Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 24-1108

Buying time: Financial aid allows college students to work less while enrolled

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VERSION: April 2025

Suggested citation: Anderson, Drew M., and Melanie A. Zaber. (2025). Buying time: Financial aid allows college students to work less while enrolled. (EdWorkingPaper: 24 -1108). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/1vpg-7k07

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Abstract

Many empirical studies have found that financial aid improves college attainment. Few have been able to test why. This study used administrative records of employment and earnings to get a more complete picture of students' finances during college and test one potential mechanism: financial aid buys students time by allowing them to work less in off-campus jobs. We studied recipients of New Jersey's need-based Tuition Aid Grant (TAG). We used the eligibility cutoffs of TAG to identify groups of otherwise similar students who received sharply different amounts of aid. A prior study took the same approach and found that TAG increased on-time graduation rates from public universities. At these schools, 80 percent of TAG recipients worked at some point during the year. This study found that when students received additional aid, on average they reduced earnings dollar for dollar.

We thank the Higher Education Student Assistance Authority (HESAA), the National Student Clearinghouse (NSC), and the New Jersey Department of Labor (DOL) for assistance with data. HESAA collaborated with NSC, NJDOL, and researchers at the RAND Corporation to further the mission of each organization by learning about how student work responds to public aid. HESAA gathered data from all three sources and created a longitudinal database where student data could be linked across years using a unique identifier. HESAA removed any personally identifying information from the database and shared files with researchers at RAND. This research was approved by the RAND Human Subjects Protection Committee. We thank Jason Lee for helpful comments. This article represents the views of the authors only. This research does not relate to Drew M. Anderson's current employment at Amazon.

1. Purpose of research and summary of findings

1.1. Why does financial aid work?

This study seeks to understand why financial aid for college is effective at keeping students enrolled. A recent meta-analysis found that on average, $1,000 of grant aid increased rates of college persistence by 1.5 to 2 percentage points for low-income students (Nguyen et al., 2019). From a long-term perspective, receiving a thousand dollars during college should not be a decisive factor for so many students, since completing a college education yields potentially hundreds of thousands of dollars over a lifetime (Oreopoulos and Petronijevic, 2013; Barrow and Malamud, 2015; Webber, 2016; Smith et al., 2020; Ma and Pender, 2023a). However, aid could be a decisive factor if it eases short-term financial constraints that prevent students from investing in their education.

Today's college students do face financial constraints, food insecurity, and housing insecurity (Goldrick-Rab and Broton, 2018; Broton, 2021; Goldrick-Rab et al., 2017). Students have limited access to borrow against their future income (Palacios Lleras, 2010; Marx and Turner, 2018; Caetano et al., 2018; Boatman et al., 2017; Boatman and Evans, 2017; Zaber and Steiner, 2021). Federal government loans are available regardless of credit and with low interest rates, but the borrowing amount is capped such that many students still drop out because they cannot finance college (Black et al., 2023).

To supplement their financial resources, today's students are more likely to work during college than before (Perna, 2010; Kalenkoski and Pabilonia, 2010; Bound et al., 2012; Scott-Clayton, 2012; Carnevale et al., 2015). While some jobs can be complementary to studies, in general the time spent working means students progress more slowly toward graduation (Stinebrickner and Stinebrickner, 2003; Darolia, 2014; Scott-Clayton, 2011; Soliz and Long, 2016; Scott-Clayton and Minaya, 2016; Yu et al., 2020; Ecton et al., 2023; Kroupova et al., 2024; Bozick, 2007). In a survey of students at public universities and community colleges in California, the largest challenges that students identified in succeeding in college were the high costs, and balancing school with work responsibilities (California Student Aid Commission, 2019). These two challenges were correlated: students facing material hardship also worked more than other students (California Student Aid Commission, 2023).

Most students receive grant aid to help overcome financial constraints (Ma and Pender, 2023b). When a student receives financial aid, how is the funding distributed among their needs? Do students borrow less? Spend more on housing and food? Or do they work fewer hours? Knowing how students spend aid funds would help us understand why these programs work, and potentially improve targeting of aid funds.

We lack evidence on students' use of aid funds, because most studies of aid lack data on each student's full financial picture. There are some exceptions discussed below, where researchers could measure effects on borrowing, working during college, or both. Our study adds to the research on student work during college.

1.2. This study: Does TAG aid reduce student earnings?

We studied recipients of the New Jersey Tuition Aid Grant (TAG) at public universities in the state. TAG is targeted to lower-income students to meet costs and support college completion. Therefore, we cannot simply compare recipients of TAG to higher-income non-recipients in order to understand its impact on finances or educational outcomes. Instead, we examined cutoffs in TAG eligibility whereby some students with similar levels of financial need received sharply different amounts of aid. There are several cutoffs throughout the range of incomes eligible for the grant; combined, they provide a representative picture of the impacts of TAG.

This natural experiment was used in a previous study to estimate TAG's impact on college persistence and graduation; that study found that TAG increased eligible students' on-time graduation rates from public universities by 2.7 percentage points per $1,000 of aid received, on average, from a base rate of 34.6 percent graduating in four years (Anderson and Zaber, 2021a).

For the present study, we used the state unemployment insurance database to track employment and earnings in New Jersey during school year 2017–18 and 2018–19 for all TAG recipients. We estimated how employment and earnings at off-campus jobs changed when students received more TAG aid. During this time, TAG supported about 41,000 students per year across 12 universities (HESAA, 2018, 2019). The average TAG recipient in our sample received $5,872 in TAG aid and $5,044 in federal Pell Grant aid for the school year,

but that left $17,574 in tuition and other estimated costs. Students were making decisions about how much to work to support costs not covered by aid. About a fifth of students did not work, three fifths worked part of the year, and a fifth worked for the entire year. On average, students earned $7,538 over a year.

We found that university students reduced earnings dollar-for-dollar when they received TAG aid: $1,000 in additional TAG aid resulted in roughly $1,000 less income during the year. We did not find conclusive evidence of students being less likely to work at all or working fewer weeks of the year; we conclude that the main way students responded to TAG aid was that employed students worked fewer hours at their part-time jobs. Using multiple eligibility cutoffs among TAG recipients, we investigated whether student responses differed by the level of household financial resources (as measured by the eligibility score before aid was awarded), but the results were inconclusive.

1.3. Interpretation and implications of our results

Is a dollar-for-dollar response plausible? In earlier studies, for each dollar of additional financial aid, students reduced earnings from work by an amount ranging from $0.10 to over one dollar (Denning, 2019; Evans and Nguyen, 2019; Denning et al., 2019; Carlson et al., 2022). In studies of borrowing, students reduced borrowing by an amount ranging from $0.20 to over one dollar (Marx and Turner, 2018; Evans and Nguyen, 2019; Denning et al., 2019; Carlson et al., 2022). A response more than dollar-for-dollar suggests the presence of fixed costs. The trouble of taking out a loan, getting a job, or adjusting the amount borrowed or hours at work, may not be worthwhile for small amounts of money. In the presence of these frictions, small changes in financial resources push some students past a threshold where they then make large changes in borrowing or earnings. For those students, the passthrough of grant aid to reductions in work is more than dollar-for-dollar; for other students there is no effect. The average impact on earnings depends on the composition of students, their preferences, and the fixed costs they face.

The trade-off we measured helps explain why TAG had a positive impact on graduation. TAG aid alleviated the need to work during school. It allowed students in New Jersey more time to focus on their studies without losing financial resources.

2. Related literature: How need-based aid affects labor market decisions during college

Our study seeks to understand how students allocate time and financial resources to support college success. We do that by estimating a passthrough rate, defined as the decrease in earnings per additional dollar of financial aid. The passthrough rate is a summary measure of a complex decision process to allocate time and resources under financial constraints. Students do not need to follow a particular model of rational behavior or understand aid eligibility rules in order for work choices to respond to financial aid (Ziskin et al., 2014). These responses are the result of students making trade-offs between work and free time, and that trade-off may shift with additional financial resources.

To put our study in context, this section focuses on recent studies that estimate a passthrough rate for need-based grant aid among university students. Like our study, these studies exploited situations where otherwise similar students were eligible for sharply different amounts of grant aid. 24-year-old university students in Texas reduced earnings by $0.57 per dollar of federal Pell Grant aid received (Denning, 2019), while the passthrough rate for very low-income university students in Texas was inconclusive (Denning et al., 2019). Women in a national sample reduced earnings by $0.78 per dollar of federal Pell Grant aid received (Evans and Nguyen, 2019), with an inconclusive impact for men. University students in Wisconsin who qualified for the Pell Grant reduced earnings by $0.08 to $0.17 per dollar of aid received from a supplemental private grant (Carlson et al., 2022).

These empirical studies of passthrough rates captured average impacts among students with a variety of college and career goals, facing a variety of college and life expenses. A lower passthrough rate may indicate a stronger orientation toward work (Warren, 2002; Baert et al., 2017; Neyt et al., 2018). For some jobs that are more aligned with a student's field of study, other activities, or weekly schedule, spending time working may not be in direct conflict with spending time studying (Light, 2001; Molitor and Leigh, 2005; Greene and Maggs, 2015). A higher passthrough rate may indicate a student has more to gain from shifting time to studying. In most cases, a reduction in earnings was associated with increases in credit accumulation, grades, or college persistence (Denning, 2019; Denning et al., 2019; Evans and Nguyen, 2019; Kofoed, 2022; Carlson et al., 2022; Broton et al., 2016).

Whether a student can afford to work less when they receive more aid might also depend on their basic needs and financial resources. Few studies were able to estimate how effects varied by student financial need. Carlson et al. (2022) and Broton et al. (2016) studied a randomized experiment with a large enough sample size to examine differences by financial need, but they did not find significant differences.

A related literature has estimated how student borrowing responds to additional financial aid (Marx and Turner, 2018; Evans and Nguyen, 2019; Carlson et al., 2022; Denning et al., 2019). In Marx and Turner (2018), the reduction in loans was much higher than expected. The authors argued that taking out a loan carries psychological and hassle costs. After receiving additional aid, the loan amounts that would-be borrowers desired were so low that it was not worth it for them to go to the trouble to take out a loan at all. Getting a job likely has a similar up-front cost for many students, which explains why passthrough rates can range above dollar-for-dollar.

Studies have identified a wide range of passthrough rates. It is therefore important to continue investigating this topic, to establish relationships we expect for specific programs and student groups. Our study adds a new estimate for a large statewide program with demonstrated impacts on graduation, with the potential to evaluate heterogeneous effects by student income level.

3. The Tuition Aid Grant (TAG)

3.1. TAG eligibility

The Tuition Aid Grant (TAG) is New Jersey's largest financial aid program for college students, and it is one of the most generous state-level programs in the nation. In school year 2021–22, New Jersey allocated $441 million to the program, providing a larger amount of need-based aid per undergraduate student than any other state besides Washington (National Association of State Student Grant and Aid Programs, 2020). This section discusses how TAG works and what we know about its effectiveness. Our primary focus is on public universities, the largest sector supported by TAG, though the program also serves students at two-year colleges and at private colleges and universities.

The state assesses student incomes through the New Jersey Eligibility Index (NJEI), and then provides grants based on the NJEI and the college the student attends. Students with lower household incomes and facing higher tuition costs receive larger TAG awards. When a student begins the school year, TAG is packaged with other sources of aid and applied toward tuition charges as well as living expenses.

To receive an NJEI, a student must first submit the Free Application for Federal Student Aid (FAFSA) or an alternative state form for students who do not file the FAFSA. The NJEI formula is not made available, but it is generally based on key FAFSA information about household income from two years prior, including parental income for younger students.

The state publishes the annual TAG Table, which relates NJEI to a TAG amount for each college in the state (see https://www.hesaa.org/Documents/TagTable.pdf). Figure 1 depicts an example of the relationship between NJEI and the TAG amount, for state universities in school year 2018–19 (our study also includes public research universities with higher TAG awards). The figure shows that NJEI values above a certain threshold receive no aid. Then as NJEI decreases, students receive an increasing level of aid in seven different NJEI ranges.

3.2. TAG effectiveness

TAG has existed for more than 40 years, and it has evolved over time to meet the needs of stakeholders in New Jersey. Until recently, there had not been rigorous external research of the program to evaluate its implementation and effectiveness. Anderson and Zaber (2021a) found that investing additional TAG aid was likely to increase on-time graduation rates in the state, at public universities in particular. At two-year county colleges, additional aid had larger positive impacts for the lowest-income students, even though they already received the largest awards. In 2022, the state increased funding for TAG and directed more funding toward public universities; the evaluation results gave policymakers confidence that these changes were likely to support greater on-time graduation (Murphy, 2021). During this same time, the state convened a study commission to evaluate the program and recommend further changes. The commission's report drew on two additional studies (Anderson and Zaber, 2021b; Baum et al., 2021) and made recommendations to better align TAG with the Pell Grant and improve effectiveness (TAG Study Commission, 2022). The state implemented

many of these recommendations in the following years, including focusing funding increases on the lowest-income students (Murphy, 2023).

TAG now has a stronger evidence base than many state-level programs, but it is not clear exactly why it works for students. We sought more data to investigate.

4. Study aims and design

4.1. Research questions

We explored three primary research questions. First, what was the passthrough rate of TAG aid to earnings at off-campus jobs? Second, were students less likely to be employed at all or to work fewer weeks? These measures help us understand the mechanism of passthrough and the time scale on which students made trade-offs (Greene and Maggs, 2015). This is helpful since we lack data on term enrollment, credit completion, or studying. For example, if we found that students worked fewer weeks, that would suggest that TAG supported them to enroll for additional terms. If we found that students earned less within the same number of weeks, that would suggest that TAG supported them to shift time toward more intensive enrollment or studying. In general, if we found that work choices were not responsive to additional aid, that implies students adjusted along other dimensions such as borrowing less or spending more on basic needs.

Third, did student responses vary by the NJEI? The results help us understand how students with varying levels of financial need responded differently to additional aid. The NJEI represents a specific measure of financial need: students with lower NJEI values had less household income two years prior but also received larger amounts of state and federal aid for the school year. However, focusing on NJEI differences has a practical application: it informs how specific adjustments to the TAG Table would yield changes in student work and earnings.

4.2. Data sources and measures

Using administrative sources rather than survey responses meant the study had no attrition and a high degree of accuracy to address our research topic. However, it limited our scope somewhat.

We used administrative data on TAG recipients from the New Jersey Higher Education Student Assistance Authority (HESAA) to measure TAG eligibility and receipt, and to calculate Pell Grant award eligibility (Federal Pell Grant Program, 2018, 2019). TAG recipient data was linked to unemployment insurance records from the New Jersey Department of Labor (DOL). These records captured all work for pay within the state of New Jersey for covered employers. The covered employers did not include government, the military, certain household and agricultural work, and self-employment. They also did not include on-campus federal work-study jobs given as part of students' financial aid packages.

For every job worked in each quarter, we observed earnings and weeks worked. We defined earnings as the total across jobs for all quarters in the year. We defined labor supply in three categories: no employment, partial-year employment, and full-year employment where the student worked at least one job during 52 weeks out of the year. We defined job-weeks worked as the total weeks across all jobs over the year. We aligned quarters with the school year spanning from July to June. HESAA used highly accurate student identifiers that were shared across these data systems to link records. Therefore if we did not observe a match for a student in the unemployment insurance records, we considered that student not to be employed or earning at covered employers.

We were able to secure data for TAG recipients for the 2017–18 and 2018–19 school years, a subset of the cohorts used in Anderson and Zaber (2021a). College has surely changed since then with the onset of the COVID-19 pandemic, as well as changes to the FAFSA and Pell Grant calculations. The only student demographic information we had access to was first-year student status and dependent status on the FAFSA. A student is depending if they are under 24 and has not married, had children, or served in the military. Data on TAG recipients meant we focused on the impacts of varying amounts of TAG aid on decisions made during college, not on the impacts of receiving any aid or the decision to enroll in college. We were also unable to track whether students left college or reduced enrollment during the school year. We were not able to observe other types of income or consumption that would give a more complete picture of finances, or to observe the type of job or typical weekly schedule.

The sample excludes students who were eligible for TAG aid but did not choose to enroll.

This could cause selection bias in our results if differences in TAG award amounts caused significant changes in enrollment. Then the group receiving more TAG aid would also consist of more marginal students, who otherwise would not have enrolled or would have enrolled at a different college; marginal students might have different preferences or financial constraints that could explain differences in work outcomes. However, earlier studies did not find strong evidence of TAG causing higher enrollment in the year of eligibility (Anderson and Zaber, 2021a), and our tests below do not show evidence of selection.

4.3. Regression discontinuity (RD) design

To identify the effects of TAG, we used the sharp cutoffs shown in Figure 1 in a regression discontinuity (RD) design. In these designs, sharp changes in eligibility at the cutoffs create natural experiments that can be used to estimate treatment effects for students in the neighborhood of each cutoff (Cattaneo and Titunik, 2022). RD designs are common in studies of financial aid for college (Nguyen et al., 2019). In the case of need-based aid, RD often limits the analysis to a small band of incomes at the upper end of the eligible range where aid drops to zero.

Because there were multiple cutoffs in our study, we were able to examine a broader range of household incomes than is typical for regression discontinuity studies of financial aid programs. This is valuable, because the results are more likely to be representative of a broader range of recipients, particularly lower-income recipients with the greatest financial need. Combining the cutoffs leads to a larger sample size and typically better precision. However, each cutoff is a separate, valid estimation. Comparing across the cutoffs can help us understand heterogeneity in effects by financial need.

The RD approach is valid under the assumption that potential work outcomes varied smoothly as the NJEI increased across cutoff values. That assumption is not testable, since it would be impossible to observe potential work outcomes under varying levels of aid for the same student. However, we did test whether the density and the characteristics of students varied smoothly across cutoff values, to provide support for this assumption. Student characteristics within a small neighborhood of the cutoff ought to be balanced on either side of the cutoff, since students are unable to observe or control the NJEI to land on one side of

the cutoff. The NJEI formula is not public, so there is no way for a student to know exactly how inputs map into a score. Even if it were public, the inputs come primarily from tax filings from two years prior. We also assume that any differences in outcomes across the NJEI cutoffs are attributable to TAG, since it is the only program that is based on the NJEI. Pell Grant aid generally increased with the NJEI, but it did not jump discontinuously at the same cutoffs used to award TAG (Anderson and Zaber, 2021a).

4.4. Implementation of RD design

To estimate this model, we followed the same approach described in Anderson and Zaber (2021a), using the software from Cattaneo et al. (2020b). We used a two-stage "fuzzy" RD to scale the effect of TAG aid. The first stage was the average increase in dollars of TAG aid from crossing the NJEI cutoff value. The second stage was the impact on work outcomes per dollar of additional TAG aid. In both stages, we controlled for a set of observable differences between students: their dependent status, their cohort year, and the type of institution being a state college or research university (Calonico et al., 2019). A student would appear in the data two times if they received TAG in both years. The standard errors allowed for correlation between observations of the same individual.

RD effects are only identified at the cutoff points, but RD estimation uses observations surrounding those points. RD trades off bias of including individuals far from the cutoff with precision of including a larger sample size. We used a robust, data-driven approach to select a balanced bandwidth around the cutoffs and calculate bias-corrected estimates and confidence intervals (Calonico et al., 2014, 2020). The RD parameter we reported was the difference at the cutoff between local linear regressions estimated on either side of the cutoff. The local linear regression was weighted using a triangular kernel, a standard choice in empirical applications (Gelman and Imbens, 2019; Pei et al., 2022).

To illustrate our approach, below we display several figures with NJEI on the horizontal axis. The vertical lines show the NJEI cutoff values. The NJEI cutoff values that apply to universities in our sample are the same in both years, at values of 1,500, 2,500, and continuing at 1,000 intervals up 6,500. We did not evaluate the cutoff at 7,500 where TAG aid drops to zero, since we only have TAG recipients in our database and could not observe students

with an NJEI just above that cutoff. We chose a constant bandwidth of 150 NJEI points around each cutoff for illustration purposes in these figures. The data-driven bandwidth values for our numerical estimates ranged from about 135 to 205 NJEI points. Each analysis yields a slightly different bandwidth selection, which can be seen in the variation in effective observations.

5. Data and results

5.1. Baseline: TAG recipients' labor market outcomes and costs during college

Table 1 describes our sample of university students receiving TAG in 2017–18 or 2018–19. For this table, we excluded students with extreme NJEI values (below 1,000, or 7,000 and above) which removed 44 percent of the sample (HESAA, 2018, 2019). 23 percent of students did not work. 60 percent worked part of the year, an average of 19.0 job-weeks, earning an average of $6,747 total. The remaining 17 percent worked the full year, an average of 52.7 job-weeks, earning an average of $20,547. The overall unconditional average job-weeks was 20.7, earning an average of $7,538. 80 percent of students were dependent. 27 percent were first-year students.

At public universities in New Jersey, the average total cost of college was $28,400 in 2018–19. This is a student-weighted average of the official charges for tuition, fees, and estimated costs of books, supplies, health care, transportation, and living expenses. Students in our sample received an average TAG grant of $5,782 and Pell Grant of $5,044, leaving $17,574 in remaining costs. Students who worked the full year would have covered that from their work alone, while others would have needed to draw on loans, savings, or family support.

These data show that TAG recipients were making decisions about whether and how much to work during college. The rest of this section describes the results of our approach to estimating a causal relationship between TAG aid and work.

5.2. RD validity

Table 1 continues with the results of RD validity checks for any sharp differences in the types of students just below versus just above NJEI cutoffs.

The first set of results tested for a break in density across the cutoffs. We used the software and approach described in Cattaneo et al. (2020a). We pooled the data and recentered it so that the running variable was defined as the distance to the nearest cutoff. The output tells us the number of effective observations near the cutoff. Here there was a larger number of effective observations below the NJEI cutoffs, where larger awards were granted, but the difference was not statistically significant (p-value 0.67). This means that the change in density across the cutoff was not large compared to the natural levels of variation in density at NJEI values near the cutoff.

Figure 2 shows the density of public university students near cutoff values in the NJEI. Each bar represents the number of students in our sample within a bin 25 NJEI points. Visually, there is not strong evidence of a break in density at the NJEI cutoffs.

The second set of results tested for differences in student characteristics across the cutoffs. To implement this test, we estimated our RD model, removing all covariates and placing each covariate indicator in turn as the outcome variable. We tested all available covariates: dependent student status, first-year status, and an indicator for attending the research universities versus the state colleges. None of these characteristics had statistically significant differences at the TAG cutoffs. The estimated differences were all less than about 1 percentage point in the percentage of students with each characteristic.

It could still be the case that unobservable features of individuals varied discontinuously with the NJEI at the eligibility cutoffs, but we argue that is unlikely. Given the lack of ability to manipulate NJEI, and the results of our testing, we conclude that students who received similar NJEI values were similar in their underlying characteristics and potential work outcomes.

5.3. Impact: Effects of TAG aid on employment and earnings

This section discusses the results of estimating the RD approach described above. We found clear evidence of passthrough to student wages, with less clear evidence of impacts on working at all or job-weeks worked. We conclude that employed students tended to work fewer hours when they received additional TAG aid.

The figures discussed in this section are scatter plots. Each bubble represents the average

dollar amount (either TAG aid or earnings) for students within a bin of 10 NJEI points. The size of each bubble is proportional to the number of individuals in that bin, reflecting the same data that underlies the density test reported in Table 1. The red lines fit the data in these figures, so they do not necessarily match exactly with the local linear regression estimates reported in Table 2.

Figure 3 represents the first stage of our model, comparing TAG aid received to the NJEI. It is the empirical analog of the TAG Table combining all public universities across 2017–18 and 2018–19 (Figure 1 showed the TAG Table for state colleges in 2018–19). In Figure 3, there is clearly a positive and significant jump in TAG aid at each cutoff, ranging from about $500 to $1,000. The weighted average impact was an additional $802 in aid.

Figure 4 represents the reduced form of the model, comparing earnings to the NJEI. Earnings varied much more across similar students than TAG aid did, and the scatter plot does not follow a clear stairstep pattern. In general, the students with a higher NJEI tended to have higher individual earnings. This can be seen in the general upward trend of the scatter plot. A higher NJEI signifies higher family income two years prior and lower TAG receipt in the year of the analysis. We are focused on measuring how earnings change at cutoff points to isolate the impact of a sharp change in TAG aid, net of other variation across students. The linear fit endpoint is lower on the left hand side than on the right hand side of the cutoff, particularly at the lowest two cutoffs with the largest density of students. This indicates that increases in aid were passed through to decreases in earnings.

Table 2 reports the estimated impacts and confidence intervals from our two-stage fuzzy RD model. The estimates reflect the second stage, which is the impact on work outcomes, scaled by the amount of additional TAG received. The table also reports the effective sample size, which was determined by bandwidth selection and the density of observations around the cutoffs.

The first outcome is the change in dollars of total annual earnings from work across all jobs, per additional dollar of TAG aid. At every cutoff, the coefficient estimate on total earnings was negative, suggesting that an additional dollar of aid led to reduced earnings in off-campus jobs. Combining the cutoffs, the overall effect was statistically significant at -1.03 dollars of earnings per dollar of TAG aid.

The multiple cutoffs allow us to evaluate heterogeneity in the impacts of TAG aid across students with different levels of family income. There was not a clear pattern. The smallest passthrough estimates were at the 1,500 and 4,500 cutoffs (-0.43 and -0.41 dollars of earnings per dollar of TAG aid). The largest passthrough estimate was at the 6,500 cutoff (-2.52 per dollar), which corresponded to the lowest level of measured financial need based on prior household income.

The second outcome is the change in the rate of employment, scaled as the change in percentage points per $1,000 of additional TAG aid. The baseline rate of any employment in the sample was 77 percent (see Table 1). The estimates varied across cutoffs, but they were generally negative and led to an overall negative estimate of -2.85 percentage points per $1,000 of TAG aid. However, that estimate had a wide confidence interval including no effect and ranging from -7.40 to +1.24 percentage points.

The third outcome is the change in the number of job-weeks per $1,000 of additional TAG aid. The baseline average job-weeks in the sample was 20.7 (see Table 1). The estimates varied across cutoffs, but they were generally negative and led to an overall negative estimate of -1.80 job-weeks per $1,000 of TAG aid. However, that estimate had a wide confidence interval including no effect and ranging from -4.24 to +0.52 job-weeks.

Taken together, these outcomes point to more intensive work as the primary mechanism for aid passthrough. That is, students worked more hours at part-time jobs. In exploratory analysis of quarterly earnings data, we did not find evidence for shifts in employment toward later in the school year.

For all three outcome measures, we found generally larger point estimates at higher NJEI values, suggesting that students with lower NJEI values were less likely to reduce work when they received an additional $1,000 in TAG aid. However, the higher NJEI values also had less data and more variability. Their confidence intervals typically included the smaller point estimates at lower NJEI values. Therefore the evidence was inconclusive for a positive or negative relationship between NJEI and the passthrough rate of financial aid.

6. Discussion and conclusion

6.1. Summary of findings

Our results implied that TAG bought a significant amount of time for the average recipient by reducing earnings. The average additional aid triggered by cutoffs in our analysis was roughly $800 dollars from TAG, resulting in roughly $800 less in earnings. To put that amount in context, the minimum wage in New Jersey during this period ranged from $8.44 to $10.00 per hour (FRED Economic Data, 2024). $800 less in earnings would free up at least 80 hours. New Jersey Administrative Code Section 9A:1-1.2 defines the total time in and out of class required for a semester credit hour at 37.5 hours. 80 additional hours would allow for 2 additional semester credit hours, or 1.7 percent of the way to a standard 120-credit bachelor's degree.

These results help explain earlier estimates of TAG's effectiveness. Anderson and Zaber (2021a) estimated that $800 in TAG aid, triggered by eligibility in the first year of college, would increase the rate of 4-year graduation by 2.2 percentage points among first-year students at public universities.

6.2. Paths forward for research

We did not have the data to examine some interesting related topics, such as how financial resources in college affected borrowing and post-college finances, how choices varied by student characteristics, or how the passthrough rate varied for different types of jobs that were more or less aligned with students' field of study. We leave it to future studies to explore how these decisions vary and why.

With additional data, we could learn more about TAG recipients at county colleges and private colleges. Our exploratory estimates of TAG passthrough in those sectors were inconclusive. We expect the passthrough rate to differ, since work decisions also vary across sectors. While the percentage of students working was similar across all sectors, there were differences in intensity of work and earnings. Two-year college students earned the most, enough to cover the net cost of college on average. Private college students earned the least and faced the highest tuition.

6.3. Contributions of this study

Many researchers and policymakers have reasoned that one way that financial aid might improve academic attainment is by allowing college students to spend less time working at jobs off-campus. Our results support that reasoning, for this sample of relatively low-income, young, public university students in New Jersey. Insights from TAG are likely to apply to similarly structured programs in other states and at the federal level, including the Pell Grant, though more research with newer data is needed to confirm this. The range of findings in other studies shows that context is important, and the sensitivity of work decisions to financial aid varies a lot for different types of students.

Insights from this study also provide information to potentially shape student support policies for university students in New Jersey. Employment was common among TAG recipients, but earnings did not meet all their financial needs. Based on the passthrough rate we estimated, work appeared to be motivated by financial factors, with large fixed costs associated with finding employment. Therefore, graduation rates might be further increased by helping students to find flexible work, and by increasing aid to alleviate the need to work.

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Tables and figures

Table 1: Data and results: Baseline and RD validity

Employment and earnings during year of TAG receipt

	Pct. of students	Avg. job-weeks	Avg. total earnings	Pct. first-year	Pct. dependent
No employment	23%	0.0	$0	31%	80%
Partial-year employment	60%	19.0	$6,747	29%	82%
Full-year employment	17%	52.7	$20,547	14%	70%
Overall	100%	20.7	$7,538	27%	80%

2018–19 charges and aid

	Avg. cost of college	Avg. Pell Grant	Avg. TAG	Net cost after grants
Overall	$28,400	$5,044	$5,782	$17,574

Density test

	Effective observations, with lower NJEI	Effective observations, with higher NJEI	*p*-value for test of bunching below cutoff
Overall	4,920	3,919	0.67

Covariate balance

	Effective sample size	Effect estimate	*p*-value
First-year student	12,386	-0.2	0.99
Dependent student	10,550	-0.5	0.88
Research university	11,956	1.1	0.78

Sources: Authors' calculations using data from New Jersey Higher Education Student Assistance Authority (HESAA) and New Jersey Department of Labor (DOL).

Notes for employment, earnings, and aid: The sample size of 40,392 includes TAG recipients at public universities in school year 2017–18 and 2018–19. The sample is trimmed to exclude the lowest and highest values of financial need as captured by the New Jersey Eligibility Index (NJEI). It includes a range from 500 NJEI points below the lowest eligibility cutoff (an NJEI of 1,000) up to 500 NJEI points above the highest shared eligibility cutoff (an NJEI of 6,999 for the public university students).

Notes for density test: We recentered values of the New Jersey Eligibility Index (NJEI) around cutoffs and estimated the test described in Cattaneo et al. (2020a).

Notes for covariate balance: These results are analogous to the main specification overall estimates, combining all cutoffs.

Table 2: Data and results: Effects of additional TAG aid at eligibility cutoffs (fuzzy RD)

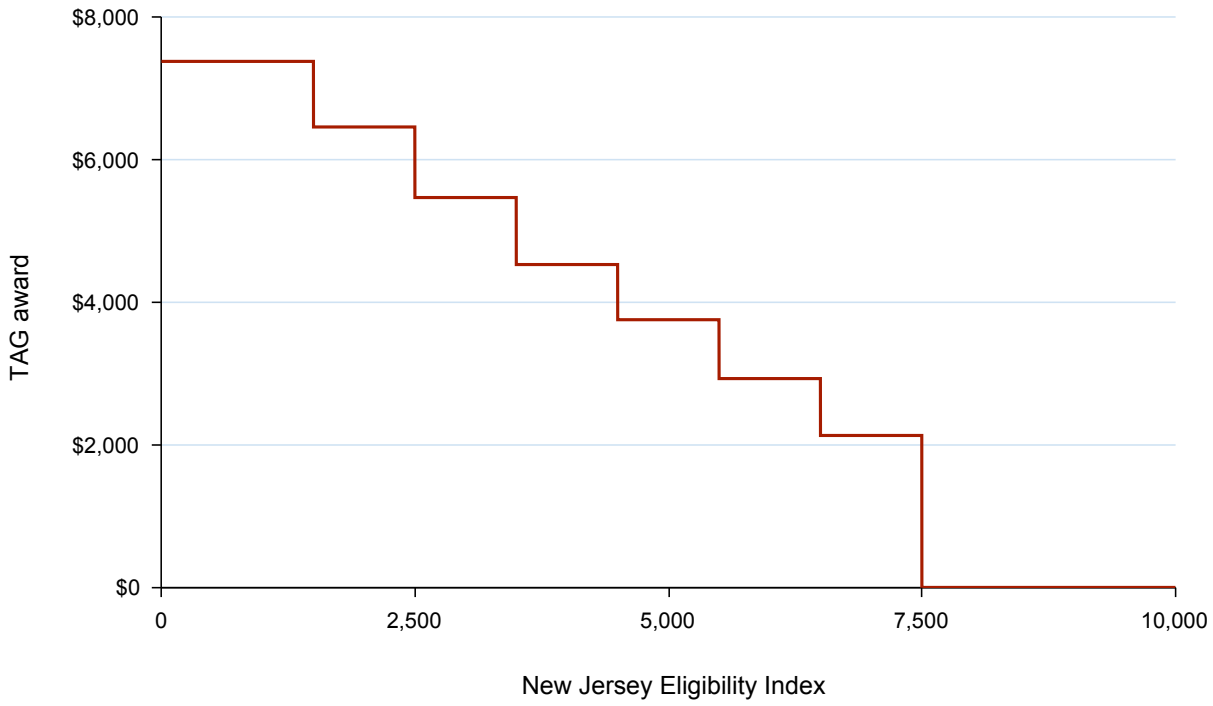
	Effective sample size	Effect estimate	95% Conf. int.
Change in total annual earnings, dollars per dollar of TAG aid (passthrough rate)			
Overall	12,752	-1.03	**(-2.18, -0.09)
1,500 cutoff	2,997	-0.43	(-2.14, 1.27)
2,500 cutoff	2,196	-1.35	(-4.05, 0.73)
3,500 cutoff	2,580	-0.69	(-2.79, 1.50)
4,500 cutoff	2,020	-0.41	(-3.72, 2.96)
5,500 cutoff	1,426	-1.72	(-5.00, 1.27)
6,500 cutoff	1,533	-2.52	*(-6.26, 0.47)
Change in rate of employment, percentage points per $1,000 of TAG aid			
Overall	14,141	-2.85	(-7.40, 1.24)
1,500 cutoff	3,836	-0.65	(-8.40, 7.90)
2,500 cutoff	3,253	0.45	(-8.37, 9.01)
3,500 cutoff	2,296	-1.80	(-12.39, 7.29)
4,500 cutoff	2,168	-3.46	(-16.34, 9.25)
5,500 cutoff	1,208	-14.86	***(-30.08, -2.79)
6,500 cutoff	1,380	-7.07	(-22.04, 7.10)
Change in total annual labor supply, job-weeks worked per $1,000 of TAG aid			
Overall	12,920	-1.80	(-4.24, 0.52)
1,500 cutoff	3,650	0.40	(-3.47, 4.43)
2,500 cutoff	2,210	-2.46	(-8.97, 2.91)
3,500 cutoff	2,580	-2.03	(-6.83, 2.89)
4,500 cutoff	1,655	1.51	(-6.09, 10.81)
5,500 cutoff	1,285	-5.66	(-13.39, 1.56)
6,500 cutoff	1,540	-5.96	*(-13.87, 0.48)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Sources: Authors' calculations using data from New Jersey Higher Education Student Assistance Authority (HESAA) and New Jersey Department of Labor (DOL).

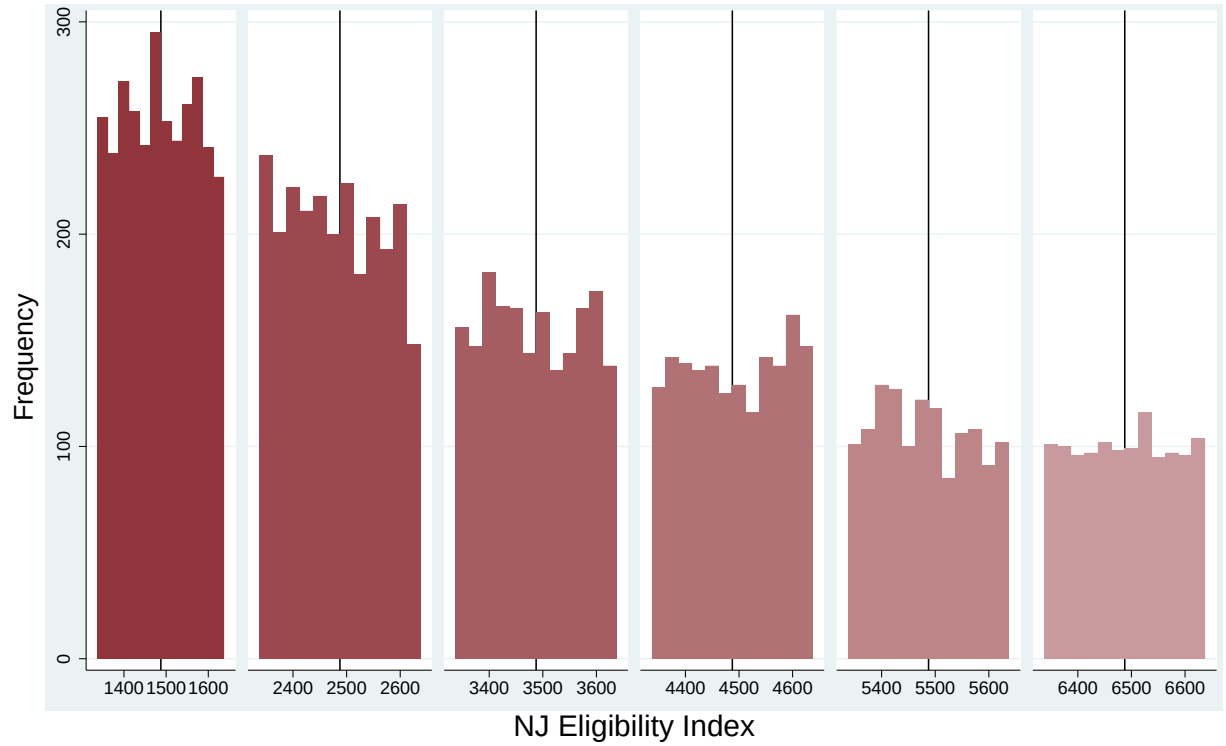
Notes: We implemented the estimation using the multiple cumulative regression discontinuity design and software from Cattaneo et al. (2020b). Effective sample size is the number of students within a data-driven bandwidth around each cutoff.

Figure 1: TAG eligibility example: State colleges in school year 2018–19



Source: New Jersey Higher Education Student Assistance Authority (HESAA).

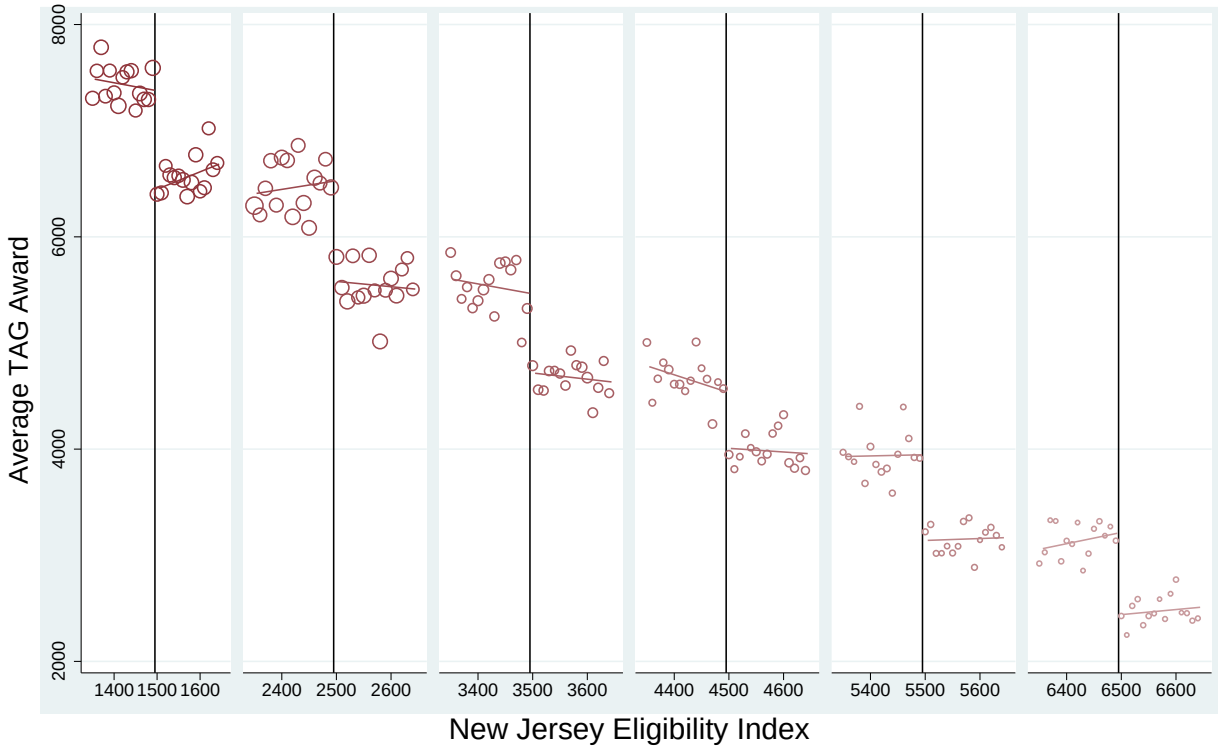
Figure 2: Histogram of TAG recipients by eligibility index near TAG cutoffs, for public university students (validity test)



Sources: Authors' calculations using data from New Jersey Higher Education Student Assistance Authority (HESAA) and New Jersey Department of Labor (DOL).

Sample: TAG recipients at public universities in 2017–18 and 2018–19 school years, restricted to NJEI values near eligibility cutoffs.

Figure 3: TAG aid by eligibility index near TAG cutoffs (first stage)



Sources: Authors' calculations using data from New Jersey Higher Education Student Assistance Authority (HESAA) and New Jersey Department of Labor (DOL).

Sample: TAG recipients at public universities in 2017–18 and 2018–19 school years, restricted to NJEI values near eligibility cutoffs.

Notes: Bubble size is proportional to the number of students with that New Jersey Eligibility Index (NJEI) value.

Figure 4: Total earnings by eligibility index near TAG cutoffs (reduced form)

Sources: Authors' calculations using data from New Jersey Higher Education Student Assistance Authority (HESAA) and New Jersey Department of Labor (DOL).

Sample: TAG recipients at public universities in 2017–18 and 2018–19 school years, restricted to NJEI values near eligibility cutoffs

Notes: Year 1 refers to the school year of TAG receipt. Bubble size is proportional to the number of students with that New Jersey Eligibility Index (NJEI) value.