\tau^\Gamma \equiv (S_\tau^G - S_\tau^{\gamma g}) + (S_\tau^{\gamma g} - S_\tau^\Gamma) \tag{4}$$

Following the discussion above, if $S_\tau^{\gamma g}$ is very close to S_τ^G, then the difference between the two groups (at age τ) is mostly due to differences in their exit rates. The converse is true if $S_\tau^{\gamma g}$ is very close to S_τ^Γ.

We emphasize that, because the difference in self-employment rates of the groups G and Γ can *not* be decomposed into the incremental contributions of the entry rate differences and the exit rate differences, i.e, because

$$S_\tau^G - S_\tau^\Gamma \neq (S_\tau^{\gamma g} - S_\tau^\Gamma) + (S_\tau^{g\gamma} - S_\tau^\Gamma),$$

the decompositions (3) and (4) above do not yield the same results in terms of the relative importance of entry and exit rates in determining the difference in self-employment rates between two groups. However, in practice they tend to give similar results.[24]

[23] If group G was somehow endowed with the exit rates of group Γ it would still "look like" the original group G. In this sense, it is the entry rates that is the distinguishing characteristic of group G when compared to group Γ.

[24] The fact that an effect can not be unambiguously decomposed in two constituent parts is also a feature of other popular decompositions that are often used in the labor economics literature, such as the Oaxaca decomposition (Oaxaca, 1973, and Oaxaca and Ransom, 1994) and the Gini decomposition (Bhattacharya and Mahalanobis, 1967, Pyatt, 1976, and Lambert and Aronson, 1993).

4.2 Results

4.2.1 Overview

In Table 6 we report the results of a relatively parsimonious model of employment transitions. In this model we do not allow the effect of any socioeconomic characteristics to vary over a person's life-cycle. Striking among the results of this model is the relative small impact of the two economic variables in determining transitions in and out of employment. The only notable exception is the negative impact of high unemployment in the transitions from wage employment into non-employment. However, note that a high unemployment rate does not negatively impact transitions into either type of employment for those who are currently not employed or self-employed. A second interesting finding is that the presence of children in a household increases the "stickiness" into the current employment status: those currently not employed are more likely to remain not employed and those who are currently employed are more likely to remain currently employed. This appears to reflect the need of those who are employed to maintain employment in order to support their family and the lack of desire of those who are non-employed (presumably the care givers) to seek employment *in lieu* of providing child-care services at home. We reserve a detailed discussion of the race, gender, and education effects for later in the paper, but we note, in passing, that African-Americans appear to be less likely than other Americans to enter into self-employment from any of the other two states and less likely to stay self-employed, while education appears to be positively correlated with entry and persistence into both types of employment. This latter finding corroborates those in Blanchflower and Meyer (1994) and Evans and Leighton (1989), who also report a positive relationship between high education and transition into self-employment.[25]

For the remainder of the paper we discuss the results of a much more flexible model in which the effect of all socio-economic variables is allowed to vary over a person's life-

[25]However, the relationship is not statistically significant in the latter paper. Blanchflower and Meyer (1994) utilizes the SIPP database, while the results and Evans and Leighton (1989) are based on the NLSY.

cycle. The estimation results of this flexible estimation framework consist of 1,020 parameter estimates.[26] We do not aim to discuss these parameter estimates in any detail. Instead, we focus on the discussion of the transition probabilities between employment modes and the associated predicted self-employment levels for selected types of individuals. We also focus, as described in the preceeding section, on the decomposition of differences in self-employment levels between these types of individuals into differences in entry rates into self-employment and differences in exit rates from self-employment. We, nevertheless, report (for completeness) the multinomial logit coefficient estimates of the transition probabilities in Tables 7 to 9. Despite the very large number of regressors included in the model, most personal characteristics are shown to have a significant effect on most transitions.[27] Further, the marginal effect of approximately half of the variables on the index function, $\beta_{ij\tau}\, x_{ht}$, differs across age groups: the p-values of the test of parameter constancy is rejected for 44 out of 102 variable-transition combinations. Therefore, the differences in self-employment rates across individuals and over time that we construct below are expected to be (by and large) statistically significant.

Our analysis focuses on the differences in self-employment rates between the benchmark group (college educated white males) and individuals of three other groups that are identical to the benchmark group *except* for the following characteristics: (i) gender, (ii) racial background, and (iii) educational level. These four groups correspond to those described in detail in section 3 above. The estimates of the transition probabilities for these groups are reported in Table 10. We defer a comparison across groups until further below, but we note that the results in Table 10 reveal the persistence of non-employment for middle aged individuals regardless of group, the progressively increasing propensity to enter into self-employment,

[26]There are ten age groups, 17 socio-economic variables, and three multinomial logit regressions with two independent transition states. However, some of the "cells" are empty, i.e., there are no individuals with a certain set of characteristics that have undergone some particular transitions. Therefore, the actual number of estimated parameters is slightly lower than 1,020.

[27]This is can be ascertained from the p-values of the joint test of equality with zero of a characteristic's parameters for all age groups.

and the increasing propensity to exit into non-employment.[28]

An easier way to gauge the implications of these transition probabilities is to plot the associated predicted probabilities of self-employment. This is done in Figure 2 which plots the self-employment rate, conditional on employment, for each of the four groups listed above, as obtained from equation (2). In creating Figure 2, we assumed that the other (shared) characteristics of these individuals are as described in section 3 and that the unemployment and interest rates are equal to their average values for our sample period. These probabilities correspond to the steady-state proportion of self-employed in the economy (for each respective group). That is, they are equal to the proportion that members of each group are self-employed, as a function of their age, if the transition probabilities remain constant over time.

A member of the benchmark group is more likely to be self-employed than a member of any other group, except for ages below 29, for which range high school graduates are the group most likely to be self-employed. In general, the difference between college educated and high-school educated individuals is relatively small compared to the differences between males and females and the difference between whites and blacks. It is worth noting that among the four groups that we examine, African-Americans have consistently the lowest probability of being self-employed. Finally, the probability of self-employment broadly increases with age for all groups. These results parallel those of the cross-section analysis as reported in Figure 1 above.[29] The similarity in the two sets of results suggests that the transition

[28]We note that the probability of entry into employment given non-employment in the preceeding year is much lower than the probability of re-employment as estimated by previous studies. The reason for this is that studies of re-employment condition on prior employment (sometimes in the recent past), while a non-employed person in our sample may not have worked for a large number of years, if ever. People with relatively prior work experience are much more likely to be willing and able to obtain employment than those with no recent such experience. See Chan and Stevens (2001) for a study of older workers.

[29]Of course, the fact that we calculate the transition probabilities on a *annual* base has a result that the self-employment rates reported in Figure 2 are "smooth" even though the parameters are constant within any 5 year age group.

probabilities among the three states have not significantly changed in a systematic way over the last generation.[30] We next proceed to discuss the decomposition of the differences in self-employment rates into differences in entry and/or exit rates and also provide explanations consistent with the results of this decomposition analysis.

4.2.2 Comparison of Males and Females

The decomposition of male vs. female differences is shown in Figure 4. At age 18 (at the beginning of the life-cycle), men are orders of magnitude more likely than women to be self-employed, though the probability of self-employment for both groups is essentially equal to zero. The results of Figure 4 show that (through their 20's) the difference in the propensity of self-employment for the two groups is almost entirely attributable to differences in their entry rates. A hypothetical person with the male entry rates and the female exit rates has a propensity to be self-employed that is almost identical to that of females. Similarly, a person with the female entry rates and the male exit rates has a propensity to be self-employed that is identical to that of males.[31] However, immediately after the age of 32, the difference between men and women is almost entirely attributable to differences in their transition probabilities *from* self-employment: a person with male entry rates and female exit rates has a propensity to be self-employed that is essentially the same as a female (and conversely for a person with male exit rates and female entry rates).

The results indicate that women get a slow start in entering the entrepreneurial sector.

[30] In Figure 3 we plot the corresponding *unconditional* on employment probabilities of self-employment. The probabilities of self-employment plummet after the age of 60 as people move into retirement. The rapid increase in the conditional on employment probability of self-employment after the age of 60 reflects the fact that many of the "retired" salaried workers pursue entrepreneurial activities at the end of their working lives.

[31] Note that, by construction, a person endowed with the male entry probabilities and the female exit probabilities has a male's propensity to be self-employed at age 18. Similarly, a person endowed with the female entry probabilities and the male exit probabilities has a female's propensity to be self-employed at age 18. However, immediately after the initial age the two sets of probabilities can diverge from each other.

By middle age they have caught up with their male peers in terms of their rate of entry. However, the lower persistence rates of women (from mid-life onwards) indicates that their self-employment activities are on a temporary or transient basis: women are less likely to make a career out of an entrepreneurial activity. The results are important in that they show a lack of entry barriers into self-employment for women. The male-female difference is due to the choice of women who are self-employed to leave self-employment.[32] In fact, as Table 10 shows, middle aged women who exit self-employed do not necessarily quit employment altogether. The majority of these women (85%) continue to work in the salary sector. Furthermore, the transition probability of middle-aged women from self-employment to salary employment exceeds that of middle-aged men (32% vs. 24%) . In other words, the low persistence of women into self-employment is *not* due to women who decide to stay at home; it is due to a career choice.

We can further highlight the effect of gender on employment status by considering the effect of marriage and young children on the employment decisions of men and women. The results of Table 6 show that marriage increases the probability of moving into self-employment from non-employment equally for both genders (the probability of moving into wage employment is unaffected). However, marriage slightly decreases the probability of self-employed women to remain in either type of employment while it strongly increases the probability that self-employed men remain in either type of employment. Similarly, while marriage increases the probability of a woman currently in wage/salary employment to remain in employment (of either type), it does so even more strongly with regards to the corresponding probabilities of men. Overall, marriage tends to increase the employment propensity of both genders, weakly for the women and strongly for the men. This may be due to the fact that marriage brings greater stability (or that people with stable careers tend to be married). On the other hand, the effect of young children on men's and women's employment decisions is strikingly different. Except for those who are not employed, the

[32]Of course, in our data set we do not distinguish between different types of self-employment. Women may be able to enter self-employment but in activities that have little potential for growth. In other words, women may be able to enter, but only is relatively low quality activities.

presence of young children increases the employment propensity of men and decreases that of women. This is consistent with the widely-held perception that women are the primary care givers. Furthermore, the presence of young children increases the propensity of being self-employed relative to being a wage/salary worker for both genders. The increased propensity of women to choose unpaid employment as child care providers and the increased propensity of *working* women to choose self-employment has been documented in previous studies using the *Survey of Income and Program Participation* (SIPP) (e.g., Connelly, 1992a,b) and the *Public Use of Microdata Sample* (PUMS) (Carr, 1996). However, the effect of young children on the employment decisions of men has not been as thoroughly examined. [33]

Finally, we note that the difference between men and women is exacerbated by the higher attrition rate of women from the labor force. As Figure 3 reveals, the unconditional on employment difference between the self-employment rates of men and women is higher than the conditional (on employment) difference. Further, this difference grows substantially with age. In fact, women appear to be moving out of the labor force five years earlier than males and experience a faster decline in their employment rates: by the age of 67 the proportion of women who are self-employed is only 7%, while the proportion of men who are self-employed is 18%. In contrast, the corresponding figures, conditional on employment, are 25% and 43%.

4.2.3 Comparison of Blacks and Whites

The decomposition of the white vs. black difference in self-employment rates is shown in Figure 5. One can easily discern three key facts. First, the white vs. black difference is very pronounced at all age categories, with whites being anywhere from twice to four times as likely to be self-employed as blacks are. Second, the difference in the propensity to be self-employed is due to both entry and exit differences to an approximately equal degree over

[33]Among the rare studies to investigate this issue, Carr (1996) finds that the propensity of men to be self-employed is decreased by the presence of children.

most of the life-cycle. Third, African-Americans are progressively closing the entry rate gap. The transition probabilities of blacks into self-employment from either non-employment or salary employment are a fourth to a fifth that of whites for ages 30 or lower but become approximately half or more of the corresponding rates of whites for ages 40 or higher. There is no corresponding trend for exit rates. Therefore, for individuals who are 58 years of age or older, the difference in the black-white self-employment rates is primarily due to the higher black exit rates.

These results are consistent with the findings in Fairlie (1999) who shows that black-white differences in entrepreneurship rates are due to liquidity constraints for African Americans and the fact that they are less likely to have self-employed parents. Both of these factors are likely to affect entry rates early on someone's life. Older individuals are less likely to be influenced by the occupation of their parents and, if determined to become self-employed, can alleviate financial constraints by saving money from their years in salary employment.

4.2.4 Comparison of High School and College Graduates

The decomposition of the high school vs. college educated self-employment rates is shown in Figure 6. One striking result is the similarity in self-employment rates for ages lower than 40. In fact, not only are the self-employment rates for the two groups very similar, so are their entry and exit rates! The behavior of the two groups diverges only in the second half of their life-cycle, with the entry rates of college educated individuals exceeding those of high school graduates. The corresponding exit rates, however, remain similar for the two groups throughout their life: a person with the college graduate entry rates and high school graduate exit rates has a pattern of self-employment that is almost identical to that of a college graduate (and conversely for a person with high school graduate entry rates and college graduate exit rates).

The results are indicative of the fact that the occupations of the college educated and high school educated individuals in the salary sector are qualitatively different. One possibility is

that college educated people are assigned to jobs which allow them to increase their human capital. As a consequence, college educated individuals are able to enter into self-employment activities in the latter part of their careers that were not open to them in the early part of their careers. In other words, the set of possible self-employment opportunities is expanding over time for those who are college educated. Conversely, high school educated people are often assigned to "dead-end" jobs, that is, jobs which do not increase their human capital appreciably. Therefore, high school educated people do not experience a broadening of their opportunities for profitable self-employment. This qualitative difference in the type of salary employment of the two groups is manifested in the increase in the entry rates (into self-employment) of the college educated relative to those of the high school educated in the latter part of their life-cycle. In contrast, the exit rates of the two groups remain similar.[34] We believe that this is due to the fact that the opportunity costs of self-employment increase faster for the college educated than for the high school educated. Therefore, conditional on being self-employed, a college educated person is as likely as a high school graduate to leave self-employment for the salary sector if his foray into entrepreneurship proves to be less lucrative than anticipated.

Another possibility for the increased entry rate of educated individuals later in their life-cycle is that there is a positive correlation between educational attainment and financial capital: College educated people earn more than high school educated people, accumulate more capital, and, thus, are better able to enter into entrepreneurial activities. Furthermore, there is some evidence that educated people are better able to obtain financing from commercial banks.[35]

[34]However, Figure 3 reveals that the exit rates into non-employment are not similar after the age of 60. The less educated seem to retire from any type of work earlier and at a faster rate than the educated. Indeed, a contributing factor to our results is that the educated "retire" into self-employment before they quit all work.

[35]See, for instance, Bates (1990).

4.2.5 Sensitivity Analysis

We have investigated the robustness of our results by repeating the analysis under three different specifications. In our first alternative specification, we re-estimate the Markov transition probabilities by constraining some of the parameters to have an impact that is constant (on the latent variables) over the life-cycle. The set of parameters so constrained differs across the three multinomial logit regressions depending on the corresponding p-values of the test of parameter equality over the life-cycle. In particular, we constrained the parameters of variable x in the transition from state j into the other two states if the p-values of the test of parameter constancy (over the life-cycle) for variable x is higher than 0.10 for the transition from state j into both of the other two states. All graphs constructed from this more parsimonious model are almost identical to those obtained by our flexible specification. Therefore, our decomposition analysis is not materially affected by the use of such a constrained model.

In our second alternative specification, we broaden the definition of non-employment to include those who have worked less than 400 hours in a year. People who characterize themselves as employed but are working less than 400 hours are to a first approximation not-employed, either by choice or because of their inability to find work for longer hours. This re-definition of employment is particularly interesting since the percentage of the employed who report working less than 400 hours is somewhat higher for the self-employed than for the wage/salary employed. Indeed, the results obtained using this broader definition of non-employment show a slightly lower percentage of self-employed than the results obtained under our original model. However, the *relative* (conditional on employment) self-employment rates for the groups that we examine are not materially affected. Further, our decomposition analysis is not affected from this redefinition of employment. Of course, the *unconditional* self-employment probabilities are somewhat lower for all groups, especially towards the end of the life-cycle when many of the self-employed are effectively retired former employees who work for only a few hours a year.

Our last specification is motivated by the widespread belief (supported by some evidence) that the effects of education and race on employment outcomes for males differ from their effects on females. It is possible, therefore, that the effect of education and race on the entry and exit probabilities of males may not be the same as the effect of these same characteristics on females. Perhaps, for instance, human capital accumulation is not such an important factor for female entry into self-employment. Therefore, we re-estimated both the cross-section and transition regressions separately for males and females. We then used the estimated coefficients to construct the cross-section employment profile and the entry-exit decomposition graphs for the two genders. Figures 7 and 8 show the probability of self-employment (conditional on employment) for the two genders based on the results of the cross-section regressions. The results of Figure 7 are directly comparable with those in Figure 1 (except for that Figure 7 does not include the probability of self-employment for white, college educated, females). One can readily observe that the results of these two figures are very similar. One can also observe, from Figure 8, that the probability of self-employment of white, college educated, women estimated using the parameter estimates of the female-only regressions, is very similar to that reported in Figure 1. The probabilities of self-employment for black and high-school educated women are not directly comparable with any of those reported in Figure 1. However, we constructed the probabilities of self-employment for black (college educated) and (white) high-school educated women using the parameter estimates in Table 5 and compared them with those in Figure 8. In both cases, the results were observationally similar to each other. Therefore, there does not appear to be strong differences in the impact of various socio-economic characteristics on the probability of self-employment of men and women. Indeed, this is born out from the likelihood ratio test which shows that any differences in the coefficients of the male and female regressions (over and above the differences allowed for in the regressions shown in Table 5) are not statistically significant.

In contrast, the differences in the coefficients of the male and female transition regressions are statistically significant for two of the three initial states: they are significant when the initial state is non-employment and wage/salary employment and not-significant when

the initial state is self-employment. However, these differences do not lead to qualitatively different results. All conclusions discussed above remain valid when examining the figures constructed using the regression results of the separate male and female regressions. Therefore, these figures are omitted.[36]

5 Concluding Remarks

This paper makes three important contributions. First, it represents a detailed analysis of the self-employment probabilities over the life-cycle and the impact of various socio-economic factors on these probabilities. Second, it decomposes differences in the self-employment propensities of various groups into differences in their entry rates into self-employment and their exit rates from self-employment. This latter contribution is of particular importance since, as discussed above, a gap that is primarily due to entry rates has different implications than a gap that is primarily due to exit rates. Lastly, the markov-based entry-exit decomposition analysis we use can be applied to the analysis of many other types of labor transitions. For instance, it can be utilized in the analysis of transitions between non-employment, part-time employment, and full-time employment to investigate to what extent would the gap in full-time employment between two groups (at any given age) be reduced if there were no differences in the transition probabilities from non-employment, or if there were no differences in the transition probabilities from part-time employment, or if there were no differences in the transition probabilities for full-time employment. As in this study, decomposing the intra-group differences in full-employment rates (at any given age) into the contribution of each row (or rows) of the transition matrix would provide insight in the underlying causes of these differences.

[36]We choose not to use the results of this most flexible specification as our "base" results because of the (relative) parsimony of our more restrictive model and the reduced precision of the estimates in the more flexible model.

References

Bates, T. [1990], "Entrepreneur Human Capital Inputs and Small Business Longevity," *Review of Economics and Statistics,* vol. 72, pages 551-559.

Becker, E. H. [1984], "Self-Employed Workers: An Update to 1983," *Monthly Labor Review*, vol. 107, pages 14-18.

Bernhardt, I. [1994], "Comparative Advantage in Self-Employment and Paid Work," *Canadian Journal of Economics*, vol. 27, pages 273-289.

Bhattacharya, N and Mahalanobis, B. [1967], "Regional Disparities in Household Consumption in India," *Journal of the American Statistical Association*, vol. 62, pages 143-161.

Blanchflower, D. G., and B. D. Meyer [1994], "A Longitudinal Analysis of the Young Self-Employed in Australia and the United States," *Small Business Economics*, vol. 6, pages 1-19.

Blanchflower, D. G., and A. J. Oswald [1998], "What Makes and Entrepreneur?," *Journal of Labor Economics*, vol. 16, pages 26-60.

Blank, R. M. [1994] "The Dynamics of Part-Time Work," NBER Working Paper No. 4911.

Carr, D. [1996], "Two Paths to Self-Employment? Women's and Men's Self-Employment in the United States, 1980," *Work and Occupations*, vol. 23, pages 26-53.

Carrasco R. [1999], "Transitions to and from Self-Employment in Spain: An Empirical Analysis," *Oxford Bulletin of Economics and Statistics*, vol. 61, pages 315-341.

Chan, S. and A. H. Huff [2001], "Job Loss and Employment Patterns of Older Workers," *Journal of Labor Economics*, vol. 19, pages 484-521.

Clark, K. B. and L. H. Summers [1978], "Labor Force Transitions and Unemployment," NBER Working Paper No. 277.

Connelly R. [1992a], "Self-Employment and Providing Child Care," *Demography*, vol. 29, pages 17-29.

Connelly R. [1992b], "The Effect of Child Care Costs on Married Women's Labor Force Participation," *Review of Economics and Statistics*, vol. 74, pages 83-90.

Deltas, G. and G. Kim [2001] "Analyzing Labor Markets in Transition: A Markov-Based Approach With an Application to South Korea," CIBER working paper No. 01-102, University of Illinois Urbana-Champaign.

Dunn, T., and D. Holtz-Eakin [2000], "Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links," *Journal of Labor Economics,* vol. 18, pages 282-305.

Eberwein, C. [2002] "Correcting Estimates of Expected Durations from Discrete-Time Hazard Models," *Labour Economics*, vol. 9, pages 303-339.

Evans, D. S., and B. Jovanovic [1989], "An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints," *Journal of Political Economy*, vol. 97, pages 808-827.

Evans, D. S. and L. S. Leighton [1989], "Some Empirical Aspects of Entrepreneurship," *American Economic Review*, vol. 79, pages 519-535.

Even, W. E. [1987] "Career Interruptions Following Childbirth," *Journal of Labor Economics*, vol. 5, pages 255-277.

Fairlie, R. W. [1999], "The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment," *Journal of Labor Economics*, vol. 17, pages 80-108.

Fairlie, R. W. and B. D. Meyer [1996], "Ethnic and Racial Self-Employment Differences and Possible Explanations," *Journal of Human Resources*, vol. 31, pages 757-793.

Flinn, C. J. and J. J. Heckman [1983] "Are Unemployment and Out-of-the-Labor Force Behaviorally Distinct Labor Force States?," *Journal of Labor Economics*, vol. 1, pages

28-42.

Fujii, E. T., and C. B. Hawley [1991], "Empirical Aspects of Self-Employment," *Economics Letters*, vol. 36, pages 323-329.

Haber, S, E. J. Lamas, and J. H. Lichtenstein [1987], "On Their Own: The Self-employed and Others in Private Business," *Monthly Labor Review*, vol. 110, pages 17-23.

Heckman, J. J. and R. J. Willis [1977] "A Beta-logistic Model for the Analysis of Sequential Labor Force Participation by Married Women," *Journal of Political Economy*, vol. 85, pages 27-58.

Hout, M. and H. S. Rosen [1999], "Self-Employment, Family Background, and Race," NBER Working Paper, No. 7344.

Jones, S. R. G., and W. C. Riddell [2000], "The Dynamics of US Labor Force Attachment," manuscript, McMaster University and University of British Columbia.

Kim, G. S. [2000], "Entrepreneurship and Self-Employment: The State-of-the-Art and Directions for Future Research," manuscript.

Kuhn, P. J., and H. J. Schuetze [1998], "The Self-Employment Dynamics of Men and Women in Canada: 1982-1995," manuscript, McMaster University.

Lambert, P. J., and J. R. Aronson [1993], "Inequality Decomposition Analysis and the Gini Coefficient Revisited," *Economic Journal*, vol. 103, pages 1221-1227.

Lin, Z, J. Yates, and G. Picot [1998], "The Entry and Exit Dynamics of Self-Employment in Canada," manuscript, Statistics Canada.

Moore, C. S., and R. E. Mueller [1998], "The Transition into Self-Employment in Canada: The Importance of Involuntary Separation and Unemployment Duration," manuscript, CNA corp. and University of Maine.

Moser, J. W. [1986] "Labor Market Transitions: Cyclic, Trend, and Seasonal Effects for Prime-Age Men," *Industrial and Labor Relations Review*, vol. 39, pages 251-263.

Oaxaca, R. [1973] "Male-Female Wage Differential in Urban Labor Markets," *International Economic Review*, vol. 14, pages 693-709.

Oaxaca, R. and M. R. Ransom [1994] "On distribution and the decomposition of wage differentials," *Journal of Econometrics*, vol. 61, pages 5-21.

Peracchi, F. and F. Welch [1994] "Trends in Labor Force Transitions of Older Men and Women," *Journal of Labor Economics*, vol. 12, pages 210-242.

Peracchi, F. and F. Welch [1995] "How Representative are Matched Cross-Sections? Evidence from the Current Population Survey," *Journal of Econometrics*, vol. 68, pages 153-179.

Poterba, J. M. and L. H. Summers [1986] "Reporting Errors and Labor Market Dynamics," *Econometrica*, vol. 54, pages 1319-1338.

Poterba, J. M. and L. H. Summers [1995] "Unemployment Benefits, Labor Market Transitions, and Spurious Flows: A Multinomial Logit Model with Errors in Classification," *Review of Economics and Statistics*, vol. 77, pages 207-216.

Pyatt, G. [1976] "On the Interpretation and Disaggregation of the GINI Coefficients," *Economic Journal*, vol. 86, pages 243-255.

Rees H., and A. Shah [1986], "An Empirical Analysis of Self-Employment in the U.K.," *Journal of Applied Econometrics*, vol. 1, pages 95-108.

Table 1: Definition of Variables

Variable	Definition
EmplSt	Employment Status (0 for not-employed, 1 for wage/salary employed, 2 for self-employed)
Male	Dummy for individuals who are male
White	Dummy for individuals who are white
Black	Dummy for individuals who are black
Marriage	Dummy for individuals who are married
Divorce	Dummy for individuals who are divorced
RealInterest	Real Interest Rate (The Prime rate minus the rate of Producer Price Indexes)
Unemployment	Unemployment rate
Children	Dummy for individuals who have a child
LessHigh	Dummy for individuals who did not get a high school degree
High	Dummy for individuals with a high school degree
LessColl	Dummy for individuals with an Associate's degree or who have attended, but not completed, college
Coll	Dummy for individuals with a Bachelor's degree
Graduate	Dummy for individuals with a graduate school or professional school degree
Cohort	The year a person is surveyed for the first time
Age	A person's age at the time he/she was initially surveyed

Table 2: Macroeconomic Variables

Year	Prime Rate	Changes in PPI	Unemployment Rate
1983	10.79	1.0	9.6
1984	12.04	4.4	7.5
1985	9.93	-0.8	7.2
1986	8.33	2.6	7.0
1987	8.21	2.1	6.2
1988	9.32	2.8	5.5
1989	10.87	5.4	5.3
1990	10.01	4.8	5.6
1991	8.46	-0.2	6.8
1992	6.25	-0.6	7.5
1993	6.00	1.9	6.9
1994	7.15	0.9	6.1
1995	8.83	1.7	5.6
1996	8.27	3.6	5.4
1997	8.44	0.7	4.9
1998	8.35	-0.1	4.5
1999	8.00	0.6	4.2

Source:*Economic Report of the President, 2000*

Table 3: Summary Statistics[a]

Variable	Obs	Mean	Std. Dev.	Min	Max
Employment Status	381050	1.4500	0.8398	0	2
Gender	381050	1.5239	0.4994	1	2
Age	381050	41.2206	13.4801	18	67
Unemployment Rate	381050	6.0314	1.9240	1.7	9.6
Real GDP Growth	381050	3.8815	1.6229	-0.2	7.3
Real Interest	381050	6.9335	1.5189	4.67	9.79
Cohort	381050	89.9241	4.7131	83	98
Marriage Dummy	381050	0.6776	0.4674	0	1
Divorce Dummy	381050	0.0672	0.2504	0	1
White Dummy	381050	0.8805	0.3244	0	1
Black Dummy	381050	0.0873	0.2823	0	1
Child Dummy	381050	0.1870	0.3899	0	1
LessHigh Dummy	381050	0.2952	0.4561	0	1
High Dummy	381050	0.2797	0.4489	0	1
LessColl Dummy	381050	0.2508	0.4335	0	1
Coll. Dummy	381050	0.1287	0.3349	0	1
Graduate Dummy	381050	0.0451	0.2075	0	1

[a] This data set consists of the first year survey of individuals sampled for two consecutive years. The data excludes individuals younger than 18 or older than 67 at the first year survey.

Table 4: Cross-Section Analysis of Self-Employment

	Dependent Variable : Self-employed		
Var.	1	2	3
Male	1.1070	1.1063	0.8699
	(31.738)	(31.720)	(31.356)
White	0.0914	0.0911	0.1118
	(2.680)	(2.671)	(3.312)
Black	-1.0152	-1.0167	-0.9778
	(-21.185)	(-21.218)	(-20.543)
Marriage	0.8362	0.8369	0.8928
	(26.522)	(26.546)	(35.315)
Male*Marriage	-0.4932	-0.4928	-0.2366
	(-13.009)	(-13.000)	(-7.647)
Divorce	0.2632	0.2635	-
	(5.577)	(5.583)	-
Male*Divorce	0.0063	0.0085	-
	(0.104)	(0.141)	-
RealInterest	0.0123	-	-
	(2.580)	-	-
Unemployment	-0.0220	-	-
	(-4.845)	-	-
Child	0.1582	0.1585	-
	(7.814)	(7.831)	-
Female*Child	0.2697	0.2694	-
	(8.486)	(8.476)	-
High	0.0741	0.0538	-0.0204
	(4.340)	(3.264)	(-1.255)
LessColl	0.1881	0.1783	0.0515
	(11.235)	(10.735)	(3.170)
Coll	0.2539	0.2407	0.1672
	(13.434)	(12.888)	(9.093)
Graduate	0.3861	0.3626	0.3756
	(15.277)	(14.648)	(15.355)
cohort	-0.0048	-0.0004	-
	(-3.120)	(-0.353)	-
Age	0.0372	0.0371	-
	(63.889)	(63.853)	-
constant	-4.3723	-4.8006	-3.1898
	(-28.134)	(-39.028)	(-77.391)
Log Likelihood	-100460.78	-100472.49	-102976.26
No. of Obs.	293822	293822	293822
Pseudo R2	0.0661	0.066	0.0427

Note: z-statistics are in parenthesis.

Table 5: Cross-Section Analysis of Self-Employment(by Age Groups)

Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	1.073**	1.245**	1.077**	1.139**	1.064**	1.036**	1.224**	1.196**	1.221**	1.306**	0.768
White	-0.168	0.290*	0.189	0.162**	-0.055	0.037	0.076	0.058	0.153	0.368**	0.323
Black	-1.506**	-0.843**	-1.148**	-1.163**	-1.210**	-1.123**	-1.061**	-0.970**	-0.797**	-0.437**	0.044
Marriage	1.222**	0.652**	0.557**	0.726**	0.585**	0.618**	0.759**	0.759**	0.793**	0.798**	0.293
Male*Marriage	-0.493	-0.341**	-0.491**	-0.527**	-0.474**	-0.399**	-0.629**	-0.550**	-0.669**	-0.565**	0.840
Divorce	1.360	0.263	-0.427*	0.124	0.102	0.182	0.181	0.346**	0.128	0.071	0.345
Male*Divorce	-0.149	-0.527	0.389	-0.111	0.056	-0.017	-0.202	-0.201	-0.376	0.207	0.432
RealInterest	0.058	0.030	-0.001	0.027**	0.010	0.019*	-0.005	0.004	0.024	0.009	0.714
Unemployment	-0.067	-0.039*	-0.025	-0.029**	0.000	-0.017	-0.019	-0.014	-0.021	-0.012	0.787
Child	0.083	0.054	0.133**	0.036	0.123**	0.157**	0.313**	0.231	-0.745*	-0.631	0.076
Female*Child	0.177	0.801**	0.273**	0.314**	0.141	0.158	0.332	-0.661	-0.298	0.976	0.003
High	-0.190	-0.006	0.111*	0.137**	0.053	0.004	0.076	0.057	0.102*	-0.039	0.180
LessColl	-0.432**	-0.019	0.077	0.140**	0.186**	0.161**	0.211**	0.220**	0.297**	0.297**	0.000
Coll	0.601*	-0.193**	-0.107	0.231**	0.252**	0.218**	0.314**	0.267**	0.285**	0.257**	0.000
Graduate	dropped	0.029	-0.123	0.320**	0.393**	0.323**	0.427**	0.283**	0.505**	0.391**	0.002
Cohort	-0.006	-0.008	-0.009	-0.017**	-0.013**	-0.011**	-0.011**	0.004	0.008	0.024**	0.000
Intercept Shift[b]	0.940	1.400	2.451**	3.091**	3.258**	3.132**	3.207**	1.832**	1.344	0	0.011

Note: ** Significance at 5% level.

* Significance at 10% level.

Log Likelihood:-99863.091, No. of Obs.: 293815

[a] p-value of the joint test of parameter equality across age groups.

[b] Intercept shift by AgeGroup. The regression constant equals -4.957.

Table 6: Multinomial Logit Results of Employment State Transitions

	From Non-Employment		From Self-Employment		From Wage Employment	
Var.	to SE[a]	to WE[b]	to SE	to WE	to SE	to WE
Male	0.464	0.074	0.318	-0.043	0.773	-0.056
	(3.603)	(2.163)	(2.427)	(-0.304)	(11.596)	(-1.883)
White	0.042	0.061	0.443	0.474	0.171	0.086
	(0.324)	(1.216)	(3.810)	(3.551)	(2.057)	(1.840)
Black	-0.841	0.075	-0.194	0.525	-0.826	-0.171
	(-4.711)	(1.317)	(-1.197)	(2.905)	(-7.882)	(-3.335)
Marriage	0.866	-0.013	-0.199	-0.335	0.782	0.156
	(8.565)	(-0.441)	(-1.834)	(-2.805)	(13.015)	(6.371)
Male*Marriage	-0.032	0.067	1.015	0.802	0.154	0.773
	(-0.220)	(1.383)	(7.157)	(5.165)	(2.001)	(20.529)
Divorce	0.432	0.207	0.386	0.252	0.521	0.438
	(2.450)	(3.658)	(2.292)	(1.352)	(5.212)	(10.332)
Male*Divorce	0.245	-0.006	-0.009	-0.020	0.330	0.197
	(0.925)	(-0.054)	(-0.039)	(-0.081)	(2.408)	(2.646)
RealInterest	-0.029	-0.019	0.010	0.014	0.000	0.027
	(-1.463)	(-2.379)	(0.559)	(0.675)	(-0.033)	(3.944)
Unemployment	-0.032	-0.011	-0.030	0.005	-0.068	-0.057
	(-1.713)	(-1.454)	(-1.745)	(0.234)	(-6.058)	(-8.591)
Child	-0.298	-0.324	0.741	0.592	0.923	0.683
	(-1.893)	(-5.107)	(4.644)	(3.595)	(13.914)	(12.954)
Female*Child	0.317	-0.057	-1.952	-1.850	-1.251	-1.450
	(1.937)	(-0.855)	(-11.435)	(-10.312)	(-15.216)	(-25.331)
High	0.341	0.268	0.242	0.162	0.289	0.256
	(5.261)	(10.537)	(4.014)	(2.358)	(6.923)	(11.877)
LessColl	0.543	0.428	0.455	0.360	0.495	0.335
	(8.062)	(16.130)	(7.286)	(5.135)	(12.061)	(15.116)
Coll	0.817	0.505	0.752	0.712	1.143	0.828
	(9.722)	(12.931)	(9.554)	(8.245)	(23.120)	(26.260)
Graduate	0.721	0.524	1.094	0.909	1.506	1.056
	(4.667)	(6.979)	(8.865)	(6.814)	(20.275)	(19.570)
Age	-0.025	-0.060	-0.044	-0.071	-0.010	-0.024
	(-11.549)	(-69.019)	(-18.331)	(-26.274)	(-6.866)	(-31.645)
Cohort	-0.011	-0.014	-0.017	0.009	-0.007	-0.002
	(-1.805)	(-5.226)	(-2.866)	(1.374)	(-1.932)	(-0.755)
Constant	-2.241	2.009	5.001	2.589	-0.920	3.307
	(-3.523)	(7.796)	(8.312)	(3.866)	(-2.407)	(15.031)
Log Likelihood	-41203.525	-41203.525	-22974.588	-22974.588	-89108.788	-89108.788
No. of obs.	87228	87228	35138	35138	258684	258684
Pseudo R2	0.1055	0.1055	0.0563	0.0563	0.0365	0.0365

Note: z-statistics are in parenthesis.

[a,b] SE and WE stand for Self-Employment and Wage Employment, respectively.

Table 7: Multinomial Logit Results: Transitions from non-employment

Transitions from non-employment to self-employment

Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	0.341	0.940**	1.035**	0.867**	1.063**	-0.039	0.987*	0.321	0.220	-0.021	0.485
White	-0.207	0.073	0.873*	0.148	0.079	-0.295	0.073	0.120	-0.421	-0.225	0.793
Black	-2.947**	-1.142*	-0.268	-0.766	-0.611	-0.914*	-1.132*	-0.896	-1.008*	-0.668	0.803
Marriage	0.901**	0.515	1.159**	0.884**	0.680*	0.384	0.878*	0.062	-0.045	0.083	0.127
Male*Marriage	-0.922	-0.698	-2.226**	-1.389**	-0.718	0.432	-0.454	0.628	0.615	1.069**	0.000
Divorce	dropped	-0.197	-0.652	0.993**	-0.189	0.011	0.460	-0.574	0.201	-0.136	0.589
Male*Divorce	dropped	1.831	1.880	-0.270	0.501	0.222	0.072	0.092	-0.823	0.592	0.848
RealInterest	-0.014	0.047	0.027	-0.055	-0.063	-0.039	-0.109	-0.079	0.036	-0.044	0.780
Unemployment	0.032	-0.127*	0.012	-0.011	-0.043	-0.059	0.000	-0.012	-0.126**	-0.014	0.700
Children	0.301	-1.132	0.864*	0.418	0.338	0.210	0.895	0.058	0.993	dropped	0.571
Female*Child	-0.371	1.538**	-1.046*	-0.517	-0.381	-0.827	-0.339	1.876	-0.231	dropped	0.168
High	0.222	1.054**	0.491**	0.070	0.489**	0.219	0.144	0.477**	0.711**	-0.063	0.016
LessColl	-0.144	0.913**	0.804**	0.432**	0.771**	0.471**	0.237	0.793**	1.072**	0.134	0.008
Coll	1.176**	0.516	0.877**	0.287	0.266	0.919**	1.057**	1.308**	1.018**	1.069**	0.053
Graduate	dropped	0.835	0.291	0.663*	-0.485	-0.332	0.519	1.354**	1.559**	0.647*	0.109
Cohort	-0.017	0.003	0.022	-0.017	-0.016	-0.017	-0.024	-0.018	-0.064**	0.012	0.201
InterceptShift[b]	2.898	0.995	-1.952	3.425	3.335	4.288	3.788	3.581	7.443**	0	0.122

Transitions from non-employment to wage employment

Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	0.062	0.199**	0.295**	-0.514**	-0.002	0.235	-0.153	0.258	-0.051	-0.151	0.002
White	0.436**	0.041	-0.146	0.010	0.175	-0.053	-0.289	-0.204	-0.052	-0.247	0.003
Black	0.150	0.052	0.012	0.089	0.258	0.179	-0.088	-0.295	0.163	-0.179	0.790
Marriage	-0.379**	-0.133	0.001	-0.053	-0.014	0.130	0.080	0.119	-0.267*	-0.384**	0.004
Male*Marriage	-0.903**	-0.848**	-0.357**	0.074	0.193	-0.162	0.297	0.367	0.475**	0.794**	0.000
Divorce	-0.602	0.518**	0.351**	0.234	0.136	0.226	0.247	0.148	-0.138	0.085	0.450
Male*Divorce	-0.682	0.395	0.276	0.646**	-0.011	-0.712**	0.008	-0.044	0.439	0.426	0.249
RealInterest	-0.048**	0.006	-0.018	-0.030	-0.050**	0.013	0.012	-0.028	-0.032	0.007	0.509
Unemployment	0.056**	-0.016	-0.019	-0.001	-0.036	-0.056**	-0.039	-0.034	-0.002	-0.072**	0.002
Children	0.119	-0.032	-0.274	0.124	-0.078	0.594**	0.439	-0.006	-0.258	-0.336	0.324
Female*Child	-0.413**	-0.358*	-0.087	-0.541**	-0.229	-0.428	-0.289	dropped	0.486	dropped	0.766
High	0.232**	0.288**	0.349**	0.196**	0.376**	0.360**	0.276**	0.321**	0.192*	0.239**	0.738
LessColl	0.197**	0.655**	0.417**	0.322**	0.570**	0.641**	0.678**	0.372**	0.475**	0.320**	0.000
Coll	0.448**	0.768**	0.456**	0.313**	0.384**	0.643**	0.717**	0.498**	0.703**	0.088	0.009
Graduate	dropped	0.439*	0.559**	0.588**	0.579**	0.519**	0.504*	0.576**	0.763**	-0.034	0.726
Cohort	-0.020**	-0.007	-0.012	0.002	-0.008	-0.010	-0.043**	-0.007	-0.036**	-0.036**	0.005
InterceptShift[c]	0.398	-0.876	-0.381	-1.820	-1.145	-1.421	1.351	-2.168	-0.027	0	0.103

Note: ** Significance at 5% level.

* Significance at 10% level.

Log Likelihood: -40748.161, No. of Obs.: 87228

[a] p-value of the joint test of parameter equality across age groups.

[b] Intercept shift by AgeGroup. The regression constant value equals -5.657.

[c] Intercept shift by AgeGroup. The regression constant value equals 0.590.

Table 8: Multinomial Logit Results: Transitions from self-employment

Transitions from self-employment to non-employment											
Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	-1.286**	-0.528	-0.838**	-0.563	0.608	1.157	-0.227	-1.242**	-0.622	-0.345	0.073
White	0.128	-0.253	-0.485	-1.048**	-0.006	-0.195	-0.653*	-0.573*	-0.002	-0.900**	0.357
Black	dropped	-0.027	0.461	-0.214	1.398**	0.062	0.438	-0.612	0.827*	-0.265	0.118
Marriage	-0.094	0.817**	0.233	0.494	1.561**	1.920**	0.820*	-0.101	0.227	0.161	0.073
Male*Marriage	-0.726	-2.559**	-1.534**	-2.403**	-2.437**	-3.016**	-1.738**	-0.344	-0.243	-0.277	0.000
Divorce	dropped	dropped	dropped	0.427	0.643	1.329*	-0.014	-0.250	-0.001	-0.440	0.000
Male*Divorce	dropped	dropped	dropped	-0.891	-0.961	-2.810**	-0.226	1.211**	0.170	0.538	0.000
RealInterest	0.034	0.037	0.004	-0.016	0.108*	0.152**	0.024	-0.153**	0.005	-0.093**	0.006
Unemployment	-0.091	0.026	0.040	0.027	-0.065	-0.021	0.024	0.201**	-0.030	0.062	0.059
Children	dropped	0.218	-0.645	0.332	-0.502	0.143	-0.260	-0.355	0.095	dropped	0.000
Female*Child	dropped	0.399	1.206**	0.190	1.326**	0.261	1.459	0.897	dropped	dropped	0.000
High	0.168	-0.958**	-0.035	-0.179	-0.412**	-0.262	-0.038	-0.190	-0.238	-0.131	0.330
LessColl	0.373	-0.658**	-0.489**	-0.331	-0.654**	-0.685**	-0.640**	-0.289	-0.501**	-0.118	0.131
Coll	0.487	-0.646	-0.526**	-0.559**	-1.074**	-0.646**	-0.854**	-0.429*	-0.864**	-0.454**	0.515
Graduate	dropped	0.478	-1.105**	-1.399**	-1.154**	-1.252**	-1.360**	-0.802**	-0.641**	-1.030**	0.328
Cohort	0.045	-0.016	0.017	0.013	0.027	0.036*	0.021	0.050**	0.012	0.006	0.684
InterceptShift[b]	-4.129	-0.391	-2.853	-2.277	-5.747**	-7.373**	-3.765	-5.293**	-2.158	0	0.431

Transitions from self-employment to wage employment											
Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	-0.970**	-0.034	-0.328	-0.240	-0.579**	-0.187	-1.214**	-0.562*	-0.347	-0.396	0.083
White	1.756**	-0.131	-0.253	0.101	-0.384**	0.058	0.411	0.454	1.235**	-0.737	0.007
Black	1.990**	0.953**	0.419	0.928**	0.436*	0.347	1.220**	0.974**	2.541**	-0.270	0.022
Marriage	-0.221	-0.145	-0.113	0.130	-0.055	-0.038	-0.391*	-0.111	-0.024	0.093	0.942
Male*Marriage	-1.241	-0.083	-0.194	-0.499**	0.045	-0.386	0.503	-0.067	-0.170	-0.287	0.346
Divorce	dropped	0.709	-1.333**	0.121	-0.252	-0.054	-0.358	0.000	-0.064	0.263	0.343
Male*Divorce	dropped	-0.885	1.369**	-0.185	0.412	-0.045	0.417	0.212	-0.290	-0.158	0.463
RealInterest	0.049	0.015	-0.040	-0.022	-0.006	0.016	0.017	0.010	0.058	0.041	0.824
Unemployment	0.056	0.028	0.073**	0.021	0.088**	0.034	0.050	-0.042	-0.021	0.001	0.221
Children	0.948*	-0.248	-0.263**	-0.024	-0.202*	0.025	-0.201	-0.699	-0.642	dropped	0.368
Female*Child	-0.983	0.357	0.277	-0.055	0.121	-0.944**	0.147	dropped	dropped	dropped	0.154
High	-0.231	-0.300*	-0.095	-0.138	-0.185	0.088	-0.085	0.110	0.005	-0.063	0.566
LessColl	-0.050	-0.254	-0.067	-0.064	-0.262**	-0.027	0.089	-0.009	-0.151	-0.041	0.673
Coll	0.522	-0.093	-0.202	-0.175	-0.083	0.033	-0.057	0.275*	0.370**	0.477**	0.020
Graduate	dropped	-0.213	-0.764**	-0.447**	-0.190	-0.003	0.033	-0.201	0.448**	0.164	0.008
Cohort	-0.009	0.025	0.031**	0.021**	0.045**	0.029**	0.023**	0.025**	0.016	-0.003	0.441
InterceptShift[c]	0.133	-2.068	-2.408	-2.044	-4.305**	-3.434	-2.921	-3.026	-3.717	0	0.764

Note: ** Significance at 5% level.

* Significance at 10% level.

Log Likelihood: -22514.413, No. of Obs.: 35138

[a] p-value of the joint test of parameter equality across age groups.

[b] Intercept shift by AgeGroup. The regression constant value equals -0.181.

[c] Intercept shift by AgeGroup. The regression constant value equals -0.791.

Table 9: Multinomial Logit Results: Transitions from wage employment

Transitions from wage employment to non-employment

Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	-0.095**	-0.061	-0.291**	-0.062	0.207	-0.151	-0.076	0.542**	0.242*	0.307**	0.000
White	-0.419**	-0.264**	-0.242*	-0.147	-0.084	-0.188	-0.128	0.130	0.243	0.526**	0.002
Black	0.298**	0.221	0.046	0.157	0.324*	0.068	0.118	0.549**	0.449**	0.632**	0.335
Marriage	0.178**	0.241**	0.467**	0.364**	0.513**	0.272**	0.169	0.611**	0.360**	0.319**	0.018
Male*Marriage	-1.565**	-1.374**	-1.487**	-1.546**	-1.805**	-1.173**	-0.990**	-1.385**	-0.532**	-0.268*	0.000
Divorce	0.275	-0.037	-0.004	0.203	0.280*	-0.359**	-0.198	-0.001	-0.054	0.237**	0.060
Male*Divorce	-0.726	-0.664	-0.259	-0.566**	-0.637**	0.279	0.042	-0.318	0.238	-0.186	0.088
RealInterest	-0.034**	0.005	-0.014	-0.013	-0.014	-0.021	-0.018	-0.058**	-0.042**	-0.024	0.776
Unemployment	0.034**	0.058**	0.031	0.072**	0.111**	0.074**	0.025	0.050**	0.023	0.062**	0.139
Children	-0.138	0.031	-0.037	-0.115	0.033	0.241	0.123	-0.050	-0.003	-0.561	0.927
Female*Child	0.710**	0.813**	0.576**	0.590**	0.551**	0.206	0.911**	0.511	0.057	0.767	0.819
High	-0.336**	-0.165**	-0.235**	-0.312**	-0.339**	-0.330**	-0.291**	-0.152**	0.014	-0.134**	0.001
LessColl	-0.015	-0.283**	-0.415**	-0.638**	-0.514**	-0.588**	-0.550**	-0.261**	-0.134*	-0.096	0.000
Coll	-0.205	-0.595**	-0.775**	-0.870**	-1.003**	-1.105**	-0.799**	-0.397**	-0.267**	-0.332**	0.000
Graduate	0.680	-0.181	-1.085**	-1.082**	-1.071**	-1.120**	-1.105**	-0.865**	-0.525**	-0.633**	0.000
Cohort	0.024**	0.010	0.003	0.009	0.022**	0.000	0.008	0.006	0.007	-0.006	0.067
InterceptShift[b]	-2.150**	-2.324**	-1.431	-2.277**	-3.964**	-1.341	-1.697	-1.818*	-1.310	0	0.314

Transitions from wage employment to self-employment

Variable	Age Groups										p-value of
	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	equality[a]
Male	1.312**	0.908**	0.716**	0.543**	0.965**	0.489**	0.730**	1.133**	1.059**	0.566	0.069
White	-0.241	0.395	-0.072	0.257	-0.054	0.277	-0.081	0.008	0.292	0.253	0.664
Black	-0.987**	-0.627*	-1.402**	-0.608**	-0.802**	-0.480*	-0.765**	-0.363	0.083	0.008	0.095
Marriage	1.586**	0.426**	0.272*	0.250*	0.631**	0.241	0.577**	0.802**	0.671**	1.022**	0.000
Male*Marriage	-1.399**	-0.396**	-0.337*	-0.371**	-0.678**	-0.371*	-0.605**	-0.902**	-0.941**	-0.238	0.217
Divorce	0.371	-0.395	-0.478	0.007	-0.087	-0.337	0.222	0.263	-0.249	0.439	0.560
Male*Divorce	dropped	0.154	0.600	0.192	0.201	0.610**	-0.291	-0.278	0.318	0.345	0.663
RealInterest	-0.050	-0.027	0.011	-0.007	-0.075**	-0.021	-0.014	-0.038	-0.042	-0.082	0.538
Unemployment	0.049	-0.008	0.005	-0.046**	0.036	-0.022	-0.026	-0.014	-0.057	0.044	0.280
Children	0.281	0.229*	0.104	0.184**	0.179*	0.310**	-0.399	0.150	0.889*	dropped	0.607
Female*Child	0.333	0.407**	0.381**	0.136	0.184	0.080	-0.054	0.106	-0.037	dropped	0.945
High	-0.119	-0.069	0.102	0.111	-0.193*	-0.054	-0.038	0.328**	0.170	-0.082	0.070
LessColl	-0.347**	0.168	0.114	0.196**	0.034	-0.022	0.239**	0.308**	0.530**	0.394**	0.004
Coll	-0.194	-0.072	0.265**	0.140	0.224**	0.228**	0.392**	0.734**	0.619**	0.621**	0.000
Graduate	dropped	0.204	0.481**	0.432**	0.373**	0.347**	0.244	0.608**	0.686**	0.610**	0.667
Cohort	0.008	-0.024**	-0.009	-0.015*	-0.001	0.000	-0.009	0.003	0.006	0.011	0.547
InterceptShift[c]	-0.543	2.757	1.820	2.606	1.439	1.511	2.185	0.670	0.559	0	0.670

Note: ** Significance at 5% level.

* Significance at 10% level.

Log Likelihood: -85908.664, No. of Obs.: 258684

[a] p-value of the joint test of parameter equality across age groups.

[b] Intercept shift by AgeGroup. The regression constant value equals -1.443.

[c] Intercept shift by AgeGroup. The regression constant value equals -5.198.

Table 10: Markov Transition Probabilities

			Age Groups									
Individuals	From	To	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67
Bench-	NE [a]	NE	0.5599	0.4873	0.7105	0.7712	0.7529	0.7253	0.7628	0.7750	0.8927	0.9146
mark		SE	0.0084	0.0162	0.0225	0.0310	0.0419	0.0551	0.1028	0.0784	0.0254	0.0440
		WE	0.4317	0.4965	0.2670	0.1979	0.2052	0.2196	0.1345	0.1466	0.0819	0.0415
	SE [b]	NE	0.1604	0.0324	0.0098	0.0049	0.0112	0.0144	0.0114	0.0326	0.0474	0.1138
		SE	0.4163	0.5784	0.7282	0.8229	0.7509	0.8204	0.8396	0.8158	0.7838	0.7542
		WE	0.4233	0.3892	0.2620	0.1722	0.2378	0.1652	0.1490	0.1516	0.1688	0.1320
	WE [c]	NE	0.1136	0.0385	0.0071	0.0088	0.0074	0.0078	0.0131	0.0319	0.0901	0.1970
		SE	0.0126	0.0225	0.0329	0.0314	0.0406	0.0449	0.0381	0.0541	0.0451	0.0701
		WE	0.8738	0.9390	0.9601	0.9598	0.9521	0.9472	0.9488	0.9141	0.8648	0.7329
Female	NE	NE	0.5785	0.5459	0.6968	0.7171	0.7828	0.7691	0.8291	0.8643	0.9374	0.9569
		SE	0.0079	0.0099	0.0458	0.0437	0.0295	0.0381	0.0467	0.0416	0.0097	0.0187
		WE	0.4136	0.4442	0.2573	0.2392	0.1877	0.1928	0.1243	0.0941	0.0529	0.0244
	SE	NE	0.3277	0.0605	0.1191	0.0790	0.0640	0.0825	0.0707	0.1299	0.0930	0.1858
		SE	0.2034	0.5090	0.5276	0.6436	0.6183	0.6733	0.6897	0.6369	0.6643	0.6090
		WE	0.4689	0.4305	0.3533	0.2775	0.3177	0.2442	0.2396	0.2333	0.2427	0.2052
	WE	NE	0.1280	0.0504	0.0524	0.0524	0.0382	0.0309	0.0393	0.0729	0.1233	0.1985
		SE	0.0030	0.0100	0.0258	0.0260	0.0300	0.0390	0.0321	0.0433	0.0408	0.0496
		WE	0.8690	0.9397	0.9218	0.9215	0.9318	0.9301	0.9286	0.8838	0.8359	0.7519
African-	NE	NE	0.6431	0.4894	0.6861	0.7725	0.7385	0.7221	0.7942	0.8228	0.8841	0.9260
American		SE	0.0033	0.0050	0.0086	0.0110	0.0237	0.0261	0.0426	0.0254	0.0122	0.0298
		WE	0.3536	0.5056	0.3053	0.2165	0.2378	0.2519	0.1632	0.1517	0.1037	0.0442
	SE	NE	0.1207	0.0183	0.0105	0.0117	0.0328	0.0212	0.0263	0.0371	0.0646	0.1892
		SE	0.1638	0.3893	0.4932	0.7066	0.5268	0.7807	0.6832	0.7405	0.5210	0.6096
		WE	0.7154	0.5924	0.4963	0.2817	0.4404	0.1981	0.2906	0.2224	0.4145	0.2012
	WE	NE	0.2174	0.0624	0.0099	0.0119	0.0114	0.0106	0.0166	0.0482	0.1071	0.2276
		SE	0.0041	0.0087	0.0095	0.0123	0.0193	0.0217	0.0201	0.0349	0.0370	0.0528
		WE	0.7785	0.9289	0.9806	0.9758	0.9693	0.9677	0.9633	0.9168	0.8559	0.7196
High	NE	NE	0.5599	0.5875	0.7347	0.7940	0.7433	0.7826	0.8672	0.8273	0.9251	0.9422
School		SE	0.0084	0.0256	0.0185	0.0239	0.0415	0.0390	0.0384	0.0415	0.0204	0.0162
Graduate		WE	0.4317	0.3869	0.2468	0.1821	0.2152	0.1784	0.0944	0.1312	0.0544	0.0416
	SE	NE	0.1604	0.0251	0.0148	0.0076	0.0207	0.0225	0.0275	0.0439	0.0860	0.1738
		SE	0.4163	0.6398	0.7075	0.8134	0.7728	0.8030	0.8284	0.8229	0.8086	0.7342
		WE	0.4233	0.3351	0.2777	0.1790	0.2065	0.1745	0.1441	0.1332	0.1054	0.0920
	WE	NE	0.1136	0.0531	0.0132	0.0144	0.0140	0.0171	0.0234	0.0412	0.1141	0.2464
		SE	0.0126	0.0219	0.0297	0.0287	0.0287	0.0315	0.0264	0.0345	0.0277	0.0366
		WE	0.8738	0.9250	0.9571	0.9569	0.9573	0.9514	0.9502	0.9243	0.8581	0.7170

[a] Non-Employment.
[b] Self-Employment.
[c] Wage-Employment.

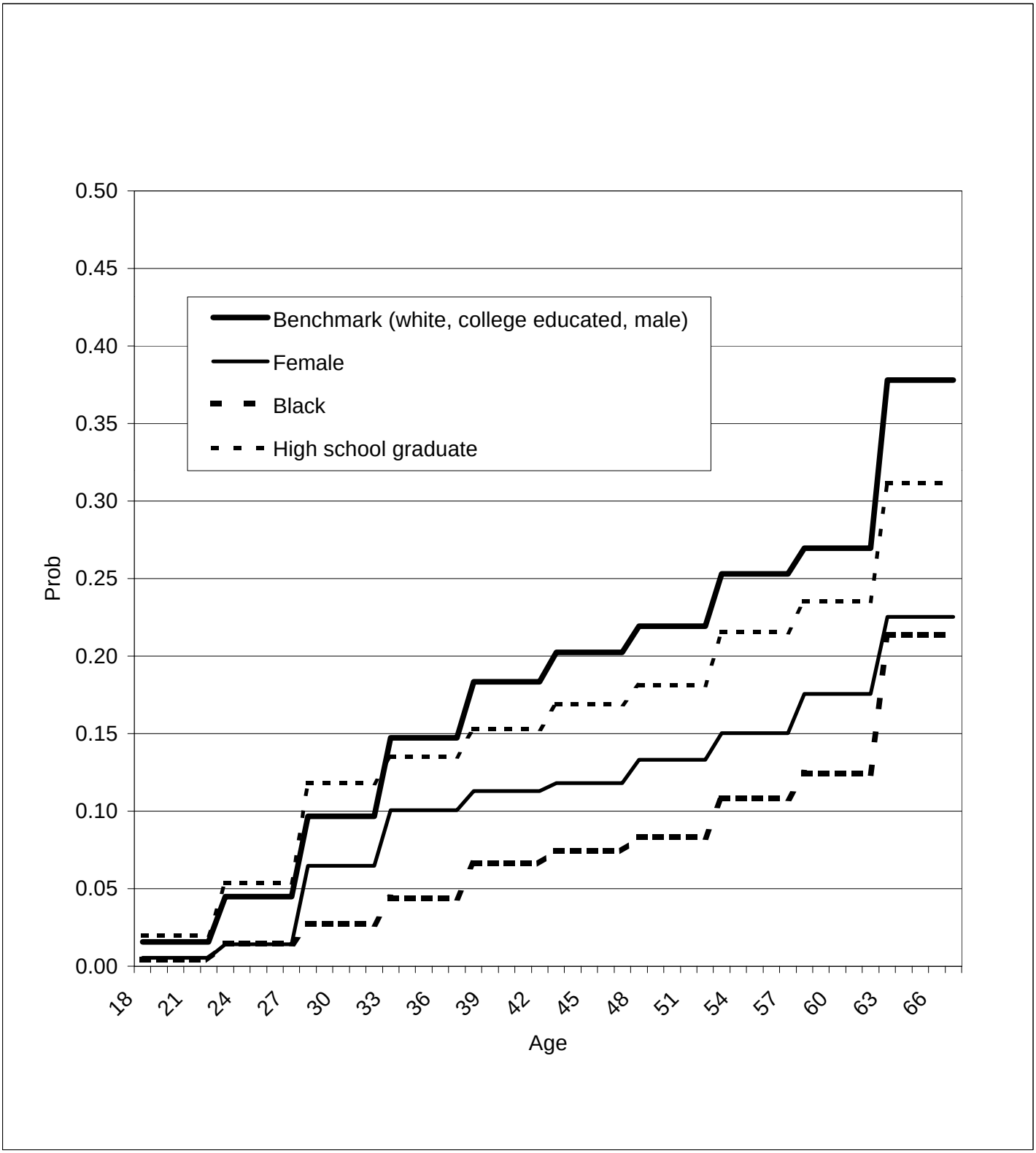

Figure 1. Predicted self-employment probabilities (conditional on employment) estimated by cross-section analysis

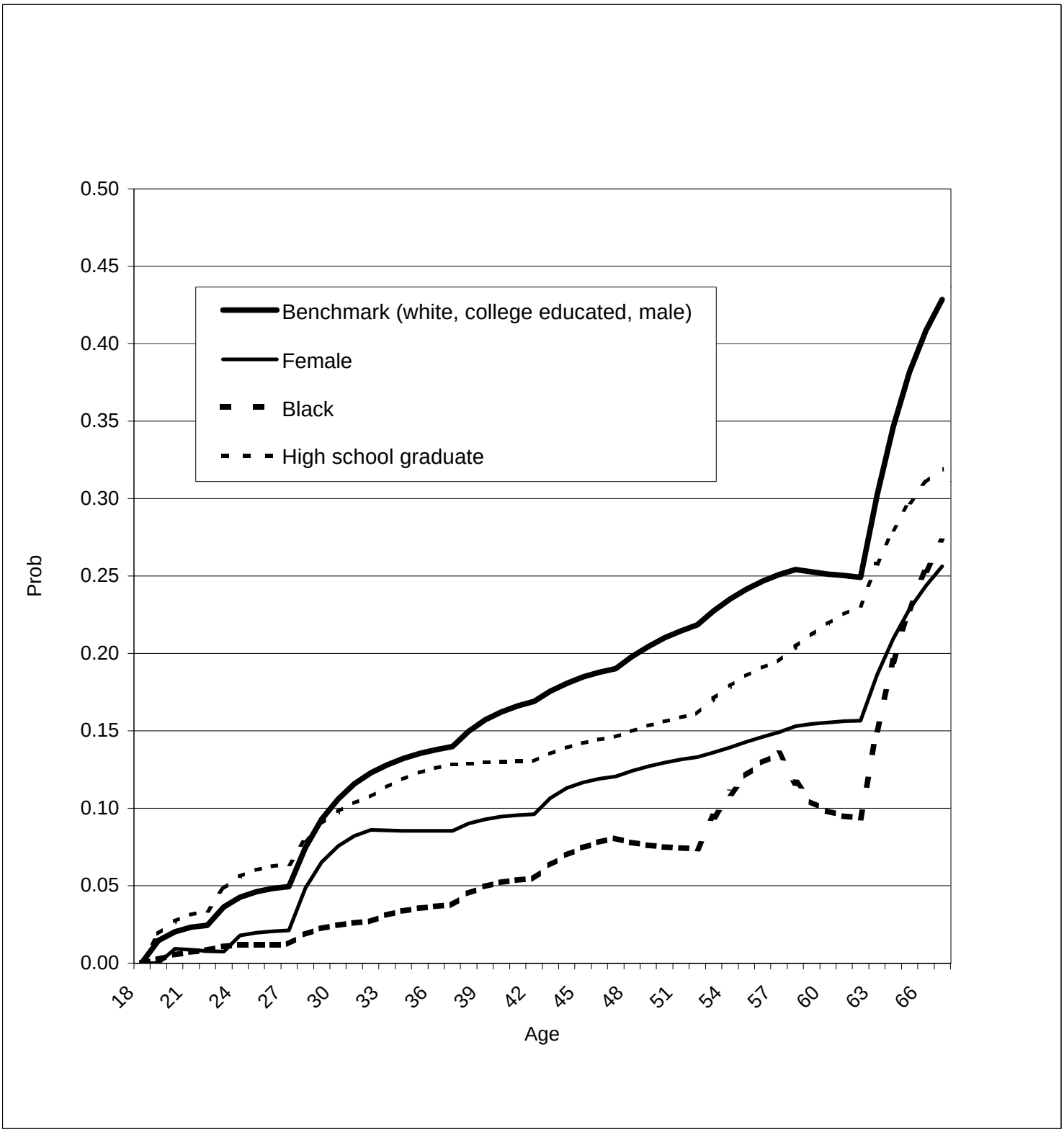

Figure 2. Predicted self-employment probabilities (conditional on employment) estimated by Markov transition analysis

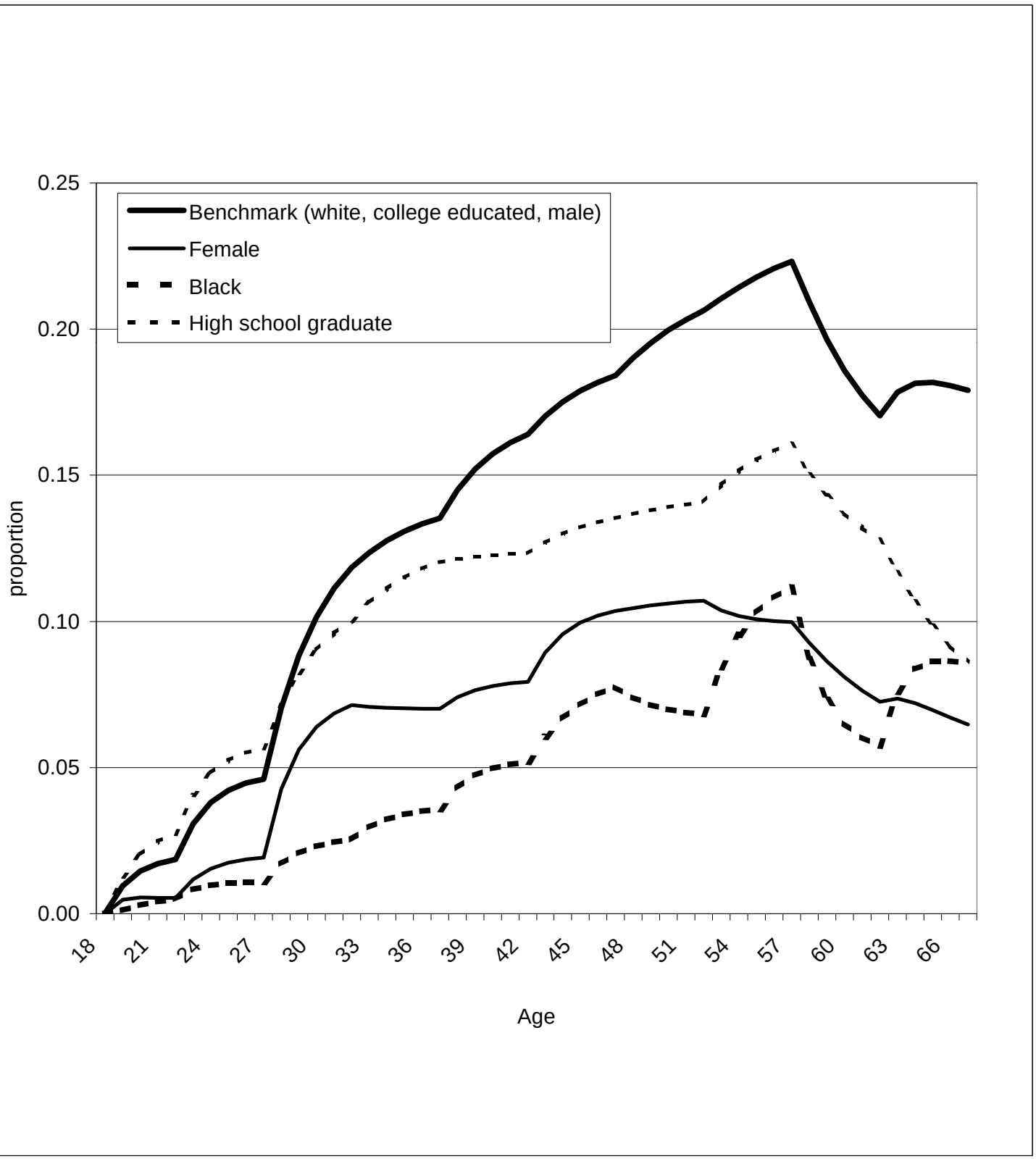

Figure 3. Predicted self-employment probabilities (unconditional on employment) estimated by Markov transition analysis

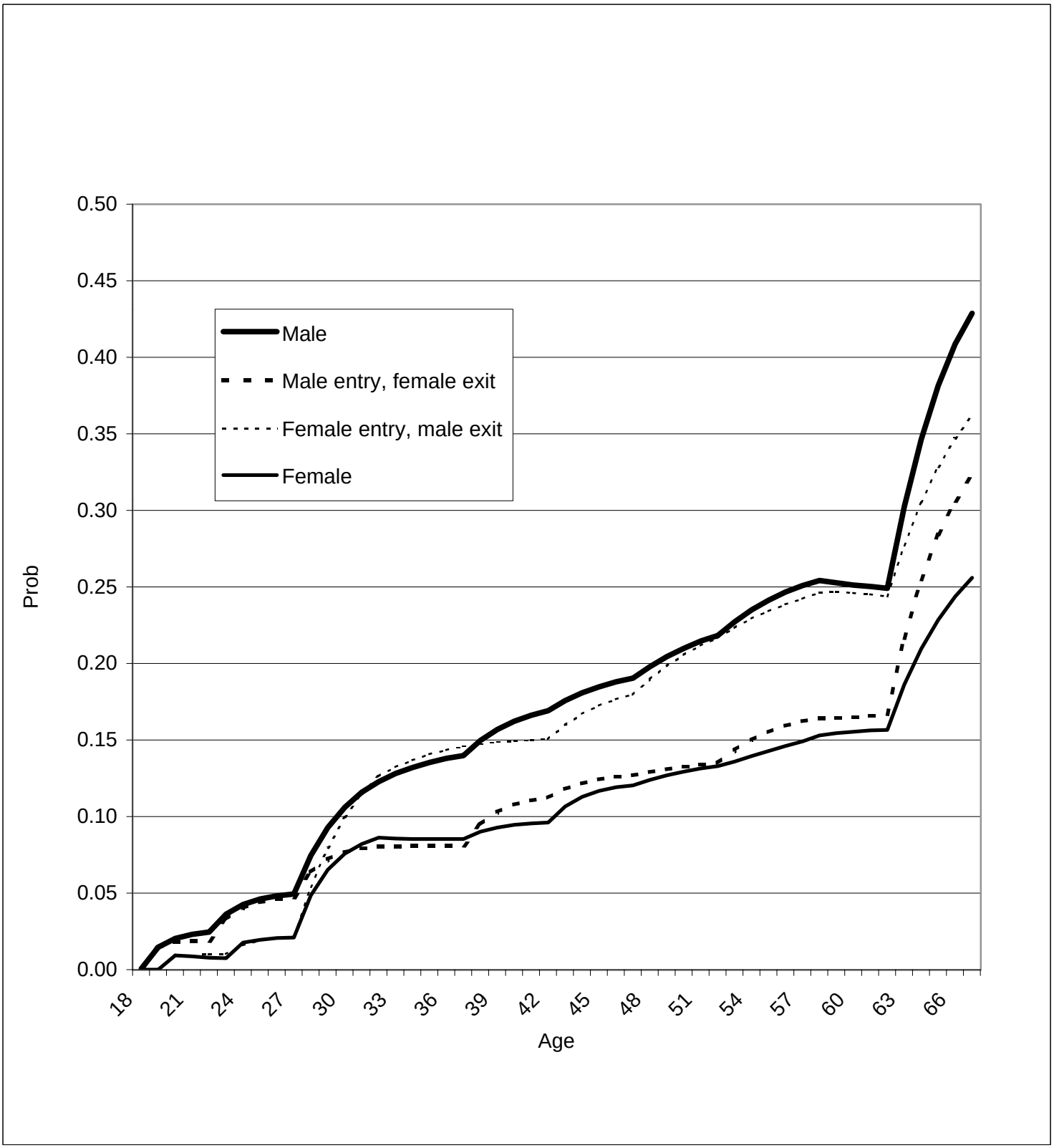

Figure 4. Decomposition of male vs. female differences in the probability of self-employment into entry and/or exit rate differences

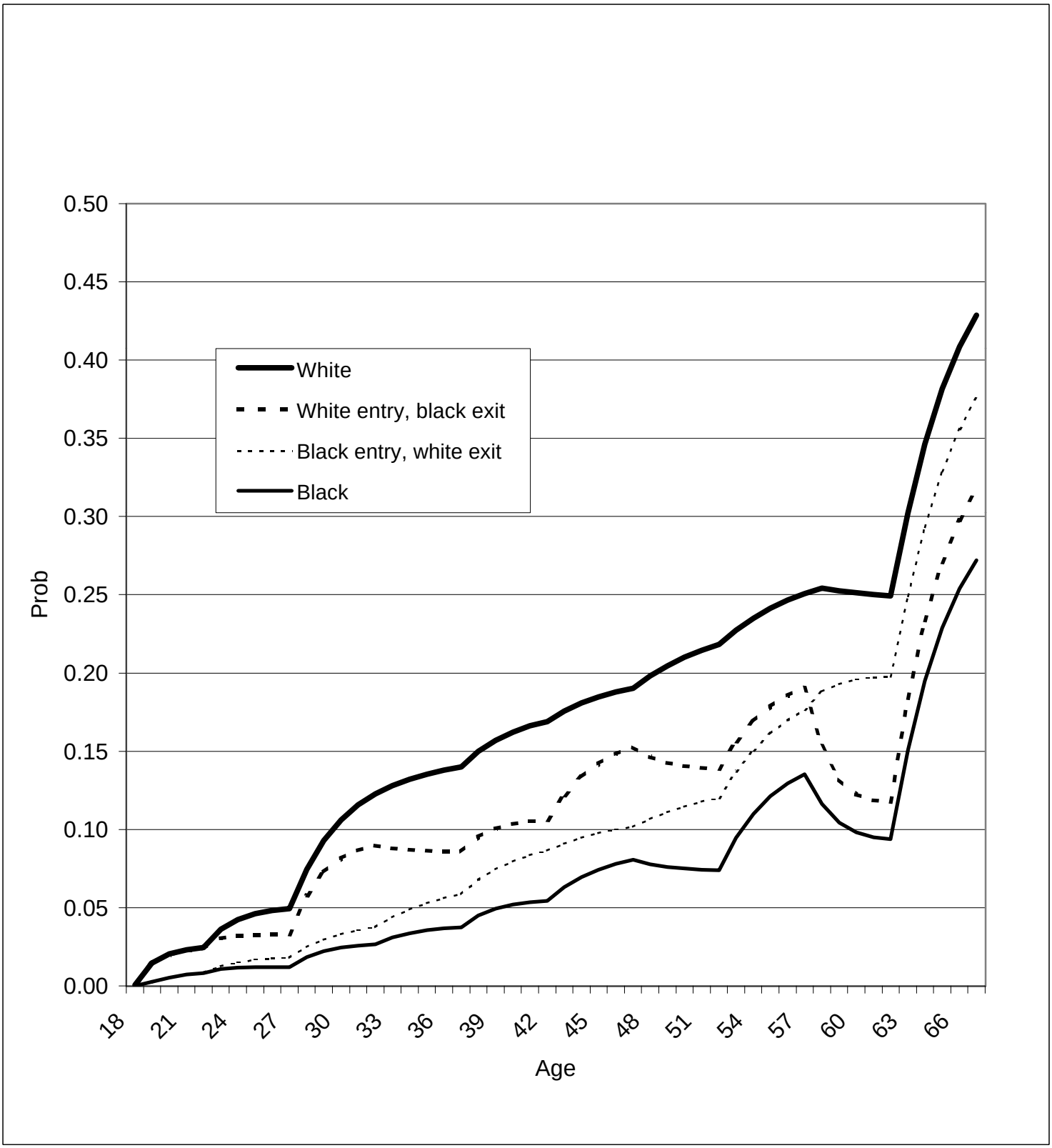

Figure 5. Decomposition of white vs. black differences in the probability of self-employment into entry and/or exit rate differences

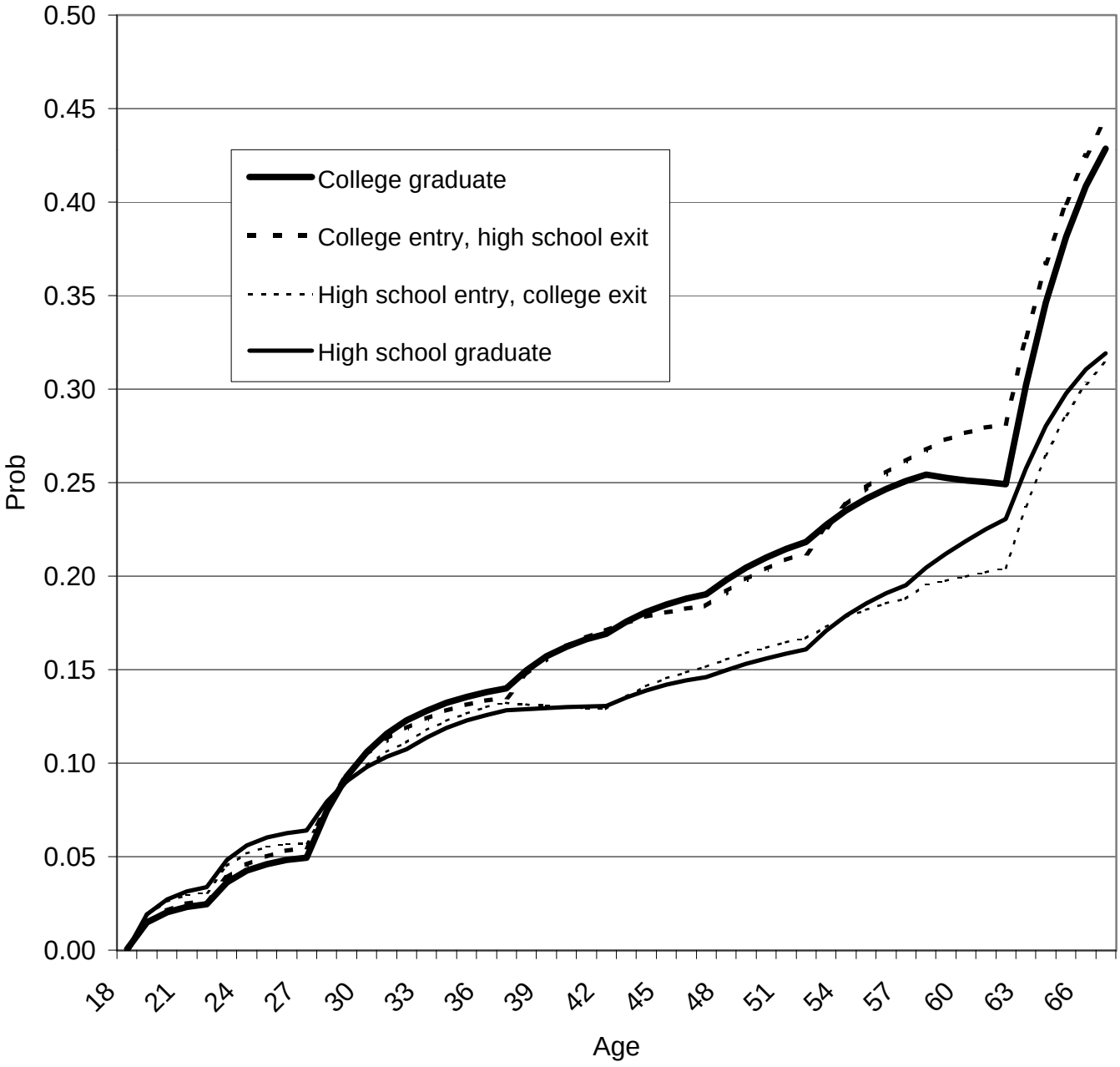

Figure 6. Decomposition of college vs. high school differences in the probability of self-employment into entry and/or exit rate differences

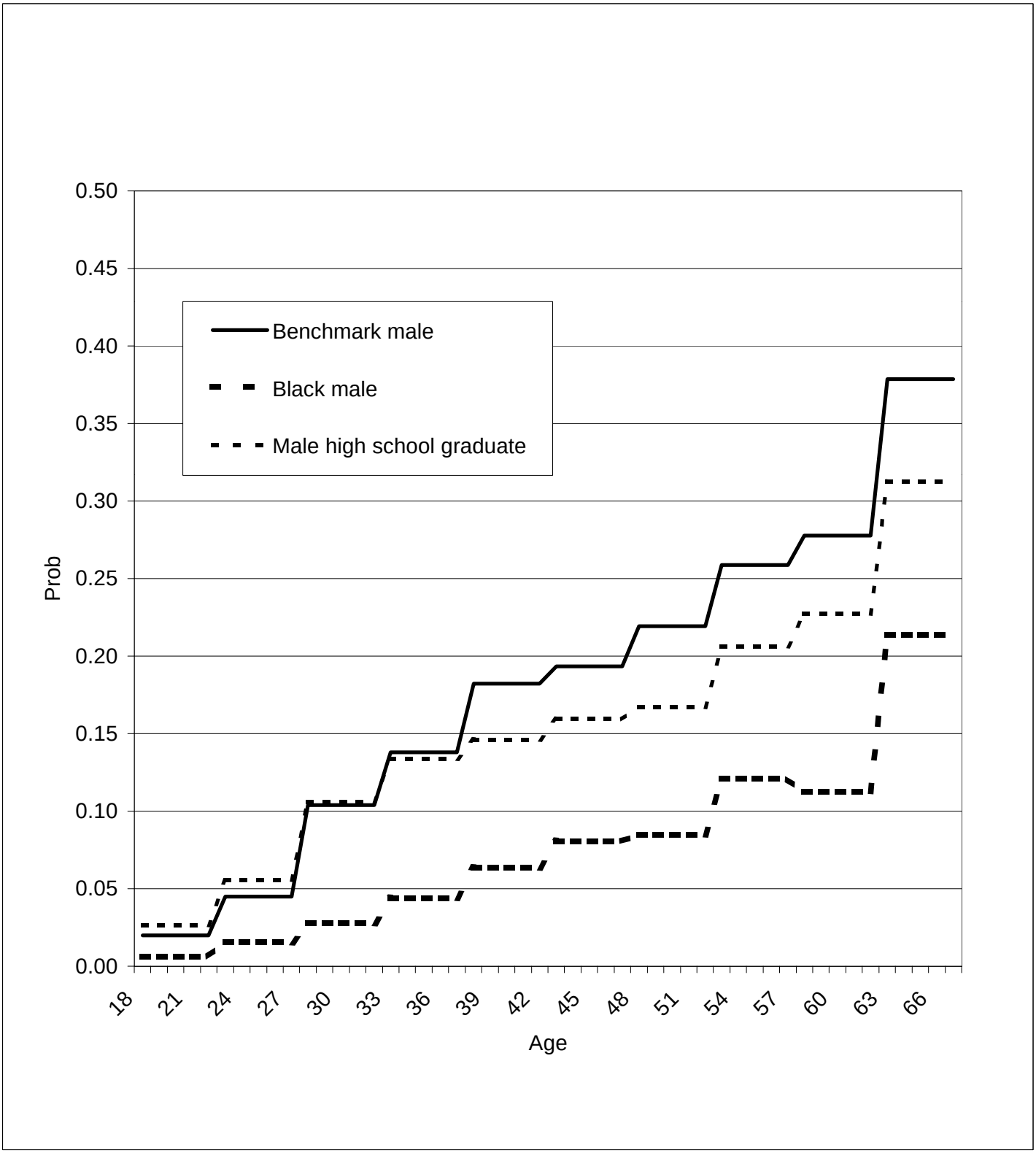

Figure 7. Sensitivity analysis: predicted self-employment probabilities for men (conditional on employment) estimated by cross-section analysis using the male-only subset of the data.

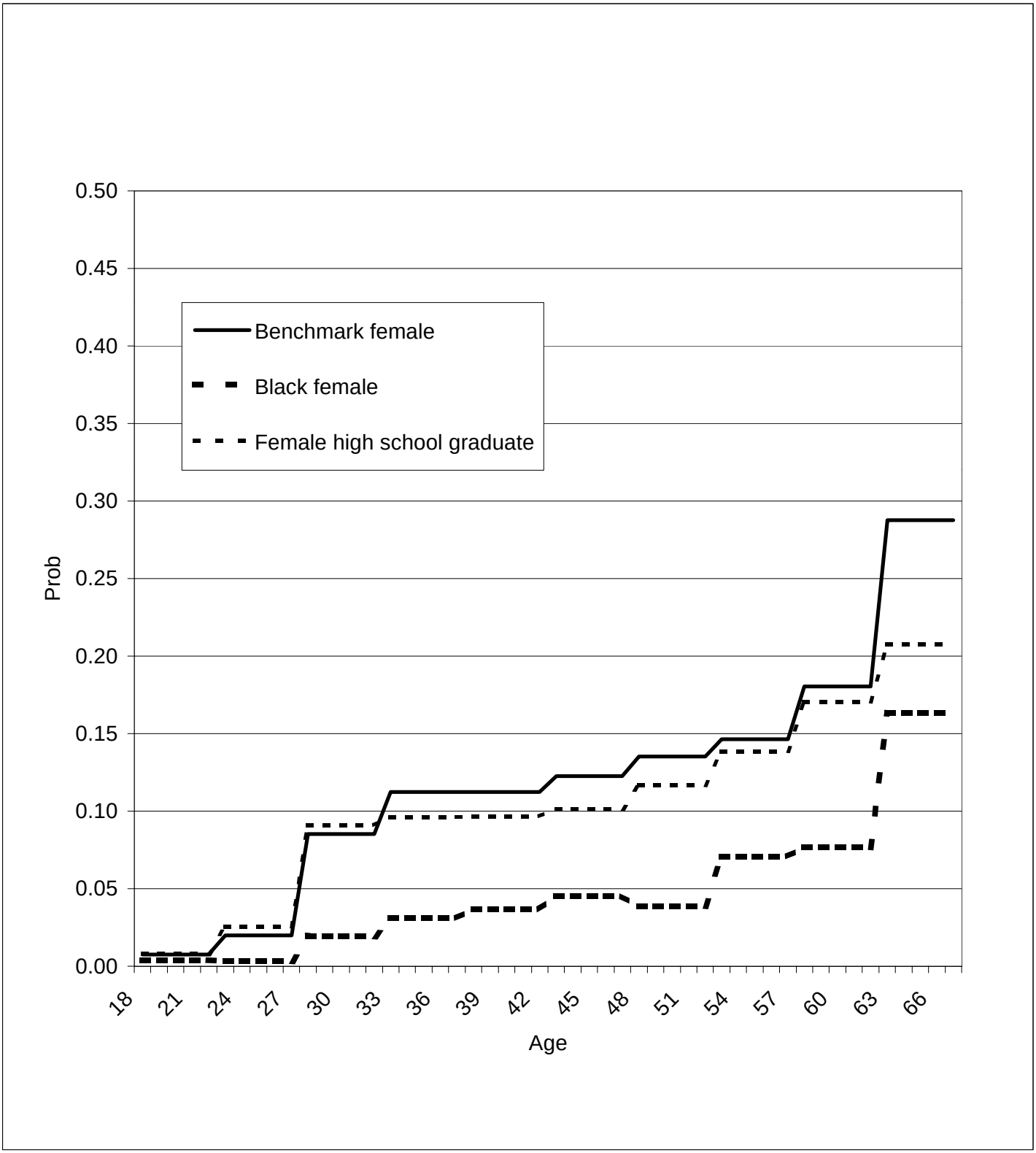

Figure 8. Sensitivity analysis: predicted self-employment probabilities for women (conditional on employment) estimated by cross-section analysis using the female-only subset of the data