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ABSTRACT

This paper uses longitudinal data from the National Longitudinal Survey of Youth to examine whether acquisition of a GED increases the probability that male and female school dropouts obtain training, post-secondary education, or military service. Random effects probit models are used to account for both the dichotomous nature of the dependent variables and non-zero correlations among error terms pertaining to different years of data for the same individual. We find that acquisition of a GED increases the probability that school dropouts obtain post-secondary education and the probability that they obtain non-company training, defined as training provided by government or by proprietary schools. However, it is still the case that the majority of GED recipients obtain no post-secondary education or training through the age of 26.

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Changes in the U.S. economy have dramatically reduced labor market opportunities for school dropouts. Between 1979 and 1993 the real earnings of 25-34 year-old male dropouts declined by 34 percent; the comparable figure for female dropouts was 18 percent.[1] One reason for the earnings declines is that school dropouts bring relatively little formal education to a labor market that increasingly values skills typically learned in school (Katz & Murphy, 1992; Murnane, Willett, & Levy, 1995). A second reason is that dropouts receive little training, either from their employers or in private programs, and as a result have few opportunities to acquire job-specific skills.

One academic credential that school dropouts can work toward is the General Educational Development (GED) certificate. Approximately 500,000 school dropouts acquire this credential each year by achieving passing scores on a seven and one-half-hour battery of examinations testing knowledge and/or skills in writing, social studies, science, reading, and mathematics. Cameron & Heckman (1993b) have shown that male GED recipients do not fare as well in the labor market as conventional high school graduates. However, for the large number of school dropouts unable or unwilling to return to school there is a second question: Is it worthwhile to obtain a GED?

One reason the GED credential could have value to dropouts is that it may improve access

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[1] The authors calculated the median earnings figures from the Current Population Survey March Demographic Files for 1980 and 1994. The calculations are based on samples of all workers with positive earnings. The median real earnings declines for 25-34 year-old dropouts working year-round, full-time are similar: 32 percent for males and 18 percent for females.

to three types of human-capital-enhancing activities: training, post-secondary education, and military service. Many training programs and college degree programs are open only to high school graduates or GED holders. The military services, while giving preference to conventional high school graduates over GED holders, historically have preferred GED recipients to noncredentialed school dropouts.[2] The explanation may be that dropouts acquire skills while studying for the GED which make them better candidates for training, post-secondary education, or military service. Given that the median length of time dropouts study for the GED exams is only 30 hours (Baldwin, 1990), a more likely explanation is that the GED acts as a signal that recipients have skills that differentiate them from dropouts without this credential (Spence, 1973). In this paper, we explore whether acquisition of a GED increases the probability that school dropouts participate in human-capital-enhancing activities.[3]

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[2] The 1986 Reauthorization of the Higher Education Act specifies that possession of a GED or enrollment in a remedial program that will lead to a GED within one year counts as fulfillment of the provision that an individual must have the "ability to benefit" from higher education aid. Pawasara & Quinn (1986) cite Lawrence (1983) as showing that the minimum AFQT scores required for admission to the Navy and Air Force are lower for GED-holders than for dropouts without this credential. The Army and Marines use the same minimum score for these two groups.

[3] In an earlier paper (Murnane, Willett, and Boudett, 1995), we showed that acquisition of a GED results in a modest increase in the rate of wage growth for males. This earlier paper did not examine the extent to which the benefits of GED acquisition stemmed from improved

Data

Our data are drawn from the National Longitudinal Survey of Youth (NLSY). This data set provides detailed longitudinal information on the family backgrounds, educational attainments, and labor market experiences of 12,686 men and women who were between the ages of 14 and 21 when first interviewed in 1979. Our analyses are based on males and females in the random sample and the low income sample who were less than 18 years of age in 1979 and did not subsequently graduate from high school.[4] *Table 1* presents summary information describing the dropouts in our samples, by gender. For purposes of comparison, this table and *Table 2* also provide descriptive information for individuals in the NLSY data set who were in this same age group in 1979 and did graduate from high school.

Inspection of *Table 1* shows that the racial/ethnic composition and high school histories of males and females in this sample were similar. Of the 918 males and 699 females studied, approximately a quarter were Black, a quarter Hispanic, and half non-Hispanic White. Regardless of gender, Hispanic youth were especially likely to leave school before obtaining a high school diploma.

On average, dropouts tended to leave school between the ages of 16 and 17, after completing ninth grade. Slightly more than one-third of the dropouts in our sample had obtained a GED by 1991, and had done so, on average, between the ages of 19 and 20. Among males,

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access to post-secondary education and training.

[4] We restricted our sample to people who were young enough in 1979 for all of their post-dropout training to be captured by the survey.

GED recipients completed about one-third of a year more of schooling before dropping out than did dropouts who did not subsequently obtain a GED (a group that we call *permanent dropouts*).[5] Among females, differences in years of schooling completed between GED recipients and permanent dropouts are less evident. Finally, mothers of GED recipients had completed approximately one more year of schooling than had mothers of permanent dropouts, regardless of the child's gender.

The NLSY provides detailed data on the training experiences of each respondent. We are indebted to Ann Bartel and Nachum Sicherman for sharing with us their coding of the extensive training data for the years 1979 through 1990.[6] We extended the code to include 1991. This code

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[5] The mean difference in years of completed schooling between GED holders and permanent dropouts is smaller in our sample than in Cameron & Heckman's (1993b). The explanation lies in the sample definitions. C&H's sample consists of individuals who had reached the age of 25 by 1987. This definition excluded the three youngest cohorts in the NLSY -- individuals who were ages 14-16 in 1979. Our sample is composed exclusively of the four youngest cohorts. The mean difference in years of completed schooling between GED-holders and permanent dropouts is much smaller for the younger cohorts than for the older cohorts.

[6] Bartel & Sicherman's original code distinguished between government-sponsored training and other training not provided by employers. However, changes in the training questions NLSY participants were asked over the 1979-92 period made it impossible to distinguish reliably between government-sponsored training and other non-company training. For this

permits calculation of the cumulative number of hours of two types of training that an individual received. It also permits coding of whether an individual received each type of training in each year.[7] The first, company training, is provided by employers. The second, non-company training, is a residual category that includes training provided by proprietary institutions and training sponsored by government. The NLSY also provides information on whether an individual was in college or serving in the military in any given year. We included in our analyses information for every year from date of dropout through 1991 on whether an individual obtained each type of training.

Table 2 provides information on the cumulative amounts of human-capital-enhancing activities in which the males and females in our samples participated through age 26. The top panel shows that very few permanent dropouts (4 percent of males; 6 percent of females) received any company training. The percentages of GED recipients who received company training were larger, but still modest (10 percent of males; 15 percent of females). Females who graduated from high school were just about as likely to obtain company training as were female GED recipients; however, male high school graduates were twice as likely as male GED recipients to

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reason we combined these types of training into a single category.

[7] The training questions pertain to the time period since the person was previously interviewed. When an individual missed an interview, we treat as missing information on training for that year. If the person reported having received training in the next interview, we assume that the training took place in the year of the interview.

have obtained some company training by age 26.

Even those permanent dropouts and GED recipients who did obtain some company training did not receive very much -- median hours of cumulative training by age 26 are approximately three full-time weeks for males and two for females. Only two percent of male GED recipients and one percent of female recipients obtained at least three months (approximately 500 hours) of company training by the age of 26.

Both male and female dropouts were much more likely to participate in non-company training than company-provided training. The likely explanation is that many dropouts are eligible for government-sponsored training programs and they can also choose to pay for programs provided by proprietary training schools. Approximately one quarter of permanent dropouts and almost half of GED recipients participated in some non-company training by the age of 26. (In fact, higher percentages of GED recipients obtained non-company training than high school graduates.) Those GED recipients who did obtain non-company training tended to spend much more time in this activity than did dropouts who obtained company training. In fact, the median cumulative hours of non-company training obtained by those GED recipients who received any such training was more than three months (525 hours) for females and only slightly less (478 hours) for males.

While no permanent dropouts had attended college,[8] 14 percent of male GED recipients and 19 percent of female recipients had some college experience. However, less than one percent of GED recipients had earned a Bachelor's Degree by 1991. In contrast, almost half of high

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[8] To identify permanent dropouts in the NLSY data base accurately, it was necessary to impose the restriction that they have no college experience.

school graduates had some college experience and approximately 20 percent had earned a Bachelor's Degree by 1991.

Almost no permanent dropouts had any military service. However, 21 percent of male GED recipients (but almost no female GED recipients) served in the military.

The descriptive statistics in *Table 2* show that GED recipients are more likely to participate in human-capital-enhancing activities than are permanent dropouts. Is this because they have desirable attributes, such as more completed schooling, than other dropouts, and consequently would have obtained more education and training even without the GED? Or does acquisition of the GED result in dropouts receiving more training and having better access to college and military service than they would have had without the credential? The descriptive summaries in *Table 2* do not address these questions because they do not take into account the characteristics of individual dropouts nor do they distinguish between participation in training, post-secondary education or the military before receipt of a GED and participation after receipt of the credential. These questions provide the focus for this paper.

Cameron & Heckman (C&H, 1993a,b) begin to answer these questions by showing that male GED holders are more likely to enter post-secondary education and training programs and military service than are other male dropouts with the same observed characteristics. Our work goes beyond Cameron & Heckman's in three ways. First, we study female dropouts as well as male dropouts. Second, we include training reported by NLSY respondents through the 1991 interview, five years later than the last interview data included in the C&H study. Third, we employ a statistical methodology that explicitly takes advantage of the longitudinal nature of the NLSY data on training, post-secondary education, and military service.

Statistical Analyses

For all dropouts in our data set, we know: (a) whether they participated in each type of human capital enhancing activity in each year from date of dropout through 1991, (b) the year in which they obtained the GED (for those who obtained the credential), and (c) information on a variety of time-varying and time-invariant covariates. By virtue of the multi-cohort design of the data collection and variation in the age at which individuals dropped out of school, each person may contribute a different number of "person-years" to the total empirical record. Our statistical analysis incorporates all longitudinal information available on each person, regardless of the number of waves of data that each contributed.

In our analyses, we treated participation in each type of human-capital-enhancing activity in each year as a dependent variable and we used random-effects probit analysis (Green, 1993, 1995) to investigate the relationship between the probability of obtaining training in any year following high-school and selected predictors.[9] We chose this estimation technique in order to

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[9] There were several related reasons why we conducted probit analyses of *whether* training was obtained in each year after high-school rather than tobit analyses of the *amount* of training obtained in each year. First, inspection of sample distributions for the amount of training obtained in each year indicated that the value was zero for more than 95 percent of the person years for each dependent variable. Thus, a key distinction was whether individuals actually obtained training. Second, given the overwhelming preponderance of zero values for the dependent variables, we were unable to conduct tobit analyses that incorporated a random-effects component to accommodate potential autocorrelation among

account for both for the dichotomous nature of the dependent variables and the possibility of a non-zero correlation among error terms pertaining to different years of data for the same individual. In preliminary analyses we found that the amount of company training received by an individual was unrelated to the amount of non-company training he or she obtained. This provided the justification for exploring the extent to which GED acquisition was associated with increased participation in each type of training separately.

Following Greene (1993, 1995), we adopted a "baseline" random-effects probit model representing the hypothesized relationship between selected predictors and individual i's participation in each of the four types of human-capital-enhancing activities (company training, non-company training, military service, higher education) in each year t:

$$\begin{aligned} y_{it}^{*} = {} & \beta_0 + \gamma_1 GED_{it} + \gamma_2 POTEXP_{it} + \gamma_3 POTEXP_{it}^2 \\ & + \beta_1 GOTGED_i + \beta_2 BLACK_i + \beta_3 HISP_i \\ & + \beta_4 DROPHGC_i + \beta_4 MOMED_i + \delta_i + \epsilon_{it} \end{aligned} \quad (1)$$

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the within-individual error-terms. Finally, we did conduct preliminary tobit analyses without the benefit of the random-effects correction, and learned from applying to the results the technique described in McDonald &Moffitt (1980) that more than 85 percent of the impact of GED on amount of training individuals received per year was in moving people from no training to some training.

where y_{it}^* is the continuous latent counterpart to observed participation in training, y_{it}, such that $y_{it} = 1$ if, and only if, $y_{it}^* > 0$, separate analyses being conducted for each type of training/education. The terms δ_i and ϵ_{it} in Equation [1] represent errors specific to the person and to the person-year respectively. This is the Butler & Moffitt (1982) equicorrelated model, a probit counterpart to the random-effects regression model. In this model, the total residual variance on occasion t is the sum of the two error variances ($\sigma_\delta^2+\sigma_\epsilon^2$) and the (assumed constant) autocorrelation, ρ, between errors on occasions t and t′ is $\sigma_\delta^2/(\sigma_\delta^2+\sigma_\epsilon^2)$.

The inclusion of time-varying potential experience, $POTEXP_{it}$, (defined as calendar time since date of dropping out), and its square, $POTEXP^2_{it}$, as predictors in the model permits the hypothesized temporal training trajectory to be curvilinear in potential experience.[10] In addition, the dichotomous predictor, GED_{it}, has value zero in each year prior to the receipt of GED and is subsequently set to one. Its coefficient, γ_1, is the parameter of central interest and represents a vertical discontinuity or "shift" in the average temporal training trajectory on receipt of the GED. This parameter will be non-zero and positive if dropouts who are awarded the GED are, on average, more likely to participate in training (or college or military service) after the receipt of the GED than they were before.

The model also contains several time-invariant covariates (identified by the lack of a t subscript) that are common in human capital models. They include dichotomous predictors $BLACK_i$ and $HISPANIC_i$ representing the race/ethnicity of the dropout, and continuous variables $DROPHGC_i$ and $MOMED_i$ recording the highest grade completed in high school by the dropout

[10] We included potential experience rather than actual experience because the latter is endogenous. An implication is that the model should be viewed as a reduced form model.

and his/her mother respectively. To facilitate subsequent interpretation of estimated coefficients, we centered the two continuous predictors, highest grade completed ($DROPHGC_i$) and mother's educational attainment ($MOMED_i$), so that they took on value zero when the original variables had value nine.[11]

We also included the time-invariant dichotomous predictor, $GOTGED_i$, to distinguish dropouts who obtained the GED at any time during the period of observation from those who did not (that is, $GOTGED_i = 1$ if the GED was awarded at any time during the period of observation, 0 otherwise). Thus, the coefficient on $GOTGED_i$ provides a test of unobserved heterogeneity -- namely that unobserved attributes of GED recipients prior to receipt of the credential differed from the unobserved attributes of permanent dropouts in dimensions that affected the probability of obtaining training, post-secondary education, or military service.

In fitting models in which the dependent variable was one of the two types of training, we also included the dichotomous variable PRE_87_{it} as a time-varying predictor that assumed the

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[11] Values of mother's education were missing for some individuals in the data set. We created an indicator with value 1 whenever a missing value was encountered. We then set missing values of $MOMED_i$ to an ad-hoc value. The missing-value indicator was included as a predictor in all models in which $MOMED_i$ was included. As Cohen & Cohen (1983) describe, this ensures that all person-years can be used in model-fitting. Choice of the particular ad-hoc value selected to replace missing values impacts only the coefficient associated with the missing-value indicator, not coefficients associated with other more substantively interesting predictors.

value 1 in each person-year record pertaining to year 1987 or earlier, and the value 0 for every record pertaining to a year thereafter. This predictor accounts for an anomaly in the NLSY coding of training: in the years prior to 1987 NLSY participants were only asked about training programs that lasted more than four weeks; in 1987; no questions about training were asked; starting in 1988 questions were asked about all programs, regardless of length.

For each of the four dependent variables and two genders we fitted a taxonomy of probit models, starting with the baseline model. One model included the interaction between GED_{it} and the time-invariant $DROPHGC_i$ to investigate whether the effect of GED differed by years of schooling completed. A second model included the interactions of $GOTGED_i$ with $POTEXP_{it}$ and $POTEXP_{it}^2$ to examine whether the shape of the training profile was different for GED recipients before receipt of the credential than it was for permanent dropouts. Finally, we fitted models that included years of potential experience after receipt of GED ($POTEXP\_GED_{it}$) and its square ($POTEXP\_GED^2{}_{it}$) to examine whether receipt of a GED was associated not only with a vertical shift in the training or education profile, but also with a change in the slope and shape of that profile.

All of these interaction terms were based on plausible interesting hypotheses; however, none rested on well developed economic theory. Consequently, we adopted the following decision rule in deciding which models to report. We tested hypotheses about interactions using standard decrement-to-χ^2 methods. If a particular interaction made a statistically significant contribution to prediction, we included that interaction term in the model reported for both males and females for that particular dependent variable. We also fitted models containing all tested interactions, and verified that the results were not substantively different from those reported in

the paper.

Results

Table 3 presents estimated coefficients and associated standard errors for random-effects probit models predicting whether dropouts obtained company training and non-company training in each year. We present separate estimates for males and females. *Table 4* presents the analogous estimates for college attendance and military service.[12]

We use two methods to show how the coefficients in these probit models translate into impacts on the probability of obtaining training, education, or military service in each year: figures displaying prototypical training profiles and estimates of the impacts of one-unit changes in the values of key covariates. *Figures 1, 2,* and *3* illustrate predicted training and education profiles for prototypical male and female dropouts. (We do not include a figure for military service for men because the very low probability of serving in the military in any year made the graph uninteresting.) Potential experience, which is plotted along the abscissa of the predicted profiles, begins when a dropout leaves school. The solid line in each figure depicts the predicted profile for a dropout who obtained a GED four years after leaving high school. The dotted line illustrates the predicted profile that the GED recipient would have had, had he or she not obtained the credential. The dashed line depicts the predicted profile for a permanent dropout. In constructing these profiles, we set the values of Highest Grade Completed, Mother's Highest Grade Completed, Black, and Hispanic to their sample means. A result of this decision is that

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[12] Because so few women had any military service, we did not fit military models for women.

differences between the dashed line and the dotted line are based on the value of the coefficient of the time invariant GOTGED (and its interaction with potential experience, where significant), not on differences between the average observed characteristics of GED recipients and permanent dropouts. All fitted probabilities are plotted on the ordinate using the same scaling to facilitate comparisons across different types of training.

As figures 1-3 illustrate, the predicted impact of GED acquisition on the annual probability of obtaining training (the vertical distance between the solid and dotted lines) depends on the number of years the person has held the credential (as well as on the values of all other predictors). At the bottom of each column in Table 3 and Table 4, we provide an estimate of the impact of GED acquisition on the probability that the typical recipient participated in the relevant training activity in the third year after receiving the credential (the seventh year after dropping out.)[13]

Since readers are also interested in whether race and ethnicity predict the probability of participating in a training activity, we include estimates at the bottom of Table 3 and Table 4 indicating the differences between the annual probabilities that Black (and Hispanic) dropouts participate in a training activity and the corresponding probability that non-Hispanic White dropouts (the baseline group) participate. In computing these estimates, we set the values of all other predictors to their sample means. In describing our results we focus on those coefficients which imply a difference of at least one percentage point in the annual probability of obtaining

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[13] In calculating these estimates of the impact of the GED on the annual probability of particicipating in a training activity, we set the values of all time-invariant predictors to their sample means.

training, post-secondary education, or military service.

Company Training

Figures 1a and *1b* show that the probability that school dropouts obtain company training in the first years after leaving school is almost zero. This probability does increase with age, but the probability that permanent dropouts obtain company training in the tenth year after leaving school is still less than .01.

Obtaining a GED has no statistically significant impact on the probability that male dropouts obtain company training. Model 2 in *Table 3* shows that obtaining a GED does increase the probability that female dropouts obtain company training, with the impact largest for those females who completed the fewest years of schooling before dropping out. While the annual impact is small, the cumulated effect over a decade explains the 9 percentage point difference reported in *Table 2* between the percentages of female permanent dropouts and female GED recipients who obtained some company training.

Non-company Training

As explained above, non-company training includes training provided by government and by proprietary schools. *Figure 2a* shows that male dropouts who obtained a GED were more likely to obtain non-company training before receipt of the credential than were permanent

dropouts with the same observed characteristics. The difference is not only in the value of the intercept, but also in the shape of the training-experience profile. The probability of obtaining non-company training declined in the first years after dropout for permanent dropouts while it held steady for dropouts who subsequently obtained a GED. This figure also illustrates that acquisition of a GED increases the probability that male dropouts obtain non-company training. However, Model 3 in *Table 3* shows that the GED coefficient is not significantly different from zero at the α=.10 level.

Model 3 in *Table 3* also shows that Black and Hispanic male dropouts were one to two percentage points more likely to obtain non-company training each year than were White male dropouts. Finally, the estimated coefficient on PRE_87_{it} in Model 3 indicates that male dropouts were three percent more likely to obtain non-company training in each year up to 1988 than in subsequent years. One explanation for this pattern could be that males tend to get non-company training soon after dropping out, so their training participation in later years of the survey is minimal.

Figure 2b shows that receipt of a GED is associated with a large initial increase (from .04 to .13) in the probability that female dropouts obtained non-company training. The impact declines over time, but even six years after receipt of the credential (ten years after dropping out), females who obtained a GED were more likely to obtain non-company training than they would have without the credential. The shape of the predicted profile -- the large initial impact, tailing

off over time -- suggests that many female dropouts may have obtained a GED in order to gain immediate access to non-company training or to Pell grants to pay for such training.

Model 4 in *Table 3* shows that Black and Hispanic female dropouts were two to three percentage points more likely to obtain non-company training each year than were White female dropouts. One possible explanation for the especially high probability that Black and Hispanic dropouts of both genders obtained non-company training is that they may have seen this as a strategy for overcoming discrimination in the labor market.

College

Figures 3a and *3b* show that acquisition of a GED increases the probability of college attendance initially by about two percent for both males and female dropouts, and the magnitude of the increase grows over the next several years, with the rate of growth faster for female GED recipients than for male recipients. The other two prototypical profiles (represented by dotted and dashed lines) are indistinguishable from the horizontal axis as all fitted probabilities are zero or very close to zero. While the impact of GED acquisition on the probability of college attendance in any year is modest, the cumulation over a decade explains the large difference in the percentages of permanent dropouts and GED recipients who had some college education by age 26.

Models 5 and 6 in *Table 4* show that the size of the increase in the probability of attending

college associated with GED acquisition is largest for those male and female dropouts with the least number of years of completed schooling. One possible explanation is that this is the group with the greatest need to signal ability to do college work by passing the GED battery of exams.

Military Service

The probability that male permanent dropouts served in the military is very low -- in fact only three percent of this group had any military service. In contrast, 21 percent of GED recipients had some military service (*Table 2*). The results of the estimated probit model (Model 7 in *Table 4*) show that three complementary factors help explain the difference. First, acquisition of a GED is associated with an increased probability of military service. Second, the more years of schooling a dropout completed, the greater the probability of military service, and dropouts who obtained a GED tended to have completed more schooling before dropping out than did permanent dropouts. Third, the positive coefficient on the variable, $GOTGED_i$, indicates that GED recipients were more likely to serve in the military, even if they had not obtained the credential, than were permanent dropouts with the same observed characteristics.[14] The likely explanation is that those dropouts who subsequently obtained a GED scored better on the battery of tests used to screen applicants for military service than did permanent dropouts.

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[14] Evaluated at the sample means of all explanatory variables, the quantitative impacts of GED, GOTGED, and DROPHGC on the probability of serving in the military service in any year are very small. The coefficients on the three variables are approximately the same size, however, indicating that their contributions to explaining why GED recipients were 18 percentage points more likely than permanent dropouts to have served in the military are of the same order of magnitude.

Summary

Our analyses of longitudinal data show that the cumulated differences between permanent dropouts and GED recipients in training and college enrollment at age 26 that are displayed in Table 2 do not stem primarily from differences between permanent dropouts and GED recipients at the time they left school. The probability of obtaining military service is an exception to this pattern.

Receipt of a GED is important in improving dropouts' access to college and to non-company training. In other work we have shown that college pays off in the labor market for GED recipients.[15] Consequently, appropriate advice to give to a school dropout would be that obtaining a GED makes sense so long as the dropout thinks of this as the first step with college as the second step. It is disturbing, however, that less than 20 percent of GED recipients had obtained any college education through the age of 26 (Table 2). This figure contrasts sharply with the statements of two-thirds of GED test-takers that they plan further study after obtaining the GED credential (GED Testing Service, 1995, p. 25).

The evidence on the labor market payoff to non-company training is mixed. Grubb (1993) finds that training in proprietary schools has only a small impact on the earnings of high school graduates. He conjectures that the large standard errors associated with his estimates stem from large variation in the quality of proprietary training programs. Lynch (1992) finds a positive effect of non-company training on wages. Given the equivocal nature of the evidence, it is not

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[15] See Murnane, Willett, and Tyler (1996), which uses data from High School & Beyond.

clear whether advising a school dropout to obtain a GED in order to gain entry to a non-company training program makes sense or not.

Our results are consistent with Cameron & Heckman's (1993a,b) education and training results for males and extend them to females. There is a difference in emphasis, however. They emphasized that GED recipients obtained less post-secondary education than conventional high school graduates. We focused on the question of whether acquisition of a GED improved access to post-secondary education and training for school dropouts.

In interpreting the patterns reported in this paper, it is important to keep in mind that they reflect responses to the institutional environment that school dropouts face. One aspect of this environment is that acquisition of a GED is the only formal educational option open to most dropouts. A second is that a high school diploma or a GED is required to obtain access to most human-capital-enhancing activities. This paper provides no evidence either on the wisdom of the present institutional arrangements or on the attractiveness of alternatives. The paper does show that, in the present institutional environment, acquisition of a GED increases the probability that school dropouts attend college and participate in non-company training programs.

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Table 1: Sample means (and standard deviations) of selected characteristics, for permanent dropouts, GED recipients, and high school graduates, by gender.

	Males			Females		
Variable	Permanent dropouts N = 594	GED holders N = 324	HS grads N =1897	Permanent dropouts N = 439	GED holders N = 260	HS grads N =2010
White	0.50	0.46	0.59	0.50	0.60	0.57
Black	0.26	0.31	0.27	0.25	0.19	0.27
Hispanic	0.24	0.23	0.14	0.25	0.21	0.16
Grade in high school at dropout	8.78 (1.38)	9.06 (1.25)	----	8.98 (1.40)	9.35 (1.19)	----
Mother's highest grade completed	9.21 (3.24)	10.25 (2.97)	11.38 (3.00)	8.96 (2.98)	10.06 (2.96)	11.13 (2.99)
Age at dropout from high school	16.35 (1.34)	16.65 (1.18)	----	16.19 (1.35)	16.28 (1.14)	----
Age when obtained GED	----	19.32 (2.64)	----	----	19.93 (3.13)	----

Table 2: Cumulative participation in human-capital-enhancing activities as of age 26, for permanent dropouts, GED recipients, and high school graduates, by gender.

	Males			Females		
Type of Activity	Permanent dropouts N = 603	GED holders N = 315	HS grads N =1897	Permanent dropouts N = 459	GED holders N = 240	HS grads N =2010
Company Training						
% with None	96.0	89.5	79.8	94.3	85.4	84.6
% with 1-500 Hrs	3.5	8.3	17.0	4.8	13.3	13.9
% with >500 Hrs	0.5	2.2	3.2	0.9	1.3	1.5
Median Hrs for those with training	129.83	129.90	99.8	80.18	60.04	57.07
Mean Hrs for those with training	376.86	352.08	318.37	252.84	228.96	185.67
Non-Company Training						
% with None	77.8	53.0	65.5	75.2	53.3	61.2
% with 1-500 Hrs	15.4	24.8	18.5	17.4	22.1	20.4
% with > 500 Hrs	6.8	22.2	16.0	7.4	24.6	18.4
Median Hrs for those with training	306.08	478.47	418.70	229.37	524.88	451.87
Mean Hrs for those with training	491.80	633.65	729.02	442.06	702.10	743.71
Years in College						
% with No College	100	85.7	51.4	100	80.8	50.4
% with Some Coll., but no Degree	0.0	10.1	22.0	0.0	16.1	22.0

% with Associate's Degree	0.0	3.9	6.6	0.0	2.3	8.5
% with at least a Bachelor's Degree	0.0	0.3	20.0	0.0	0.8	19.1
Years in Military						
% with None	96.4	78.7	83.0	99.6	99.6	97.7
% with 1-3	2.0	11.0	6.1	0.0	0.4	1.1
% with 4 or more	1.6	10.3	10.9	0.4	0.0	1.2

Table 3: Probit coefficients and associated standard errors from models predicting the probability that dropouts obtained company training (columns 1 and 2) or non-company training (columns 3 and 4).

	Company Training		Non-company Training	
Model	1 Males	2 Females	3 Males	4 Females
GOTGED	0.131 (0.323)	0.060 (0.187)	0.025 (0.157)	-0.036 (0.171)
BLACK	-0.353* (0.164)	-0.218 (0.147)	0.154* (0.076)	0.321** (0.076)
HISPANIC	0.148 (0.160)	0.042 (0.135)	0.226** (0.086)	0.207* (0.080)
DROPHGC	0.182** (0.062)	0.069 (0.050)	0.014 (0.023)	0.021 (0.022)
MOMED	0.027 (0.022)	0.071** (0.021)	0.025* (0.013)	-0.002 (0.012)
POTEXP	0.050 (0.061)	-0.035 (0.070)	-0.164** (0.036)	-0.149** (0.040)
$POTEXP^2$	0.004 (0.004)	0.007~ (0.004)	0.014** (0.003)	0.012** (0.003)
GED	0.327 (0.313)	0.328~ (0.198)	0.145 (0.117)	0.691** (0.122)
POTEXP after GED			0.003 (0.045)	0.104* (0.045)
$POTEXP^2$ after GED			-0.004 (0.005)	0.003 (0.004)
DROPHGC*GED	-0.065 (0.097)	-0.226** (0.079)		
GOTGED*POTEXP			0.162** (0.059)	0.077 (0.068)
$GOTGED*POTEXP^2$			-0.012* (0.005)	-0.007 (0.005)
UPRE	-0.130 (0.185)	-0.249 (0.183)	0.466** (0.105)	0.138 (0.107)

CONSTANT	-3.489** (0.363)	-2.639** (0.371)	-2.059** (0.154)	-1.757** (0.168)
ρ	0.420	0.254	0.214	0.136
# person-years	9171	7283	9171	7283
# persons	918	699	918	699
Predicted impact of GED acquisition on the probability of participating in a training activity in the 3rd year after receipt of the credential	0.003	0.005	0.014	0.042
Predicted impact of BLACK on the probability of participating in a training activity	-0.002	-0.003	0.011	0.028
Predicted impact of HISPANIC on the probability of participating in a training activity	0.001	0.001	0.016	0.018

~ = p<.10
* = p<.05
** = p<.01

Table 4: Probit coefficients and associated standard errors from models predicting the probability that dropouts attended college (columns 1 and 2) or served in the military (column 3).

	Attended College		Military Service
Model	5 Males	6 Females	7 Males
GOTGED	-0.310 (0.503)	-0.565 (0.425)	0.888** (0.159)
BLACK	-0.402* (0.178)	-0.237 (0.212)	-0.116 (0.127)
HISPANIC	0.101 (0.209)	0.435~ (0.235)	0.165 (0.172)
DROPHGC	0.350* (0.147)	0.422** (0.148)	0.499** (0.049)
MOMED	0.075* (0.031)	0.103** (0.034)	0.028 (0.025)
POTEXP	-0.009 (0.074)	-0.103~ (0.061)	0.184** (0.070)
$POTEXP^2$	-0.004 (0.006)	0.002 (0.005)	- 0.035** (0.006)
GED	2.315** (0.502)	2.659** (0.477)	0.676** (0.168)
POTEXP after GED	0.148* (0.072)	0.242** (0.057)	- 0.253** (0.069)
$POTEXP^2$ after GED	-0.010 (0.006)	-0.018** (0.005)	0.028** (0.007)
DROPHGC*GED	-0.320~ (0.163)	-0.352* (0.160)	
CONSTANT	-3.928** (0.368)	-3.827** (0.365)	- 4.698** (0.266)
ρ	0.537	0.516	0.819
# person-years	7698	6126	9171

# persons	917	699	918
Predicted impact of GED acquisition on the probability of participating in a training activity in the 3rd year after receipt of the credential	0.032	0.049	0.000
Predicted impact of BLACK on the probability of participating in a training activity	-0.000	-0.000	-0.000
Predicted impact of HISPANIC on the probability of participating in a training activity	0.000	0.000	0.000

~ = $p<.10$
* = $p<.05$
** = $p<.01$

Figure Legends

Figure 1: Fitted profiles of probability of obtaining company training

Figure 2: Fitted profiles of probability of obtaining non-company training

Figure 3: Fitted profiles of probability of attending college

Figure 1: Company Training

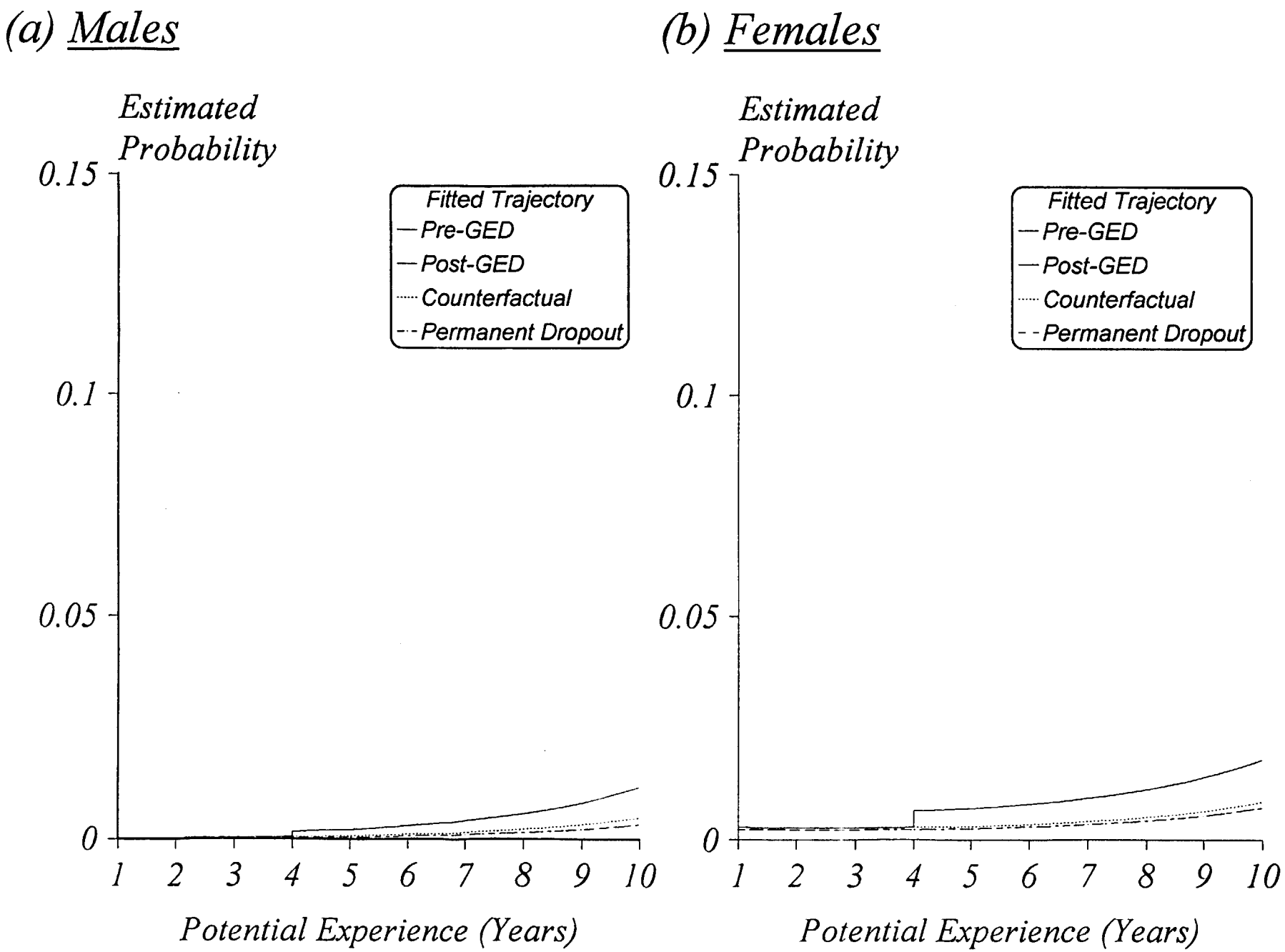

Figure 2: Non-Company Training

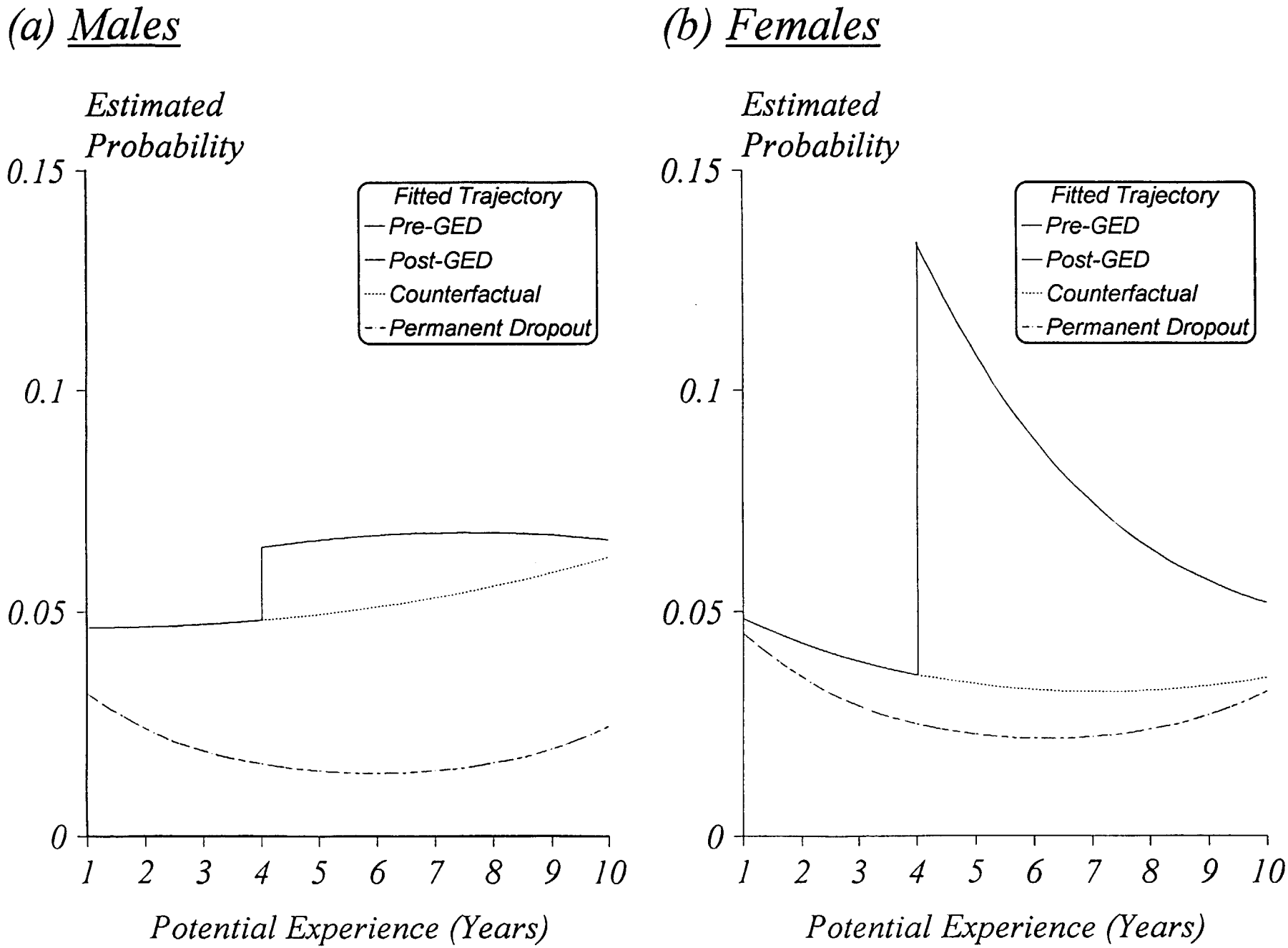

Figure 3: Attending College