MORE MONEY, LESS WORK? ESTIMATING THE SCHOLARSHIP EFFECT ON TIME SPENT WORKING WHILE IN COLLEGE

by

JOSHUA ANDREW REINI

(Under the Direction of David Mustard)

ABSTRACT

This paper examines the effect of scholarships and grants on the work patterns of college students. Using data from the NELS:88, it investigates the impact of scholarships on hours worked per week using number of siblings and census region as exogenous instruments to manipulate scholarships. The results suggest that college students work fewer hours per week when they receive scholarships. I find receiving a scholarship cuts hours worked per week between one and five hours, a decrease between seven and thirty-seven percent of the mean.

INDEX WORDS: Scholarships, Grants, Number of Siblings, Region, Instrumental Variables, Hours Worked, College Costs, Financial Aid

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JOSHUA ANDREW REINI

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JOSHUA ANDREW REINI

Major Professor: David Mustard

Committee: Josh Kinsler

Christopher Cornwell

Electronic Version Approved:

Suzanne Barbour

Dean of the Graduate School

The University of Georgia

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Introduction

Working while enrolled in college has become a necessity for many students as college costs continue to rise, more than doubling in real terms from 1985 to 2015 (NCES, 2016). To compensate, full-time undergraduates spend more time working than ever before (Riggert et al., 2006). More than two thirds of students at 4-year colleges and universities hold a job while enrolled with 23% working full-time and 47% working part time; a total of nearly 3.4 million students. This number has increased over time, with nearly 34% percent of students working while in college in 1970 increasing to over 47% working while in college in 1995. The main reasons cited for working are the need for spending money, living expenses and tuition (Dundes and Marx, 2007). Students also report that working offers a chance to identify future career options, enhance their soft skills, create networking opportunities, and connect to society (Wang and Chen, 2013). Examining students' time allocation when they receive financial aid will help to understand to what extent students' budget constraints force them to work.

Financial aid may allow students to reduce or avoid working while in college and allow more time for academic and nonacademic activities. Conversely, financial aid may allow students to spend their wages on consumption, incentivizing them to work more hours. Financial aid programs are increasingly designed to provide students with sufficient financial support for them to concentrate on academics (Henry and Rubenstein, 2002), and policymakers and taxpayers should be interested to find if scholarships achieve this goal.

With an estimated $46 billion in grants and scholarship money awarded by the U.S. Department of Education, colleges, and universities, and another $3.3 billion awarded by private sources, it is important to discover how these scholarships change students' employment levels. The Georgetown Center on Education and the Workforce finds that 45 percent of working students fall below 200 percent of the poverty line, and over a third of these working learners work in jobs that are unrelated to long-term career goals. This suggests

that students are credit constrained in their employment choice, and that they would not choose to work in these jobs if they were not financially constrained.

This study examines the effect of scholarship receipt on student employment during the school year. I use an instrumental variables approach with data from the National Education Longitudinal Study of 1988 to find how receiving a scholarship affects how much time a student allocates to work per week. I find receiving a scholarship has reduces the number hours worked per week by between one and five hours, which is between seven and thirty seven percent of the mean, depending on the specification.

The rest of the paper proceeds as follows. Section 2 reviews relevant literature and section 3 presents a time choice model of work and study to elucidate the role of scholarships. Section 4 gives an overview of my data, section 5 outlines my identification strategy, and section 6 discusses my results.

Literature Review

Ehrenberg and Sherman (1987) study the connection between employment in college and outcomes using panel data from the National Longitudinal Survey (NLS) of the High School Class of 1972. They find that working while in college negatively affects college outcomes including GPA and graduating on time. Leuven et al. (2004) examines the tie from scholarships to outcomes when he conducts a randomized field experiment in which first-year university students could earn financial awards for passing all requirements in the first year. The results of their experiment show that financial incentives increase achievement of high ability students but reduce the achievement of low ability students.

Denning (2016) uses administrative data from all public colleges and universities in Texas linked to earning records from the Texas Unemployment Insurance System to investigate the effect of a discrete change in financial aid on earnings while in college. They use a discontinuity design stemming from how financial independence is determined from age and the effect of financial independence on need-based aid. The concern with this design is that it relies on a population of "nontraditional" students that turn 24 during their senior year that may act differently than more traditionally aged students. He finds that students respond to financial aid by increasing credits attempted and speeding up graduation.

DesJardins et al. (2010) is one of few papers to tackle the influence of scholarship receipt on work patterns when they use a regression-discontinuity approach to investigate the effects of the Gates Millenium Scholars program, which awards an average of about $8,000 to freshman and $10-11,000 to juniors and seniors. The Gates Millenium Scholarship gives awards to 1,000 outstanding pell-grant eligible minority students. Pell grant eligibility is determined from families' expected contribution and most pell grants are awarded to students whose families make less than $30,000 annually. DesJardins concludes that students that receive the scholarship work 4.23 hours less per week than they would had they not received the scholarship. Scaling this down, the scholarship decreases hours worked by approximately

0.47 hours per $1,000 awarded. This result is specific to a small subgroup of the population and may not extend to the general population or other scholarships.

Broton et al. (2016) uses the lottery design of the Wisconsin Scholars Grant, a grant given to low-income students enrolled in Wisconsin public colleges and universities. The Wisconsin Scholars Grant awards $3,500 per year, renewable for up to 5 years. Students who were offered the additional grant were 5.88 percent less likely to work and worked 1.69 fewer hours per week. This amounts to a decrease of about 0.48 hours per week for each $1,000 awarded, consistent with DesJardins et al. (2010). This paper bolsters the connection between variables critical to students' success in college: scholarships and employment. While the papers mentioned above address this question for specific subsets of the population, namely Gates Millenium Scholars and Wisconsinites, my contribution examines this relationship for a broader population of students.

Time Choice Model of Study, Work, and Leisure

Consider a lifetime with three periods: 0, 1, and 2. In period 0, the student is endowed with a transfer payment from her parents and a scholarship. In the first period, the student attends college where she allocates her time between study, work, and leisure. The second period is the rest of the student's life after graduating college where she allocates her time between work and leisure to maximize utility. Time and consumption are expressed in units of the numeraire good. Subscripts denote the time period.

Let c denote consumption and ℓ denote leisure, and $0 < \theta < 1$ measures how the agent weighs consumption and leisure. As an alternative to spending on consumption, the student can also save into $b > 0$ or borrow from $b < 0$ the next period. P, G and A are determined outside of the model, where P is the transfer payment to the student from her parents, G is the scholarship received, and A is the cost of schooling. In the first period, the student can choose to work for base wage, w, with h representing the time the student spends working for pay. The student can also choose to spend her time studying, s, or at leisure, ℓ. If the student works in a capacity such as a chemistry lab or an internship, this work can be thought of as analogous to studying in that it works to build human capital. T is the total time available each period.

$\delta < 1$ is the discount factor for the second period, representing the student's patience. In the second period, $\phi(s)$ serves as a multiplier on wages received after college as a function of s. This mechanism allows for the student to increase her wage in the second period by studying more in the first period. Let the functional form of $\phi(s)$ be $s + 1$. I also assume the student exhibits Cobb-Douglas utility.

$$\underset{s_1,h_1}{Max} c_1^{\theta}\ell_1^{1-\theta} + \delta c_2^{\theta}\ell_2^{1-\theta} \tag{3.1}$$

Subject to the constraints:

$$P + G + wh_1 \geq A + c_1 + b \tag{3.2}$$

$$\phi(s_1)wh_2 + b \geq c_2 \tag{3.3}$$

$$\ell_1 = T_1 - s_1 - h_1 \tag{3.4}$$

$$\ell_2 = T_2 - h_2 \tag{3.5}$$

Solving the constraints for c_1, c_2, ℓ_1, ℓ_2 and plugging into the objective:

$$\underset{s_1,h_1}{Max}(P + G + wh_1 - A - b)^{\theta}(T_1 - s_1 - h_1)^{1-\theta} + \delta(s_1wh_2 + wh_2 + b)^{\theta}(T_2 - h_2)^{1-\theta} \tag{3.6}$$

Taking the First Order Conditions:

$$s_1 : \Big(\frac{c_1}{\ell_1}\Big)^{\theta} = \frac{\delta\theta wh_2}{1-\theta}\Big(\frac{c_2}{\ell_2}\Big)^{\theta-1} \tag{3.7}$$

$$h_1 : \frac{c_1}{l_1} = \frac{\theta w}{1-\theta} \tag{3.8}$$

Substituting (3.3), (3.5), and (3.8), into (3.7):

$$\Big(\frac{\theta w}{1-\theta}\Big)^{\theta} = \Big(\frac{\delta\theta wh_2}{1-\theta}\Big)\Big(\frac{s_1wh_2 + wh_2 + b}{T_2 - h_2}\Big)^{\theta-1} \tag{3.9}$$

Solving for s_1:

$$s_1 = \Big(\frac{\theta w}{1-\theta}\Big)^{\frac{\theta}{\theta-1}}\Big(\frac{1-\theta}{\delta\theta wh_2}\Big)^{\frac{1}{\theta-1}}\Big(\frac{T_2 - h_2}{wh_2}\Big) - \Big(\frac{wh_2 + b}{wh_2}\Big) \tag{3.10}$$

Substituting (3.2), (3.4) into (3.8):

$$T_1 - s_1 - h_1 = (P + G + wh_1 - A - b)\Big(\frac{1-\theta}{\theta w}\Big) \tag{3.11}$$

Solving for h_1:

$$h_1 = \left(T - (P + G - A - b)\left(\frac{1-\theta}{\theta w}\right) - s_1\right)\left(\frac{\theta w}{\theta w + 1 - \theta}\right) \tag{3.12}$$

Taking comparative statics for s_1, I find that changes in parent transfers, scholarships and college costs have no effect on time spent studying.

$$\frac{\partial s_1}{\partial G} = \frac{\partial s_1}{\partial P} = \frac{\partial s_1}{\partial A} = 0 \tag{3.13}$$

Also, students who are less patient study less and work more in the first period. This is a natural result as less patience results in students wanting to realize income and thus consumption sooner rather than choosing to study and increase future income.

$$\frac{\partial s_1}{\partial \delta} > 0 \; ; \; \frac{\partial h_1}{\partial \delta} < 0 \tag{3.14}$$

Taking comparative statics for h_1, I find that scholarships and parent transfers have a negative effect on working while college costs have a positive effect. Increases income flowing from scholarships, parent transfers, or decreases in college costs allow the student to substitute away from working towards nonacademic activities, representing a freedom from their budget constraint.

$$\frac{\partial h_1}{\partial G} = \frac{\partial h_1}{\partial P} = -\frac{\partial h_1}{\partial A} = \left(\frac{\theta - 1}{1 + \theta(w-1)}\right) < 0 \tag{3.15}$$

From this result, it is also interesting to note that as the base college wage increases, the effects of scholarships, parent transfers and college costs on working approach zero. This is intuitive because as wages increase working becomes more attractive, and students become less willing to substitute away from working. Preferences toward consumption work similarly. As relative preferences toward consumption θ increase, the effects of sholarships,

parent transfers and college costs on working also apporach zero. This result is also intuitive because as preferences shift towards consumption, the student must generate income in the first period from working to satisfy this desire and is less likely to substitute away from working.

Data

I analyze data from the National Educational Longitudinal Study of 1988 (NELS:88), a nationally representative, longitudinal study of 24,599 participating 8th graders in 1988, incorporating 1,052 participating schools, 22,651 participating parents and 1,035 participating school administrators. The base year design consists of four components: survey and tests of students, survey of parents, school adminsistrators, and teachers. Students were surveyed in every wave, whereas the parents were surveyed in the base year and the second follow-up; school administrators and teachers were surveyed and cognitive tests were conducted in the base year, first follow-up, and second follow-up; and student transcripts were taken in the second and fourth follow-ups. The NELS:88 is a good fit for this analysis because of the rich set of controls about the students taken from high school and during their college years. Additionally, because the NELS:88 is a national survey, I exploit the effect of geographical region on scholarships.

In the NELS:88 base year, a two-stage probability design was used to select a nationally representative sample of eighth grade schools and students. Schools were the primary sampling unit with a target sample size of 1,032. The sampling frame was sorted to create groups of relatively similar schools. First, schools were sorted into combinations of school type and geographic region. Next, substrata were formed according to values on an urbanization variable and according to minority classification. Minority classifications were not created for private schools.

A pool of 1,032 schools was selected through stratified sampling with probability of selection proportional to eighth grade size and with oversampling of private schools. A pool of 1,032 replacement schools was selected by the same method. Of the 1,032 initial selections, 30 were ineligible, and 698 of the remaining participated. An additional 359 schools from the alternative selection also participated for a total sample of 1,057 cooperating schools of which 1,052 schools (815 public schools and 237 private schools) contributed usable student data.

Students were the second stage sampling unit. A random selection of 26,342 students from participating sampled schools resulted in participation by 24,599 spring term 1988 eighth graders. On average 23 student participants represented each of the participating schools.

The data collection took place in 1988, 1990, 1992, 1994, and 2000. I use the 1994 wave when the students are sophomores in college. In this wave, because of the dispersal of the sample, data collection was conducted primarily by computer-assisted telephone interview of sample members along with personal interviews with selected respondents who required intensive tracking and nonresponse refusal conversion. The collection period took place from February through June 1994.

In the 1994 wave, I observe 8,121 full-time college students from a total of 14,915 people remaining in the sample. I drop 1,047 varsity athletes because of outside restrictions on work and 1,961 students who didn't answer questions about their number of siblings, leaving my sample to 6,598 students. Since the nonresponses account for only about 23% of the non-athlete student sample, the remainder is representative of this group.

To determine if a student is awarded a scholarship, I use the parent response to the question: "Which of the following did you or will you use to cover current educational expenses for any of your children?" where respondents were asked to mark all answers that apply. Answer choices were: your savings or sale of assets, second mortgage, your borrowing, alimony or child support, your child's earnings or savings, a trust fund, contributions from relatives, scholarships or grants, state or federal loans, social security or VA benefits, or other. I generate a binary indicator if parents check yes for grants or scholarships and use this as my independent variable.

The NELS also provides personal characteristics including sibling information, race, sex, and census region; household characteristics including family income, marital and education status of parents, and parental involvement; indicators about the students' awareness of financial aid; characteristics of the students' spending habits; school characteristics including the number of guidance counselors, contact with college representatives, and type of school;

if the student has received formal job training while in college and the hours the student worked in their most recent job from the 1992 wave when the student is in high school. These controls were chosen because they could significantly impact a student's eligibility for need or merit-based aid, the effort they are willing or able to expend applying for scholarships, and the ability or desire of students to find employment. I focus on the average hours working per week in period three from January of 1994 until the interview date in the Spring of 1994 because this period does not include the summer. I do not include the summer in my study because students change their working and academic patterns during the summer and I am more interested in changes during the academic year. Table 1 contains summary statistics that I will discuss in my analysis.

Nearly half of college students receive some amount of scholarship and proportionately spread across census regions. The test scores listed are achievement tests given by the NELS, designed to facilitate comparisons with other national studies. "Good Teaching" represents if a student self-identified their school as having good teachers. It is also notable that almost seventy percent of students in the sample worked while in high school, pre-exposing these students to employment even though more than ninety percent of these students worked less than ten hours per week.

Table 1: Summary Statistics

Variable Name	**Mean**	**Std. Dev.**
Scholarship Receipt*	0.46	0.50
Instruments		
Number of siblings	2.36	2.08
North Central*	0.28	0.45
South*	0.32	0.47
Northeast*	0.21	0.41
Funding sources to pay for education		
Trust Fund*	0.01	0.08
Relatives*	0.02	0.12
Parent Earnings*	0.31	0.46
Personal Loan*	0.03	0.15
Family Characteristics		
Fam. Inc. less than $5,000*	0.02	0.14
Fam. Inc. between $5,000 and $10,000*	0.04	0.18
Fam. Inc. between $10,000 and $25,000*	0.18	0.39
Fam. Inc. between $25,000 and $50,000*	0.37	0.48
Fam. Inc. between $100,000 and $200,000*	0.05	0.21
Fam. Inc. greater than $200,000*	0.02	0.14
Parents recently lost job*	0.13	0.34
Parents Divorced*	0.08	0.28
School Characteristics		
Greater than 50% Free Lunch*	0.08	0.27
Good Teaching*	0.83	0.37
Private School*	0.23	0.42
College Prep.*	0.47	0.50
Student Characteristics		
High School GPA	3.11	0.90
Math Score	51.62	16.55
Reading Score	51.17	16.55
Science Score	50.70	16.62
History Score	50.64	16.77
No HS Work Experience*	0.31	0.46
Up to 4 Hrs/Wk HS Work Experience*	0.35	0.47
11 to 20 Hrs/Wk HS Work Experience*	0.07	0.25
Greater than 21 Hrs/Wk HS Work Experience*	0.04	0.20
Sample Size		**6,598**

* denotes a dummy variable.

Identification Strategy

To find if scholarships allow students to reduce time spent working, I start with the simplest version of the estimation using ordinary least squares in (5.1). Using this strategy, I estimate the effect of scholarships on hours worked per week, where β_1 is the change in the amount of hours a student will work if awarded a scholarship. The error term is uncorrelated with β_1, then I directly examine how receiving a scholarhip affects how students allocate thier time across work, study, and leisure. A negative effect of scholarships on hours worked would suggest that scholarships unbind students from their credit constraints allowing them to substitute away from working.

$$WorkingHours_i = \beta_0 + \beta_1 Scholarship_i + \beta_O \Omega_i + \epsilon_i \tag{5.1}$$

In choosing the controls, I find factors that affect the student's decision to substitute towards or away from working along with characteristics intermingled with scholarships. These factors include additional nonmonetary costs associated with working, evidence of credit constraints, evidence of ability or how the student values various activities. While I allow the functional form of the observables to be flexible, since most of the observables are indicators, interacting race with family income and sex indicators is the only change that proves to be statistically significant. However even this change had minimal impact on the effect of scholarships on hours worked. Other functional forms that proved to be insignificant include: quadratic grades or test scores, interacting sex and birth order, and interacting parent and school characteristics.

Using OLS to esimate these effects is a potentially misleading strategy. I am most concerned with an omitted ability variable that would affect both scholarships and hours worked. For example, ambitious "Type A" students have a seemingly unrelenting desire for accomplishment, both expending extra effort in applying for scholarships and working

in addition to school. While it might appear in the data that the student is working more because they have a scholarship, that would not be the case. In reality, the personal drive of the student leads to both the scholarship and working time and there is no causal relationship between the two variables. Alternatively, we could think of a student that may have to financially support a sick family member. Similar to the first story, the scholarship does not have a causal relationship with the amount of time the student allocates towards work, but rather it is an unobservable characteristic of the student that influences hours worked. To address the endogeneity of scholarships, I employ an instrumental variables (IV) strategy using the number of siblings and census region as instruments.

For my instruments to be sufficient in creating exogenous change to scholarships, they must act in a way that is uncorrelated with the error but correlated with the regressor, scholarships. The first assumption excludes the instrument from being a regressor in the model for hours working. In order for this to happen, the instrument must act outside of any decisions to do with employment as if the scholarship was awarded randomly, unaffected by decisions of the student or her family. The second assumption requires that the instrument play a role in how scholarships are awarded.

To satisfy the exclusion requirement for the number of siblings, I condition on student employment history. I control for how much the student works during high school, and I argue that a large majority of the students who must work during college to support a large number of siblings are more likely to have worked during high school to satisfy the same need. This is a plausible explanation because we see that nearly seventy percent of students in the sample have some level of employment experience from high school.

A concern with number of siblings as a source of quasi-experimental variation is that families with greater household income may have more children because they can afford it, while lower-income families may have fewer kids. On the other hand, lower-income parents may have less access to effective birth control and may be less forward-looking resulting in an increase in number of siblings. Variation in number of siblings related to household income

could create omitted variable bias. If students with a larger number of siblings act differently in ways that affect scholarship receipt and hours working but the financial wellbeing of their parents when they chose number of siblings is the true driver of variation. The results show however that the number of siblings has a positive efffect on scholarships, and I categorically control for household income, so that any bias stemming from the parents' choice of number of siblings in my results is second order.

There is a considerable theory and evidence that a child's number of siblings has a negative effect on education attainment (Kessler, 1991; Booth and Joo Kee, 2009), because parents must spread their resources across more children. In addition, Conley and Glauber (2006) argue that "in terms of parental investment, the cup starts to run dry as we go down the line..." This would suggest that as the number of siblings increases, parents are more likely to have to rely on outside sources to fund their children's education. Additionally, when calculating financial need, the Free Application for Federal Student Aid (FAFSA) divides the expected parent contribution by the number of children in college to determine each child's Expected Family Contribution (EFC). The EFC is not only used to determine eligibility for government aid but most colleges also use it to calculate eligibility for institutional aid. In this way children with larger families are eligible for need-based aid and therefore an increase in the number of siblings would have a positive effect on receiving scholarships.

In an ideal data set, I would have more information about the age of the siblings that I could use to determine if the siblings are enrolled in college concurrently with the student. Creating an instrument for siblings that are enrolled in college concurrently with the student while controlling for the overall number of siblings would help me to isolate need-based scholarships. In my data, I do not have information about the age of the student's siblings, only the number. Use of the more blunt instrument, the total number of siblings, is vulnerable to merit-based aid being reduced as parents distribute their child rearing efforts across more children. Despite this concern, I use the total number of siblings as a proxy for the number of siblings enrolled concurrently in college.

To satisfy the exclusion requirement for census region, I assume that students reach an employment equilibrium that is independent from their local labor market because the jobs that they take are primarily student jobs and are characteristically distinct from jobs that are taken by the general population. It is straightforward and reasonable to argue that the regions of the United States are heterogeneous in their scholarship offerings. These scholarships could come from any number of local organizations including rotary clubs, fraternal organizations, veterans groups, and more. I will describe a few of these scholarship programs. The Union City Rotary Club in rural northwest Tennessee awards scholarships only to studentss graduating from the Union City System and the Obion County School system. This particular scholarship was started in 1982 and awarded $59,000 in 1992. The Rotary Club of Los Angeles awards twenty to twenty-five scholarships to high school seniors in the LA area which typically range between $1,000 and $2,000 per year, renewable annually for four years. The American Legion of Ohio awards scholarships to students of Belmont, Delaware, Knox, Licking, Madison, Marion, Morrow, or Union Counties who meet their eligibility requirements. Lastly, the Cascade Pacific Eagle Scout Scholarship offers ten annual scholarships to Eagle Scouts residing in the Cascade Pacific Council service area located in Northwest Oregon and Southwest Washington. There is an innumerable amount of comparable scholarships offered to students who attended certain high schools or lived in certain cities or counties. These location-based scholarships serve as the justification for the relevance condition.

In the first stage of the IV, I estimate scholarship receipt using number of siblings and census region as my instruments along with a set of observables found in the NELS:88. In the second stage, I estimate the effect of scholarships on hours worked per week. I also allowed the effect of siblings on scholarships to be nonlinear. While the number of siblings is positively correlated with scholarship receipt in an expected way, it took the power away from the instruments while not qualitatively changing the main results. Because of these factors, I report this specification as an addition to the final result but use the number of siblings for the remainder of the results. I also checked my results adding a proxy for per

capita household income as well. The results for this specification are consistent in direction but overstated and underpowered, so I do not include these results in the paper but they are available upon request. I also run robustness checks that include different sets of controls and include these in the final result as well.

Results

Table 2 displays the effect of scholarship receipt for both the OLS and IV Methods. When I use number of siblings and region to instrument for scholarships I see receiving a scholarship has a negative effect on hours worked per week between one and five hours. As students become unbound from credit constraints, they trade their working time for either academic activities or leisure. The negative, although insignificant, IV results suggests that the substitution effect dominates and this result is uniform across all of the specifications and consistent with DesJardins et al. (2010), Broton et al. (2016), and the predictions of the time choice model. With the average student in the sample working 15.43 hours per week, these results are quite large. The various specifications suggest a decrease in hours worked per week of nearly 7 percent to over 37 percent of the mean.

All funding sources have a negative effect on hours worked because of a lessened need for income. Specifically, trust funds decrease hours worked per week by between 2.90 and 3.41 hours and financial support from relatives decreases hours worked per week by between 3.69 and 4.27 hours. These funding sources are reflected in the time choice model as parent transfers, and our results are consistent with the predictions from the model. Also, the effects of family income are as expected, with lower income brackets having a positive effect on hours worked while students with families earning over $100,000 per year work less than then their less affluent counterparts. Other financial hardships including divorce and parents losing their job see similar positive effects to having a lower family income. Pre-exposure to employment including both working in high school also shows significant positive effects on working while in college where a student who did not work in high school works almost 5 hours less per week in college than a student that worked over 20 hours per week in high school.

In Table 3, I display the results of the first stage is a linear probability model (LPM) and it is labeled as such in the table. As hypothesized, we see the probability of scholarship

increasing with the number of siblings in both the categorical and linear specifications. There are statistically significant effects of each of the regions on scholarship probability, further confirming our relevance condition that stated that census regions are heterogeneous in their scholarship offerings.

Table 3 also shows a negative effect of between nine and eleven percentage points from the presence of a trust fund to help pay for schooling expenses, reflecting a decreased eligibility for need-based aid. Conversely, relatives helping with college expenses increase the probability of a scholarship by almost twelve percent stemming from their monetary support not being picked up when determining eligibility for need-based aid and the relatives' strong incentives to help the student apply for scholarships that would save them from having to pay a larger expense. The effect of family income tells a similar story as the trust fund with the eligibility for need-based aid having an inverse relationship with family income. High School GPA increases the probability of earning a scholarship by 7.05 percent as GPA increases by one point (e.g. from a C average to a B average). The positive effects of High School GPA and math scores on the probability of a scholarship reflect increases in merit-based aid.

In Table 4, after estimating using both the OLS and IV approach, I compare my results, particularly OLS, to the estimated effect of the Gates Millenium Scholarship on hours working in a regression discontinuity (RD) approach (DesJardins et al., 2010). DesJardins uses the noncognitive test score that partly determines the selection of scholars for the GMS program as an instrumental variable for the scholarship. This RD has a fuzzy design because not all students above the cut point receive scholarships since they could be deemed ineligible for other reasons.

While they are not perfectly comparable due to the specific nature of DesJardin's paper, my results mirror DesJardin's results, with a small negative effect of having a scholarship on hours worked per week. These results suggest that receiving a scholarship frees them from their budget constraint and allows them to substitute away from working and towards academic and leisure activities.

Table 4 also contains a comparison of my OLS estimations with DesJardins' estimations by race subgroups. A lack of power in my instruments for smaller sample sizes prohibits me from comparing the IV results by race subgroups along with the OLS. Similar to the DesJardins estimations, I observe a stronger negative effect of scholarships on hours worked per week for minority groups than the general population. This result suggests two possible mechanisms at play. The first is that minority students are more likely to be budget constrained prior to the scholarship and therefore work because they have to. The second possible mechanism is that students in these subgroups receive scholarships that are greater in magnitude on average. This mechanism is possible because I have no measure of scholarship intensity to control for.

Table 2: Effects on Hours Worked Per Week

Variable Name	**OLS**	**IV1**	**IV2**	**IV3**
Scholarship	-2.71 (0.41)	-5.56 (4.83)	-1.83 (5.57)	-4.30 (5.26)
Funding Education				
Trust Fund	-3.20 (2.28)	-3.41 (2.31)	-2.90 (2.34)	-3.14 (2.35)
Relatives	-4.03 (1.62)	-3.76 (1.70)	-4.27 (1.74)	-3.69 (1.72)
Parent Earnings	0.86 (0.53)	-0.86 (0.53)	-0.99 (0.53)	-1.04 (0.53)
Personal Loan	-0.05 (1.23)	-0.02 (1.22)	-0.46 (1.24)	-0.89 (1.24)
Family Characteristics				
HH Income < \$5k	0.75 (1.54)	1.40 (2.00)	0.43 (2.17)	1.16 (2.14)
HH Income \$5-10k	4.77 (1.26)	5.28 (1.61)	5.15 (1.71)	5.70 (1.70)
HH Income \$10-25k	3.10 (0.81)	3.64 (1.33)	3.10 (1.48)	3.76 (1.44)
HH Income \$25-50k	3.09 (0.71)	3.18 (0.73)	3.27 (0.74)	3.41 (0.74)
HH Income \$100-200k	-0.42 (1.09)	-0.79 (1.31)	-0.18 (1.39)	-0.50 (1.39)
HH Income > \$200k	-2.32 (1.55)	-2.73 (1.75)	-1.76 (1.84)	-2.14 (1.85)
Parents lost job	0.25 (0.56)	0.41 (0.64)	0.20 (0.67)	0.39 (0.67)
Parents Divorced	0.16 (1.18)	-0.05 (1.15)	-0.49 (1.18)	-0.41 (1.19)
Student Characteristics				
High School GPA	-1.04 (0.31)	-0.88 (0.45)	-1.28 (0.50)	-1.07 (0.50)
No Work in HS	-2.00 (0.55)	-2.01 (0.55)	-1.98 (0.55)	-2.11 (0.55)
< 4 Hrs/Wk in HS.	-0.46 (0.53)	-0.54 (0.54)	-0.43 (0.55)	-0.52 (0.55)
11-20 Hrs/Wk in HS	0.40 (0.83)	0.30 (0.86)	0.24 (0.87)	0.18 (0.86)
> 20 Hrs/Wk in HS	2.91 (1.01)	2.95 (1.01)	3.07 (1.01)	3.17 (1.02)
Spending Habits Controls	YES	YES	YES	NO
F Statistic	9.28	3.95	8.86	9.91

Standard errors listed in parentheses to the right of each coefficient estimate. The sample size of 6,598 is constant for each estimation. In the first IV specification categorical dummies are used for siblings along with the rest of the controls. In the second IV, the number of siblings enters linearly and all of the controls are still used. In the third IV, spending habits controls are dropped. Unless specifically mentioned, the entire set of controls is used for each estimation.

Table 3: First Stage Effects on Probability of Receiving a Scholarship

Variable Name	**IV1**	**IV2**	**IV3**
Instruments			
One Sibling	-1.56 (2.39)	X	X
Two Siblings	0.75 (2.45)	X	X
Three Sibling	-1.52 (2.70)	X	X
Four Siblings	-2.10 (3.03)	X	X
Five Sibling	0.09 (3.58)	X	X
Six Siblings	3.84 (3.94)	X	X
Seven Sibling	12.27 (5.32)	X	X
Eight Siblings	12.35 (5.51)	X	X
More Than Eight Siblings	5.88 (4.71)	X	X
Number of Siblings	X	0.72 (0.29)	0.74 (2.92)
North Central	9.66 (1.86)	9.70 (1.86)	9.74 (1.86)
South	11.83 (4.91)	3.92 (1.79)	2.93 (1.78)
North East	6.58 (1.95)	6.59 (1.95)	6.74 (1.95)
Funding Education			
Trust Fund	-9.06 (6.89)	-9.42 (6.90)	-10.64 (6.91)
Relatives	11.83 (4.91)	11.56 (4.91)	10.98 (4.92)
Parent Earnings	-0.07 (1.60)	-0.08 (1.60)	-0.09 (1.60)
Personal Loan	1.17 (3.72)	1.11 (3.72)	0.53 (0.37)
Family Characteristics			
HH Income $<$ \$5k	25.38 (4.67)	25.99 (4.67)	27.15 (4.67)
HH Income \$5-10k	19.61 (3.82)	19.14 (3.82)	20.41 (3.82)
HH Income \$10-25k	21.58 (2.46)	21.56 (2.46)	22.18 (2.46)
HH Income \$25-50k	3.43 (2.15)	3.27 (2.15)	3.84 (2.16)
HH Income \$100-200k	-15.08 (3.28)	-15.20 (3.28)	-16.01 (3.30)
HH Income $>$ \$200k	-16.76 (4.70)	-17.25 (2.83)	-18.44 (4.71)
Parents lost job	7.01 (1.70)	7.19 (2.59)	7.46 (1.71)
Parents Divorced	-8.24 (3.28)	-8.06 (3.28)	9.07 (3.29)
School Characteristics			
$>$ 50% students have Free/Reduced Lunch	10.71 (2.52)	11.01 (2.53)	10.77 (2.53)
Private School	-4.71 (2.74)	-4.50 (2.74)	-4.30 (2.75)
College Preperatory Curriculum	1.83 (1.79)	1.96 (1.80)	2.15 (1.80)
Student Characteristics			
High School GPA	7.05 (0.94)	7.3 (0.94)	7.74 (0.94)
Math Score	0.11 (0.08)	0.11 (0.09)	0.08 (0.08)
Spending Controls	YES	YES	NO
F Statistic	11.58	12.39	13.50

Standard errors listed in parentheses to the right of each coefficient estimate. The sample size of 6,598 is constant for each estimation. Estimated coefficients and standard errors are multiplied by 100 to make the table more easily readable. In the first IV specification categorical dummies are used for siblings along with the rest of the controls. In the second IV, the number of siblings enters linearly and all of the controls are still used. In the third IV, spending habits controls are dropped. Unless specifically mentioned, the entire set of controls is used for each estimation.

Table 4: Scholarship Effect Estimations on Hours Worked/Week

	DesJardins	**OLS**	**N**
All	-4.23 (1.40)	-2.71 (0.41)	6,598
Asian	-6.95 (3.2)	-2.93 (1.12)	641
Black	-5.45 (2.1)	-7.18 (1.62)	525
Hispanic	-0.26 (2.6)	-4.20 (1.46)	659

Standard errors listed in parentheses to the right of each coefficient estimate. The OLS estimation uses the same set of controls as the previous two tables, and the DesJardins estimations are taken from DesJardins et al. (2010).

Discussion

One could be concerned that there is an unobserved ability or motivation that affects which students receive scholarships. It is unclear if these higher ability students would be more likely to work more hours. I am perhaps more concerned with the potential of an an unobserved financial need variable that strongly determines if and to what extent scholarships are awarded. Since these financially needy students truly need to work to afford schooling, I theorize that these are the students that lie on the budget constraint and would be relieved from some amount of work when given a scholarship. If this is the case, then my results would be biased downwards, and my results are larger than estimated.

Another bias stems from the wording of the scholarship question including funding used to cover the education expenses of "any of your children". This bias would result in some students being misidentified as receiving scholarships when they do not, and therefore the effect on hours worked would be biased downward and my results are larger than estimated.

Much of the data that would help alleviate many the concerns metioned is available in the restricted version of the NELS, while I only have access to the publicly available data set. More specific information about the location the student is from would help to specify if they are affected by a location-based scholarship. Additionally, more specific information about the age and college-going status of the students' siblings would help to identify how they are affected by changes in their expected family contribution. Linking to FAFSA records could also alleviate this issue. I would also be interested to learn more information about students' wages along with the nature of the jobs they take to piece together more information about their motivation for working. With this information, I could identify students who take jobs unrelated to future aspirations to meet their budget constraint as distinct from those students who work during college in order to further their personal goals.

Conclusion

I examined how scholarships affect college employment and estimated the effects using ordinary least squares and instrumental variables methods. Instrumental variables were necesssary to account for endogenous selection of scholarships because scholarships and working are likely to be determined jointly. Receiving a scholarship reduces the number of hours worked per week between one and five hours, a decrease between seven and thirty-seven percent of the mean, depending on the specification. This result reflects scholarships freeing students from their credit constraint, allowing them to substitute away from working and is consistent with results found in the literature and suggested by theory. Ehrenberg and Sherman (1987) suggests that a decrease of one hour working per week decreases the probability of dropping out by around one percent. Coupling this result implies that scholarships decrease the probability of dropping out by between one to five percent.

The negative, but stastically insignificant results can be traced back to the time choice model and suggest a significant amount of variation in base wages or relative preferences. If there is indeed large variation in these parameters (base wages or relative consumption preference), students would subsequently have a wide variance in their responses to increases in scholarships. This variation in the effect of scholarships on hours worked is reflected in the data.

Further research in this area would help to illuminate a more direct relationship between scholarship dollars and hours worked. Because of data constraints, my paper only examines the affect of scholarships on the extensive margin but cannot determine how increases in the dollar amount of scholarships affect employment decisions. Research in this area would help to inform policy makers looking to efficiently induce students to work less while in college and spend more time learning and developing skills in the classroom. This result is desirable because it would decrease time students spend in college and therefore college costs along with making students more employable once they graduate.

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