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The Effects of Need-based Grant Aid on Long-Term College and Workforce Outcomes

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If you have questions regarding this publication, please contact mlds.center@maryland.gov.

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* Appendix can be found in a separate document on MLDS website.

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Executive Summary

This report estimates the effect of Maryland's largest need-based grant aid program on bachelor's degree persistence, graduation, and early career workforce wages. Previous literature generally finds positive effects of need-based grant aid on academic and early workforce outcomes, though with widely varying magnitude of effect size. This report examines Maryland's Howard P. Rawlings Educational Assistance (EA) grant and uses the fact that eligibility for the grant is determined by a definite threshold of financial need as a natural experiment to estimate a causal effect of receiving the EA Grant for bachelor's degree-seeking students. Using data from the Maryland Longitudinal Data System on students who enter four-year programs from the 2008-2009 to 2015-2016 academic years, this report finds that EA Grant receipt increases the likelihood that an entering student will persist through the fourth-year, with similar sized effects for graduation within five years, and positive effects on workforce wages after graduation. The report also shows that while this positive effect does not appear to vary by other demographic characteristics, it does provide several pieces of evidence that the effects are larger for lower-income students. Additionally, this report also finds that institutions reduce the amount of institutional grant aid awarded to students and that students take out smaller loans amounts in response to an EA Grant. Policy implications for need-based grant aid programs and directions for future research are discussed.

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Introduction

The federal government and many states, including the State of Maryland, provide need-based grant aid to undergraduate students in order to reduce the financial burden of their studies[1]. The costs of an undergraduate education can be quite high. In Maryland the annual estimated costs for tuition, fees and board in 2016-17 were $3,983 for an in-state public 2-year, $20,647 for an in-state public 4-year, and $53,775 for a private 4-year.[2] Recently, there has been considerable policy and academic interest in how grant aid affects student's postsecondary outcomes, and whether grant aid programs are designed in a way that provides aid to students who would most benefit from additional financial assistance. This report examines the largest grant aid program in the State of Maryland, the Educational Assistance (EA) Grant, and (1) estimates how receipt of this grant affects students' academic persistence, probability of graduation, and workforce wages and (2) investigates whether student characteristics (e.g., high school test scores or eligibility for free and reduced price meals (FARMS) in high school) relate to differential benefits of the EA grant on outcomes. The report begins by describing the current state of the literature on grant aid programs, with a focus on academic persistence. It then describes the EA Grant program in detail, focusing on how eligibility for the grant is determined. The method by which EA Grant eligibility is determined provides a natural experiment to evaluate a causal effect of additional grant aid for students by comparing students who were just-eligible for the EA grant with those who were just-ineligible. Using this method and data from the Maryland Longitudinal Data System (MLDS), the report estimates the causal effect of need-based grant aid on academic persistence, probability of graduation, and workforce wages.

Background

Prior Research on the Effects of Grant Aid

Literature on the effects of grant aid on educational outcomes initially focused primarily on initial college enrollment and on how grants induced students to attend university or college who would otherwise not attend. Deming and Dynarski (2010) provide a comprehensive survey of this literature, which looks at several different programs and uses different methods, with several examples discussed here. Dynarski (2003) examined a nationally representative survey of students, the National Longitudinal Survey of Youth, and used the elimination of the Social Security Student Benefit Program in 1982, which provided college assistance to children of beneficiaries, as a source of variation in aid receipt. She found that $1,000 of grant aid increased the probability of college attendance by 3.6 percentage points. Cornwell et al. (2006) examined the enrollment effects of the introduction of Georgia's HOPE program and found a 4

[1] Additional merit-based programs also offer awards to students based on academic criteria, which may have different objectives than need-based programs.

[2] According to statistics from the National Center for Education Statistics (https://nces.ed.gov/programs/digest/d17/tables/dt17_330.20.asp?current=yeshttps://nces.ed.gov/programs/digest/d17/tables/dt17_330.20.asp?current=yes)

to 6 percentage point increase in enrollment with $1,000 in increased aid. Abraham and Clark (2006) investigated Washington, D.C. residents who received aid to match in-state tuition in states outside of D.C. and found a 3 to 4 percentage point increase per $1,000 in enrollment in Virginia and Maryland universities. In general, the body of research that estimated enrollment effects finds close to a 4 percentage point increase in persistence per $1,000 of grant aid. This enrollment evidence suggests that grants may be successful in removing constraints that prevent students from enrolling in postsecondary education.

One important distinction in education research, however, is that enrollment is not the same thing as persistence. The rate of completing a four-year degree in five years of the most recent cohort is only 51.5 percent (NCES, 2017), and this completion rate has remained largely unchanged over recent cohorts. Indeed, Bound et al. (2010) analyzed different high school classes in nationally representative surveys, and found that the 1992 graduating high school cohort had much higher rates of enrollment in postsecondary education than the 1972 cohort, but worse college graduation rates. In additional evidence showing a disparity between enrollment and completion, Shapiro et al. (2015) showed that enrollment increased during recessions, but that these increases were accompanied by decreases in completion. The difference between helping students attend postsecondary education and allowing them to graduate seems to be an important distinction and has fueled a growth in recent research on persistence and degree completion.

More recently, applied social science literature has indeed focused on longer term outcomes like persistence and degree completion and has found positive effects on each. Castleman and Long (2016) found that Florida's Student Access Grant increased the rate of credit accumulation and degree completion within 6 years by 22 percent. Bettinger (2015) used a change in Ohio's need-based grant aid, which increased aid for some students while decreasing aid for others and found that drop-out rates fell by 2 percent in response to $800 extra in grant aid. Conger and Turner (2017) found that a one-time tuition increase of 113 percent caused by a decrease in in-state tuition benefits led to an 8 percent decrease in re-enrollment. Bettinger et al. (2016) found that California's Cal Grant increased degree completion by 2 to 5 percentage points. Looking at even longer run outcomes, Bettinger et al. (2016) found 5 percent increases in earnings between 10 and 14 years after college entry, and Denning et al. (forthcoming) found a 5 to 8 percent increase in earnings beginning four years after college entry. Scott-Clayton and Zafar (2016) found that grant recipients were more likely to earn a graduate degree, own a home, and have better credit scores.

Differential Effects of Grant Aid by Student Characteristics

Understanding differences in the effects of grant aid can provide useful evidence to inform researchers and policymakers. Grant aid is often targeted towards students with financial need, and evidence on the differential effects by income or poverty status could help inform the design of the programs, such as whether more aid should be directed at lower income students. If the effects are larger for students with better academic preparation or test scores, then this may provide rationale for merit aid programs. Evidence on other characteristics, while unlikely to shape the targeting of the programs themselves, could provide

evidence that could be useful for counselors and school administrators. Some prior research has investigated differences in the effect of grant aid by student characteristics. Castleman and Long (2016), for instance, found evidence that the persistence effect may be higher for students with higher high school GPAs. Dynarski (2000) found that initial college enrollment responses differed by race, with Georgia's HOPE grant having a larger impact on Black students than White students. This report examines effects by income, race, gender, ethnicity, High School Assessment (HSA) scores, and student eligibility for free-and-reduced-price meals (FARMS[3]) to identify whether any differential effects in the effect of grant aid may exist for Maryland students.

Maryland's Howard P. Rawlings Educational Assistance Grant

The Howard P. Rawlings Educational Assistance (EA) Grant is the State of Maryland's largest need-based grant program that provides grant aid to students in two- and four-year degree programs at postsecondary institutions in the state. The amount awarded to a student is based on the remaining level of financial need, with a maximum award of $3,000 which can be renewed annually. In the state fiscal year 2015, the program disbursed 28,525 EA grant awards to new and continuing students, with a total expenditure of $61.1 million (Maryland General Assembly, 2016). To be eligible for the EA grant, students must have Maryland in-state residency and be enrolled in a Maryland two-year or four-year postsecondary institution as a full-time, degree-seeking undergraduate student.

Students apply for the EA grant by completing the Federal Application for Free Student Aid (FAFSA) which then automatically places them into consideration for state grant aid. A FAFSA application, by complex formula, produces an amount called an Expected Family Contribution (EFC), which indicates what the family of a student (or the student if the student is independent) should reasonably contribute toward the cost of education. The FAFSA uses many pieces of financial information to arrive at an EFC, but a student's EFC is generally correlated to the student's or student's family income (if the student is a dependent) and the number of family members. EFC is also used as the criteria in other programs, such as the Pell Grant, the largest federal need-based grant program, which offers a schedule of grant aid that depends on EFC, cost of attendance (COA), an amount that institutions determine is the average cost of attending the institution and course registration (enrollment status).

The EA grant is awarded through calculations that considers the students COA, EFC, regional cost of living, and other state and federal awards. The state determines the student's unmet need by taking a student's COA and subtracting the student's EFC, Pell award and other State scholarships[4], and then making adjustments based upon regional cost of living.
To award the EA grant, the state determines the student's unmet need by taking a student's COA, and subtracting the student's EFC and Pell Grant award, adjusting for regional variations in

[3] Student eligibility for FARMS is a proxy measure for student poverty in high school.

[4] Not all state grants are included in this formula. The Guaranteed Access (GA) Grant, which provides 100% of the cost of attendance to students whose families fall under 130% of the federal poverty line is included in the formula. These students may not receive an EA grant as the GA grant already provides them with full funding.

cost of living, and subtracting awards of other state scholarships. This calculation is summarized by the equation:

$$Unmet\ need = COA - EFC - Pell - state\ scholarships$$

where cost of living adjustments are included in the COA.

After determining the unmet need, the state then determines eligibility for the EA grant using a formula which provides the methodological approach of this study. The state has limited appropriations for the EA grant, and cannot fund all existing unmet need. As a result, students with unmet need are sorted in ascending order according to their EFC, and the state then sets an EFC cutoff, above which students are no longer eligible for the EA grant. After determining EFC eligibility, students meeting this cutoff who attend two-year and four-year institutions can receive 60% and 40%, respectively, of their existing unmet need up to the $3,000 maximum award.

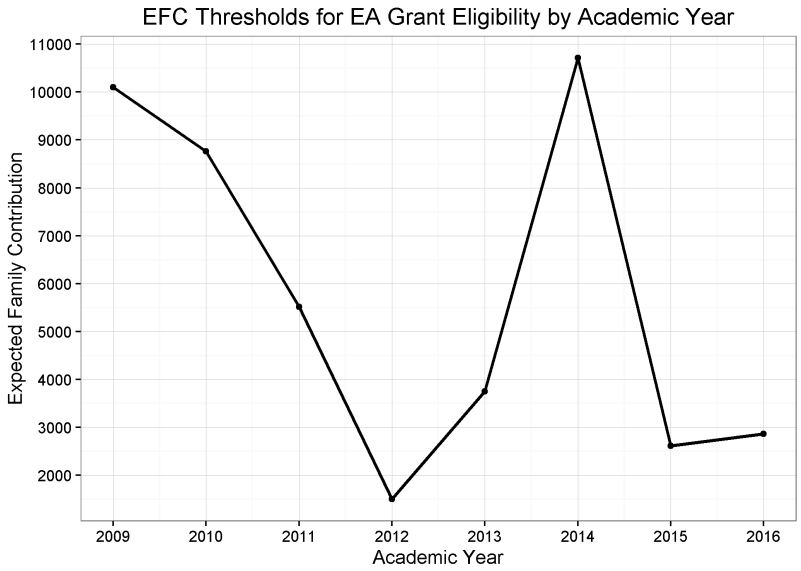
In practice, the state sets an initial EFC eligibility threshold based on estimates of how many students will accept (or renew previous) awards in an attempt to exhaust yearly appropriations. Students below the initial EFC cutoffs are notified of their eligibility and can accept the award as part of their financial aid package from their institution Awarded students must accept the terms and conditions of the award in order to receive the funds in a timely manner. Students above the initial EFC cutoff are placed on a wait list for the award and are accepted off the wait list as the state increases the EFC cutoff to distribute any additional available aid.

Some students apply to or are concurrently enrolled at more than one institution. Award amounts for these students are determined by the student's highest COA institution on their FAFSA. Students who then attend the lower-cost institution may become ineligible for the aid if their aid total is more than their COA. Students becoming ineligible increases the cutoff level of EFC as the State selects students from the wait list. A final EFC cutoff is determined in the fall semester once the process of determining the final pool of who is eligible is complete.

In recent years the final EFC cutoff has varied substantially from year to year. A graph of the final EFC cutoff over time can be found in Figure 1, where each academic year is represented by the terminal year (for example, the 2013-2014 academic year is represented as 2014). The final EFC cutoff was higher than $8,000 in 2009, 2010, and 2014, while lower than $6,000 in 2011, 2012, 2013, and 2015. In 2012 and 2015, the EFC cutoff was particularly low, at $1,500 and $2,610. To put the variation in EFC levels in perspective, for a dependent student who is an only child, an EFC of $1,500 roughly corresponds to an average of $32,500 in family income, while an EFC of $9,000 corresponds to an average of $70,000 in family income.

A combination of factors has led to this variability over time, including the difficulty in estimating how many students will accept the EA grant and attend the institution that makes them eligible. The number of applications for grant aid have also changed significantly over this period, which is correlated with the location of the EFC threshold. In years with a high number of financial aid applications from Maryland students, the EFC threshold is lower as there are more students at lower incomes placed on the wait list. In addition, the State awarded less than appropriated for several years prior to 2014 and decided to use that surplus in the 2014 year. The lower EFC cutoff in 2015 is a direct consequence of that policy.

Figure 1: EFC threshold variation by academic year.



The Current Study

This report provides new causal evidence of the effect of grant aid on academic persistence, graduation, and workforce wages. Using the eligibility threshold for EA Grant aid, the analysis compares students who are "just eligible" versus "just ineligible" as a natural experiment for the receipt of EA Grant aid. This method has been used previously in the literature (see Castleman and Long, 2016; Bettinger, 2016; Denning et al., forthcoming). However, the EA Grant provides an optimal setting for this analysis due to the changing eligibility threshold, which is a feature not found in previously studied grant aid programs. The changing threshold makes it unlikely that students will be able to estimate their eligibility for the grant ahead of time, which provides legitimacy to EA grant receipt as a natural experiment. The changing threshold also allows for estimating the effects for students at different levels of income, something that is not possible with a constant eligibility threshold over time. Additionally, the MLDS data provide many student demographics and high school achievement, permitting the estimation of differential effects by student characteristics.

Specifically, the study asked, what is the causal effect of the EA grant on financial aid (total financial aid package, institutional grants), persistence in college (enrolling at the same institution 2, 3, and 4 years after entering postsecondary education), STEM major concentration, graduation after 5 years, and workforce wages (in years 1, 5, 6, and 7 after entry)?

Research Question

This report responds to the Maryland Longitudinal Data System Center (MLDSC) Research Agenda Question*:*

Which financial aid programs are most effective in improving access and success (i.e., retention and graduation) for Maryland students?

Method[5]

Data and Sample Selection

The data used for this report are from the Maryland Longitudinal Data System (MLDS), which contains linked longitudinal data from three state agencies.[6] The Maryland State Department of Education (MSDE) provides data for public PreK-12 students and schools. The Maryland Higher Education Commission (MHEC) provides data for Maryland public and state-aided independent college students and colleges. The Department of Labor Licensing and Regulation (DLLR) provides data for Maryland employees who work for employers who are subject to Maryland Unemployment Insurance. The workforce data do not include information for federal employees, military employees, individuals who are self-employed, or private contractors.

For this report, data were used from students who entered four-year public universities in Maryland in the fall semesters between and including the 2008-2009 and 2015-2016 academic years.[7] Postsecondary enrollment histories were constructed for all students in the sample. Financial aid data[8] were used to create histories of students' financial aid awards for each year of postsecondary enrollment, as well as to determine eligibility for the EA grant program.[9] The final sample of students used for the analysis was created using the following criteria. The data were limited to students who completed a FAFSA, and thus had financial aid data available to view EFC, COA, and adjusted gross income (AGI).[10] The data were also limited

[5] A detailed description of the method can be found in Section 1 of the Appendix.

[6] For more information on the sources and data elements included in the MLDS, see https://mldscenter.maryland.gov/.

[7] From 2008 to 2013 MHEC only collected enrollment data for the Fall. Therefore, students that enrolled in spring, summer or winter sessions will not be included in the data unless they were also enrolled in a subsequent fall term.

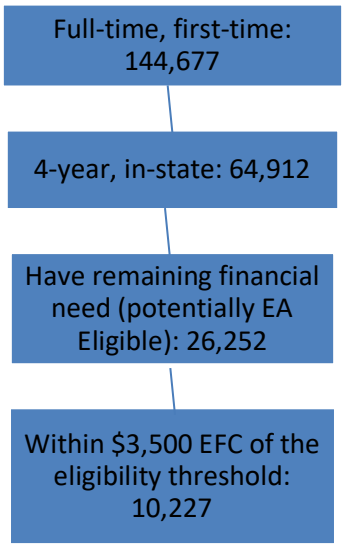
[8] MHEC data collected in the financial aid information system include data on financial aid awards. Institutional practices vary on whether the aid amount was reported as the award amount, the disbursed amount, or the net disbursed amount

[9] FAFSA data is only available for students who enroll in postsecondary education, apply for financial aid using the FAFSA and received at least one award. Data are not collected for students who complete the FAFSA but who either do not enroll, do not receive an award or decline all awards offered.

[10] The MHEC financial aid information system (FAIS) report data on financial aid awards. Institutional practices vary on whether EFC, COA, and AGI were reported from data on the FAFSA or from institutional derived formulas. If reported from the FAFSA, the data may be either from the initial ISIR, the corrected ISIR, or from a value derived through professional judgement.

to in-state, first-time, full-time, and degree-seeking students in order to be consistent with the eligibility requirements of the program. In this spirit the data were also limited to students who had positive remaining financial need and were thus potentially eligible for the EA grant. Lastly, only students with available 12th grade public school enrollment were retained in the sample. Using these filters, the overall analytical sample had 26,252 students out of the total 144,677 full-time, first-time, degree-seeking students in the Maryland higher education system over this time period. In the last step, a process standard to the literature was used to limit the data to students within an optimally chosen window around the eligibility threshold, which was determined to be within $3,500 of either side of the threshold.[11] This final number was 10,227.

The following flowchart describes the selection process:



Measures

EA Grant Eligibility

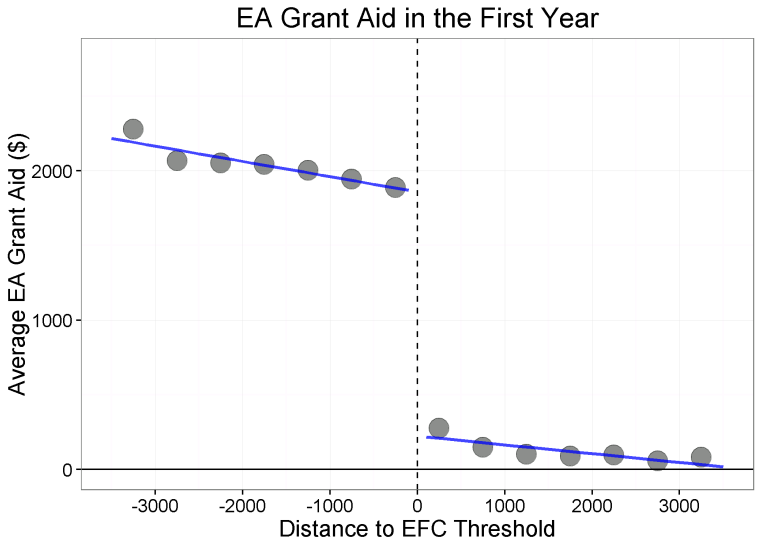
Information from the FAFSA application[12] and financial aid received were used to determine eligibility. Figure 2 provides a visualization of how EA Grant aid is provided to eligible students based on how close they are to the eligibility threshold. In this figure, grey dots represent the average amount of EA Grant aid within $500 EFC bins, while the solid blue lines show an estimated trend line on each side of the cutoff. Clearly visible is a large difference in the average amount of EA Grant aid received by students who are "just-eligible" by virtue of their EFC, versus those who are "just-ineligible." (This sharp change in the amount of EA Grant

[11] This was determined by an optimal bandwidth selection process developed by Imbens and Kalyanaraman (2011). The Analysis section describes how this bandwidth is used in the selection process.

[12] See footnote (10)

received forms the basis for the regression discontinuity (RD) estimation strategy in this study, as explained in the next section.)[13]

Figure 2: EA Grant receipt around the eligibility threshold



Outcomes

This study examined the impact of EA grants on students' financial aid packages, persistence to two, three, and four years, concentration in a STEM major, probability of graduation within 5 years, and workforce wages one, five, six, and seven years after entering postsecondary education. This section provides details on how each of these outcomes were measured.

Financial aid. Information from the FAFSA application and financial aid received[14] were also used as outcome variables to determine how a student's overall financial aid changes with the receipt of an EA Grant. Aid awards[15] were summed by category for the first academic year. EA Grant aid, other sources of grant aid, and loans from all sources during the first academic year were used as dependent variables.

Persistence in college. College persistence was defined as enrolling at the same institution 2, 3, and 4 years after entering postsecondary education. The probability of persisting to *X* years after entering college was examined, and indicator variables were created that equal 1 if a student is enrolled in the fall semester *X* years later at the same institution.

[13] Given footnotes (8) and (10), which describe the reported FAFSA and financial aid award variables, designation of "eligible" and "ineligible" should be treated with some caution.

[14] See footnotes (8) and (10)

[15] See footnote (10)

STEM major concentration[i]*.* An indicator was created for whether a student was enrolled in a Science, Technology, Engineering, and Math (STEM) major in the fall semester. The MLDS classifies majors as STEM based on the Classification of Instructional Programs (CIP) code according to the Department of Homeland Security's designation of STEM CIP codes.

Graduation after 5 years. A similar indicator was created for graduation, which equals to 1 if a student receives a bachelor's degree from the same institution within 5 years of entry.

Workforce wages. Workforce data were used to create measures of wages in years 1, 5, 6, and 7. To align with academic years, wage years were coded such that quarters roughly match the academic year, thus wages in the 2013-2014 academic year are from quarter 3, 2013 through quarter 2, 2014. Any missing quarters were coded as zero for a student, meaning that the workforce wages measure is the sum of all observed wages (including zeros) for the academic year approximation.

Covariates. Other demographic and high school achievement variables were included to serve multiple purposes. A student's highest high school assessment (HSA) Algebra and English scores were included, as well as a student's eligibility for free or reduced-price meals (FARMS) during their senior year of high school, and race, ethnicity, and gender. Dummy variables for the postsecondary institution attended were also included to control for average differences in outcomes between colleges. These variables were included as controls in the main regressions of the report to control for observable differences and to increase precision of the estimates. These categories of variables were also used to estimate whether the receipt of EA Grant aid produced differential effects for students with different characteristics.

Analyses

To estimate a causal effect of the EA grant on the outcomes of interest, this report employed a regression discontinuity (RD) empirical strategy, which compares students immediately on either side of the EFC cutoff in a given year. The FAFSA is a form that requires many inputs and has a very convoluted formula for determining EFC from a student's financial information. Therefore, it is nearly impossible for a student to precisely estimate their EFC. Furthermore, the EFC cutoff chosen by the State of Maryland differs in various years, as discussed above, and students would likely be unable to estimate what the cutoff would be each year. Given these assumptions, it is possible to treat students who are very close to the cutoff as being randomly eligible or not, as their EFC would randomly give them eligibility for the grant or make them ineligible.[16] This is a method that has been employed in previous research on postsecondary grant aid (see: Turner, 2017; Castleman and Long, 2016; Bettinger et al., 2016).

Figures 2.a – 2.c provide a graphical explanation for how the method works. Figure 2.a demonstrates how the EA Grant has an eligibility EFC cutoff, below which students are eligible for the grant and above which they are ineligible. As a result of the assumptions, the only thing

[16] Section 2 of the Appendix provides evidence in support of these main assumptions.

that should be different between students immediately above and below the cutoff is their level of EA grant aid. An RD strategy then looks at the relationship between the outcome variable (for example, academic persistence) and EFC. If this relationship is smooth through the cutoff (as in Figure 2.b) then we would estimate no effect of grant aid, but if there appears to be a "jump" in the outcome at the threshold, then this discrete change becomes our estimate of the effect of EA Grant aid on the outcome (shown in Figure 2.c).

Figure 2: Explanation of Regression Discontinuity (RD) Strategy

Figure 2.a

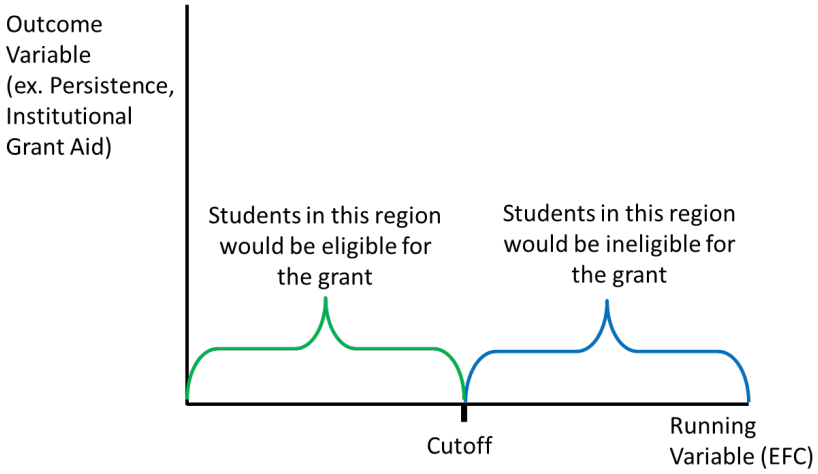


Figure 2.b

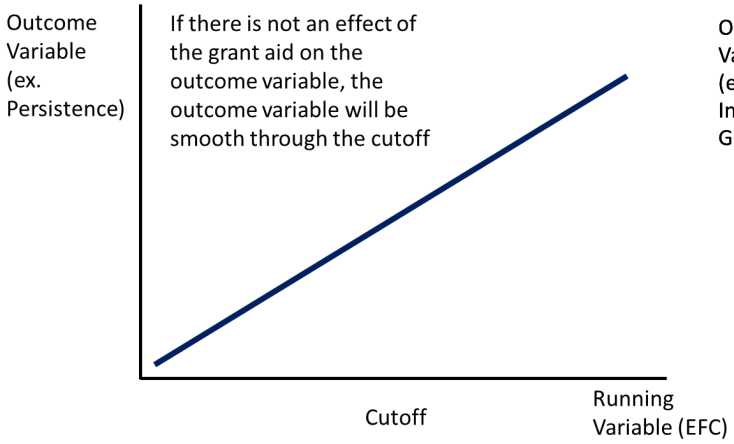
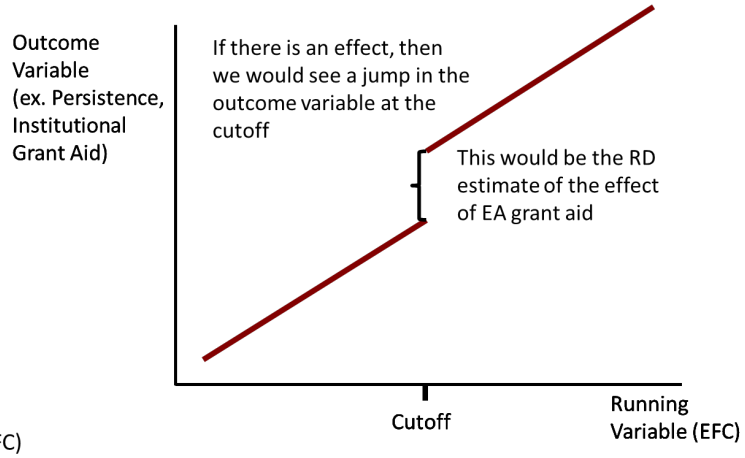


Figure 2.c



Importantly for the RD method, the data are restricted to students within an EFC "bandwidth" or window around the eligibility threshold. This restriction statistically defines "close" to the threshold, ensuring that the students on either side are similar when being compared. A statistical procedure popularized by Imbens and Kalyanaraman (2011) was used to find a bandwidth of $3,500 EFC and restrict the data to students within $3,500 EFC on either

side of the eligibility threshold.[17] This restricts the data to 10,227 students when looking at the first-year outcomes.

To estimate differential effects by students' demographic and high school achievement, each characteristic variable was interacted with the main effect in the procedure described above. This provided an estimate of the effect of EA grant aid for the subgroup and permitted a test of whether that differential effect was statistically significant.

Examining Low versus High Thresholds

In addition to the main estimates, this report also uses the changing EFC thresholds to examine the effect of grant aid for students with different levels of resources. Figure 1 noted the drastically different thresholds by academic year. The same analysis for the pooled sample above can be applied to individual years. The academic year cohorts are split into "high" thresholds and "low" thresholds, indicating whether the EFC eligibility threshold corresponds to relatively high income or low income students, and performs the same estimation procedure on each category. The 2012, 2013, 2015, and 2016 cohorts comprise the low category, while the remaining four make up the high category. Under a reasonable set of assumptions (described in Section 1 of the Appendix), this provides a test of whether the effect of grant aid is different for relatively low-income students compared to high-income students.

Findings[18]

Sample Summary Statistics

Table 1 displays a selected set of summary statistics for the sample, restricted to observations close to the cutoff used for the estimation. This provides the clearest picture of the student characteristics that comprise the analytic sample. For variables such as the various financial aid awards and wages, both the percent receiving a positive amount and the average amount per student with a positive amount are included.

The average EFC[19] for the students in the sample was $5,083, which, in adjusted gross income translates into an average of $61,019. These averages are particularly notable. The empirical strategy used in this paper focuses on students who are at the upper end of eligibility for the grant aid, and the average eligibility threshold over the time period is fairly high. In this way, this report is focusing on students of a relatively higher income level than other empirical papers that have used similar methods in other states (i.e., Bettinger and Long, 2016; Denning et al., forthcoming). Students in these four-year institutions face an average cost of

[17] Section 3 of the Appendix discusses the robustness of the main results to different bandwidths.

[18] When interpreting values of financial aid awards and FAFSA-related variables, refer to footnotes (8) and (10) on how awards and FAFSA information was reported in the FAIS system.

[19] See footnote (10)

attendance[20] of $21,200, a measure that includes tuition, fees, food, room, and board. Around 40% of this sample received an EA Grant, of an average amount per recipient of $2,915. Despite the relatively high income level, 55% of the sample received a Pell grant, the largest federal source of grant aid, with an average award of $3,195. Fifty-two percent of the sample received institutional grant aid, with an average of $3,517. Seventy-six percent took out the Direct Loan, with $5,808 as the average amount received. The Parent PLUS loan, an award that students' parents can receive, which carries a higher interest rate, but also a higher maximum, is received at a lower rate (19%), but those who use a PLUS loan took out an average loan of $9,651. A large proportion of this sample worked during their first academic year (62%) and earned an average of $3,194. The sample is 41% white, 6% Hispanic, and 44% male, and had an average Math SAT score of 529.

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[20] The MHEC financial aid information system (FAIS) collects data on financial aid awards. There is variation in institutional practices related to reporting cost of attendance. COA may be reported as either specific to a student (comprehensive of tuition, books and supplies, housing, etc.), or specific to a student and that student's major, or may be a generic budget model used during initial financial aid package that does not account for variations in COA by major, dependency status, housing, etc.

Table 1: Selected Summary Statistics of the Sample[a]

Variable	Average
A. Financial Characteristics	
Expected Family Contribution	$5,083
Adjusted Gross Income	$61,019
Cost of Attendance	$21,200
Percentage with Pell Grant	55%
Average Pell Grant	$3,195
Percentage with Institutional Grants	52%
Average Institutional Grant	$3,517
Percentage with Direct Loans	76%
Average Direct Loan	$5,808
Percentage with Parent PLUS Loans	19%
Average Parent PLUS Loan	$9,651
Percentage with EA Grant	39%
Average EA Grant	$2,915
Percentage with Positive Wages (First Year)	62%
Average Wages	$3,194
B. Demographic Characteristics	
Percentage White	39%
Percentage Hispanic	7%
Percentage Male	43%
Average Math SAT Score	529
N	10,227

[a]Notes: This table displays summary statistics for the sample used to estimate the effects of the EA Grant. This includes all eligible students as described in the data section, restricted to those that fall within the $3,500 EFC bandwidth around the EFC cutoff.

Effects of EA Grant Receipt on Financial Aid Package[21,22]

First, the ways in which a student's total financial aid package changes with an increase in EA Grant aid were examined to help understand the full impact of EA Grant aid. Though EA Grant eligibility might change the amount of EA Grant aid a student receives, students may respond by reducing the amount of loans they take out, and institutions could possibly alter the amount of institutional aid they provide.

Table 2 shows the estimates for how a student's financial aid changes with receipt of the EA Grant. Panel A shows the average difference in EA Grant aid for students who are just-eligible. A highly statistically significant difference of $1,621 is estimated and corresponds to the size of the gap between eligible students and ineligible students at the threshold in Figure 2. Panel B shows estimates of how other types of financial aid respond to receiving EA Grant aid. For convenience, these estimates are expressed in terms of $1,000 in additional EA Grant aid for easy conversions into percentages.

In panel B of Table 2, a significant (p<.01) decrease of $156 in institutional grant aid per $1,000 of EA Grant is estimated, suggesting that 15.6% of a student's EA grant is captured by institutions in the form of a reduction in institutional grant aid. Students also receive significantly (p<.05) less in loan aid as a response to increased EA Grant aid, with a reduction of $347 in loans from all sources. When the types of loan aid are estimated separately, the significant effect is driven mainly by a reduction in Parent PLUS loans, loans that are made directly to the parents of dependent students, which carry higher interest rates and no upper limit. Direct loans and private loans see small and insignificant negative effects. There is a small, significant effect on the amount of federal work-study received, but the size of the change ($21) is not economically meaningful. Both the reduction in institutional grant aid and loans suggest that the effects of receiving additional EA grant aid could be somewhat blunted by responses from institutions and from parents. Figure 3 provides visual confirmation of the change in financial aid among eligible students in graphs similar to that of Figure 2. In 3.1 and 3.2, there is a visually discernible decrease in institutional grants and total loans among students who are just eligible.

Figure 3.3 also helps illustrate an important point in how the "treatment" of additional EA Grant aid should be interpreted. This figure shows the change in overall grant aid, incorporating both the increase in grant aid due to the EA grant and the decrease in institutional grant aid as a response. As shown in Table 1, students around the EA Grant eligibility threshold are typically receiving grant aid from multiple sources, including the Pell Grant and institutional grant aid. Even among EA ineligible students immediately to the right of the threshold, students are receiving $4,000 in grant aid from all sources. However, to the left of the EA Grant eligibility threshold, this grant aid sharply increases, due to the addition of the

[21] Because of how award amounts and FAFSA variables are reported in FAIS (see footnotes (8) and (10)), the designation of a student as "eligible" or "ineligible" for the EA Grant should be treated with some caution.

[22] Sections 2 and 3 of the Appendix provide support for the main assumption that students are not sorting to one side of the threshold and there do not appear to be visible differences in the types of students at the threshold. Sections 3 and 4 of the Appendix show how robust the estimated effects are to different models used to estimate the effects.

EA Grant. This is important for the interpretation of the effects in the next sections. Eligible students are not receiving grant aid when they otherwise would not, but are instead seeing increases in grant aid above what they would receive in the absence of the EA Grant program.

Table 2: Effects of EA Grant on a Student's Financial Aid Package in the First Year[b]

	Estimated Effect
A. Effect of EA Grant Eligibility:	
EA Grant	$1,621***
	(45)
B. Other sources of financial aid (per $1,000 of EA Grant):	
Institutional grant aid	-156***
	(50)
Total loans	-347**
	(135)
a. Direct Loans	-56
	(71)
b. Parent PLUS Loans	-232**
	(100)
c. Private Loans	-37
	(50)
Federal Work-study	-21**
	(9)
N	10,227

[b]Notes: Table 2 provides estimates of the effect of EA Grant eligibility and receipt on a student's financial aid package. Panel A shows the effect of EA Grant eligibility on the average EA Grant received. Panel B shows the effect of receiving $1,000 of EA Grant on other types of financial aid in the first year. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Figure 3: How Financial Aid Responds to EA Grant Eligibility

Figure 3.1: Institutional Grant Aid

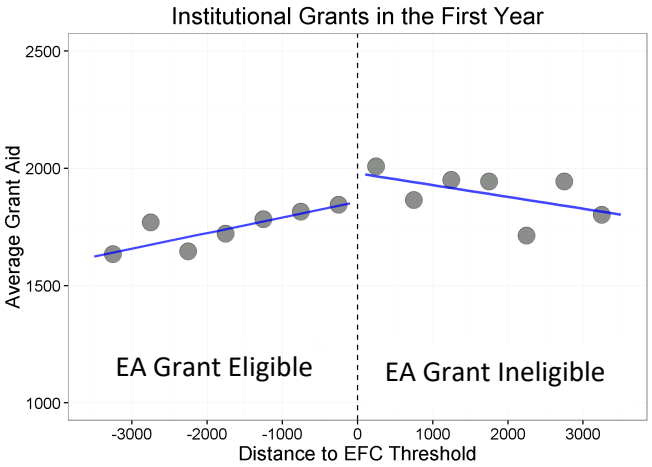


Figure 3.2: Total Loan Aid

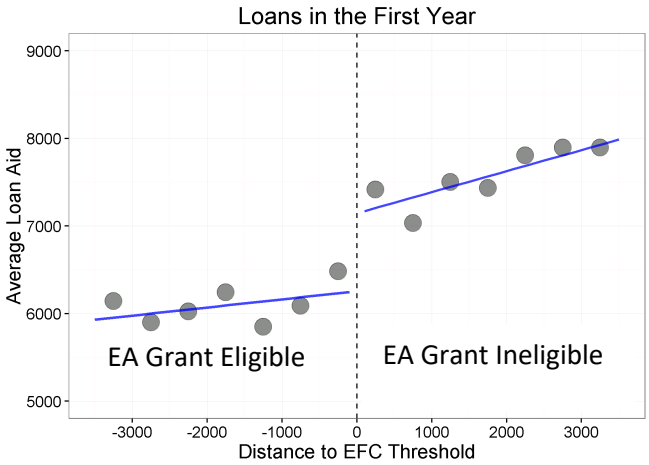
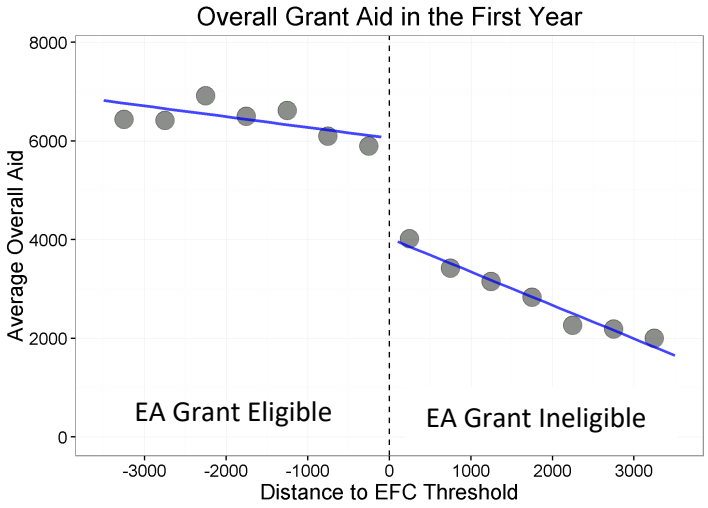


Figure 3.3: Overall Grant Aid



Effects of EA Grant on College Persistence and Graduation

Table 3 displays the estimates for the effect of receiving $2,000 in EA Grant aid on the probability of being enrolled at the same institution in a given year after entry and graduating within five years. The second column shows the estimated effect, while the third column shows the mean of the dependent variable (probabilities of persistence or graduation) among students near the threshold but who are ineligible for the EA Grant. This helps place the estimated effect in context.

Table 3: Effect of EA Grant on Academic Persistence and Graduation[c]

Effect of $2,000 in EA Grant on:	Estimated Effect	Mean | Ineligible	N
Probability of persisting to the ____ year :			
a. 2nd	0.04**	0.84	10,227
	(0.02)		
b. 3rd	0.06***	0.75	10,227
	(0.02)		
c. 4th	0.04*	0.71	8,625
	(0.02)		
Graduation after 5 years	0.03	0.62	6,208
	(0.03)		

[c]Notes: Table 3 shows the effect of receiving an annual $2,000 of EA Grant on the probability of persisting to a given year. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Each estimate reflects a different sample of cohorts, as longer-term outcomes require a restriction to earlier cohorts. Rows 1 and 2 use the full sample (academic years 2009-2016), row 3 uses academic years 2009-2015, and row 4 uses academic years (2009-2013).

The persistence estimates show positive and statistically significant effects of receiving an annual award of $2,000 in EA grant aid on the probability of persisting to later years. Additional EA Grant aid of $2,000 results in a 4, 6, and 4 percentage point increase in the probability of enrolling at the same institution 2, 3, and 4 years, respectively, after entering postsecondary education. These effects are also visually discernible in Figure 4, which produces graphs of the probability of persistence similar to that of Figure 2. When compared to the mean rates of persistence, this means that $2,000 of EA grant aid increases the probability of persistence to years 2, 3, and 4 by 4.5%, 8%, and 5.6% respectively. A positive effect of 3 percentage points on graduation after 5 years is found, but the effect is statistically insignificant from zero. Estimates further into the future have less precision, as longer-term outcomes restrict the cohorts that can be used for the estimate.

Figure 4: Effects of EA Grant on Persistence

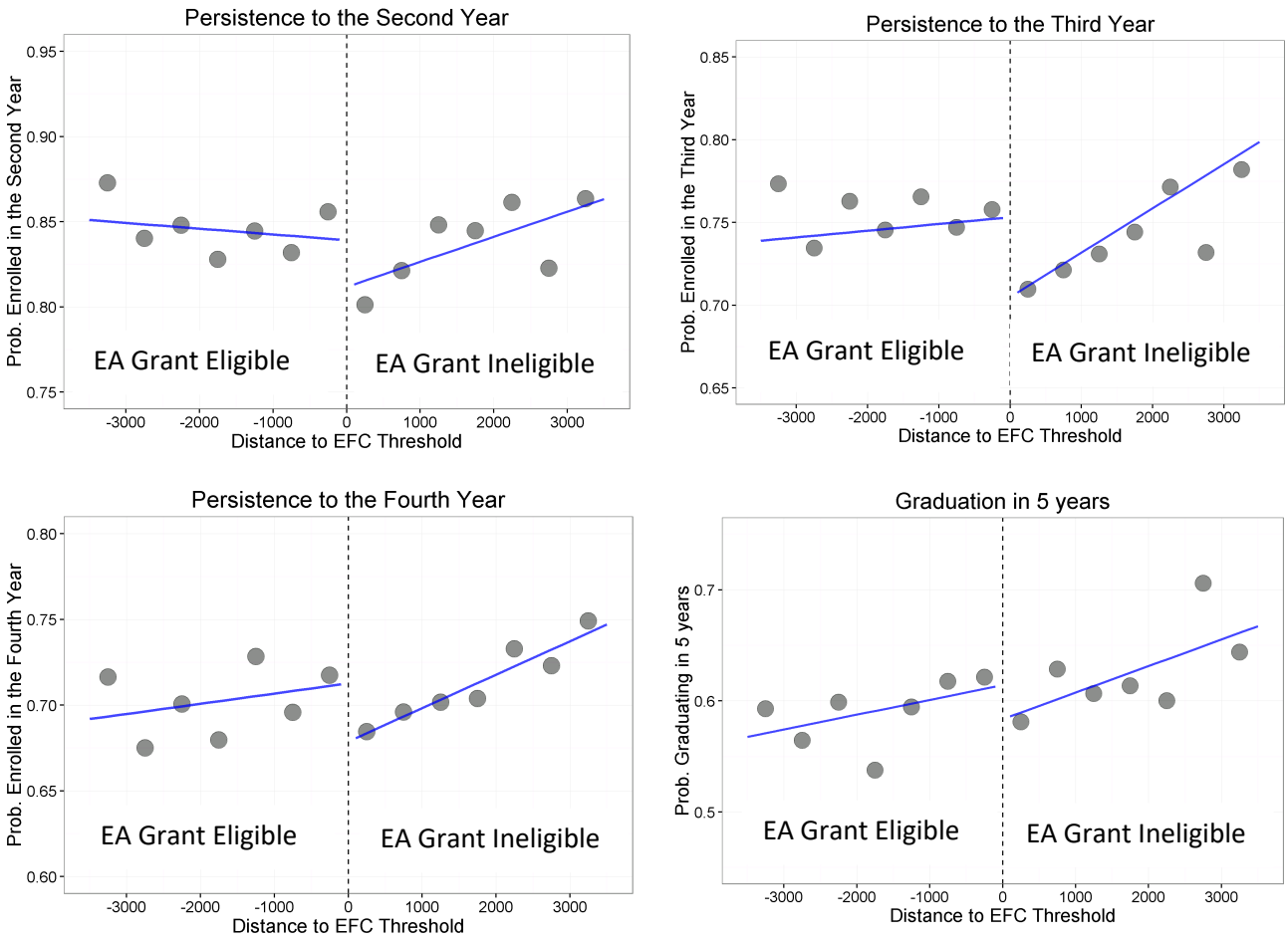


Table 4 examines both persistence and major choice. The dependent variable examined is whether a student is both enrolled and concentrated in a STEM major in a given year after entering postsecondary education. As in Table 3, the mean level of persistence and enrollment in STEM majors is provided in column 3.

The first row of Table 4 indicates that receiving $2,000 in EA Grant aid does not have a statistically significant effect on the probability of being enrolled in a STEM major in year 1 or year 2. However, by years 3 and 4 there are positive and statistically significant effects of being enrolled and in a STEM major, with $2,000 of annual EA Grant aid resulting in increases of 3 and 4 percentage points respectively, or 15% and 16%. There is not a statistically significant effect of graduating in a STEM major, which could possibly be due to the cohorts used to estimate the effect. The increases in persistence and enrollment in STEM indicate two possibilities. Students could possibly be induced to enroll in STEM majors when they otherwise would not as a result of EA Grant aid. However, the other possibility is that the increases in persistence found in Table 3 occur among students that eventually concentrate in STEM majors.

Table 4: Effects of EA Grant on STEM Major Concentration[d]

Effect of $2,000 in EA Grant aid on:	Estimated Effect	Mean | Ineligible	N
Probability of being enrolled and concentrating in a STEM Major in ____ year:			
a. 1st	-0.03 (0.02)	0.30	10,227
b. 2nd	0.02 (0.02)	0.28	10,227
c. 3rd	0.04** (0.02)	0.26	10,227
d. 4th	0.04** (0.02)	0.25	8,625
Graduation after 5 years	0.01 (0.02)	0.19	6,208

[d]Notes: Table 4 shows the effect of receiving an annual $2,000 of EA Grant on the probability of persisting and being enrolled in a STEM major to a given year. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Each estimate reflects a different sample of cohorts, as longer-term outcomes require a restriction to earlier cohorts. Rows 1, 2 and 3 use the full sample (academic years 2009-2016), row 4 uses academic years 2009-2015, and row 5 uses academic years (2009-2013).

Effects of EA Grant on Workforce Wages

Table 5 shows the effect of EA grant aid on workforce wages in years 1, 5, 6, and 7. The effect on year 1 is estimated to determine whether currently enrolled students alter the amount of work during the academic year as a result of receiving $2,000 extra in EA Grant aid. Previous research has shown that grant aid can have an effect on a student's propensity to work during school (Goldrick-Rab, 2015), so the estimate for the first year examines whether this effect exists for EA Grant recipients. The effects on wages in years 5, 6, and 7 are conducted to see if the persistence effects result in higher annual wages for EA Grant recipients.

Table 5: Effects of EA Grant on Workforce Wages[e]

Effect of $2,000 of EA Grant aid on:	Estimated Effect	Mean | Ineligible	N
Workforce wages in the _____ year:			
a. 1st	-118	$1,985	10,227
	(166)		
b. 5th	367	$18,178	4,565
	(1,475)		
c. 6th	$4,011*	$21,211	3,388
	(2,185)		
d. 7th	$7,481**	$24,794	1,951
	(3,282)		

[e]Notes: Table 5 shows the effect of receiving an annual $2,000 of EA Grant on workforce wages a given number of years after entry. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Each estimate reflects a different sample of cohorts, as longer-term outcomes require a restriction to earlier cohorts. Row 1 uses the full sample (academic years 2009-2016), row 2 uses academic years 2009-2012, row 3 uses academic years 2009-2011, and row 4 uses academic years 2009-2010.

The first row of Table 5 estimates a -$118 effect on first year wages that is statistically insignificant from zero, indicating that students do not appear to change how much they work while enrolled in response to the EA Grant. In the second row, a small and statistically insignificant effect is found on workforce wages 5 years after entry. In the 6th year, a positive and marginally significant ($p < 0.1$) increase of $4,011 per year is estimated, and a significant effect ($p <0.05$) of $7,481 is found on the 7th year's wages. The effects on the 6th and 7th year's wages amount to 18% and 30% of the average wages for ineligible students. These effects suggest large increases in earnings shortly after graduation for EA Grant recipients. However, the interpretation of these effects require some caution. Seventh year wages are estimated on a cohort of students who entered in the 2008-2009 and 2009-2010 academic years, during a time of poor economic conditions, so the magnitude of the increase in earnings for students whose academic persistence was changed by EA Grant receipt could be influenced by those economic conditions.

Effects of EA Grant by Students' Demographic and High School Achievement

Table 6 examines whether any of the main effects of interest in this report differ by demographic characteristics; such as race, gender, or ethnicity; high school level test scores, such as the High School Assessment (HSA) scores in Algebra and English; and a student's eligibility for free-or-reduced-price-meals (FARMS) in high school. Each panel of Table 6 presents a model with the main estimate of $2,000 in annual EA Grant receipt, and the estimate interacted with the student characteristic to determine if there are any significant differences in the effects by student characteristics. Table 6 focuses on institutional grant aid,

total loans, and persistence effects, as there are enough cohorts available to have large enough samples to look at differential effects by other student characteristics.

Table 6: Differential Effects by Students' High School Test Scores and Demographic Characteristics[f]

	Dependent Variable:				
			Persistence to:		
	Inst. grants	Total Loans	Year 2	Year 3	Year 4
A. Algebra HSA Score					
EA Grant (per $2,000)	-237	-451	0.03	0.09***	0.06*
	(150)	(371)	(0.02)	(0.03)	(0.03)
EA Grant x Median Algebra HSA	-87	-447	0.01	-0.03	-0.04
	(144)	(352)	(0.02)	(0.03)	(0.03)
B. English HSA Score					
EA Grant (per $2,000)	-243	-609	0.07*	0.10**	0.08
	(213)	(554)	(0.04)	(0.04)	(0.05)
EA Grant x Median English HSA	-85	-256	-0.05	-0.06	-0.07
	(286)	(740)	(0.05)	(0.06)	(0.06)
C. White					
EA Grant (per $2,000)	-191*	-1,013***	0.05**	0.07***	0.04
	(110)	(295)	(0.02)	(0.02)	(0.03)
EA Grant x White	-283***	744***	-0.01	-0.01	0.01
	(90)	(240)	(0.02)	(0.02)	(0.02)
D. Hispanic					
EA Grant (per $2,000)	-326***	-693**	0.04**	0.06***	0.04
	(102)	(271)	(0.02)	(0.02)	(0.02)
EA Grant x Hispanic	202	-30	0.02	0.03	0.07*
	(208)	(464)	(0.03)	(0.03)	(0.04)
E. Male					
EA Grant (per $2,000)	-253**	-814***	0.04**	0.06***	0.04*
	(106)	(285)	(0.02)	(0.02)	(0.02)
EA Grant x Male	-145*	291	0.02	0.003	-0.003
	(87)	(235)	(0.02)	(0.02)	(0.02)
F. FARMS					
EA Grant (per $2,000)	-352***	-583	0.03*	0.06***	0.03
	(104)	(279)	(0.02)	(0.02)	(0.02)
EA Grant x FARMS	190*	-561*	0.05**	0.03	0.06*
	(114)	(291)	(0.02)	(0.02)	(0.03)

[f]Notes: Table 6 shows the effect of receiving an annual $2,000 of EA Grant on a given outcome and the differential effect for a specific student characteristic. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Though many of the differential effects are statistically insignificant, there are a few that are statistically significant from zero. In Table 2, it was found that in response to EA Grant aid, institutions reduce the amount of institutional grants provided, and EA Grant recipients reduce

their total amount of loans. In Table 6, Panels C, E, and F indicate that white and male students see an even larger decrease in institutional grant aid than non-white and female students, while institutions capture less of a student's EA Grant when they were eligible for FARMS in high school. An opposite pattern is found with regards to total loans. White students reduce their loans less than non-white students in response to EA Grants, while students eligible for FARMS reduce them more than students not eligible for FARMS.

Most differential effects on persistence are insignificant, suggesting that the EA Grant does not differentially affect persistence for students with different demographic characteristics or levels of high school achievement. One potential exception is student eligibility for FARMS. Panel F displays positive differential effects of 5, 3, and 6 percentage points on the probability of persistence for students eligible for FARMS, with significant effects in the second and fourth academic years. This suggests that the increase in persistence due to the EA Grant is larger for students who were eligible for FARMS in high school.

Effects of EA Grant by Level of Income

Lastly, the varying EFC thresholds were utilized to examine whether the effects on persistence differ for students at different levels of income. These effects are presented in Table 7, which shows the effect of $2,000 of annual EA Grant aid on persistence to the second year for students that faced a "low" eligibility threshold, versus a "high" threshold. The first row of Table 7 shows how adjusted gross income differs for the students around each threshold. Students facing a "low" threshold had an average adjusted gross income of $52,000 while those facing a "high" threshold had an income of $74,000.

In Table 7 we see a significant effect ($p < 0.05$) of around 5.9 percentage points per $2,000 of EA Grant for the low group and a statistically insignificant 2 percentage point increase in probability of persisting to the second year for the high group. This set of results provides some suggestive evidence that the positive persistence effects of the additional grant aid is concentrated in lower income students. However, some caution in this interpretation is needed, as the effects for the two groups are not statistically different due to fairly large standard errors around the estimates. This can be seen by the F statistic shown in the table, which cannot conclude that the two estimates are statistically distinguishable.

Table 7: Persistence Effect for "Low" and "High" Thresholds[g]

	Cutoff Group	
	Low	High
Avg. adjusted gross income (AGI)	$52,000	$74,000
Effect of $2,000 EA Grant on persistence to second year (in percentage points):	0.059** (0.02)	0.02 (0.03)
F statistic for test of Low = High	1.11 (p-value = 0.29)	

[g]Notes: Table 7 shows the average AGI for each group of students as well as the estimated effect of $2,000 in EA Grant aid on persistence to the second year. Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.10.

This method can only be applied to persistence to the second year and not any subsequent persistence and graduation. Due to how the threshold changed from year to year, there are some years in which a low threshold followed a high one and some years where the converse is true. A student who was ineligible in his or her first year has the possibility of becoming eligible in her second year, if the threshold increases, but does not if it decreases. When pooling together all years, this does not pose a significant problem, but this peculiarity determines a difference between the high and low groups in long-run outcomes that is not due to the level of EFC, and therefore the income of the students.

Summary of Findings

This report examined the effect of receiving the Educational Assistance (EA) Grant on a student's overall financial aid package, persistence, graduation, and workforce wages, and examined whether these effects differed by student demographic characteristics, high school achievement, and the income level of the students who receive additional grant aid. This study found that when students receive additional grant aid, the institution that they attend tends to reduce the amount of institutional aid that they provide, slightly offsetting some of the EA Grant aid. The additional grant aid has statistically significant effects on persistence in the first and second years, as well as similarly positive, but statistically insignificant effects on longer-term persistence, graduation, and workforce wages. The insignificance of the longer-term outcomes may be due to a limited timeframe and reduced sample. These estimates do not seem to differ by student characteristics in terms of race, gender, or math achievement, as measured by student performance on the Algebra HSA. This study also finds suggestive evidence that the increase in persistence may be concentrated in students at lower levels of family income.

Discussion

Previous literature has found positive effects of grant aid on academic persistence in postsecondary education, and the results in this report provide additional positive supportive evidence. The nearly 2 percentage points per $1,000 of aid in persistence to the second year, and nearly 3 percentage points in persistence to the third year is similar to some estimates of the existing literature, in percentage point terms. For example, Castleman and Long (2016) found around a 4.3 percentage point increase in persistence into the spring semester for $1,300 in state grant aid. However, the sample of students in other literature tends to focus on students of relatively lower-income, and also lower average rates of persistence. As the probability of persisting is higher in the sample in this report, this percentage point increase is a smaller effect in percentage terms. Though limited by sample size, the positive effects on long-term outcomes are consistent with other estimates in previous literature (Bettinger, 2016; Denning et al., forthcoming). This evidence, combined with that of previous literature continues to suggest that grant aid can play a small, positive role in increasing rates of academic persistence.

Additionally, this report provides evidence on institution and student responses to additional grant aid. The actual change in grant aid when students become eligible for the EA Grant is smaller because institutions reduce the amount of institutional grant aid that they provide, to the tune of nearly $0.20 per dollar. This estimate is very similar to that found by Turner (2017), who examined institutional responses to the Pell Grant and found that overall, institutions capture around $0.19 per dollar and around $0.12 per dollar for highly-selective, public institutions. This report, therefore, provides supporting evidence that institutions "capture" a portion of grant aid by reducing their own aid.

Lastly, previous research on grant aid using regression-discontinuity strategies (e.g., see: Turner, 2014; Castleman and Long, 2016; Bettinger et al., 2016) are only able to focus on a single eligibility threshold, and thus students of a particular level of income. This report helps add to this literature by examining the persistence responses of students at different thresholds, and thus different levels of income. Though the estimates are not statistically different from each other, this report finds that the persistence response seems to be concentrated at the lower-income thresholds.

In general, this study found little evidence of differential effects due to student demographic characteristics or high school academic achievement. Persistence and financial aid responses to EA Grant aid do not appear to differ systematically for students with higher HSA scores. This is contrary to the high school GPA finding of Castleman and Long (2016) but could be due to the fact that a student's GPA is a function of more than ability as measured by tests, but also the ability to complete assignments and regularly attend school and teachers' subjective perceptions of students. Persistence did not seem to depend on race, ethnicity or gender, though the institutional grant aid and loan responses indicate some differential effects. White and male students see a larger reduction in institutional grant aid than other students while students eligible for FARMS do not see as large a drop in their institutional grant aid, a finding not previously seen in the literature on institutional responses to grant aid. There is also some evidence that the effect on persistence is larger for students eligible for FARMS, which, when combined with the other evidence on the differential effects by income, provides

evidence that students of lower socio-economic status see larger effects from additional grant aid.

Several limitations apply to this study. First, the current study focuses on four-year institutions only, while the EA Grant is also available to eligible Maryland residents who attend two-year institutions. If the effect of grant aid is different for students who attend two-year institutions, then the results from these analyses will not generalize to two-year student populations. This study also focuses on enrollment at the same institution and does not follow students who change attending institutions. If the EA Grant were to change how students persist if they transfer to other institutions, then this study would provide an underestimate of the overall level of persistence. Also, the data on workforce wages only include those who work in Maryland at non-federal organizations. The Maryland workforce data also do not include individuals employed with the military or self-employed and private contractors. If the EA Grant alters the probability of being employed in any of these employment sectors, then this would be one limitation to the estimate of the effect of EA Grant aid on workforce wages.

Policy Implications

A $2,000 annual EA grant has significant positive effects on persistence to the fourth year of postsecondary education (of around 6%) and positive effects on workforce wages after graduation. The estimates of this report, in agreement with previous literature, suggest that grant aid receipt can have small positive effects on academic persistence in postsecondary education. Additionally, this report finds that these effects may be concentrated among lower-income students and students who were eligible for FARMS during high school. For a program whose eligibility threshold has changed significantly from year to year, this research may suggest that a low-threshold, larger-dollar amount design might be preferable to a high-threshold, low-dollar amount design. This design would provide aid in higher dollar amounts to fewer students. Additionally, recent legislation in the state of Maryland has focused on limiting the ability of institutions to reduce institutional aid in response to private scholarships.[23] By finding that institutions reduce institutional grant aid in response to the EA Grant, this report contributes to existing evidence that institutions engage in similar behavior with respect to state need-based aid.

Future Research

The research described in this report suggests that EA Grant receipt can increase student persistence. However, when examining some longer-term outcomes, the regression discontinuity research method is somewhat hampered by a small sample, which is partially dependent on the number of cohorts that are currently possible to follow 5 years after college entry. As the MLDS continues to add years of data, more of the cohorts can be included in the

[23] Public Senior Higher Education Institutions - Financial Aid - Reduction Restrictions, H.B. 266, 2017 Session, Maryland

longer-term analysis, and the precision of the long-term estimates can be improved. The Guaranteed Access (GA) grant, which has a slightly different entrance process and acceptance, but higher award amount, should also be of interest for researchers and policymakers. Future research on the GA Grant could provide additional evidence on how aid amounts and recipient's income affect how they respond to additional grant aid and can be used to further study the long-term effects of grant aid on college and workforce outcomes.

Conclusion

This report examined the effects of the Howard P. Rawlings Educational Assistance (EA) Grant on postsecondary academic and workforce outcomes. Using the strict eligibility cutoffs in the program's design, it examined the difference in students who were just eligible for grant aid versus just ineligible to estimate a causal effect of grant aid. Differential effects were examined by high school academic achievement, student race, and gender. Changes in this eligibility criteria over time were also used to examine whether students at different levels of income were differentially responsive to the additional grant aid.

Students who received EA Grant aid were statistically more likely to persist to the second and third years at their postsecondary institution. Effects on longer term persistence and graduation rates were of similar magnitudes, but statistically insignificant, likely due to smaller sample sizes caused by fewer available cohorts in the MLDS data. Around 20% of a student's EA Grant also appears to be captured by the postsecondary institution in the form of a reduced institutional grant aid. Though the academic effects do not appear to be different for students with different test scores or demographic characteristics, examining students at different levels of income suggests that the positive academic effects are concentrated in students of relatively lower income levels.

The findings in this report provide evidence that EA Grant receipt has small positive academic effects, particularly for students at lower income levels. Some evidence of positive effects on workforce wages after college graduation are also found, though should be interpreted with more caution. These effects are likely to be of interest to policymakers when evaluating any future changes to the EA Grant program or future state grant programs. The institutional responses to state grant aid may be of additional interest to state policy makers, who have already shown interest in the reaction of institutional grant aid to outside aid, as evidenced by the recent legislation in Maryland placing restrictions on how institutions are allowed to adjust institutional grant aid in response to private scholarship aid.

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[i] When a Maryland college or university seeks to offer an academic program, the Maryland Higher Education Commission (MHEC) assigns a Higher Education General Information Survey (HEGIS) code and Classification of Instructional Programs (CIP) code upon approval or recommendation to implement the program. Six-digit HEGIS codes are assigned based upon program, degree level and degree type. Typically, HEGIS codes in the range of 01 to 23 indicates a program offered at the baccalaureate level or higher, 49 indicates a transfer degree program offered at community colleges, 50 to 56 indicates a career degree program offered at community colleges, and 90 indicates an undeclared program.

MHEC data collections include HEGIS code to identify the program of enrollment and graduation for degree-seeking students rather than CIP code. The MLDS Center maps HEGIS to CIP to align to MHEC's academic program inventory, which contains both the HEGIS and CIP for each approved program. Due to the limitations of the HEGIS coding scheme, a HEGIS code may not always uniquely identify a program, as the code does not always distinguish between variations in curriculum across institutions or within the same institution. For example, HEGIS code 089901 identifies Agricultural Education at one college and Health Professions Education at another. Depending on the CIP code assigned in the academic program inventory, it may not be possible to identify this variation in the MLDS Center data.

Additionally, academic programs may have areas of concentrations. MHEC does not collect college enrollment and graduation information on areas of concentrations. Instead, MHEC collects information solely on the parent program. For example, the HEGIS code 491001 identifies all Arts & Sciences Transfer enrollments and degrees at the same institution even though individual students may complete an area of concentration in either: art, biology, business, chemistry, English, physics or any of 14 possible concentrations. The HEGIS code structure may limit uniquely identifying the program of study and may result in understating or overstating the number of enrollments and graduates for any one program across the State.