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Does Working Help or Hurt College Students? The Effects of Federal Work-Study Participation on Student Outcomes

A CAPSEE Working Paper

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Abstract

Due to rising costs and declining affordability, many students have to work while attending college. The federal government takes a major role in subsidizing the wages of college students and spent over $1 billion on the Work-Study program in 2010–11 (College Board, 2011), yet little is known about how working during the school year impacts college student outcomes. Few studies have explored the causal effect of the Federal Work-Study program, and the previous studies provide an incomplete picture. In contrast to these earlier studies, our paper focuses on a large sample of over 45,000 students in the Ohio public higher education system, which is the fifth largest public system in the United States and reflects the national mixture of selective and nonselective four-year institutions. We estimate the causal effects of participating in the Federal Work-Study program on a range of college students' academic outcomes, including college GPA, credits earned, and persistence. Our empirical strategy employs a differences-in-differences instrumental variables model, which exploits the variation in allocation of federal work-study funds across institutions and across students. We find that working on-campus has a small, negative, but statistically significant effect on students' first-year GPAs. However, we also find some evidence that participating in the Federal Work-Study program increases the number of credits that students accumulate by the end of their first year. These results suggest that working in an on-campus, work-study job may have small negative effects that are outweighed by potential benefits.

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1. Introduction

The cost of college is rising while family incomes remain stagnant. In 2012, the average list tuition price of a four-year college or university was 84 percent of median family income for families in the lowest income quintile (Association of American Colleges and Universities, 2015). In an effort to mitigate the cost of college for low-income students, the federal government spends a large amount on need-based aid. For example, in 2013 the federal government spent $33.7 billion dollars on the Pell Grant, the largest source of federal need-based grant aid (College Board, 2014). However, even after taking into account all sources of grants, including from government and institutional sources, the average college student still has substantial unmet need. In 2012, grants and tax benefits only covered 36 percent of tuition and fees for the average full-time undergraduate studying at a public four-year institution (Payea, Baum, & Kurose, 2013). Thus, students relying on financial aid to pay for college are forced to take out loans or consider working during the school year in order to cover the full cost of attendance. In 2011, 72 percent of undergraduate students worked at least part-time while attending college (Davis, 2012). Moreover, the number of hours students are working during college appears to be increasing. Between 1970 and 2003, the average number of hours worked by traditional undergraduates during the school year increased from 5.0 to 9.6 per week (Scott-Clayton, 2012).[1]

This paper examines the effects of working during college on early postsecondary outcomes. At first glance, it is not clear if working has a net positive or negative effect on students' academic performance and persistence. On the one hand, there is concern that working during the school year may take away from time students could spend on their studies. According to the National Survey of Student Engagement (2012), 60 percent of college students working 20 hours or more a week believe that work interferes with their studies, but the majority of these students also report asking employers about increasing their work hours in order to pay tuition and living expenses.

On the other hand, it is possible that working a reasonable number of hours gives students skills that make them more competitive and capable when they enter the labor market after college. On-the-job training is an important way to increase one's human capital (Mincer, 1962), and there are long-documented labor market returns to work experience (Altonji & Shakotko, 1987; Altonji & Williams, 1998; Topel, 1991). Furthermore, it is possible that off-campus and on-campus employment have different effects on students' academic performance and persistence. Tinto (1975) theorizes that students drop out of college when they do not experience social and academic integration into their school's community. While off-campus work may exacerbate feelings of alienation from the college community by minimizing the time they spend

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[1] Scott-Clayton (2012) defines "traditional" undergraduates as those between the ages of 18 and 22, enrolled full-time at a four-year institution.

on campus and limiting their ability to participate in community building activities, on-campus work may help students feel more integrated into campus life.

This study explores the effect of participating in the Federal Work-Study (FWS) program for first-time, full-time freshman in the Ohio public university system. Ohio has the fifth largest public system (after California, Texas, New York, and Illinois) and has a mixture of selective and nonselective four-year institutions that reflect the landscape nationally. We use an instrumental variables differences-in-differences model, which exploits variation in institutional FWS allocations and student eligibility for work study to estimate the causal effect of participating in the Federal Work-Study program on students' first-year academic outcomes. We find that participating in work study has a small negative effect on first and second semester GPAs, but a positive effect on first-year cumulative credits earned. We also find some evidence that participating in the work-study program has less of a negative effect for students who are financially independent of their parents. The rest of the paper proceeds as follows: section 2 gives background on the Federal Work-Study program and reviews the literature. Section 3 describes the data and empirical strategy. Section 4 describes the results, robustness checks, and subgroup analysis. Finally, section 5 concludes.

2. Background and Literature Review

In 2008–09, 781,000 students participated in the Federal Work-Study (FWS) program nationwide (College Board, 2009). Work-study funds may be used to subsidize the wages of students working in one of several different types of on-campus jobs including food service, facilities maintenance, or research assistantships. In order to be offered a work-study job, students must have financial need as determined by the Free Application for Federal Student Aid (FAFSA). If a student's cost of attendance exceeds their Expected Family Contribution (EFC),[2] that student qualifies for work study.

Unlike the Pell Grant, which is awarded directly to students, FWS funds are allocated as a lump sum to institutions, which then have some discretion as to how to distribute the funds to students. The allocation of work-study funds to institutions has two parts: a base guarantee and a fair share component. The base guarantee makes up the lion's share of an institution's work-study allocation, and is determined by the amount of work-study funding the institution received in previous years. In Ohio, 65 percent of FWS funding was allocated for base guarantees in 2004 (Smole, 2005).[3] The amount of fair share increase is determined by institutional need, and an institution's need is determined by comparing the cost of attendance to the average EFC of students who applied for aid at that institution (Smole, 2005). Appendix Figure A.1 graphs the

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[2] Students receive a report containing their EFC after filling out the FAFSA. A student's EFC is calculated based on family income, family size, the number of the siblings in college, and other assets.

[3] For Scott-Clayton's sample in West Virginia, the percent of allocation designated as base guarantee in 2004 was 80.8 percent (Smole, 2005).

work-study allocation to Ohio's 13 four-year campuses from 1983 to 2011. As one would predict given the allocation formula, the institutional allocation of Federal Work-Study funds fluctuates slightly from year to year, but does not trend consistently upwards or downwards.

The amount of work-study funding a student receives can be used as a proxy for the number of hours students are working on campus. On a webpage describing work-study jobs, Ohio State University (OSU) states that they encourage work study recipients to participate in jobs related to their course of study (Ohio State University Student Financial Aid Office, 2013). OSU's student employment page lists tutoring-type jobs with wages of $9–$12 an hour. Similarly, an undergraduate research assistantship at the College of Optometry estimates wages of $9–$12 an hour (Ohio State University Student Financial Aid Office, 2013). Employers hiring students who qualify for work study pay between 20 and 50 percent of a student's wages. Thus, if we assume 50 percent of wages are being subsidized, and a student is working in a job that pays $10 an hour, an additional $100 of work-study funding translates into 20 more hours of work over the course of the semester. On the other hand, if we assume 80 percent of wages are being subsidized, and again the student is working for $10 an hour, then $100 additional hours of work-study funding translates into 12.5 more hours of work. Thus, an additional $100 of work-study funding can be interpreted as approximately one additional week of part-time employment, depending on how heavily subsidized students' wages are by the Federal Work-Study program.

Students can also work off campus. Unfortunately, our data does not allow us to observe participation in work study and off-campus employment for the same cohorts of students. The most recent cohort for which we can observe off-campus employment is 2006. While approximately 6 percent of first-time, full-time freshman entering a public four-year university in Ohio in 2007, 2008, or 2009 participated in the work-study program, approximately 40 percent of the 2006 cohort worked off campus their freshman year.

Some early studies found working during the school year to be negatively correlated with persistence and academic performance for college students, though these studies' results were not causal (Ehrenberg & Sherman, 1985; Gleason, 1993; Paul, 1982). It is difficult to isolate the causal effect of working on college student outcomes because students who choose to work may come from families with different educational and financial backgrounds than students who do not work, and these differences in background characteristics may impact academic performance and persistence outside of the effects of working. Moreover, students who work may differ from students who do not work on unobservable characteristics, such as long-term career goals and expectations regarding future employment, or their family's willingness to help pay for college, factors that are also correlated with academic outcomes.

However, a few studies have reported plausibly causal effects of working on college student outcomes. DeSimone (2008) estimates the effect of off-campus work on the GPAs of 41,958 undergraduates (a nationally representative sample of full-time, four-year college students) who took part in the Harvard College Alcohol Survey between 1993 and 2001. Instrumenting for student employment with whether or not the students' parents are Jewish and

paternal education levels, he finds that working has a negative effect on GPA. However, DeSimone's instrument may violate the assumption that it only affects student outcomes through its effect on whether or not a student works.

Two more recent studies that attempt to estimate the causal effect of working off-campus find mixed evidence. Dadgar (2012) uses an individual fixed effects model to estimate the effect of working on the academic outcomes of 10,313 students enrolled in a community or technical college in Washington State. She finds that working has a small, negative but statistically significant effect on the end-of-quarter GPAs and credits earned. Darolia (2014) uses both individual fixed effects models and a system Generalized Method of Moments (GMM) estimator to estimate the effects of working on GPA and cumulative credits earned for undergraduate students appearing in the 1997 National Longitudinal Survey of Youth (NLSY97). In his fixed effects models, he finds no evidence that working impacts either part-time or full-time students' yearly GPAs. However, a marginal hour of work has a small, negative effect on the number of credits full-time students accumulate in a year. Likewise, in his GMM models, Darolia finds no evidence that working impacts students' GPAs. On the other hand, he again finds that working has a negative impact on cumulative credits earned for full-time students.

Stinebrickner and Stinebrickner (2003), Scott-Clayton (2011), and Scott-Clayton and Minaya (2015) study the effects of on-campus, work-study employment on student outcomes. Although their studies contribute to our understanding of the impact of on-campus employment on college outcomes, they each have limitations. Stinebrickner and Stinebrickner (2003) find that working an additional hour has a statistically significant, negative effect on students' grades. However, their sample is limited to students from a single institution in rural Kentucky, Berea College, which admits students who have academic promise but are low-income (the mean family income for students entering in their sample years is $22,450). Berea gives all students full scholarships but requires that they all participate for at least 10 hours in a mandatory work-study program. Scott-Clayton's estimates come from West Virginia, a small state not representative of most other states or regions. She focuses on approximately 25,000 students at 21 public two- and four-year institutions who began in 2002, 2003, or 2004. In the full sample she finds no statistically significant effect of participating in work study on academic outcomes. On the other hand, in her gender subgroup analysis, she finds statistically significant negative effects on first-year GPA and probability of bachelor's degree receipt within four years for women, and statistically significant positive effects on first-year GPA and credits earned for men.

Scott-Clayton and Minaya (2015) make use of a sample of 14,064 full-time, dependent students who enrolled at four-year institutions from the Beginning Postsecondary Students (BPS) 96/01 and the BPS 04/09 to examine the effects of participating in the Federal Work-Study program on students' first-year GPAs, the number of months persisted, bachelor's degree completion, employment, and earnings six years after college entry. They find that, when compared to students who are working at non-FWS jobs, participating in work study has a positive effect on academic outcomes but no effect on future employment outcomes. On the

other hand, when compared to students who did not work at all, work-study participants experience null or negative effects on academic outcomes but positive effects on employment outcomes. Though this study makes the important point that the counterfactual matters for students who are working during college, the estimates are only causal if the observable characteristics that the authors are able to control for completely determine whether or not a student participates in the FWS program.

This study adds to the evidence on the causal effect of the Federal Work-Study program by examining the effect of work-study participation on first-year GPA, cumulative credits earned, and early persistence with a large sample from the Ohio public university system. In addition, because Scott-Clayton's study suggests that there may be differential effects of participating in work-study by gender and dependency status, we build on her sub-group analysis by exploring the possibility of differential effects by gender, dependency status, and race/ethnicity.

3. Empirical Framework

Data

The data for this study were provided by the Ohio Board of Regents (OBR) and consist of administrative data on colleges in the Ohio public university system. The dataset includes enrollment files with student demographics, term-by-term course enrollment files with GPA and credits earned, and financial aid records with EFC and detailed information about the types and amounts of financial aid students receive each term. Though there are 61 institutions in the Ohio public university system, including the four-year institutions, their two-year branch campuses, as well as community and technical colleges, the sample only includes undergraduates whose initial home institution is one of the 13 four-year universities.

The sample for this study consists of cohorts of students who enrolled as first-time, full-time freshmen in fall of 2007 and 2008. These are the years for which we have detailed financial aid records that allow us to identify students who received work study. A total of 63,290 freshmen entered one of the four-year institutions in these years. However, because we are studying the impact of receiving Federal Work-Study, a form of financial aid, we restrict the sample to students for whom we have complete financial aid applications. Of the observations in our data, 45,510 have complete financial aid data. We test the sensitivity of our estimates to this loss of data as a robustness check first, by assuming that all missing observations are not eligible to participate in work study, and then by assuming that they are eligible.

The Ohio public university system is the fifth largest public university system in the United States. College enrollment, among traditionally college-aged students, in Ohio in 2007 matched the national average of 50 percent (College Board, 2010). Table 1 compares the

characteristics of our sample with the national cohort entering college in fall 2007 as well as with our sample with some institutions excluded. Our sample is less ethnically diverse than the national sample of full-time college students. Approximately 10 percent of the national cohort in 2007 was Hispanic, whereas only 2 percent of our sample is Hispanic. Also, the students in our sample are more likely to be financially dependent on their parents than those in the national sample. This is not surprising, given that we limit our sample to four-year institutions. Approximately 95 percent of our sample is dependent, compared with only 50 percent of the national cohort. Finally, family incomes in Ohio are similar to the national average. The average income level in Ohio reported by the U.S. Census for the period from 2007 to 2009 was $58,868, which is just below the national average of $61,960 (U.S. Census, 2013).

Table 1: Characteristics of First-Time, Full-Time Freshmen Attending a Four-Year Campus in the Ohio Public University System From 2007–2009 Compared With National Samples

	Ohio Board of Regents Data		
	Fall 2007 Cohort	Analytic Sample Including all 13 Universities	Sample Excluding Ohio State University
Female	0.55	0.53	0.54
White	0.67	0.78	0.77
Black	0.13	0.13	0.14
Hispanic	0.10	0.02	0.02
Asian	0.07	0.02	0.02
Dependent	0.50	0.96	0.95
EFC = 0	0.17	0.14	0.15
Received FWS	0.05	0.06	0.06
N	7,166,661	45,510	39,606

Note. Source of the fall 2007 cohort from *Digest of Education Statistics* (2009).

In addition to student-level data from the OBR, we use data on institutional work-study allocations from the Department of Education. To be able to compare allocations across institutions while accounting for differences in size and number of eligible students, we divide an institution's yearly allocation by the number of fall 2007 Pell recipients. Table 2 displays the allocations per fall 2007 Pell recipient by institution.

Table 2: Federal Work-Study Allocations at Four-Year Campuses in the Ohio Public University System

| | FWS Disbursement | | | |
| | 2007 Figures | | Average 1983–2011 | |
	Total Amount	Per Pell Recipient	Total Amount	Per Pell Recipient
High allocation schools				
Central State University	$678,852	$624	$573,326	$527
Ohio State University	$4,448,273	$447	$3,749,094	$377
Miami University	$905,027	$339	$768,195	$288
University of Toledo	$1,456,773	$335	$966,546	$222
Wright State University	$1,074,900	$317	$1,035,364	$306
University of Cincinnati	$1,570,382	$287	$957,307	$175
Low allocation schools				
Cleveland State University	$779,759	$241	$739,257	$228
University of Akron	$1,438,207	$238	$1,155,516	$191
Bowling Green State University	$995,852	$218	$875,996	$192
Ohio University	$1,120,338	$185	$1,166,231	$193
Kent State University	$1,685,374	$180	$1,618,115	$173
Youngstown State University	$677,119	$146	$466,581	$101
Shawnee State University	$174,624	$107	$137,608	$84

Note. Disbursements per Pell recipient are author's calculations using the number of Pell recipients on each campus in fall 2007. *High allocation schools* have FWS disbursements per Pell recipient above the sample average.

Empirical Strategy

Our goal is to estimate the effect of working on campus during the school year on academic outcomes including GPA and cumulative credits earned. We proxy for hours worked in an on-campus job the amount of work-study funding a student received their freshman year. We start by estimating OLS models relating the amount of work-study money received to a series of outcomes.

$$y_{ij} = \beta_0 + \beta_1(WSreceived)_{ij} + \beta_2(X)_{ij} + \epsilon_j \qquad (1)$$

However, these estimates do not provide an unbiased estimate of the causal effect of participating in work study on student outcomes. Students who spend more time at their work-study jobs, thus earning more money, may also differ from students receiving less or no work-study funding on unobservable characteristics such as having clearly defined career goals. The

positive relationship between the amount of work-study money a student receives and her academic outcomes may then be the result of being more motivated because of more clearly defined career goals than a student who spends less time at her job, not the effect of participating in work study per se. In order to produce a causal estimate of the effect of receiving Federal Work-Study on college student outcomes, it is necessary to find a source of exogenous variation in the allocation of work-study funds to students that approximates students being randomly assigned to receive work study.

Following Scott-Clayton (2011), we make use of the variation in work-study funds allocated across institutions as well as the variation in work study awarded to students with different EFCs to estimate the effect of receiving work study on student outcomes. Institutions must allocate work-study funds to students who demonstrate financial need, but there is no explicit EFC cut-off for determining work-study eligibility. Moreover, because an institution's allocation is determined more by historical precedent than by the need of the current student body, there is some exogenous variation in the amount of work-study funds available across institutions. Students at Ohio State University (OSU) and Shawnee State University (SSU) may have the same financial need (as determined by EFC), but the students at OSU likely receive more work-study funding than the student at SSU because the historical allocation of work-study funds to OSU is bigger. Figure 1 shows the variation across institutions in work-study allocations for the two years in our sample. The institutional allocation at OSU, which receives the largest allocation, is more than 25 times that of SSU, which receives the lowest allocation. Table 2 shows institutional allocations in 2007, as well as average allocations per Pell recipient. If the FWS allocation were distributed equally across all Pell recipients, at OSU, each recipient would receive $447 in FWS funding, whereas students at SSU would receive $107. Though our estimation strategy relies on the assumption that institutional allocations do not vary from year to year, Figure 1 shows that the allocation at OSU increased in 2008, while the allocations at the University of Toledo (UT) and the University of Cincinnati (UC) decreased in 2008. Our robustness checks explore this violation of our assumptions.

In the first stage of our estimation strategy, we make use of this variation in the amount of work-study funding received by institutions in a differences-in-differences model. The first difference compares schools with different average work-study allocations per fall 2007 Pell recipient. The second difference capitalizes on the fact that students are much more likely to participate in the Federal Work-Study program if they have a lower EFC. We estimate the following equation,

$$WSreceived_{ij} = \beta_1(EFCXalloc)_{ij} + \beta_2(EFC)_i + \beta_3(alloc)_j + \delta_i + \gamma_j + \epsilon_{ij} \qquad (2)$$

in which *WSreceived* is the amount of work-study funding a student receives their freshman year divided by 100, *alloc* is the Federal Work-Study allocation per Pell recipient that institution *j* received in 2007, and *EFC* is the primary EFC of student *i*. δ_i are fixed effects for 18 bins of EFC based on 20 percentiles of the primary EFCs of students in our sample. Finally, γ_j are fixed effects for the 13 institutions in the sample. As a result of the fixed effects, equation (1) estimates

a different value of $\widehat{WSreceived}_{ij}$ for students in each EFC bin–institution combination. The coefficient of interest is β_1, and it represents the effect of the interaction of EFC (or neediness) and institutional work-study allocation on the amount of work-study money received for a student in a given institution, in a given EFC bin. We use this differences-in-differences model as the first stage in a two-stage least squares instrumental variables model.

The second stage regresses student outcomes including GPA, cumulative credits earned, and persistence on the predicted amount of work-study funds received and a vector of student-level covariates:

$$y_{ij} = \beta_0 + \beta_1\big(\widehat{WSreceived}\big)_{ij} + \beta_2(X)_{ij} + \alpha_{ij} \tag{3}$$

In this way we use the variation in amount of work study a student receives due to differences in eligibility and institution-level allocation to estimate the effect of participating in the Federal Work-Study program on academic outcomes.

Our preferred specification makes use of the continuous variable, *primary EFC*, as the indicator of students' eligibility for the Federal Work-Study program and the institution-level FWS allocation per Pell recipient in 2007. However, we also test the robustness of our estimates to three alternate specifications. Though, as expected, institution-level allocation of FWS does not change for most of the institutions in our sample from 2007–2008 (Figure 1), it is possible that these three years are not representative of the allocations received by institutions across all the years of the Federal Work-Study program. Therefore, we also calculate the average FWS allocation across all the years of the program (1983–2011) and use that average, per 2007 Pell eligible student, to instrument for the amount of work-study funding students receive. The average work-study allocations across all years of the program are displayed in Table 2, in addition to the 2007 figures.

We also present a specification in which, rather than using students' EFCs directly, like Scott-Clayton (2011), we estimate a cut-off for work-study eligibility from the data (Figure 2).[4] Generally, in our sample, only students with estimated family contributions below $10,000 receive work study, though 4.5 percent of those in our sample participating in work study have EFCs above this cut-off (Figure 2). In the third specification, we use this threshold for the second difference, thereby comparing students with EFCs above and below $10,000 at institutions with different allocations per 2007 Pell recipient.[5] Table 3 displays descriptive statistics for the sample by institution-level work-study allocation and eligibility. The means displayed confirm that eligible students at high allocation institutions are more likely to receive work study and receive larger amounts of work-study funding than ineligible students or students at low allocation institutions.

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[4] Though strict rules about maximum EFC govern the allocation of federal grants such as the Pell, no such rules determine who may be offered work-study money (U.S. Department of Education, 2013).
[5] Scott-Clayton (2011) uses $8,000 as the cutoff for eligibility in her sample, and so our cut-off is only slightly higher.

Figure 1: Total Federal Work-Study Allocations by Year and Institution
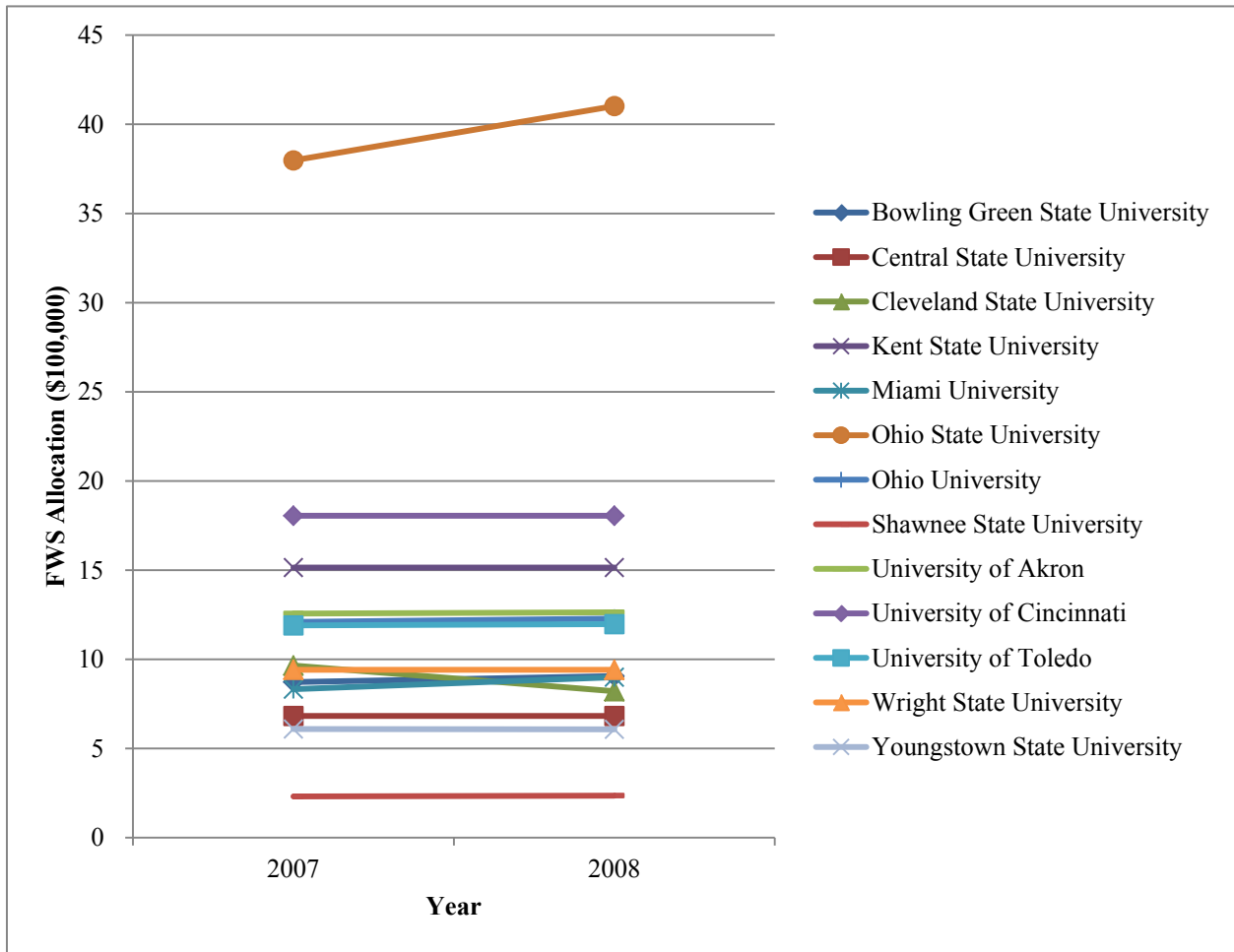
Note. Figures based on U.S. Department of Education, Federal Campus-Based Programs Databook. Shows the yearly allocations of Federal Work-Study funding for the institutions in the sample. With the exception of Ohio State University, the institutional allocations change very little from year to year.

Table 3: Work-Study Eligible and Ineligible Students at High and Low Allocation Institutions

	Ineligible (EFC > $10,000)		Eligible (EFC ≤ $10,000)	
	Low Allocation	High Allocation	Low Allocation	High Allocation
Female	0.52	0.50	0.56	0.54
White	0.89	0.88	0.73	0.63
Black	0.04	0.05	0.17	0.27
Hispanic	0.02	0.02	0.03	0.03
Asian	0.01	0.03	0.02	0.03
Native American	0.00	0.00	0.00	0.00
Dependent	0.99	1.00	0.91	0.95
Mother's Education	1.51	1.39	1.80	1.74
Has Work-Study Funding	0.01	0.01	0.06	0.18
Year's Work-Study Funding	0.01	0.01	0.09	0.35
1st Semester GPA	2.81	3.02	2.51	2.67
2nd Semester GPA	2.79	2.99	2.47	2.61
1st Semester Credits Earned	13.36	14.19	12.01	13.00
2nd Semester Cumulative Credits	29.51	36.93	25.33	33.41
Persisted to Sophomore Year	0.88	0.93	0.79	0.84
N	9,629	11,770	13,699	10,412

Note. Figures based on Ohio Board of Regents. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Eligible* is defined as having an EFC below $10,000. *High Allocation* indicates institutions with Federal Work-Study allocations per Pell eligible student above the sample mean.

Finally, we present estimates in which the amount of work-study money students received is regressed on the interaction of a binary variable indicating work-study eligibility and a binary variable indicating that an institution receives a high allocation, or in other words has a work-study allocation above the sample mean. These are the institutions located above the dashed line in Figure 2.

Figure 2: Amount of Work-Study Funding Received by EFC
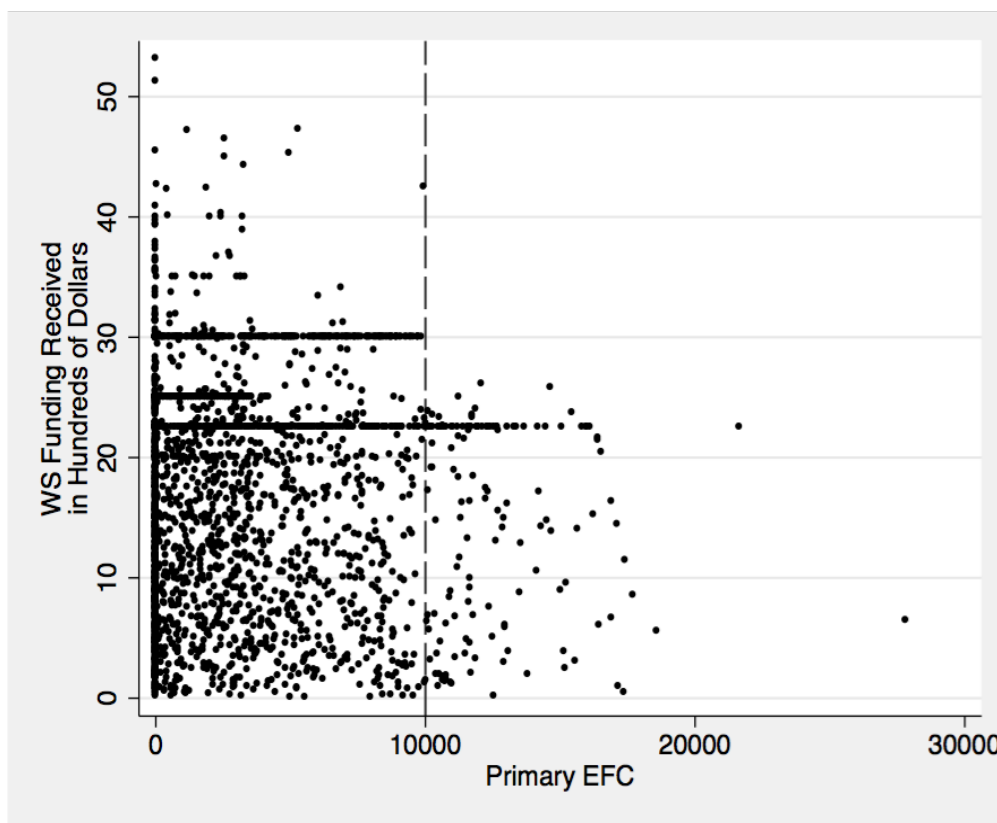
Note. Figures based on Ohio Board of Regents data. Sample includes freshmen in 2007 and 2008 attending one of 13 four-year campuses and receiving Federal Work-Study funding.

4. Results

Table 4 displays ordinary least squares estimates from regressing students' outcomes on the amount of work-study money they received. The models displayed in the second panel include fixed effects for 18 bins of EFC based on 20 percentiles of EFC as well as fixed effects for the 13 institutions in the sample. The estimates from the models including fixed effects suggest that there may be a statistically significant, positive relationship between the amount of work study students receive and their first and second semester GPAs, cumulative credits earned, and probability of persisting to their sophomore year. The estimates in the bottom panel of Table 4 (models with fixed effects) suggest that participating in the work-study program has a statistically significant, positive effect on students' academic outcomes. However, as explained above, these estimates are not causal.

Table 4: Ordinary Least Squares Estimates of the Effect of Receiving Federal Work-Study Money on Academic Outcomes Without and With Fixed Effects

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	

Models Without Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.000601	0.00400	-0.000683	0.00429	-0.0136	0.00515	0.154**	0.206***	0.00138	0.00231**
	(0.00388)	(0.00343)	(0.00445)	(0.00403)	(0.0336)	(0.0327)	(0.0641)	(0.0642)	(0.000814)	(0.000821)
Constant	2.745***	2.583***	2.704***	2.575***	13.10***	11.26***	30.89***	25.91***	0.856***	0.781***
	(0.0626)	(0.0655)	(0.0726)	(0.0695)	(0.443)	(0.392)	(2.657)	(2.048)	(0.0212)	(0.0212)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510
R-squared	0.000	0.089	0.000	0.117	0.000	0.108	0.005	0.108	0.000	0.031

Models With Institutional Fixed Effects

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	0.00649*	0.00658**	0.00756**	0.00773**	0.0234	0.0229	0.0683**	0.0661***	0.00277***	0.00271***
	(0.00301)	(0.00252)	(0.00297)	(0.00253)	(0.0165)	(0.0146)	(0.0239)	(0.0190)	(0.000753)	(0.000699)
Constant	2.576***	2.382***	2.558***	2.399***	14.03***	12.04***	27.45***	22.74***	0.763***	0.690***
	(0.0257)	(0.0412)	(0.0264)	(0.0419)	(0.171)	(0.321)	(0.307)	(0.560)	(0.00833)	(0.0153)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510
R-squared	0.092	0.135	0.129	0.181	0.224	0.262	0.632	0.655	0.058	0.066

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. The models displayed in panel 1 do not include fixed effects. The models in panel 2 include fixed effects for institution attended and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

The differences-in-differences models in Tables 5 and 6 estimate the effect of the interaction of student need and an institution's Federal Work-Study allocation on the dollar amount of work-study funding a student received. For all specifications, the interaction has a statistically significant effect on the amount of work-study funding students receive. In the specifications making use of the continuous variable, EFC, the interaction of EFC and allocation has a statistically significant, negative effect on the amount of work-study funding students receive. As one would expect, as a student's EFC increases, indicating that the student has less financial need as determined by the FAFSA, the amount of work study they receive decreases. The use of the institution-level allocation from 2007 or the average institution-level allocation across all years of the program does not change the sign or magnitude of the coefficient on the interaction term. In specifications in which EFC is replaced by a binary variable indicating that a student has an EFC below $10,000 and is eligible for work study, the interaction of eligibility and work-study allocation has a statistically significant, positive effect on the amount of work-study funding a student receives. In other words, being eligible to receive work-study funding at an institution that receives a higher allocation of work-study funding has a statistically significant, positive effect on the amount of work-study funding a student receives.

Tables 7 and 8 display the instrumental variables estimates with and without covariates using all four first-stage specifications. Comparing the estimates in Tables 7 and 8 suggests that changing the specification of the first stage does little to change the estimated effect of receiving an additional $100 of work-study money on academic outcomes. Therefore we focus on the models in the top panel of Table 7, which use the interaction of EFC and the 2007 institution-level FWS allocation divided by the number of Pell recipients as the first-stage instrument.

Models 1 and 2 in Table 7 display estimates of the effect of work study received on first semester GPA with and without covariates. The estimates suggest that working on campus has a small, negative, but not statistically significant effect on students' first semester GPAs. The coefficient on *WSreceived* in model 2 indicates that, for each $100 of additional work-study funding a student receives, their first semester GPA decreases by 0.0137 points, on average. Models 3 and 4 estimate the effect of work-study money received on second semester GPAs without and with covariates. Again, the estimates are small, negative and not statistically significant.

The estimates in models 5 and 6 suggest that participating in work study has a small, negative effect on the number of credits students earn in their first semester, though these estimates are not statistically significant. However, the coefficient on *WSreceived* in model 8 suggests that when we control for race/ethnicity, gender, mother's education, and whether or not the student is financially dependent on their parents, receiving an additional $100 of work-study funding increases the number of credits students have earned by the end of their freshman year by 1.165, on average. This estimate is statistically significant. Finally, the estimates in models 9 and 10 indicate that participating in the work-study program does not have a statistically significant effect on students' likelihood of persisting to their sophomore year.

Table 5: First Stage Differences-in-Differences Estimates of the Effect of the Interaction of Students' Financial Need and Institution-Level Federal Work-Study Allocation on the Amount of Work-Study Funding Students Receive

	Dependent Variable: Amount of Work Study Received			
	Using 2007 Allocation Figures		Using Mean Allocation 1983–2011	
	(1)	**(2)**	**(3)**	**(4)**
EFC X Award Per Pell Recipient 2007	-0.000351*** (0.0000686)	-0.000347*** (0.0000680)		
EFC	0.112*** (0.0337)	0.111*** (0.0333)	0.132*** (0.0260)	0.131*** (0.0257)
Award Per Pell Recipient 2007	0.00414*** (0.000298)	0.00352*** (0.000424)		
EFC X Award Per Pell Recipient 1983–2011			-0.000496*** (0.0000582)	-0.000491*** (0.0000580)
Award Per Pell Recipient 1983–2011			0.00518*** (0.000520)	0.00443*** (0.000553)
Constant	0.390 (0.615)	-0.433 (0.410)	0.308 (0.672)	-0.487 (0.435)
Covariates	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510
R-squared	0.138	0.140	0.144	0.146

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Amount of Work Study Received* is the amount of work-study funding a student received their freshman year, scaled by 100. *Award Per Pell Recipient 2007* is an institution's 2007 federal work-study allocation divided by the number of 2007 Pell recipients at that institution. *Award Per Pell Recipient 1983–2011* is an institution's average federal work-study allocation over the period from 1983 to 2011 divided by the number of 2007 Pell recipients at that institution. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 6: First Stage Differences-in-Differences Estimates of the Effect of the Interaction of Work-Study Eligibility and Institution-Level Federal Work-Study Allocation on the Amount of Work-Study Funding Students Receive

	Dependent Variable: Amount of Work Study Received			
	Using Binary "FWS Eligible"		Using Binary "FWS Eligible" and Binary High Allocation	
	(1)	**(2)**	**(3)**	**(4)**
FWS Eligible X Award Per Pell Recipient	0.0167*** (0.00357)	0.0166*** (0.00355)		
FWS Eligible	0.158 (0.349)	0.165 (0.342)	0.163 (0.346)	0.171 (0.339)
Award Per Pell Recipient	-0.0117*** (0.00338)	-0.0121*** (0.00346)		
FWS Eligible X High Allocation			2.644* (1.292)	2.607* (1.285)
High Allocation			-1.870 (1.253)	-2.067 (1.282)
Constant	-0.183 (0.455)	-0.949*** (0.202)	0.370** (0.168)	-0.584 (0.491)
Covariates	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510
R-squared	0.147	0.149	0.140	0.142

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Amount of Work Study Received* is the amount of work-study funding a student received their freshman year, scaled by 100. *Award Per Pell Recipient* is an institution's 2007 federal work-study allocation divided by the number of 2007 Pell recipients at that institution. *FWS Eligible* is a dummy variable coded 1 for students with EFCs below $10,000. *High Allocation* is a dummy variable coded 1 for institutions with federal work-study allocations per Pell eligible student above the sample mean. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 7: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes

	First Semester GPA		Second Semester GPA		First Semester Cumulative Credits		First Year Cumulative Credits		Persisted to Sophomore Year	
	Instrument 1: EFC X Allocation Per Pell Recipient 2007									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Work Study Received	-0.0460*	-0.0137	-0.0530*	-0.0188	-0.237	-0.105	0.700	1.165**	-0.00709	-0.0000196
	(0.0243)	(0.0183)	(0.0289)	(0.0239)	(0.186)	(0.178)	(0.499)	(0.471)	(0.00689)	(0.00528)
Constant	2.795***	2.580***	2.762***	2.571***	13.35***	11.24***	30.29***	26.09***	0.865***	0.781***
	(0.0490)	(0.0638)	(0.0548)	(0.0668)	(0.362)	(0.385)	(2.512)	(2.037)	(0.0164)	(0.0206)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510
	Instrument 2: EFC X Allocation Per Pell Recipient Averaged Across 1983–2011									
	(11)	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**
Work Study Received	-0.0430**	-0.0124	-0.0493*	-0.0168	-0.218	-0.0932	0.685	1.122**	-0.00604	0.000708
	(0.0219)	(0.0170)	(0.0267)	(0.0227)	(0.179)	(0.172)	(0.461)	(0.444)	(0.00615)	(0.00488)
Constant	2.792***	2.580***	2.758***	2.571***	13.33***	11.24***	30.30***	26.08***	0.864***	0.781***
	(0.0499)	(0.0636)	(0.0562)	(0.0667)	(0.364)	(0.384)	(2.519)	(2.031)	(0.0168)	(0.0206)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 8: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes

	First Semester GPA		Second Semester GPA		First Semester Cumulative Credits		First Year Cumulative Credits		Persisted to Sophomore Year	
	— Instrument 3: FWS Eligible X Allocation Per Pell Recipient 2007									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0411*	-0.0106	-0.0481*	-0.0157	-0.215	-0.0919	0.660	1.090***	-0.00643	0.000176
	(0.0240)	(0.0184)	(0.0284)	(0.0235)	(0.182)	(0.171)	(0.457)	(0.420)	(0.00664)	(0.00502)
Constant	2.790***	2.580***	2.757***	2.571***	13.33***	11.24***	30.33***	26.07***	0.864***	0.781***
	(0.0499)	(0.0636)	(0.0559)	(0.0668)	(0.363)	(0.384)	(2.529)	(2.026)	(0.0166)	(0.0206)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510
	Instrument 4: FWS Eligible X High Allocation									
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0447*	-0.0124	-0.0523*	-0.0182	-0.232	-0.101	0.673	1.132**	-0.00720	-0.000208
	(0.0252)	(0.0191)	(0.0293)	(0.0241)	(0.176)	(0.168)	(0.531)	(0.499)	(0.00705)	(0.00526)
Constant	2.794***	2.580***	2.761***	2.571***	13.34***	11.24***	30.32***	26.08***	0.865***	0.781***
	(0.0497)	(0.0637)	(0.0555)	(0.0669)	(0.369)	(0.383)	(2.519)	(2.037)	(0.0166)	(0.0206)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510	45,510

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Robustness Checks

As described above, 17,780 of the freshmen starting at four-year campuses in Ohio in 2007or 2008 have missing or incomplete financial aid files. Therefore, we re-ran our models after imputed the missing observations first as eligible for FWS and then as ineligible. Table 9 displays the instrumental variables estimates including the full sample of 63,290 freshmen. The results with missing observations imputed as eligible for FWS have the same signs and similar magnitudes to those with missing data imputed as ineligible. The results with the missing data imputed as eligible or ineligible for FWS are both slightly larger than the estimates from the sample with complete financial aid files because the coefficient on the interaction in the first stage is smaller for both imputations (see Appendix Table A.1 for the first stage estimates). However, the results using the full sample do not differ substantively from the estimates using only the sample with complete financial aid information.

One of the assumptions underlying our empirical strategy is that there is very little yearly variation in the amount of work-study funding allocated to universities because the allocation is based more on historical precedent than on the current student body or other contextual changes. As a result of this assumption, in the first stage of our instrumental variables model, we use 2007 allocation per Pell Grant recipient to estimate the predicted values of work-study money received for students in a given school, within a given EFC bin, for all three of the cohorts in our sample pooled together.

The disbursements at OSU, UC, and UT violate the assumption that disbursements do not vary from year to year (Figure 1). By only making use of 2007 allocations in our instrumental variables strategy and estimating off the variation in work-study money received across institutions and EFC bins, our model does not allow for differences in the predicted values of work-study funding received for different cohorts. If the 2008 cohorts of students at OSU, UC, and UT actually received much more work-study funding than the 2007 cohorts, the predicted values of work-study funding received for those schools may be poorly estimated in the first stage. In order to explore this potential problem, we re-estimated the main models excluding these three schools.

As mentioned above, Table 2 compares the student characteristics of three samples: a sample including all 13 universities, one excluding OSU, UC, and UT, and another just excluding OSU. All three samples are similar along student characteristics and percent receiving FWS. Because, on average, the sample is similar with or without these institutions, but *WSreceived* may be more accurately predicted by the first stage without them, we re-ran our analyses on subsamples that exclude these institutions.

Table 9: Instrumental Variables Estimates of the Effect of the Amount of Work-Study Money Received on Students' Academic Outcomes with Missing Observations Imputed as First, Eligible, and Also Ineligible for the Federal Work-Study Program

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
	Missing Observations Imputed as Eligible for Work Study									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0596*	-0.0236	-0.0711**	-0.0330	-0.263	-0.132	0.795	1.362**	-0.00729	0.000938
	(0.0305)	(0.0239)	(0.0354)	(0.0299)	(0.199)	(0.206)	(0.607)	(0.605)	(0.00764)	(0.00607)
Constant	2.823***	2.762***	2.802***	2.735***	13.41***	13.50***	30.48***	31.22***	0.860***	0.862***
	(0.0522)	(0.0549)	(0.0568)	(0.0598)	(0.362)	(0.337)	(2.395)	(2.511)	(0.0171)	(0.0181)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290
	Missing Observations Imputed as Ineligible for Work Study									
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0608*	-0.0245	-0.0718**	-0.0334	-0.283	-0.153	0.773	1.343**	-0.00734	0.000944
	(0.0321)	(0.0249)	(0.0365)	(0.0305)	(0.200)	(0.205)	(0.637)	(0.634)	(0.00817)	(0.00672)
Constant	2.824***	2.762***	2.803***	2.735***	13.42***	13.51***	30.50***	31.23***	0.860***	0.862***
	(0.0510)	(0.0542)	(0.0560)	(0.0594)	(0.362)	(0.338)	(2.396)	(2.511)	(0.0166)	(0.0177)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290	63,290

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All include fixed effects for 13 institutions and 18 EFC bins.

*$p < 0.1$. **$p < 0.05$. ***$p < 0.01$.

Table 10 displays the first-stage models first excluding just OSU (models 1 and 2) and then excluding OSU, UC, and UT (models 3 and 4). In all models, the interaction of EFC and 2007 allocation per Pell eligible student is statistically significantly correlated with the amount of work-study funding students received.

Table 10: First Stage, Differences-in-Differences Estimates of the Effect of the Interaction of Students' Financial Need and Institution-Level Work-Study Allocation on the Amount of Work-Study Money Received

	Dependent Variable: Amount of Work Study Received			
	Excluding Ohio State University		Excluding Ohio State University, University of Cincinnati, University of Toledo	
	(1)	(2)	(3)	(4)
EFC X Award Per Pell Recipient	-0.000258* (0.000139)	-0.000253* (0.000138)	-0.000414** (0.000169)	-0.000409** (0.000166)
EFC	0.0715 (0.0419)	0.0702 (0.0418)	0.114** (0.0470)	0.114** (0.0465)
Award Per Pell Recipient	0.00420*** (0.000492)	0.00354*** (0.000433)	0.00474*** (0.000633)	0.00403*** (0.000458)
Constant	-2.087** (0.903)	-2.576** (0.863)	-0.392** (0.173)	-0.822** (0.321)
Covariates	No	Yes	No	Yes
N	39,606	39,606	30,521	30,521
R-squared	0.121	0.123	0.134	0.136

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Award Per Pell Recipient* is an institution's 2007 Federal Work-Study allocation divided by the number of 2007 Pell recipients at that institution. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for institution and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 11 displays the instrumental variables models, first excluding just OSU, and then excluding OSU, UC, and UT. Coefficients from these models, whether excluding one university or three universities, have the same signs and similar magnitudes as the models including the full sample of schools, but the estimated effects of receiving an additional $100 of work-study funding on first and second semester GPAs, as well as first semester credits earned, are statistically significant. The coefficient on *WSreceived* in model 2 indicates that, when OSU is excluded from the sample, receiving an additional $100 of work-study funding decreases students' first semester GPAs by 0.0286 points on average. The estimates in model 4 suggest

that, when OSU is excluded from the sample, receiving an addition $100 of work-study funding decreases students' first-year GPAs by 0.0406 points on average. Finally, the estimate in model 6 suggests that receiving an additional $100 of work study has a small, negative effect on the number of credits students earn in their first semesters. When the three universities are excluded from the sample, the estimated effects of participating in work study on GPA and credits earned in the first semester follow the same pattern as the estimates from the sample just excluding OSU. Additionally, with the three universities excluded, we find that receiving work-study funding has a statistically significant, positive effect on first-year cumulative credits earned, and a small, negative, statistically significant effect on persistence to sophomore year.

Subgroup Analysis

We explore heterogeneous effects by gender, race/ethnicity, and whether or not the student is financially dependent on their parents. We do not find evidence of differential effects either by gender or race/ethnicity in our sample. Estimates for these subgroups, both including and excluding OSU, can be found in Appendix Tables A.4 and A.5, respectively.

Table 12 displays estimates comparing the effect of participating in work study for students who are financially dependent on their parents and those who are not, for the complete sample. For independent students, receiving an additional $100 of work-study funding has a positive, statistically significant effect on the number of credits earned in the first semester (0.390 credits). For both financially dependent and independent students, receiving an additional $100 of work-study funding has a statistically significant effect on the number of credits earned by the end of freshman year. Dependent students earn an additional 1.111 credits by the end of their freshman year, on average, while independent students earn an additional 2.093 credits, on average.

In the sample excluding OSU, receiving an additional $100 of work-study money has a statistically significant negative effect on first and second semester GPAs and first semester credits earned for dependent students, but not for independent students (Table 13). Receiving an additional $100 of work-study decreases first semester GPAs by 0.0326 points and second semester GPAs by 0.0434 points, on average, for students who are financially dependent on their parents. The coefficient on *WSreceived* indicates that participating in FWS also decreases first semester credits earned for dependent students by 0.319 credits, on average. On the other hand, none of the estimates from covariate models, of the effect of receiving the additional work study on GPAs or first semester credits earned for independent students, are statistically significant. For financially independent students, the only statistically significant effect is a positive effect on credits earned by the end of their first year. Receiving an additional $100 of work-study funding increases first-year cumulative credits earned by 1.694 credits, on average, for independent students. This subgroup analysis by dependency status provides some evidence that working, even on campus, may have a more negative effect on students who are financially dependent on

their parents. However, the number of independent students in our sample is very small ($N =$ 1,887), so this subgroup analysis may be asking too much of the data.

Scott-Clayton (2011) points out that differences in the effect of participating in the work-study program across subgroups can either be due to differences in the treatment or differences in counterfactual uses of time. The OBR data does not include information about job placements that would allow us to explore the possibility of differences in treatment between financially dependent and independent students. However, we can hypothesize about counterfactual uses of time.

Financially independent students are probably more likely to hold off-campus jobs than their dependent peers. Of those students working, older students are more likely to work longer hours. Of college students who are working, those 18 or younger are most likely to be working between 1 and 15 hours, whereas those between the ages of 24 and 29 are most likely to be working 40 or more hours (2007–08 National Postsecondary Student Aid Study, computation using NCES Quickstats). If dependent students who get a work-study job would otherwise be spending their time on their studies and not holding a job at all, but independent students who get a work-study job would otherwise be working off campus, this could explain why participating in work study has some negative effects on the academic outcomes of dependents but some positive effect on independent students.

Table 11: Instrumental Variables Estimates of the Effect of Work-Study Money Received on Students' Academic Outcomes

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
	Excluding Ohio State University									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Work Study Received	-0.0623**	-0.0286**	-0.0760***	-0.0406***	-0.433***	-0.300***	0.327	0.739	-0.0131	-0.00588
	(0.0263)	(0.0136)	(0.0258)	(0.0125)	(0.0971)	(0.0685)	(0.732)	(0.600)	(0.00861)	(0.00499)
Constant	2.750***	2.549***	2.715***	2.535***	13.21***	11.11***	28.79***	24.35***	0.853***	0.771***
	(0.0453)	(0.0656)	(0.0514)	(0.0678)	(0.380)	(0.411)	(2.384)	(1.717)	(0.0162)	(0.0200)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	39,606	39,606	39,606	39,606	39,606	39,606	39,606	39,606	39,606	39,606
	Excluding Ohio State University, University of Cincinnati, and University of Toledo									
	(11)	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**
Work Study Received	-0.0465***	-0.0159**	-0.0594***	-0.0281***	-0.355***	-0.242***	0.728	1.076***	-0.00902*	-0.00343
	(0.0156)	(0.00707)	(0.0144)	(0.00697)	(0.0742)	(0.0733)	(0.479)	(0.374)	(0.00522)	(0.00305)
Constant	2.722***	2.535***	2.696***	2.530***	13.09***	11.21***	27.36***	23.53***	0.852***	0.785***
	(0.0557)	(0.0779)	(0.0661)	(0.0819)	(0.498)	(0.498)	(2.258)	(1.898)	(0.0199)	(0.0211)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	30,521	30,521	30,521	30,521	30,521	30,521	30,521	30,521	30,521	30,521

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 12: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes, for Students Who Are and Are Not Financially Dependent on Their Parents

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
					Dependent Students					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0462**	-0.0168	-0.0530*	-0.0209	-0.236	-0.124	0.674	1.111**	-0.00719	-0.000929
	(0.0228)	(0.0185)	(0.0274)	(0.0239)	(0.180)	(0.179)	(0.478)	(0.479)	(0.00639)	(0.00539)
Constant	2.820***	2.922***	2.787***	2.909***	13.51***	14.19***	30.80***	34.49***	0.873***	0.924***
	(0.0468)	(0.0637)	(0.0520)	(0.0721)	(0.345)	(0.359)	(2.521)	(3.034)	(0.0156)	(0.0192)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	43,572	43,572	43,572	43,572	43,572	43,572	43,572	43,572	43,572	43,572
					Independent Students					
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	0.0173	0.0446**	0.000927	0.0275	0.322	0.390*	1.928***	2.093***	0.0186***	0.0222***
	(0.0263)	(0.0214)	(0.0349)	(0.0302)	(0.216)	(0.219)	(0.398)	(0.395)	(0.00485)	(0.00486)
Constant	2.175***	2.685***	2.144***	2.572***	9.141***	10.55***	17.98***	21.86***	0.655***	0.725***
	(0.0673)	(0.0577)	(0.0742)	(0.0561)	(0.554)	(0.398)	(1.303)	(1.340)	(0.0186)	(0.0277)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	1,938	1,938	1,938	1,938	1,938	1,938	1,938	1,938	1,938	1,938

Note. Data based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include gender, mother's education, and race/ethnicity. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table 13: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes, for Students Who Are and Are Not Financially Dependent on Their Parents With OSU Excluded

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
					Dependent Students					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Work Study Received	-0.0631***	-0.0326**	-0.0764***	-0.0434***	-0.432***	-0.319***	0.311	0.690	-0.0134*	-0.00701
	(0.0243)	(0.0142)	(0.0241)	(0.0128)	(0.0838)	(0.0706)	(0.713)	(0.621)	(0.00783)	(0.00503)
Constant	2.776***	2.869***	2.741***	2.848***	13.38***	14.03***	29.28***	32.03***	0.862***	0.909***
	(0.0419)	(0.0570)	(0.0471)	(0.0626)	(0.363)	(0.408)	(2.388)	(2.687)	(0.0152)	(0.0176)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	37,719	37,719	37,719	37,719	37,719	37,719	37,719	37,719	37,719	37,719
					Independent Students					
	(11)	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**
Work Study Received	-0.0109	0.0261*	-0.0374	-0.00152	0.122	0.200	1.501***	1.694***	0.0139***	0.0181***
	(0.0218)	(0.0146)	(0.0228)	(0.0161)	(0.136)	(0.156)	(0.239)	(0.247)	(0.00390)	(0.00368)
Constant	2.187***	2.677***	2.161***	2.573***	9.243***	10.55***	18.18***	21.49***	0.656***	0.720***
	(0.0683)	(0.0571)	(0.0752)	(0.0553)	(0.558)	(0.403)	(1.335)	(1.249)	(0.0187)	(0.0275)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 12 four-year campuses in the Ohio public university system (excluding OSU) with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include gender, mother's education and race/ethnicity. All models include fixed effects for 12 institutions and 18 EFC bins.

$*p < 0.1$. $**p < 0.05$. $***p < 0.01$.

5. Conclusions

This study adds to the evidence on the causal effect of participating in the Federal Work-Study program. Our findings support previous research on the effect of having a work-study job on students' academic outcomes. Scott-Clayton (2011) finds that participating in work study has a negative effect on GPA and a positive effect on credits earned, though her estimates are not statistically significant. We find statistically significant effects of participating in FWS on credits earned by the end of the freshman year. Furthermore, when we exclude OSU from our sample, we also find that participating in work-study has a statistically significant, negative effect on students' GPAs, though the negative effects are minimal—less than a tenth of a point. On the other hand, Scott-Clayton finds that holding a work-study job has differential effects by gender, but we do not see this pattern among gender subgroups in Ohio.

Our findings are also consistent with Stinebrickner & Stinebrickner (2003) and Dadgar's (2012) estimates of the impact of off-campus work on students' academic outcomes. We find some evidence that working during the school year, even in an on-campus job, has a negative effect on students' grades. This is not surprising given the challenges students face when they first enter college. Many freshmen struggle to manage their time and maintain focus on their studies. The added time constraints caused by a job may make these skills, which are already difficult to develop, impossible to maintain.

Our most consistent finding is that an additional $100 of work-study funding, which translates roughly into an additional 12.5 to 20 hours of work, has a significant, positive effect on the number of credits students earn in their second semester. Many classes are worth three or four credits, so this means that having an on-campus job that is subsidized by work-study funds may enable some students to earn the equivalent of an additional class every two years. For some students, this could mean graduating more quickly and saving money on tuition as well as the opportunity cost associated with not being able to work full-time during college. It is possible that students who work on campus choose to take more classes because their job forces them to spend more time on campus. It is also possible that connections students make through an on-campus job give them a clearer idea about which courses they would like to take. Finally, it may simply be that some campuses have course load requirements tied to work study. Though we limited our sample to full-time students, we defined full-time as students taking at least three courses a semester. It could be that some institutions require students participating in work study to take a full load of four courses.

When considering the effect of working during the school year on students' academic achievement, it may be important to distinguish between on-campus and off-campus work. It is possible that working off campus has a more negative effect on students than working on campus. Working off campus requires extra travel time and may involve employers who are less understanding about, for example, students who want to work less in the middle of the semester in order to study for midterms. On-campus employers, on the other hand, may be much more willing to allow students to put academics first.

The difference between on-campus work and off-campus work may be particularly pertinent for students who are financially independent of their parents. It seems likely that financially independent students who have to support themselves will be working during the school year whether or not they qualify for work study. For these students, being offered a work-study job may allow them to decrease hours at an off-campus job that is inflexible and requires extra travel time and instead spend time at an on-campus job that they can walk to right after class and which makes them feel more integrated into campus life.

The Federal Work-Study program is a potentially attractive financial aid policy option. The minimal negative effects on GPA may be outweighed by increases in non-academic, work-relevant skills that we cannot measure using the OBR data. If funds can be used to provide students with work experience that enriches their course of study and gives them a foothold when they enter the labor market, while at the same time meeting the labor needs of the colleges and universities where they attend, then this would seem to be an efficient use of scarce government resources. However, student employment may need to be more carefully regulated to prevent any negative effects on students' academic success. A logical next question is whether there are differential effects of participating in work study for students working more or fewer hours. In addition, we would like to compare the effect of off-campus work versus on-campus work, though unfortunately the OBR dataset does not allow us to explore this question. Given the high cost of higher education, it is inevitable that students are going to have to work to pay their expenses. If working on campus has a less negative effect than off-campus work, and if the more productive employment opportunities afforded to those participating in work study help them in the labor market after college, then the Federal Work-Study program may be a worthwhile investment.

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Appendix

Figure A.1: Total Federal Work-Study Allocations by Year and Institution, 1983 to 2011
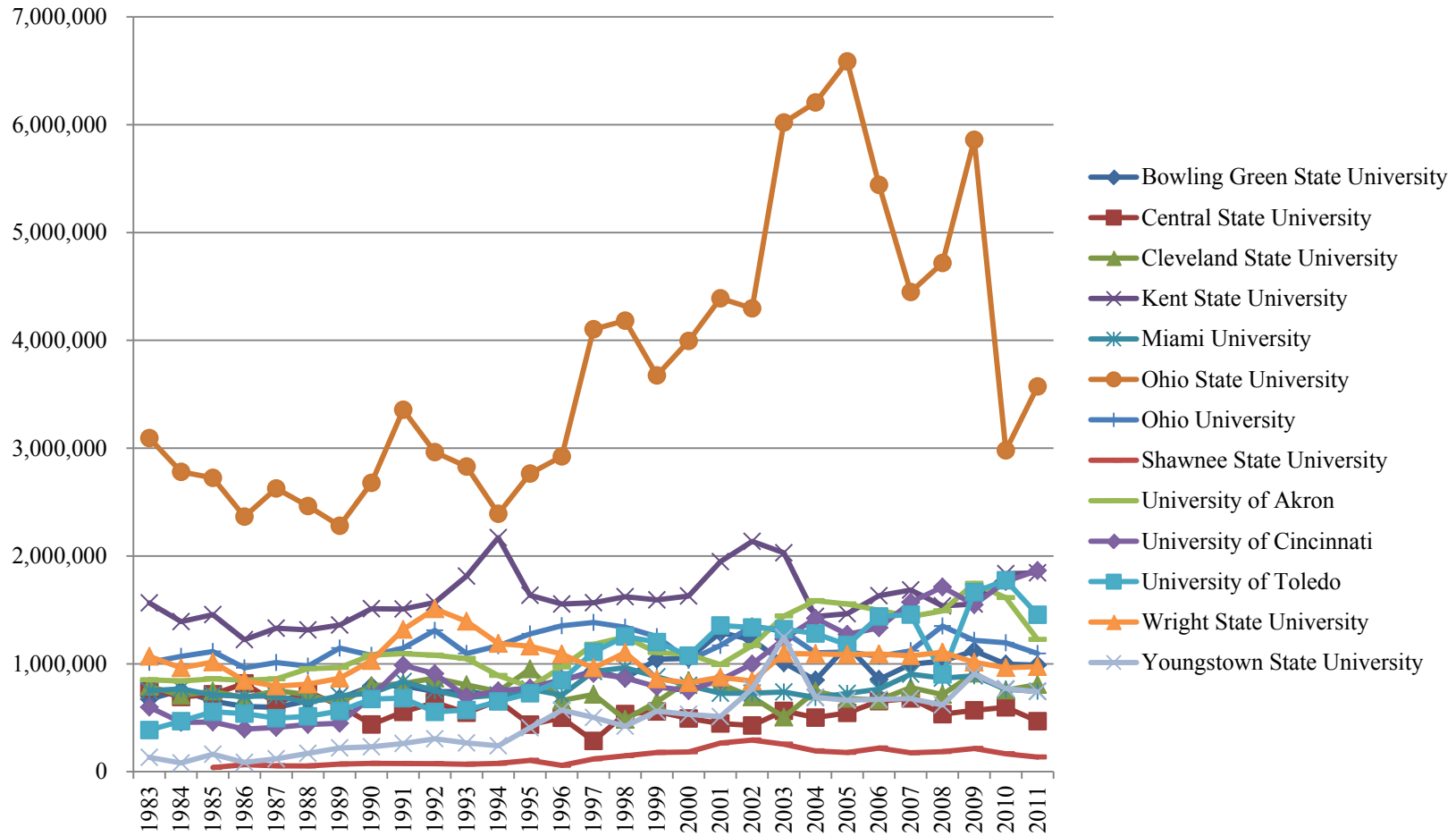
Note. Figures based on U.S. Department of Education, Federal Campus-Based Programs Databook.

Table A.1: First Stage With Missing Observations Imputed as Either Eligible or Ineligible for the Federal Work-Study Program

	Dependent Variable: Amount of Work Study Received	
	Eligible	Ineligible
	(1)	(2)
EFC X Award Per Pell Recipient 2007	-0.000000215***	-0.000000282**
	(0.0000000489)	(0.000000121)
EFC	0.0000619**	0.0000825*
	(0.0000208)	(0.0000454)
Award Per Pell Recipient 2007	0.00514***	0.00852***
	(0.000374)	(0.00181)
Constant	-2.247***	-2.967**
	(0.671)	(1.119)
Covariates	Yes	Yes
N	63,290	63,290
R-squared	0.117	0.122

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007, and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system. *Amount of Work Study Received* is the amount of work-study funding a student received their freshman year, scaled by 100. *Award Per Pell Recipient* is an institution's 2007 federal work-study allocation divided by the number of 2007 Pell recipients at that institution. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table A.2: First Stage Differences-in-Differences Estimates of the Effect of the Interaction of Students' Financial Need and Institution-Level Federal Work-Study Allocation on the Amount of Federal Work-Study Funding Students Receive, by Subgroup

	Females		Males		Black Students	
	(1)	(2)	(3)	(4)	(5)	(6)
EFC X Award Per Pell Recipient	-0.000394***	-0.000387***	-0.000309***	-0.000308***	-0.000491	-0.000485
	(0.0000761)	(0.0000749)	(0.0000613)	(0.0000608)	(0.000300)	(0.000297)
EFC	0.130***	0.128***	0.0956***	0.0949***	0.139	0.137
	(0.0372)	(0.0366)	(0.0304)	(0.0301)	(0.0912)	(0.0897)
Award Per Pell Recipient	0.00572***	0.00478***	0.00265***	0.00250***	0.00485***	0.00489***
	(0.000315)	(0.000444)	(0.000290)	(0.000479)	(0.000921)	(0.000934)
Constant	0.233	-0.660	-2.285**	-2.732**	-3.152*	-3.918**
	(0.642)	(0.390)	(0.895)	(1.119)	(1.538)	(1.708)
Covariates	No	Yes	No	Yes	No	Yes
N	24,238	24,238	21,272	21,272	6,122	6,122
R-squared	0.144	0.146	0.130	0.131	0.157	0.158
	White Students		Dependent Students		Independent Students	
	(7)	(8)	(9)	(10)	(11)	(12)
EFC X Award Per Pell Recipient	-0.000296***	-0.000294***	-0.000341***	-0.000340***	-0.00114	-0.00113
	(0.0000536)	(0.0000531)	(0.0000646)	(0.0000650)	(0.000682)	(0.000686)
EFC	0.0946***	0.0940***	0.109***	0.109***	0.409	0.412
	(0.0264)	(0.0261)	(0.0320)	(0.0321)	(0.247)	(0.251)
Award Per Pell Recipient	0.00756***	0.00745***	0.00394***	0.00343***	0.00536***	0.00458***
	(0.00171)	(0.00168)	(0.000350)	(0.000455)	(0.000391)	(0.000587)
Constant	-3.179***	-3.962***	0.436	0.407	-9.161	-9.839
	(1.016)	(1.264)	(0.700)	(0.627)	(7.047)	(7.403)
Covariates	No	Yes	No	Yes	No	Yes
N	35,520	35,520	43,572	43,572	1,938	1,938
R-squared	0.128	0.129	0.139	0.140	0.170	0.173

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Award Per Pell Recipient* is an institution's 2007 federal work-study allocation divided by the number of 2007 Pell recipients at that institution. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01.

Table A.3: First Stage Differences-in-Differences Estimates of the Effect of the Interaction of Students' Financial Need and Institution-Level Federal Work-Study Allocation on the Amount of Federal Work-Study Funding Students Receive by Subgroup, With OSU Excluded

	Females		Males		Black Students	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EFC X Award Per Pell Recipient	-0.000288*	-0.000281*	-0.000228	-0.000225	-0.000182	-0.000178
	(0.000144)	(0.000144)	(0.000131)	(0.000130)	(0.000152)	(0.000150)
EFC	0.0845*	0.0828*	0.0593	0.0584	0.0439	0.0429
	(0.0458)	(0.0460)	(0.0373)	(0.0368)	(0.0470)	(0.0471)
Award Per Pell Recipient	0.00578***	0.00491***	0.00272***	0.00232***	0.00397***	0.00397***
	(0.000501)	(0.000448)	(0.000464)	(0.000439)	(0.000528)	(0.000506)
Constant	-0.347	-0.837**	-1.357*	-1.528*	-1.551	-2.041*
	(0.301)	(0.330)	(0.752)	(0.752)	(1.157)	(1.106)
Covariates	No	Yes	No	Yes	No	Yes
N	21,290	21,290	18,316	18,316	5,664	5,664
R-squared	0.125	0.127	0.116	0.117	0.132	0.132

	White Students		Dependent Students		Independent Students	
	(7)	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
EFC X Award Per Pell Recipient	-0.000254*	-0.000253	-0.000255*	-0.000252*	-0.000459	-0.000439
	(0.000141)	(0.000142)	(0.000139)	(0.000138)	(0.000305)	(0.000314)
EFC	0.0707	0.0702	0.0706	0.0700	0.167	0.166
	(0.0429)	(0.0429)	(0.0417)	(0.0417)	(0.118)	(0.121)
Award Per Pell Recipient	0.00616*	0.00607*	0.00407***	0.00348***	0.00521***	0.00444***
	(0.00319)	(0.00319)	(0.000540)	(0.000453)	(0.000368)	(0.000609)
Constant	-2.277*	-2.717**	-2.066**	-1.971**	-2.361	-2.481
	(1.206)	(1.133)	(0.910)	(0.795)	(1.371)	(1.402)
Covariates	No	Yes	No	Yes	No	Yes
N	30,597	30,597	37,719	37,719	1,887	1,887
R-squared	0.116	0.117	0.122	0.124	0.130	0.134

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 12 four-year campuses in the Ohio public university system (excluding OSU) with complete financial aid and covariate data. *Award Per Pell Recipient* is an institution's 2007 federal work-study allocation divided by the number of 2007 Pell recipients at that institution. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 12 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01

Table A.4: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes by Gender

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
					Females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0527**	-0.0154	-0.0602**	-0.0210	-0.253	-0.113	0.636	1.110**	-0.00717	0.0000492
	(0.0244)	(0.0174)	(0.0277)	(0.0216)	(0.178)	(0.169)	(0.470)	(0.446)	(0.00639)	(0.00499)
Constant	2.893***	2.723***	2.867***	2.743***	13.40***	11.11***	30.16***	1.110**	0.871***	0.794***
	(0.0473)	(0.0675)	(0.0521)	(0.0732)	(0.352)	(0.466)	(2.381)	(0.446)	(0.0159)	(0.0181)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	24,238	24,238	24,238	24,238	24,238	24,238	24,238	24,238	24,238	24,238
					Males					
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0388	-0.0112	-0.0452	-0.0157	-0.206	-0.0964	0.829	1.208**	-0.00658	-0.000163
	(0.0259)	(0.0196)	(0.0328)	(0.0272)	(0.201)	(0.189)	(0.558)	(0.518)	(0.00783)	(0.00574)
Constant	2.687***	2.685***	2.645***	2.658***	13.29***	11.67***	30.41***	26.76***	0.857***	0.791***
	(0.0552)	(0.0675)	(0.0619)	(0.0744)	(0.376)	(0.281)	(2.648)	(2.004)	(0.0179)	(0.0251)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	21,272	21,272	21,272	21,272	21,272	21,272	21,272	21,272	21,272	21,272

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01

Table A.5: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes by Gender, With OSU Excluded

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
	Females									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0686**	-0.0303**	-0.0813***	-0.0411***	-0.443***	-0.306***	0.303	0.704	-0.0127*	-0.00563
	(0.0266)	(0.0143)	(0.0258)	(0.0128)	(0.0976)	(0.0637)	(0.713)	(0.605)	(0.00748)	(0.00434)
Constant	2.852***	2.702***	2.827***	2.726***	13.29***	11.02***	28.78***	23.95***	0.863***	0.790***
	(0.0470)	(0.0702)	(0.0535)	(0.0777)	(0.375)	(0.496)	(2.264)	(1.517)	(0.0169)	(0.0194)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	21,290	21,290	21,290	21,290	21,290	21,290	21,290	21,290	21,290	21,290
	Males									
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0569**	-0.0258**	-0.0728***	-0.0395***	-0.414***	-0.292***	0.380	0.756	-0.0132	-0.00589
	(0.0257)	(0.0126)	(0.0260)	(0.0123)	(0.0990)	(0.0826)	(0.743)	(0.606)	(0.00993)	(0.00582)
Constant	2.634***	2.660***	2.588***	2.632***	13.12***	11.61***	28.80***	25.16***	0.842***	0.781***
	(0.0472)	(0.0704)	(0.0518)	(0.0787)	(0.389)	(0.313)	(2.507)	(1.846)	(0.0161)	(0.0245)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	18,316	18,316	18,316	18,316	18,316	18,316	18,316	18,316	18,316	18,316

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 12 four-year campuses in the Ohio public university system (excluding OSU) with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include mother's education, race/ethnicity, and whether or not the student is financially dependent on their parents. All models include fixed effects for 12 institutions and 18 EFC bins.

*$p < 0.1$. **$p < 0.05$. ***$p < 0.01$

Table A.6: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes by Race/Ethnicity

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
					Black Students					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.00973	-0.0115	-0.00356	-0.00511	0.0346	0.0223	1.178**	1.150**	0.00918	0.00897
	(0.0378)	(0.0362)	(0.0406)	(0.0394)	(0.244)	(0.239)	(0.593)	(0.579)	(0.00777)	(0.00748)
Constant	2.159***	1.897***	2.060***	1.868***	10.67***	8.923***	22.27***	18.52***	0.723***	0.677***
	(0.103)	(0.0972)	(0.104)	(0.0838)	(0.795)	(0.660)	(2.579)	(1.824)	(0.0301)	(0.0218)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	6,122	6,122	6,122	6,122	6,122	6,122	6,122	6,122	6,122	6,122
					White Students					
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0171	-0.0126	-0.0265	-0.0212	-0.164	-0.131	0.943*	1.058**	-0.00531	-0.00330
	(0.0134)	(0.0130)	(0.0182)	(0.0179)	(0.164)	(0.163)	(0.483)	(0.460)	(0.00527)	(0.00491)
Constant	2.872***	2.809***	2.847***	2.770***	13.68***	11.31***	31.36***	25.26***	0.883***	0.799***
	(0.0493)	(0.0635)	(0.0516)	(0.0715)	(0.325)	(0.468)	(2.560)	(1.778)	(0.0151)	(0.0213)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	35,520	35,520	35,520	35,520	35,520	35,520	35,520	35,520	35,520	35,520

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 13 four-year campuses in the Ohio public university system with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include gender, mother's education, and whether or not the student is financially dependent on their parents. All models include fixed effects for 13 institutions and 18 EFC bins.

*p < 0.1. **p < 0.05. ***p < 0.01

Table A.7: Instrumental Variables Estimates of the Effect of Amount of Work-Study Money Received on Students' Academic Outcomes by Race/Ethnicity, With OSU Excluded

	First Semester GPA		Second Semester GPA		First Semester Credits Earned		First Year Cumulative Credits		Persisted to Sophomore Year	
					Black Students					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Study Received	-0.0473***	-0.0498***	-0.0447***	-0.0472***	-0.223***	-0.238***	0.606	0.564	0.000662	0.000226
	(0.0165)	(0.0132)	(0.0158)	(0.0131)	(0.0864)	(0.0800)	(0.385)	(0.371)	(0.00621)	(0.00588)
Constant	2.180***	1.919***	2.083***	1.888***	10.86***	9.037***	22.43***	18.23***	0.725***	0.679***
	(0.104)	(0.107)	(0.104)	(0.0933)	(0.790)	(0.713)	(2.605)	(1.867)	(0.0304)	(0.0229)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	5,664	5,664	5,664	5,664	5,664	5,664	5,664	5,664	5,664	5,664
					White Students					
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Work Study Received	-0.0210	-0.0174	-0.0367***	-0.0325***	-0.313***	-0.285***	0.684	0.762	-0.00908*	-0.00742*
	(0.0151)	(0.0138)	(0.0138)	(0.0123)	(0.0870)	(0.0867)	(0.734)	(0.684)	(0.00523)	(0.00437)
Constant	2.826***	2.777***	2.800***	2.742***	13.54***	11.22***	29.72***	23.87***	0.871***	0.791***
	(0.0417)	(0.0653)	(0.0432)	(0.0756)	(0.335)	(0.488)	(2.362)	(1.617)	(0.0139)	(0.0218)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597

Note. Figures based on Ohio Board of Regents data. Sample comprised of first-time, full-time freshmen in 2007 and 2008 cohorts attending one of 12 four-year campuses in the Ohio public university system (excluding OSU) with complete financial aid and covariate data. *Work Study Received* is the amount of work-study money a student received their freshman year, scaled by 100. Covariates include gender, mother's education, and whether or not the student is financially dependent on their parents. All models include fixed effects for 12 institutions and 18 EFC bins.

*$p < 0.1$. **$p < 0.05$. ***$p < 0.01$