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Parental Transfers, Student Achievement, and the Labor Supply of College Students

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Abstract: Using nationally representative data from the NLSY97, financial motivations for and the effects of employment on U.S. college students' academic performance are examined. While it is expected that fewer financial resources and a higher cost of college cause greater student employment, the data indicate that the number of hours a student works per week is unaffected by either the level of parental transfers or the cost of schooling. Contrary to existing evidence that a greater number of hours worked leads to poorer academic performance, the number of hours worked per week does not negatively affect a student's GPA and may actually improve it.

JEL Classification: D1, I2, J22

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I. Introduction

When college students lack adequate resources to cover college expenses due to insufficient parental transfers and borrowing constraints, they may participate in market work as a means of financing their studies. Federal and state work study programs were designed to subsidize some of this employment in order to help more students afford college. Yet, there is some debate as to whether college student employment is beneficial or detrimental to students' academic performance. College student employment may be beneficial if it provides students with valuable work experience. Stephenson (1981); Michael & Tuma (1984); Ruhm (1995, 1997); Light (1999, 2001); and Neumark & Joyce (2001) all find positive effects of student employment on future outcomes, holding schooling constant. However, college employment may also have a detrimental effect as time spent in market work reduces time available for the accumulation of schooling-related human capital. In addition, fatigue from extensive employment hours may reduce the productivity of schooling-related activity that does occur (Oettinger 1999). Loury and Gorman (1995) as well as Jones and Jackson (1990) find that college grades, one measure of schooling-related human capital, have a substantial positive effect upon early career earnings. Therefore, an examination of the effect of employment on student achievement as measured by student grades is important.

There have been several studies of the relationship between market work and academic achievement in both high school and college. Ruhm (1995, 1997) and Tyler (2003) find that employment while in high school has a negative effect on both the number of years of schooling completed and 12^{th} grade math achievement. Oettinger (1999) finds that the grades of minority students suffer the most from working long hours while in high school. Paul (1982) finds that employment while in college negatively affects grades in macroeconomic principles courses.

Ehrenberg & Sherman (1987) find that weekly hours worked decrease the probability that a student enrolls in college in a subsequent year and, for those who do enroll, reduces the probability that they graduate on time. However, they find no effect upon college GPA. More recently, Stinebrickner & Stinebrickner (2003) and Oettinger (2005) provide evidence that working while in college has a harmful effect on a student's grade point average (GPA).

This paper improves upon several limitations of the college employment studies. First, these studies are not representative of all college students. Paul (1982) focuses only on grades in macroeconomics principles courses at one college, Ehrenberg & Sherman (1987) examine only male high school graduates that are enrolled in college full-time, and Stinebrickner & Stinebrickner (2003) and Oettinger (2005) each examine students from only one college. This paper attempts to remedy this deficiency in the literature by using a nationally representative sample of first-year college students from Rounds 1-6 of the National Longitudinal Survey of Youth 1997 (NLSY97) to provide results applicable to the general college-age population.

Second, these studies pay very little attention to the financial motivations for college student employment, and the evidence they provide is mixed. Dustmann and Micklewright (2001) and Pabilonia (2001) find that middle and high school students who work more receive lower parental transfers than their peers who do not work or who work fewer hours. Similar to those findings, Oettinger (2005) observes that college students work more if parents provide less financial support. Wolff (2005), however, finds that parental transfers have no effect on the employment of 16-22 year olds in France, although he makes no distinction between high school and college students. The need to pay for schooling is an important motivation for college student employment that does not apply to high school students. College students face borrowing constraints because guaranteed student loan maximums are set well below the full cost of college, and financial aid awards (including guaranteed student loan awards) are not adjusted in the face of parents' unwillingness to pay. If parental transfers are insufficient to cover the cost of postsecondary schooling, students may turn to employment to cover these costs.[1] This paper attempts to address these gaps in the literature by focusing on financial motives for college employment.[2]

To illustrate these plausible motives, a simple variant of a time allocation model with parental transfers is presented. In this model, a student allocates his time between schooling and market work while parents simultaneously make their own consumption and transfer decisions. Thus, parental transfers are treated as endogenous to schooling and work decisions as in Keane and Wolpin (2001) and Kalenkoski (2005b), but in contrast to Oettinger (2005), who treats parental transfers as exogenous. The model motivates testing of several hypotheses. First, smaller parental transfers result in longer hours worked while in college, all else ─ including the price of schooling net of scholarships ─ held constant. Second, an increase in the net price of schooling, holding parental transfers and everything else constant, leads to an increase in hours worked. Finally, an increase in hours worked leads to lower student achievement, all else equal.

Thus, this paper attempts to answer two questions. First, do fewer parental resources or a higher net price of schooling result in greater labor supply by college students? Second, does college students' increased labor supply while in school result in lower academic achievement, as measured by their GPA? To answer these questions, single equation, instrumental variable estimation techniques that address sample selection and endogenous right hand side variables are

[1] Kalenkoski (2005a) shows that a substantial portion of parents transfer less than their Expected Parental Contribution (EPC) towards their child's postsecondary education, suggesting that students must either choose a lower cost schooling alternative or fund the higher-priced schooling some other way, perhaps through student employment.

[2] Students may work to support living expenses when setting up a new household in a dorm or apartment. This study will not consider these effects or the costs of room and board due to lack of data.

used. Two primary equations are estimated: 1) an hours worked equation in which the predicted parental transfer and the predicted net price of schooling enter as the key right hand side variables, and 2) a college GPA equation in which a predicted hours worked variable enters as the key right hand side variable. The results indicate that the data do not support the hypotheses that decreased parental transfers and an increased net price of schooling result in increased hours worked. Students may be working for extra spending money or to support general living expenses rather than to finance their postsecondary education, suggesting that the motivations for subsidizing work study jobs be examined. The data also do not support the hypothesis that increased work hours negatively affect a student's grades. In fact, the evidence suggests that working while in college actually improves academic performance. Therefore, it appears that work study programs, while not actually aiding student financing of college tuition and fees, may be beneficial in terms of students' academic achievement. The next section presents the theoretical motivation for the analysis. Section III describes the data. Section IV presents the econometric model. Section V presents the results. Finally, Section VI concludes this paper.

II. Theoretical Motivation

A simple theoretical model illustrates the potential financial motives behind college student labor supply. Let L be the fraction of time a student spends working, and let 1-L be the fraction of time the student spends in schooling-related activity, such as in-class time (credit hours) and study time. For simplicity, the model abstracts from leisure time. Let academic achievement, A, be given by the function

$$A = A(1-L, \mu), \qquad (1)$$

where $\partial A/\partial(1-L) > 0$, that is, academic achievement is a positive function of student effort, and μ is a vector of background characteristics such as the child's ability, current human capital, and family's socio-economic characteristics that affect his production of academic achievement. There are two decision-makers in this model, a selfish child and an altruistic parent. The child's utility is given by

$$U_c = U_c(C_c, A), \qquad (2)$$

where C_c is the child's consumption. This utility function is assumed to be strictly concave in C_c and A. Note that the child's utility is specified to depend directly on the child's academic achievement. There are several reasons that the child may care about academic achievement. First, higher achievement is likely to increase the child's future income. In this case A could be replaced with Y(A) in the utility function, where Y stands for future earnings and $Y'(A) > 0$. However, higher future earnings may not be the only reason the child may value academic achievement. Higher academic achievement may lead to more desirable future job characteristics or a better future quality of life. The child may also enjoy current consumption value of a college education. Rather than sort through all these possibilities, we leave utility in this general form. Assuming no borrowing against future earnings, the child's budget constraint is given by

$$wL + t = P_s(1-L) + C_c, \qquad (3)$$

where w is the child's wage, t is the transfer the child receives from the parent, and P_s is the price per unit of schooling that can be thought of as the cost per credit hour net of financial aid. While the assumption of no borrowing is not quite realistic, college students do face borrowing constraints given loan maximums that do not cover the full cost of schooling (Keane and Wolpin 2001) and loan awards that do not depend upon parental unwillingness to pay (Kalenkoski

2005b). In addition, there is little information in the NLSY97 on student loans. Therefore, this assumption is made to keep things simple and tractable.

The parent's utility is given by

$$U_p = U_p(C_p, U_c), \tag{5}$$

where C_p is the parent's consumption. The parent's budget constraint is given by

$$M_p = C_p + t, \tag{6}$$

where M_p is the parent's income, which is taken as exogenous.

It is assumed that the parent and child make their decisions independently, given their knowledge about the other party's decision rule. Thus, the child will choose the amount of time spent in market work, L, in order to maximize his or her utility, given the parent's transfer function. At the same time, the parent chooses t to maximize his or her utility, given the child's labor supply function. The parent's transfer function and the child's labor supply function can then be solved to determine the Nash equilibrium, L* and t*.[3]

In order to obtain reaction functions, it is assumed that the academic achievement function is given by

$$A = k(1-L) + \mu, \tag{7}$$

where k is a constant greater than zero and the background factors, μ, enter additively. It is also assumed that the child's utility function is Cobb-Douglas and is given by

$$U_c(C_c, A) = C_c^{\alpha} A^{1-\alpha}, \tag{8}$$

[3] There are several ways the model could be extended to account for multiple children. A crude way would be to redefine M_p as the portion of the parent's income that is available for this particular child and let it be a function of the number of siblings, e.g. $M_p = M_p(N)$, $dM_p/dN < 0$. Alternatively, consumption of siblings can be included as a separate term in the parents' utility function or it can be thought to be subsumed in the parents' consumption variable.

where α is a constant between 0 and 1 and measures the relative importance of the child's current consumption. Note that this specification does not allow for a "no schooling" choice as the empirical analysis focuses on individuals who have already chosen some positive level of postsecondary schooling. However, the possibility of the "no college" choice is accounted for in the empirical analysis using selection correction methods. Finally, it is assumed that the parent's utility function is also Cobb-Douglas and is given by

$$U_p(C_p, C_c, A) = C_p^{\beta}[C_c^{\alpha}A^{1-\alpha}]^{1-\beta}, \qquad (9)$$

where β is a constant between 0 and 1 and measures the relative importance of a parent's current consumption.

Rearranging (3) and substituting into (8) along with (7) gives

$$U_c(L) = [wL + t - P_s(1-L)]^{\alpha}[k(1-L) + \mu]^{1-\alpha}. \qquad (10)$$

The child chooses L to maximize (10). Rearranging the first order necessary condition for a maximum gives the student's labor supply (reaction) function:

$$L = [\alpha(w + P_s)(k + \mu) + (1-\alpha)k(P_s - t)]/[k(w + P_s)]. \qquad (11)$$

It can be shown that $\partial L / \partial t < 0$. That is, greater parental transfers mean less student labor supplied, all else equal. It can also be shown that $\partial L / \partial P_s > 0$. That is, given parental transfers, an increase in the price of schooling means more labor supplied, all else equal. Estimation of (11) in Section V will reveal whether the data support these predictions. Finally, it can be shown that the sign of $\partial L / \partial w$ is ambiguous. It is positive if parents transfer more than the cost of schooling and negative if parents transfer less than the cost of schooling.

Rearranging (6) and substituting along with the rearranged (3) and (7) into (9) gives

$$U_p(t) = (M_p - t)^{\beta}[(wL + t - P_s(1-L))^{\alpha}(k(1-L) + \mu)^{1-\alpha}]^{1-\beta}. \qquad (12)$$

The parent chooses t to maximize (12) given L. Rearranging the first order necessary condition for a maximum gives the parent's transfer (reaction) function:

$$t = [\alpha(1-\beta)M_p - L(\beta w + \beta P_s) + \beta P_s] / [\alpha(1-\beta) + \beta]. \qquad (13)$$

It can be shown that $\partial t / \partial L < 0$, $\partial t / \partial Ps > 0$, and $\partial t / \partial w < 0$. Thus, greater student labor supply leads to fewer parental transfers, a higher price of schooling leads to greater parental transfers, and a higher student wage leads to lower parental transfers.

The reaction functions (11) and (13) are then solved to determine the reduced form expressions for the optimal levels of L and t. In Section V, a reduced form equation for t is estimated and a predicted transfer is then generated and included as an explanatory variable in the regression for hours worked.

III. Econometric Model

The theoretical model presented in Section II provides the motivation for testing several hypotheses. First, fewer parental transfers lead to an increase in hours worked while in college, all else – including the net price of schooling – held constant. Second, an increase in the net price of schooling, holding parental transfers and everything else constant, leads to an increase in hours worked. Finally, an assumption of the model, based on previous empirical evidence, is that an increase in hours worked reduces student achievement, all else equal. To test these hypotheses, two primary equations are estimated:

$$h = X\beta_1 + \sigma_1 e_1 \qquad (14)$$

$$A = h\beta_2 + Z\beta_3 + \sigma_2 e_2 \;, \qquad (15)$$

where h is a student's weekly hours worked; A is the student's GPA; X is a vector of explanatory variables that includes parental transfers, the price of schooling net of financial aid, measures of labor market conditions, and demographic characteristics to control for heterogeneous preferences; Z is a vector of personal and family characteristics that may affect individual production of academic achievement; β_1 and β_3 are vectors of coefficients; β_2 is the coefficient on hours worked; σ_1 and σ_2 are unknown scale parameters; and $e_i \sim N(0,1)$, i = 1, 2. Although e_1 and e_2 are likely to be correlated since there are potentially unobserved personal characteristics that affect both hours worked and academic achievement, equations (14) and (15) are separately, not jointly, estimated due to the need to address selectivity concerns to be described below.

Assuming e_1 is uncorrelated with X and e_2 is uncorrelated with Z, equations (14) and (15) could be estimated using OLS. OLS estimates of β_1, β_2, and β_3 are likely to be biased, however, if the error terms in (14) and (15) are correlated with X and Z. One reason for concern is that, although the theoretical model treats the net price of schooling as exogenous, actual tuition and fees charged minus financial aid per term (the net price variable used in the analysis) could be considered a schooling expenditure variable that depends on both the quantity and quality of schooling chosen. Thus, a predicted variable is used to replace this potentially endogenous variable in the relevant equations. Including such a predicted variable controls not only for the cost of schooling but also for the quantity and/or quality of schooling chosen. Another endogeneity concern relates to parental transfers. Parental transfers are potentially endogenous as they are chosen simultaneously with the student’s hours worked in the theoretical model. Therefore, they must also be replaced by a predicted variable in these equations. Finally, the model assumes that a student’s GPA is a direct function of chosen hours worked and so is simultaneously chosen with hours worked. Thus, the hours worked variable is endogenous in the GPA equation and a predicted hours worked variable replaces the endogenous one in this equation.

A second reason OLS coefficient estimates may be biased is that, for data reasons to be discussed in the next section, (14) and (15) are estimated using selected samples. Equation (14) suffers from two sources of sample selection bias. The first source of selection bias is that the sample includes only individuals who enroll in postsecondary school. This is because we want to test predictions regarding financial motivations for employment and the effect of employment on GPA for individuals who are enrolled in college. However, there are individuals in the analysis sample who are not enrolled and are thus at a corner solution. Let s* be a latent variable measuring the benefits of attending postsecondary school. A postsecondary enrollment selection equation can be written:

$$s^* = V\theta_2 + v_2, \qquad (16)$$

where V is a vector of explanatory variables that includes X plus one additional variable necessary for identification to be described in the data section, θ_2 is a vector of coefficients, $v_2 \sim N(0,1)$ and $corr(v_1, v_2) = \rho$. Although s* is unobserved, if $s^* > 0$ then the child enrolls. Let S be an indicator variable equal to 1 if $s^* > 0$ and equal to 0 otherwise. S is observed for all individuals.

The second source of selection bias is that the sample includes only those enrolled individuals who work a positive number of hours. Let h* be a latent variable measuring the college student's desired hours of work:

$$h^* = X\theta_1 + v_1, \qquad (17)$$

where X is the vector of explanatory variables found in equation (14), θ_1 is a vector of coefficients and $v_1 \sim N(0,1)$. Note that h* is unobserved. However, if the desired hours of work are positive ($h^* > 0$), then a positive number of hours are worked. Let H be an indicator variable equal to 1 if $h^* > 0$ and equal to 0 otherwise.

An observation is a member of the select sample used to estimate the hours equation (14) if H = 1 and S = 1. Thus, the regression function for the hours equation (14) for this subsample may be written as

$$E(h \mid X, \psi) = X\beta_1 + \sigma_1 E(e_1 \mid X, \psi) \qquad (18)$$

where ψ denotes the joint outcome of the two selection rules given by (16) and (17). Following Tunali (1986), (18) can be rewritten

$$E(h \mid X, \psi) = X\beta_1 + \alpha_1\lambda_1 + \alpha_2\lambda_2 + \sigma_1 w_1 \qquad (19)$$

where α_1 and α_2 are regression coefficients, $w_1 = e_1 - \alpha_1\lambda_1 - \alpha_2\lambda_2$ with $E(w_1 \mid h^* > 0, s^* > 0) = 0$, and λ_1 and λ_2 are highly nonlinear functions of ρ, θ_1, and θ_2.[4] As Tunali (1986) notes, λ_1 and λ_2 are the double-selection analogs of the inverse Mill's ratio that arises in the context of single-selection.

The GPA equation (15) suffers from only one source of selection because GPA is available for all enrolled students, whether or not they were working. Thus this equation needs only one selectivity correction term and can be written

$$E(A \mid h, Z, \gamma) = h\beta_2 + Z\beta_3 + \eta\lambda + \sigma_2 w_2 \qquad (20)$$

where η is a regression coefficient, λ is the inverse Mill's ratio, γ is the outcome of the selection rule given by (16), and $w_2 = e_2 - \eta\lambda$ with $E(w_2 \mid s^* > 0) = 0$.

In order to estimate (19) and (20), the potentially endogenous variables need to be replaced by predicted variables and estimates of λ_1, λ_2, and λ must be constructed. Let $\hat{X}$ denote the vector that includes these predicted variables. To construct $\hat{\lambda}_1$ and $\hat{\lambda}_2$, a two stage procedure is followed. First, a conditional bivariate probit model is estimated, where S and H

[4] See Tunali (1986) for exact formulas.

are the dependent variables and V and X are the respective vectors of explanatory variables. The estimates $\hat{\rho}$, $\hat{\theta}_1$, and $\hat{\theta}_2$ are then substituted into the formulas for λ_1 and λ_2 to get the estimates $\hat{\lambda}_1$ and $\hat{\lambda}_2$. To construct an estimate of $\hat{\lambda}$ to include in the GPA equation, a similar two-stage procedure is followed. First, a probit model in which S is the dependent variable and V is the vector of explanatory variables is estimated. The estimate of $\hat{\theta}_2$ is then substituted into the formula for λ to get $\hat{\lambda}$. Thus, (19) and (20) become

$$E(h \mid \hat{X}, \psi) = \hat{X}\beta_1 + \alpha_1\hat{\lambda}_1 + \alpha_2\hat{\lambda}_2 + \sigma_1 w_1. \qquad (19')$$

$$E(A \mid \hat{h}, \hat{Z}, \gamma) = \hat{h}\beta_2 + Z\beta_3 + \eta\hat{\lambda} + \sigma_2 w_2. \qquad (20')$$

Note that $\hat{\lambda}_1$ and $\hat{\lambda}_2$ are identified in equation (19′) and $\hat{\lambda}$ is identified in (20′) because of nonlinearities in the formulas used to construct them and by the inclusion of one additional variable in V that is not included in X.[5] Note also that $\hat{h}$ is identified in equation (20′) due to labor market and financial variables described in the next section that are included in $\hat{X}$ but not in Z. Finally, note that the errors in both equations are heteroscedastic because of the inclusion of the selectivity correction terms. Thus, corrections for heteroscedasticity and for the substitution of predicted variables for potentially endogenous variables are needed. To obtain appropriate standard errors, a bootstrap method is used.[6]

It is also important to note that data limitations necessitate estimating the predicting equations for $\hat{X}$ using selected samples. This is because the net price of schooling and the level of parental transfers are observed only for enrolled individuals and positive values for parental

[5] See Tunali (1986).
[6] Standard errors are based on 200 replications.

transfers are observed only if students reported receiving them. Procedures similar to those used for estimating the GPA equation and the hours equation are used to estimate these predicting equations.

IV. Data

The primary data used in this analysis come from the NLSY97 geocode file Rounds 1 through 6. The NLSY97 youth respondents and one of their parents were first surveyed for Round 1 between January and October, 1997 and between March and May, 1998. This cohort of the NLSY97 is representative of the non-institutionalized U.S. population aged 12-16 on December 31, 1996 and included 8,984 youth respondents in the initial round. In subsequent years, only the youths were interviewed.

In 1997, only a few of the youth respondents had completed a college term (either a semester, trimester, or quarter). By Round 6, at least 3,062 of the youths had finished at least one term in college after receiving their high school diploma. The enrollment status of some participants could not be determined due to nonresponse in later collection rounds. After deleting these observations and also observations with missing information on other key variables, the sample is reduced to 5,970 individuals, 1,768 of whom have completed a college term. Table A1 in the Appendix gives means and standard deviations for the full NLSY97 sample and the sample used in our analysis. The background characteristics are very similar. However, the percentage of enrolled individuals is significantly lower in the analysis sample. Only respondents' first term college experience is examined in order to obtain the largest sample possible and to also insure that the college term dynamics are similar. In addition, it is important to investigate the effects of employment on academic achievement in the first term because students are more likely to drop out of college in the first year (Stratton, O'Toole, & Wetzel 2005) and college drop-outs have significantly lower earnings than college graduates. Thus, a pooled cross-section of students' first college experiences from the fall term of 1996 through the spring term of 2002 is examined.

Both part-time and full-time students are included in the sample because hours spent in schooling-related activity is chosen simultaneously with hours spent in market work in the model. Time spent in schooling-related activity is also more accurately captured as a continuous variable rather than a dichotomous one. Students have a wide range of credit hours for which they can register and can choose to study as much or as little as they like. According to the model, if one knows what happens to hours spent in market work one also knows what happens to hours spent in schooling-related activity.[7]

The two primary dependent variables used in this analysis are the student's GPA, a measure of student academic achievement, and hours worked. GPA is measured on a 0-4 scale. If the respondent reported his or her GPA on a scale of 100, 0-5, or 0-10, it was converted to a 0-4 scale. Since the analysis uses first-term college students who are most likely fulfilling core college requirements, students' choice of courses should not have a great effect upon GPA.

The hours worked variable is the number of hours worked during a specific week during the first college term. The week used for each term was chosen somewhere in mid-term to avoid the beginning of terms and final exams, when students are more likely to work fewer hours or not hold a job. The week chosen also depended upon the different college term systems reported. The weeks chosen were the first week in the months of February, May, October, and December.

[7] Sensitivity analyses using both separate part-time and full-time student samples and separate four-year college students and other college students were performed and the results were quite similar to those presented in the empirical results section.

Auxiliary dependent variables used in the selectivity correction procedures include three dichotomous variables for whether or not a respondent enrolled in college, whether or not a student received a parental transfer, and whether or not a student worked during his or her first college term.

The independent variables used in this analysis come from the NLSY97 and other data sources which have been matched to the NLSY97 using either the respondent's state of residence while in high school or the college identification variable (UNITID) available in the geocode version of the NLSY97. One of the primary explanatory variables used in the analysis is the dollar value of schooling-related parental transfers measured in 1997 dollars. The Consumer Price Index for All Urban Consumers (CPI-U) is used to convert all monetary values into 1997 dollars. This variable comes from a series of questions in the NLSY97 about the sources of financial assistance received by the student during the student's first term in college. Amounts that are included are financial aid received by a youth from both biological parents, his biological mother and stepfather, and/or his father and stepmother and that the youth was not expected to repay.[8] Sixty-six percent of first-term college students received a parental transfer with an average transfer received of $3,310 per term (see Appendix Table A1). This is quite close to the average transfer of $3,300 in Oettinger's (2005) single university sample although it is in 1997 dollars while Oettinger's average is in 2002 dollars. Recall that parental transfers are potentially endogenous as they are simultaneously chosen with hours worked and schooling in the theoretical model. The instrument used to predict transfers is the average in-state tuition for four-year public institutions in the respondent's high school state of residence, obtained from the Digest of Education Statistics and converted to 1997 dollars. In-state tuition is expected to affect

[8] A family transfer, which includes parental transfers and any transfers from other family members, was also explored but the results were virtually identical.

parental transfers because in-state public universities usually are the lowest cost option for students and this cost may be the baseline to which their parents compare tuition prices. The average state grant per 18-24 year old, as it reflects state financial aid to postsecondary students, may also affect parental transfers as grants are likely substitutes for parental transfers (Kalenkoski 2005a). This variable is calculated by dividing total state grants from the Digest of Education Statistics by state population aged 18-24 from the U.S. Bureau of the Census.

Another key explanatory variable is the net price of schooling. When deciding which college to attend students are faced with a sticker price and, if applicable, an offered financial aid package for each school under consideration. This variable is defined to be tuition and fees minus scholarships for the first college term in which the student is enrolled and is measured in 1997 dollars. Information on tuition and fees for each institution comes from the Integrated Postsecondary Education Data System (IPEDS) maintained by the National Center for Education Statistics. IPEDS data are matched to the NLSY97 data using a college identification number. The dollar value of scholarships received by students is constructed from the NLSY97 youths' responses to the same series of questions as the parental transfer variable. Loans are excluded from the net price of schooling measure for several reasons. First, they cannot theoretically be subtracted from the price as are scholarships because they need to be repaid. Second, the number of observations reporting positive loan amounts is quite small. However, as a robustness check, such a measure was constructed but not well predicted. Because the net price of schooling variable is potentially endogenous, the respondent's number of siblings from Round 1 of the NLSY97 is used as an instrument. This variable is intended to measure parental resources available to support the respondent's postsecondary education and is considered by colleges when determining financial aid awards. It thus affects the net price of schooling offered to the student. However, a potential concern regarding the use of this instrument is that parents may trade off the quality and quantity of children (Becker 1976). If the number of children is chosen simultaneously with parental expenditures on postsecondary education, these instruments are invalid. However, given the length of time between birth and postsecondary attendance and the uncertain nature of financial aid awards over such long time horizons, this concern appears to be minimized.[9]

Parents' income and net worth as measured in 1996 are provided in the first round of the NLSY97 and are included as measures of the parents' financial resources. There are a large number of missing values for these variables. Therefore, missing values are recorded as zeros and missing data indicator dummy variables for parents' income and net worth are included. Missing values are an even bigger problem for the respondent's wage as wage information is missing for most respondents in the NLSY97. Thus, two variables are included to proxy for the respondent's wage. The first is the average weekly wage in the state of the respondent's high school residence, converted to 1997 dollars. This comes from the Bureau of Labor Statistics' Covered Employment and Wages (ES-202) program. The second variable, perhaps more applicable to young workers, is the effective minimum wage. The effective minimum wage is defined as the maximum of the state and federal minimum wages. As a measure of labor market conditions, the unemployment rate in the state of the respondent's high school residence from the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) program is included. Another labor market variable used is an indicator for whether or not the state where the respondent's high school is located had a work study program throughout the period under study. This variable is constructed using historical information on state work study programs collected

[9] In an attempt to limit the number of instruments needed, a "cost to student" variable equal to the net price of schooling minus parental transfers was created and a predicting equation estimated. However, this variable was not well-predicted.

by the authors directly from the relevant state agencies. All of the labor market variables are used to identify hours in the GPA equation.

Personal background variables, such as age on December 31, 1996, race, whether or not the respondent is Hispanic, mother's education as of 1997, father's education as of 1997, the respondent's high school grades from transcripts, and the respondent's ASVAB scores, are included to control for heterogeneous preferences and productivity in producing academic achievement.[10] Finally, the percent of the state population that is of traditional college age (18-24), a proxy for college acceptance rates, is included to identify the conditional bivariate probits estimated as part of the selectivity correction procedures. These data come from the State and County Quick Facts published online by the U.S. Bureau of the Census.

V. Results

Table 1 shows results from the predicting equation regressions for the net price of schooling and parental transfers. Recall that the net price of schooling is potentially endogenous as it varies with the quantity and quality of schooling and that its predicting equation is estimated on the select sample of students who first enrolled in college during the period 1996-2002. Thus, a selectivity correction term, λ, is also included as a regressor in this equation. Appendix Table A2 gives the results of the enrollment probit estimation used to create this term. The selectivity correction term is identified in the net price of schooling equation by a variable measuring the percent of the population aged 18-24, a proxy for college acceptance rates that is included in the enrollment equation but excluded from the net price of schooling equation. The selectivity correction term is also identified by nonlinearities in the formula used to construct it.

[10] ASVAB scores have a mean latent ability score of 0 and a standard deviation of 1.

The instruments in this predicting equation are jointly significant at the 1% level, thus identifying the predicted net price of schooling in the hours equation. Two of the three are also individually statistically significant, as expected. The average in-state tuition for public four-year institutions is a positive and significant predictor of the net price of schooling. If average in-state tuition were to rise by $1, the net price of schooling faced by the family would increase by 27 cents. The average state grant per 18-24 year old is also statistically significant. For every hundred dollars of state grants per 18-24 year old made available, the net price of schooling faced by a family falls by $200. Each additional sibling lowers the net price of schooling by $222. This is reasonable given that colleges and universities take into account the number of siblings in college when awarding financial aid.

Several family background variables are also significant predictors of the net price of schooling. Having a parent with a four year degree or having parents with higher income or net worth positively affects the net price of schooling. These results are not surprising as more educated and well-off parents can afford and may be willing to pay more for their children's education. Their children are also less likely to receive need-based financial aid.

Parental transfers are also endogenous as they are chosen simultaneously with hours worked in the theoretical model. The predicting equation for these transfers is found in the second column of Table 1. Note that because the transfer equation is estimated on the select sample of students who enrolled in a first term of college during the period 1996-2002 and reported receiving a transfer, two selectivity correction terms, λ_1^t and λ_2^t, are included as regressors. Appendix Table A3 provides the results of the estimated conditional bivariate probit used to create these terms. The conditional bivariate probit is identified by excluding the percent of the population aged 18-24 from the transfer receipt equation but including it in the enrollment equation. The two selectivity correction terms are identified on the basis of nonlinearities in the formulas used to construct them.

Not surprisingly, the results in Table 1 indicate that parental transfers are positively and significantly affected by having parents with high net worth. In addition, they are positively affected by mother's education. The instruments in the parental transfer equation are jointly significant at the 1% level, thus identifying the predicted parental transfer in the hours worked equation. In addition, average in-state tuition is also individually significant and positive, which supports the notion that parental transfers increase as the price of their child's lowest cost schooling option increases.

Table 2 presents the results for three specifications of the hours worked equation: OLS estimates in column I, a specification in column II that includes predicted variables but not selectivity correction terms, and the theoretically preferred specification in column III that includes predicted variables and selectivity correction terms. Recall that OLS estimates are suspect because of the potentially endogenous transfer and net price variables and the select sample of working students. Note that in this specification neither the net price of schooling nor the parental transfer is a statistically significant determinant of hours worked, suggesting that students are not working to pay for the cost of schooling. Age, however, is statistically significant, suggesting that older first term students work more than younger ones. The results also suggest that the more education a student's father has, or the greater the parents' net worth, the fewer the hours the student works. Also, students with better high school grades work less while in college. Finally, three of the labor market variables are significant. The greater the state unemployment rate, the poorer are economic conditions and the greater is the number of hours a student works, perhaps through fear of losing his job. Similarly, if the state average wage is capturing general economic conditions, a higher state average wage leads to fewer hours worked because a student's employment is more secure in better economic times.

The results in Column II control for the endogeneity of the net price of schooling and parental transfers in the hours worked equation but do not control for selection into the working student sample. Again, neither the net price of schooling nor the parental transfer has a statistically significant effect on the number of hours a student works. Likely students are instead working to pay for living expenses or other consumption. This result differs from that of Oettinger (2005) who finds a statistically significant decrease in college students' hours worked as the amount that parents contribute rises, although he treats parental transfers as exogenous.

Note, however, that the point estimates of the coefficients on these variables have changed substantially. The coefficient on the net price of schooling falls from 0.178 to -0.412, while the coefficient on the parental transfer falls from practically 0 to -0.511, suggesting endogeneity of these variables plays some role. Other variables with significant coefficient estimates in the OLS specification have similar point estimates in specification II, although they are less precisely estimated in specification II as a result of using predicted variables and bootstrapped standard errors (see Tunali 1986).

When both predicted variables and selectivity correction terms are included in specification III, again neither the predicted net price of schooling nor the predicted parental transfer is significant. This result is thus robust across all specifications, providing substantial evidence that students are not motivated by the need to pay for schooling expenses or insufficient parental transfers to work more hours. The point estimates on these predicted variables are also quite similar to those in specification II. It is important to note, however, that nothing is statistically significant at conventional levels in specification III due to the much larger standard errors generated by the two-stage estimation procedure that deals with both potentially endogenous regressors (see Tunali 1986) and selection correction. However, the t-statistic for λ_1^w is greater than one, providing weak evidence of selection, and it is informative to look at changes in the point estimates of key coefficients as a result of correcting for both endogeneity and selectivity. The point estimates for age, the father having a high school degree, and the state unemployment rate change little. However, the effect of a father having a four year degree and the effect of net worth change sign. There is also a substantial change in the estimated effect of high school grades on hours worked. This estimated coefficient is less than half the size of the estimates in either of the other specifications. All of these changes suggest that students with non-college-educated fathers, parents with lower net worth, and those who have lower achievement in high school are more likely to work while in college.

Note that besides the large standard errors generated by the two-stage procedure, an additional potential contributor to the lack of statistically insignificant results in specification III is a potential collinearity problem caused by the selectivity correction terms being highly correlated with the other included variables. Recall that these terms are nonlinear functions of the estimated coefficients and explanatory variables in the enrollment/work bivariate probit model, where most of the explanatory variables are the same as those in the predicting and hours worked equations and that they are identified in the hours worked equation primarily by nonlinearities in their formulas due to the limited availability of instruments. Therefore, these selectivity correction terms may not adequately address selection and may even confound estimates.

Given these concerns with specification III, two predicted hours worked variables to be included in separate specifications of the GPA equation are constructed, one from hours worked specification II (predicted variable #1) and the other from hours worked specification III (predicted variable #2).

Table 3 presents three separate estimates of the GPA equation. The first set of estimates in Column I are the OLS estimates. In this specification, hours worked have no effect on a student's GPA, a result consistent with that found by Ehrenberg and Sherman (1987). Parents' net worth is only marginally statistically significant and economically insignificant, suggesting that an increase in parents' net worth of $10,000 increases a student's GPA by only .001. Perhaps this variable is simply capturing remaining family preferences toward education after controlling for parents' education. High school grades do have a significant positive effect, however. An increase in a student's high school GPA by 1.0 increases a student's first term college GPA by .172, suggesting that student academic ability and/or skills prior to the start of college have a significant impact on how well the student does in college. Similarly, a student's ASVAB standardized test score in arithmetic reasoning has a significant positive effect on a student's GPA.

Column II provides the results of the GPA equation that corrects for selection into college and the endogeneity of hours worked using a predicted hours worked variable based on the estimates in Column II of Table 2. Like the OLS estimates, hours worked have a statistically insignificant effect on a student's college GPA. The magnitude of the point estimate is increased substantially, however, from 0.001 to 0.017 compared to the OLS estimates, suggesting that correcting for selection into college and the endogeneity of hours worked is important. If significant, this estimate would suggest that an additional hour worked leads to an improvement in GPA by almost .02, a result quite different from the negative effects found by Stinebrickner and Stinebrickner (2003) and Oettinger (2005). The negative effect of being male and the positive effect of high school grades (measuring innate ability and/or previous human capital investments) on college GPA are also strengthened.

Column III of Table 3 presents the results of the GPA equation that corrects for selection into college and the endogeneity of hours worked using the theoretically preferred predicted hours worked variable based on the estimates in Column III, Table 2. In this specification, the hours worked coefficient has an estimated coefficient of 0.018 that is now marginally statistically significant. This positive estimate is inconsistent with previous estimates in the literature that are negative and statistically significant (Stinebrickner and Stinebrickner 2003; Oettinger 2005) and the assumption made in the theoretical model presented in this paper. However, a positive coefficient is reasonable if working while in college is complementary to the learning process. Perhaps working more hours causes students to better organize their time, appreciate the world of work and the value of their education, and/or is simply complementary to their chosen field. The estimated effects of being male and high school grades on GPA are again strengthened compared to the OLS estimates and even compared to the estimates using the alternative predicted variable. The results indicate that being male, high school grades, and hours worked while in school are all significant determinants of academic performance in college.

VI. Conclusion

Student work is often proposed as a means of financing a student's postsecondary education, and sometimes it is subsidized via state and federal work study programs. In this paper, several hypotheses regarding the financial motives and academic effects of college student employment are examined. First, this study investigates whether the net price of schooling faced by a student and his family positively affects the number of hours a student works. Regression results indicate, however, that the net price of schooling has no effect. Second, this study also examines whether the amount of schooling-related transfers received from parents negatively affects the number of hours a student works. Results indicate that the amount of parental transfers received also does not affect the number of hours a student works. Together these results suggest that students are working not to finance tuition and fees but rather personal consumption and/or living expenses while in college. Thus, work study subsidies may be financing such consumption and/or living expenses. This issue needs to be further examined by looking more closely at data on students participating in federal and state work study programs.

Finally, this study examines whether an increase in hours worked negatively affects a student's GPA and finds that rather than having a negative effect, additional hours worked have a positive effect on academic performance. This finding is important as it contradicts previous evidence in the literature that suggests a detrimental effect. It also suggests that federal and state work study programs may in fact be beneficial. However, this research is the first such study that uses nationally representative data. It also only focuses on one measure of academic performance and includes only the first-term of college experience. Thus, more research on the effects of college student employment using nationally representative data and exploring other measures of academic performance is needed.

References

Becker, G.S. & Tomes, N. (1976). Child Endowments and the Quantity and Quality of Children. *Journal of Political Economy* 84(4), S143-62.

Dustmann, C. & Micklewright, J. (2001). Intra-Household Transfers and the Part-time Work of Children. *Centre for Economic Policy Research Discussion Paper* No. 2796.

Ehrenberg, R.G. & Sherman, D.R. (1987). Employment While in College, Academic Achievement, and Postcollege Outcomes: A Summary of Results. *Journal of Human Resources* 22(1), 152-164.

Hotz, V.J., Xu, L.C., Tienda, M., & Ahituv, A. (2002). Are There Returns to the Wages of Young Men from Working While in School? *The Review of Economics and Statistics* 84(2), 221-236.

Jones, E. & Jackson, J.D. (1990). College Grades and Labor Market Rewards. *Journal of Human Resources* 25, 253-66.

Kalenkoski, C.M. (2005a). Parents Who Won't Pay: Expected Parental Contributions and Postsecondary Schooling. *Public Finance and Management* 5(1), 178-236.

Kalenkoski, C.M. (2005b). Parent-Child Bargaining, Parental Transfers, and the Postsecondary Education Decision. Unpublished manuscript.

Keane, M.P. & Wolpin, K.I. (2001). The Effect of Parental Transfers and Borrowing Constraints on Educational Attainment. *International Economic Review* 42(4), 1051-1103.

Light, A. (1998). Estimating Returns to Schooling: When Does the Career Begin? *Economics of Education Review* 17(1), 31-45.

Light, A. (1999). High School Employment, High School Curriculum, and Post-School Wages. *Economics of Education Review* 18(3), 291-309.

Light, A. (2001). In-School Work Experience and the Returns to Schooling. *Journal of Labor Economics* 19(1), 65-93.

Lillydahl, J.H. (1990). Academic Achievement and Part-Time Employment of High School Students. *Journal of Economic Education* 21(3), Special Research Issue, 307-316.

Loury, L.D. & Garman, D. College Selectivity and Earnings. *Journal of Labor Economics*, 13(2), 289-308.

Michael, R.T. & Tuma, N.B. (1984). Youth Employment: Does Life Begin at 16? *Journal of Labor Economics* 2(4), 464-476.

Neumark, D.& Joyce, M. (2001). Evaluating School-to-Work Programs Using the New NLSY. *Journal of Human Resources* 36(4), 666-702.

Oettinger, G.S. (1999). Does High School Employment Affect High School Academic Performance? *Industrial and Labor Relations Review* 53(1), 136-51.

Oettinger, G.S. (2005). Parents' Financial Support, Students' Employment, and Academic Performance in College. Unpublished manuscript.

Pabilonia, S.W. (2001). Evidence on Youth Employment, Earnings, and Parental Transfers in the National Longitudinal Survey of Youth 1997. *Journal of Human Resources* 36(4), 795-822.

Paul, H. (1982). The Impact of Outside Employment on Student Achievement in Macroeconomic Principles. *The Journal of Economic Education* 13(2), 51-56.

Ruhm, C.J. (1995). The Extent and Consequences of High School Employment. *Journal of Labor Research* 16(3), 293-304.

Ruhm, C.J. (1997). Is High School Employment Consumption or Investment? *Journal of Labor Economics* 15(4), 735-776.

Stephenson, S.P. (1981). In-School Labour Force Status and Post-School Wage Rates of Young Men. *Applied Economics* 13(3), 279-302.

Stinebrickner, R. & Stinebrickner, T.R. (2003). Working during School and Academic Performance. *Journal of Labor Economics* 21(2), 473-492.

Stratton, L.S.; O'Toole, D.M & Wetzel, J.N. (2005) A Multinomial Logit Model of College Stopout and Dropout Behavior. *IZA DP* No. 1634.

Tunali, I. (1986). A General Structure for Models of Double-Selection and an Application to a Joint Migration/Earnings Process with Re-Migration. *Research in Labor Economics* 8B, 235-284.

Tyler, J.H. (2003). Using State Child Labor Laws to Identify the Effect of School-Year Work on High School Achievement. *Journal of Labor Economics* 21(2), 353-380.

Wolff, Francois-Charles (2005). Parental Transfers and the Labor Supply of Children. *Journal of Population Economics*, forthcoming.

Table 1. Predicting Equations (Dependent variables in 1,000s)

Independent Variables	Net Price of Schooling	Parental Transfers
Age on December 31, 1996	0.312**	-0.076
	(0.145)	(0.370)
Male	0.142	0.299
	(0.191)	(0.275)
Hispanic	-0.346	-0.572*
	(0.311)	(0.350)
Black	-0.653**	-0.761
	(0.257)	(0.661)
Other race (nonwhite)	-2.678*	-1.842
	(1.559)	(1.221)
Mother high school degree	0.167	1.210**
	(0.311)	(0.510)
Mother 4 year degree	0.993**	1.736***
	(0.389)	(0.524)
Father high school degree	-0.063	-0.174
	(0.226)	(0.373)
Father 4 year degree	0.520*	0.734
	(0.283)	(0.656)
Parents' income (in 10,000s)	0.258***	0.405
	(0.062)	(0.277)
Parents' income squared	-0.010***	-0.011
	(0.002)	(0.010)
Parents' net worth (in 10,000s)	0.026***	0.069***
	(0.011)	(0.020)
Parents' net worth squared	-0.000*	-0.000***
	(0.000)	(0.000)
High school grades	-0.136	0.137
	(0.097)	(0.302)
ASVAB – arithmetic reasoning	-0.096	-0.131
	(0.193)	(0.290)
ASVAB – word knowledge	0.121	-0.377
	(0.187)	(0.511)
ASVAB – paragraph comprehension	-0.193	0.048
	(0.178)	(0.335)
ASVAB – mathematical knowledge	0.115	-0.500
	(0.217)	(0.344)

Table 1 Continued. Predicting Equations

Independent Variables	Net Price of Schooling	Parental Transfers
State unemployment rate	-0.035	-0.199
	(0.090)	(0.155)
State average wage	0.004**	0.002
	(0.002)	(0.004)
State minimum wage	-0.437	0.001
	(0.320)	(0.518)
State work study program	0.001	-0.415
	(0.184)	(0.277)
Avg. in-state tuition for public 4-year	0.265*	0.425*
institutions (in 1,000s)	(0.124)	(0.222)
State grant per 18-24 year old	-0.002**	0.004
	(0.002)	(0.003)
Number of siblings	-0.222***	-0.195
	(0.084)	(0.154)
λ	0.933*	
	(0.496)	
λ_1^t		3.828
		(3.653)
λ_2^t		-0.526
		(1.188)
Number of observations	1,768	1,131
R-squared	0.10	0.19
F-statistic [3,1735] for joint sign. of instruments	3.62	
F-statistic [5,631] for joint sign. of instruments		10.10

Robust standard errors in parentheses. Significance levels: * = p<.10; ** = p<.05; *** = p<.01. Models also include an intercept and missing dummy variables.

Table 2. Hours Worked Regression Results

Independent variables	I OLS Coef.	S.E.	II Predicted Variables, No Selectivity Correction Coef.	S.E.	III Predicted Variables and Selectivity Correction Coef.	S.E.
Age	1.116**	0.467	1.225**	0.551	0.961	1.382
Male	0.314	0.966	0.625	1.208	3.943	2.841
Hispanic	-0.772	1.399	-1.312	1.563	-0.455	2.417
Black	-1.503	1.271	-1.943	2.168	3.988	6.363
Other race (nonwhite)	2.089	5.209	0.896	8.394	6.087	13.477
Mother high school degree	0.467	1.369	0.556	1.690	0.053	2.539
Mother 4 year degree	-2.015	1.622	-1.267	2.095	0.077	3.653
Father high school degree	-2.210*	1.212	-2.389*	1.385	-2.357	1.946
Father 4 year degree	-2.377*	1.424	-2.040	1.926	1.814	4.142
Parents' income (in 10,000s)	0.303	0.344	0.435	0.541	0.428	1.001
Parents' income squared	-0.010	0.012	-0.013	0.020	-0.005	0.036
Parents' net worth (in 10,000s)	-0.094*	0.062	-0.065	0.076	0.176	0.231
Parents' net worth squared	0.000	0.000	0.000	0.000	-0.001	0.001
High school grades	-1.814***	0.385	-1.845**	0.930	-0.565	1.817
ASVAB – arithmetic reasoning	1.125	1.058	1.092	1.220	2.97	2.585
ASVAB – word knowledge	-0.030	0.968	0.127	1.037	-0.366	1.689
ASVAB – paragraph comprehension	-1.085	1.003	-1.343	1.106	-2.228	1.476
ASVAB – mathematical knowledge	-1.799*	0.989	-1.870*	1.080	-2.671	2.245
State unemployment rate	1.313**	0.512	1.139*	0.615	1.587	1.017
State average wage	-0.010**	0.005	-0.006	0.008	0.001	0.015
State minimum wage	0.494	1.341	0.244	1.606	-0.390	2.975
State work study program	0.838	0.976	0.542	1.244	-0.632	1.993
Predicted net price of schooling (in 1,000s)			-0.412	2.226	-0.469	3.488
Predicted parental transfer (in 1,000s)			-0.511	0.978	-0.783	1.361
Net price of schooling (in 1,000s)	0.178	0.165				
Parental transfer (in 1,000s)	-0.000	0.000				
λ_1^w					-25.482	21.679
λ_2^w					0.011	4.401
Number of observations	959		959		959	
Adjusted R-squared	0.08		0.11		0.11	
F-statistic [6, 928] for joint sign. of instruments	2.62		1.89			
F-statistic [6, 926] for joint sign. of instruments					.97	

Bootstrapped standard errors are presented for columns II and III. Significance levels: * = p<.10; ** = p<.05, *** = p<.01. Models also include an intercept and missing dummy variables.

Table 3. GPA Regression Results

Independent variables	I OLS Coef.	I OLS S.E.	II Predicted Hours #1 and Selectivity Correction Coef.	II S.E.	III Predicted Hours #2 and Selectivity Correction Coef.	III S.E.
Age	0.017	0.018	0.020	0.031	0.009	0.03
Male	-0.114***	0.039	-0.131***	0.043	-0.151**	0.043
Hispanic	0.034	0.059	0.037	0.062	0.047	0.062
Black	-0.069	0.049	-0.034	0.055	-0.043	0.056
Other race (nonwhite)	-0.200	0.216	-0.251	0.236	-0.119	0.231
Mother high school degree	0.027	0.060	0.038	0.069	0.076	0.068
Mother 4 year degree	0.035	0.063	0.097	0.070	0.08	0.071
Father high school degree	-0.023	0.051	0.024	0.066	0.015	0.065
Father 4 year degree	0.006	0.051	0.057	0.064	0.004	0.063
Parents' income (in 10,000s)	-0.009	0.013	-0.006	0.017	-0.006	0.017
Parents' income squared	0.000	0.000	0.000	0.001	0.000	0.001
Parents' net worth (in 10,000s)	0.001*	0.002	0.003	0.003	0.003	0.003
Parents' net worth squared	0.000	0.000	0.000	0.000	0.000	0.000
High school grades	0.172***	0.016	0.214***	0.026	0.217***	0.026
ASVAB – arithmetic reasoning	0.080*	0.043	0.054	0.049	0.054	0.048
ASVAB – word knowledge	0.053	0.034	0.057	0.038	0.057	0.037
ASVAB – paragraph comprehension	-0.017	0.036	0.010	0.041	-0.012	0.040
ASVAB – mathematical knowledge	-0.005	0.038	0.072	0.054	-0.076	0.053
Predicted hours			0.017	0.012	0.018*	0.011
Hours	0.001	0.001				
λ			0.112	0.097	0.122	0.097
Number of observations	1,768		1,768		1,768	
R-squared	0.14					
Adjusted R-squared			0.13		0.13	

Bootstrapped standard errors are presented for columns II and III. Significance levels: * = p<.10; ** = p<.05; *** = p<.01. Models also include an intercept and missing dummy variables.

APPENDIX

Table A1. Key Variable Sample Statistics

	Analysis Sample			Full Sample		
Variable Name	**Obs.**	**Mean**	**S.D.**	**Obs.**	**Mean**	**S.D.**
Work (enrolled)	1768	0.54		2918	0.53	
Hours of Work (enrolled)	959	25.10	0.55	1628	25.70	0.45
Predicted Hours of Work	5970	27.14	0.08	-	-	-
College GPA	1727	3.02	0.02	2331	3.08	0.06
Enrollment	5970	0.30		8984	0.41	
Net price of schooling (in 1,000s)	1768	0.40	0.09	2516	0.48	0.08
Predicted net price of schooling (in 1,000s)	5970	0.51	0.02	-	-	-
Parental transfer receipt (enrolled)	1768	0.66		3062	0.66	
Parental transfer (positive values) (in 1,000s) (enrolled)	1131	3.31	0.15	1701	3.17	0.12
Predicted parental transfer (in 1,000s)	5970	2.16	0.03	-	-	-
Age on December 31, 1996	5970	13.85	0.02	8984	14.00	0.02
Male	5970	0.52		8984	0.51	
Hispanic	5970	0.13		8984	0.13	
Black	5970	0.16		8984	0.15	
Other race (nonwhite)	5970	0.01		8984	0.01	
Mother’s education missing	5970	0.21		8984	0.22	
Mother high school degree	4690	0.47		6784	0.47	
Mother 4 year degree	4690	0.22		6784	0.24	
Father’s education missing	5970	0.13		8984	0.14	
Father high school degree	5126	0.29		7537	0.30	
Father 4 year degree	5126	0.19		7537	0.22	
Parents’ income missing	5970	0.09		8984	0.09	
Parents’ income (in 10,000s)	5367	6.54	0.10	8001	6.87	0.09
Parents’ net worth missing	5970	0.24		8984	0.24	
Parents’ net worth (in 10,000s)	4496	15.86	0.77	6621	17.04	0.72
High school grades missing	5970	0.11		8984	0.09	0.004
High school grades (0-8 scale)	5267	5.67	0.03	7669	5.77	0.02
ASVAB scores missing	5970	0.16		8984	0.15	
ASVAB – arithmetic reasoning	4911	-0.35	0.02	7076	-0.26	0.01
ASVAB – word knowledge	4911	-0.52	0.01	7076	-0.44	0.01
ASVAB – paragraph comprehension	4911	-0.26	0.01	7076	-0.17	0.01
ASVAB – mathematical knowledge	4911	-0.11	0.02	7076	0.02	0.01
State average unemployment rate	5970	4.53	0.01	8976	4.52	0.01
State average weekly wage	5970	610.50	1.36	8976	613.73	1.26
State minimum wage	5970	4.99	0.00	8976	4.99	0.00
State work study program	5970	0.40		8894	0.41	0.01
Avg. in-state tuition for public 4-year institutions (in 1,000s)	5970	3.28	0.01	8880	3.29	0.13
State grant per 18-24 year old	5970	111.84	1.38	8880	114.76	1.28
Number of siblings	5970	1.54	0.02	8926	1.53	0.02

Means and standard errors have been weighted.

Table A2. Enrollment Probit for Single Selection Correction

Independent Variables	Coefficient	S.E.
Age	0.408***	0.019
Male	-0.160***	0.046
Hispanic	0.030	0.067
Black	0.332 ***	0.061
Other race (nonwhite)	0.024	0.229
Mother high school degree	0.197***	0.061
Mother 4 year degree	0.386***	0.082
Father high school degree	0.198***	0.060
Father 4 year degree	0.229***	0.077
Parents' income (in 10,000s)	0.088***	0.017
Parents' income squared	-0.003***	0.001
Parents' net worth (in 10,000s)	0.006**	0.003
Parents' net worth squared	-0.000 *	0.000
High school grades	0.239***	0.017
ASVAB – arithmetic reasoning	-0.040	0.050
ASVAB – word knowledge	0.111**	0.047
ASVAB – paragraph comprehension	0.059	0.048
ASVAB – mathematical knowledge	0.506***	0.048
State average unemployment rate	-0.064**	0.030
State average wage	0.004***	0.000
State minimum wage	-0.579***	0.077
State work study program	0.074	0.050
Avg. in-state tuition for public 4-year institutions (in 1,000s)	0.116***	0.033
State grant per 18-24 year old	-0.001 ***	0.000
Number of siblings	-0.027	0.018
State % of the population aged 18-24	0.305***	0.043
Number of observations	5,970	
LR chi-squared(33)	3043.99	
Pseudo R-squared	0.42	

Significance levels: * = p<.10; ** = p<.05; *** = p<.01. Model also includes an intercept and missing dummy variables.

Table A3. Transfer Receipt and Postsecondary Enrollment: Conditional Bivariate Probit for Double Selection Correction

	Transfer Receipt (probit)		Enrollment (selection)	
Independent Variables	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Age	-0.122***	0.044	0.409***	0.018
Male	0.002	0.068	-0.160***	0.046
Hispanic	-0.082	0.100	0.031	0.067
Black	-0.271***	0.318	0.331***	0.061
Other race (nonwhite)	-0.528*	0.369	0.049	0.229
Mother high school degree	0.198**	0.101	0.199***	0.061
Mother 4 year degree	0.194*	0.121	0.384***	0.081
Father high school degree	0.066	0.088	0.205	0.060
Father 4 year degree	0.250**	0.102	0.226***	0.077
Parents' income (in 10,000s)	0.118***	0.026	0.089***	0.017
Parents' income squared	-0.004***	0.001	-0.003***	0.001
Parents' net worth (in 10,000s)	0.009**	0.004	0.006**	0.003
Parents' net worth squared	-0.000*	0.000	-0.000**	0.000
High school grades	-0.112***	0.032	0.239***	0.017
ASVAB – arithmetic reasoning	-0.043	0.074	-0.039	0.050
ASVAB – word knowledge	-0.231***	0.066	0.110**	0.048
ASVAB – paragraph comprehension	0.068	0.070	0.057	0.048
ASVAB – mathematical knowledge	0.111	0.083	0.506**	0.047
State average unemployment rate	-0.002	0.037	-0.065**	0.030
State average wage	-0.001**	0.001	0.004***	0.000
State minimum wage	0.141	0.110	-0.585***	0.077
State work study program	0.049	0.070	0.074	0.050
Avg. in-state tuition for public 4-year institutions (in 1,000s)	-0.069*	0.041	0.118***	0.033
State grant per 18-24 year old	0.001**	0.001	-0.001***	0.000
Number of siblings	-0.057**	0.027	-0.024	0.018
State % of the population aged 18-24			0.305***	0.042
Number of observations	5,970			
Censored Observations	4,202			
Uncensored Observations	1,768			
Log likelihood	-3154.55			
ρ	-0.43			
LR test of independent equations (ρ = 0) chi-squared(1)	5.60		Prob>chi-squared = 0.02	

Significance levels: * = p<.10; ** = p<.05; *** = p<.01. Model also includes an intercept and missing dummy variables.

Table A4. Work and Postsecondary Enrollment: Conditional Bivariate Probit for Double Selection Correction

	Work (probit)		Enrollment (selection)	
Independent Variables	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Age	0.015	0.051	0.408***	0.019
Male	-0.209***	0.068	-0.160***	0.046
Hispanic	-0.070	0.101	0.030	0.067
Black	-0.401***	0.091	0.332***	0.061
Other race (nonwhite)	-0.357	0.322	0.024	0.229
Mother high school degree	0.037	0.101	0.198***	0.061
Mother 4 year degree	-0.074	0.119	0.385***	0.082
Father high school degree	-0.106	0.089	0.199***	0.060
Father 4 year degree	-0.239**	0.098	0.229***	0.078
Parents' income (in 10,000s)	-0.000	0.025	0.088***	0.017
Parents' income squared	-0.000	0.001	-0.003***	0.001
Parents' net worth (in 10,000s)	-0.015***	0.004	0.006**	0.003
Parents' net worth squared	0.000***	0.000	-0.000**	0.000
High school grades	-0.085**	0.036	0.239***	0.017
ASVAB – arithmetic reasoning	-0.126*	0.073	-0.040	0.050
ASVAB – word knowledge	0.033	0.067	0.111**	0.047
ASVAB – paragraph comprehension	0.053	0.069	0.059	0.048
ASVAB – mathematical knowledge	0.051	0.084	0.506***	0.048
State average unemployment rate	-0.025	0.037	-0.064**	0.030
State average wage	-0.000	0.001	0.004***	0.000
State minimum wage	0.044	0.117	-0.579***	0.077
State work study program	0.061	0.068	0.074	0.051
Avg. in-state tuition for public 4-year institutions (in 1,000s)	0.034	0.040	0.116***	0.033
State grant per 8-24 year old	-0.000	0.001	-0.001***	0.000
Number of siblings	0.008	0.027	-0.027	0.018
Avg. % of the population aged 18-24			0.304***	0.043
Number of observations	5,970			
Censored Observations	4,202			
Uncensored Observations	1,768			
Log likelihood	-3270.74			
ρ	-0.03			
LR test of independent equations (ρ = 0) chi-squared(1)	0.03		Prob>chi-squared = 0.86	

Significance levels: * = p<.10; ** = p<.05; *** = p<.01. Model also includes an intercept, age, and missing dummy variables.