

To Apply or Not to Apply: FAFSA Completion and Financial Aid Gaps

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Abstract

In the United States, college students must complete the Free Application for Student Federal Aid (FAFSA) to access federal aid. However, many eligible students do not apply and consequently forgo significant amounts of financial aid. Using data from the National Postsecondary Student Aid Survey, I find that 19.35 percent of eligible students who attend college do not complete FAFSA and forgo significant amounts of financial aid. These students tend to be lower to middle income, white, and male. Using propensity score matching, I find that each year applicants forgo \$9,741.05 in total aid which aggregates to \$24 billion annually.

Keywords: Student Financial Aid; FAFSA Completion; Economics of Higher Education; Propensity Score Matching.

JEL Classification Numbers: I2.

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1 Introduction

One way to make college more affordable is to ensure that each eligible student completes the Free Application for Federal Student Aid (FAFSA). FAFSA serves as the gateway for many programs sponsored by the federal government including Pell Grants, Stafford loans, Perkins loans, and work-study. In addition to federal aid, many states, institutions, and private organizations sponsoring scholarships require FAFSA completion to qualify for other financial aid programs. Despite the large amounts of aid at stake, many students who are eligible for aid fail to complete FAFSA (King 2004). Possible explanations for why eligible students do not complete FAFSA include the complexity of the form¹ (Deming and Dynarski 2009) and a lack of information regarding eligibility for aid² (Avery and Kane 2004).

Using the National Postsecondary Student Aid Study (NPSAS), I investigate which individual, academic, and institutional attributes influence a student's decision to not complete FAFSA, and quantify the amount of financial aid that a non-applicant forgoes. The NPSAS is an excellent source of information describing students who are already enrolled in college and what resources students used to cover costs of attendance. These data contain personal information from the FAFSA, academic characteristics such as high school GPA, detailed scholarship, grant, and loan information, and institutional

¹Dynarski and Scott-Clayton (2006) outline the financial aid process and discuss the complexity of the FAFSA. The FAFSA is five pages long with 128 questions and is compared to the IRS 1040EZ which is one page with 37 questions and the 1040 form is two pages with 118 questions. The authors use simulations and econometric analysis to find that a number of questions on the FAFSA have no effect on eligibility determination or financial aid allocation.

²Bettinger *et al.* (2012) conduct an interesting, natural experiment to measure the effect of complexity and information asymmetry on the probability a student completes FAFSA. Partnering with H & R Block, a tax preparation company, Bettinger and coauthors assist students completing FAFSA. The authors divide students into three groups. The first group is paired with an H & R Block employee who calculates the expected family contribution (EFC) for the student and then helps the student complete FAFSA. For the second group, the employee calculates the student's EFC only, and the third group receives no help but a brochure explaining the benefits of college. The students in the first group are more likely to apply for federal aid and enroll in college.

characteristics. While the NPSAS contains student responses from the FAFSA, the National Center for Education Statistics (NCES) collects information that would have been on the FAFSA form from students who did not complete FAFSA. Using the data collected from student interviews, the NCES imputes the Expected Family Contribution³ (EFC) for students who did not complete FAFSA.⁴

I find that students who attend college but do not complete FAFSA are more likely to be white, male, independent from parents⁵ and come from families making less than \$50,000 annually. These students may have incomplete information regarding federal student aid eligibility before enrolling in college, and thus do not apply.

I use propensity score matching to calculate the amount of aid that a student forgoes by not completing FAFSA. I find that the average total financial aid gap⁶ between applicants and non-applicants is \$9,741.05, of which \$1,281.00 are Pell Grants, \$2,439.50 are subsidized student loans, \$1,986.65 are the balance of unsubsidized student loans, and \$1,016.04 are institutional grants. Given the 20,966,826 college students in the United States in 2012,⁷ these estimates imply that non-applicants forgo a total of \$24 billion in aid of which \$3.2 billion are Pell grants, \$6.0 billion are subsidized student loans, \$5.6 billion are unsubsidized student loans, and \$2.9 billion in institutionally funded grants. The

³The EFC is the government's estimate of how much the student or student's family can contribute to the student's education. The federal government uses a formula that incorporates family income and the number of dependents in the student's family. I include a detailed description of the EFC formula in Appendix A.

⁴This imputation is done "by regression using dependency, family size, income, and number in college." While these imputed observations must be treated with caution, the NCES does include all components of the federal aid formula so there should be no concern about omitted variable bias. These data construct a helpful counterfactual to estimate how much aid a student would have received if he would have completed FAFSA.

⁵The difference between independent and dependent students is very important when studying federal financial aid. A student is considered independent if he or she is over the age of 24, has dependents, is married, or is a military veteran. Otherwise the federal government classifies the student as a dependent. If the student is an independent, then the government uses the student's income to determine need. If the student is a dependent then the government uses parents' income to determine need.

⁶In this study, I define the term financial aid gap to be the difference in financial aid between students who complete FAFSA and students who do not apply for federal financial aid.

⁷National Center for Education Statistics (2012).

reminder of the total aid consists of work-study, and state and private aid programs. Considering that the average student in 2012 took on \$9,480 in both federally backed and private student loans, these estimates show that a considerable amount of student loan debt could be avoided by receiving grant aid for which the student is already eligible. Increasing FAFSA completion rates may alleviate the total balance of student loan debt which is, as of 2012, approaching one trillion dollars.

The failure to apply for and obtain federal aid is of great concern because financial aid can influence whether a student enrolls in college (Cornwell *et al.* 2006; Leslie and Brinkman 1987; van der Klauuw 2002; Dynarski 2000), the type and quality of the institution a student chooses (Bruce and Carruthers (2014), Avery and Hoxby 2004; Fuller *et al.* 1982; Kim 2004), and the probability that a student persists to graduation (Bettinger 2004; Dynarski 2008; Singell 2004; Alon 2011; Novak and McKinney 2011; Lovenheim and Owens 2013; McKinney and Novak 2013). While the data used in this study do not permit me to address these education outcomes directly, the financial aid literature provides evidence that failure to complete FAFSA and thus forgoing financial aid has negative consequences for student success.

This paper contributes to the literature by using various econometric techniques⁸ to understand what factors affect a student's decision to complete FAFSA, and how much aid an eligible student forgoes by not applying for federal aid. While much of the literature focuses on the effects of financial aid on educational outcomes, this paper shows how completing FAFSA influences how financial aid is allocated, which correspondingly has a substantial effect on the student's academic and occupational success.

⁸King (2004) presents summary statistics from the 1999-2000 wave of the National Postsecondary Student Aid Survey (NPSAS). Characteristics that are negatively correlated with FAFSA completion include if the student is considered an independent, income, full or part time enrollment, and the type of school to which a student enrolls. The NPSAS inputs an estimated expected family contribution for non-applicants. Using these data, the author concludes that many students who do not complete FAFSA, would have been eligible for financial aid.

The results from this paper can help policymakers and higher education administrators identify certain groups of students who are not reached by school counselors or other programs before they entered college. Completing FAFSA and helping students to obtain the financial aid resources for which they are already eligible, reduces the cost of attendance and the growing amount of student loan debt. While increased FAFSA completion would increase the amount of money spent by the Federal Government on education, the returns in the form of increased tax revenue from workers' increased income, possible health benefits (Eide and Showalter 2011), and a more engaged citizenry (Dee 2004) may be worth the increased investment.

2 Data and Trends

2.1 Description of Data

2.1.1 National Postsecondary Student Aid Study (NPSAS)

I use data from the 1999-2000, 2003-2004, 2007-2008 waves of the National Postsecondary Student Aid Survey (NPSAS). The National Center of Education Statistics (NCES), a subsidiary of the United States Department of Education, compiles the NPSAS and updates it with a new cross section every four years. These data contain information from many sources including student interviews, student responses to the FAFSA, and surveys completed by college and university administrators about their institutions. Data contained in the NPSAS describe student characteristics such as grades, standardized test scores, and parents' income. NPSAS also identifies the college or university that the student attends and provides data about enrollment size, institutional control, and tuition pricing. All monetary variables are expressed in 2008 dollars.

NCES constructed the NPSAS by randomly sampling both institutions and students

to create a representative sample of typical college students for each of the fifty states, the District of Columbia, and Puerto Rico. Each institution of higher education that is eligible for federal student aid (i.e. Title IV compliant) was assigned a sampling probability and sampled with replacement so that the NPSAS creates a representative sample of the college student population in each state. After the number of observations per institution was determined, NCES randomly sampled students such that the data represent the student body with regards to demographic information, types of financial aid, and major.

2.1.2 Sample Selection

I limit my sample to undergraduate students who are American citizens, attend only one institution during the school year, and attend a four-year public or private not-for profit institution. I drop observations that are over the age of 65 and under the age of 15 (115 observations). I also drop observations of students whose institutions reported a “sticker price” tuition rate less than \$100 for full-time students (22 observations) and attend universities with headcount enrollment less than 100 students (51 observations). The tuition observations for these institutions were probably mistakes because they are large, well known universities whose tuition prices are much greater.

2.1.3 Summary Statistics

Eligibility for federal financial aid is determined by the cost of attendance (including tuition, fees, books, room and board, etc.) minus the Expected Family Contribution. One unique attribute of the NPSAS is that the NCES calculates a hypothetical EFC for non-applicants. Using the cost of attendance and EFC data from the NPSAS, I calculate potential eligibility and then sort observations into four groups: eligible and applied; eligible and did not apply; non-eligible and applied; non-eligible and did not apply.

Table 1 shows descriptive statistics for the 83,600 observations in this study. As a

condition of the restricted use license, all summary statistics and number of observations are rounded to the nearest ten. Across the three cross-sections, the average total financial aid package and federal need based grant are \$8,140 and \$760 respectively. The average expected family contribution during this time period was \$10,640 and the average GPA and SAT scores were 3.00 and 1060 respectively. The universities in the sample charged an average \$7,490 for the entire school year in tuition and fees and have an enrollment of 14,580 students. The students in this sample are representative of student bodies for most colleges and universities. Table 2 describes the differences in key summary statistics between students who are eligible for any type of federal aid who complete FAFSA, eligible students who do not complete FAFSA, non-eligible students who do not complete FAFSA, and non-eligible students who do not complete FAFSA. Of these students 58.90 percent are eligible for aid and complete FAFSA, 19.35 percent are eligible for aid but do not complete FAFSA, 8.29 percent are not eligible for any federal aid and complete FAFSA, and 13.46 percent are not eligible for any federal aid and do not complete FAFSA.

The differences between non-applicants and applicants conditional on being eligible for any federal aid are significant. The EFC for eligible non-applicants (column 2) is \$5,200 more than eligible students who apply (column 1). Eligible, non-applicants (or their parents) tend to make around \$13,500 more than non-applicants. Non-applicants also tend to be older, more white and Asian, and more likely to be independent from their parents. Academically, non-applicants have higher GPA and SAT scores, but attend colleges that are less expensive. Non-applicants are also less likely to earn financial aid even when compared to not-eligible students who complete FAFSA.

Students who are not eligible (columns 3 and 4) for any federal aid have, on average, \$18,642 more in EFC and \$61,437 more in parent or family income than eligible students (columns 1 and 2). However, eligible and non-eligible students are quite similar when comparing GPA. Also, students who were not eligible for aid attend schools who

charge, on average, \$2,531 less than students who are eligible for aid. These results may reflect the aid formula used by the Department of Education that accounts for cost of living expense (including tuition, room, and board) in addition to financial need. Students attending schools with lower tuition prices would have less incentive to complete FAFSA and less likely to be eligible for federal financial aid compared to students at more expensive institutions.

Table 3 displays summary statistics for students whose EFC is below the eligibility cap for a Pell Grant. Pell Grants are only available to students whose EFC is under a certain limit determined each year and whose cost of attendance exceeds the EFC. The maximum EFC for Pell Grant eligibility was \$4,110 in 2008, \$3,850 in 2004, and \$2,925 in 2000.

The summary statistics for Pell Eligible students are similar to those for the whole sample in Table 2. Pell eligible students who complete FAFSA receive, on average, \$10,297 more than those students who did not complete FAFSA. Non-applicants, however, only have \$100 more in Expected Family Contribution than those Pell-eligible students who complete FAFSA. Also non-applicants are more likely to be white or Asian, older, independent from their parents, and attend institutions with lower tuition prices. The pool of students who are not eligible for federal aid (meaning that their cost of attendance is still less than their EFC) is quite small. Non-eligible students account for 156 observations of 34,408 (or around 0.453% of the sample).

2.2 Trends in FAFSA Completion

Figure 1 shows the percentage of dependent and independent students who completed FAFSA for each year by parents' income. The Department of Education classifies a student as a dependent if she is under the age of 24, single, a non-veteran, and has no children. For financial aid purposes, a dependent student reports her income along with her parents'

income, while an independent student reports solely her own income.

Income reduces the percentage of students who complete FAFSA because eligibility for many federal programs is need based. What is surprising, however, is how quickly the share of students who do not complete FAFSA drops as income rises; particularly for independent students. For example, around 80% of independent students who make less than \$10,000 complete FAFSA, but only 50% of independent students who make \$40,000 apply for federal aid.

Eligibility for federally based financial aid is determined by the difference between the cost of living and the EFC. Figure 2 plots the percentage of students who completed FAFSA given the amount of federal aid (including grants, loans, and work-study employment) for which the student is eligible. If students have complete information regarding their eligibility before their decision to complete FAFSA, then a student would not complete FAFSA when the EFC exceeds the cost of attendance; while all students who are eligible for aid would complete FAFSA. Thus there would exist a clear discontinuity where zero percent of students complete FAFSA when they are not eligible and then all students with positive need would complete FAFSA.

The vertical line in Figure 2, plots what the FAFSA completion trend should look like if students have perfect information and low transaction costs of completing FAFSA (compared to actual trends for both dependent and independent students). This figure indicates that students do not have complete information regarding their eligibility because 85 percent of eligible, dependent students and around 70 to 80 percent of eligible, independent students complete FAFSA. One reason that independent student consistently complete FAFSA at lower rates is that they do not have parents or high school counselors to motivate or ensure FAFSA completion.

While non-eligible applicants may waste time and other non-monetary resources while completing FAFSA, the group of students of most concern to policymakers are the

eligible students who do not complete FAFSA. FAFSA completion varies greatly depending on the extent of need. Marginally needy students complete FAFSA at a rate from 55 to 80 percent. However, the FAFSA completion rate drops for the extremely needy students who may be most sensitive to changes in financial aid.

Figure 3 plots the percentage of students who complete FAFSA across the high school GPA distribution by dependency status. Between 60 and 70 percent of independent students complete FAFSA until the 70th percentile where the completion rate drops to 50 percent. GPA may not significantly influence on FAFSA completion as income or tuition because of two reasons. First, the federal government allocates aid by considering financial need not academic merit and students who receive institutional or private merit aid are still eligible for federal need based aid. Second, only students at the very top of the grade distribution are generally eligible for merit aid.⁹ While one may suppose that a student who already has a full merit scholarship may have less incentive to complete FAFSA, Figure 3 shows that this trend may not be general for all students.

3 Estimation Strategy

This study examines three questions regarding the application for federal student aid. First, how do demographic characteristics and family finances influence whether a student completes FAFSA? Second, what characteristics influence eligible students to mistakenly not apply even though they would have been eligible for aid? Finally, how much aid does a non-applicant forgo?

⁹Notable exceptions include HOPE-style merit aid programs that are usually very generous. For example, during the sample periods, Georgia students were only required to have a 3.0 high school GPA to be eligible.

3.1 Applying for Federal Aid

3.1.1 Probit Model

I estimate a probit model, to calculate how personal characteristics, financial resources, and institutional characteristics influence a student's decision to complete FAFSA. If all students have complete information about their eligibility for federal aid before they complete FAFSA, then the only variables that should influence FAFSA completion are the cost of attendance and the expected family contribution. All other variables such as income, gender, race, and GPA should not be statistically significant because they do not directly determine aid eligibility.¹⁰ However, if students do not have complete knowledge about their aid eligibility before they complete FAFSA, many of these characteristics will influence their decision because it biases the student's belief about their eligibility. One helpful aspect of the NPSAS, is that the Department of Education provides a random sample of students who did not complete FAFSA and calculates their hypothetical EFC. This EFC serves as a helpful counterfactual to determine the eligibility status of non-applicants. I also estimate a probit model using only students who are eligible for Pell Grants.

3.1.2 Multinomial Logit Model

Knowing which groups of students are eligible for federal aid, but do not apply would help policy makers boost FAFSA completion and ensure that deserving students receive the financial aid for which they are eligible. If the assumption of complete information does not hold, then there are essentially four possible outcomes: eligible students who do complete FAFSA, non-eligible students who do not complete FAFSA, non-eligible students

¹⁰While Federal aid is means tested, income is only one component of the EFC and thus if students have complete information, then EFC should be statistically significant while income should not. However with incomplete information, a student may incorrectly estimate her EFC. I summarize how the federal government calculates EFC in the Appendix.

who do not complete FAFSA, and eligible students who do not complete FAFSA. To measure how personal, financial, and institutional characteristics influence the probability that given an ineligible student does not complete FAFSA, I estimate a multinomial logit model. The multinomial logit model has response probabilities:

$$P(y = j|\mathbf{X}, I) = \frac{\exp(\mathbf{X}\boldsymbol{\beta}_J + \alpha I + \gamma S)}{\left[1 + \sum_{h=1}^J \exp(\mathbf{X}\boldsymbol{\beta}_h + \alpha I + \gamma S)\right]}, \quad (1)$$

where I is a student's own or family income, \mathbf{X} is a matrix containing all other personal characteristics, S is a matrix of school characteristics, and J indicates which eligibility/application group a student finds herself in.

Unlike the probit model, I do not estimate the multinomial logit model for only students whose EFC is below the cutoff for possible Pell eligibility. It is possible to have an EFC below this cutoff but not receive a Pell Grant because the student attends an institution where the cost of attendance is less than the EFC. In my sample, this condition applies only to 156 observations that account for only 0.453% of the sample of students with sufficiently low EFCs for Pell eligibility. If one removes these two options with small numbers of observations, then the multinomial logit model collapses to the standard logit model.

3.2 Propensity Score Matching and the Financial Aid Gap

Propensity score matching calculates the difference between an outcome and its counterfactual when using non-experimental data. The basic conceptual framework for propensity matching is provided by the Roy (1951) and Rudin (1974) models. I consider students who complete FAFSA as the treated group and students who fail to complete FAFSA as a control group. The financial aid gap is essentially the average treatment on the treated, which can be calculated by the following formula:

$$\tau_{att} = E(y|w = 1) - E(y|w = 0),$$

where y is the amount of financial aid that a student receives, w is a latent variable indicating whether a student completed FAFSA, and τ_{att} is the average treatment on the treated.

One challenge in using this framework is that one cannot observe $E(y|w = 1)$ or $E(y|w = 0)$ at the same time for the same student because either the student completes FAFSA and receives an observable financial aid package or does not complete FAFSA and receives no federal aid. The other observation is purely counterfactual.

Propensity score matching calculates a counterfactual with similar characteristics to a given treated observation. To avoid problems with dimensionality, the researcher first calculates a propensity score for receiving the treatment for each individual and then uses one of many available algorithms to match a student who completed FAFSA with a similar student who did not complete FAFSA.

In this study, I use Gaussian kernel matching. While, nearest neighbor is the simplest algorithm and is considered a good baseline for comparison to other forms of estimation (Caliendo and Kopeinig 2008), I use Kernel matching because this technique uses all of the observations within a certain bandwidth (Heckman *et al.* 1997, 1998) instead of using only one or an average of a few observations to develop the counterfactual as in nearest neighbor matching. The counterfactual is simply a weighted average of all observations with weights determined by how close an observation is to the treated observation. Using a normal density, observations that are the closest to the treated observation are weighed greater than those farther away. Following Smith and Todd (2005), I match with replacement which allows for better matching and increases the standard error, thus reducing the possibility for Type I error in casual inference.

The counterfactual observation, using kernel smoothing, is:

$$E(y|w = 0) = \frac{\sum_{i:W_i=w} y_i \cdot \phi\left(\frac{X_i-x}{h}\right)}{\sum_{i:W_i=w} \phi\left(\frac{X_i-x}{h}\right)}, \quad (2)$$

where ϕ is the standard normal distribution, X_i is the control observation for which the weight is being calculated, x is the treated observation that the researcher is comparing, and h is the chosen bandwidth.

One matching algorithm is not optimal for all circumstances (Imbens 2004), there are tradeoffs for using one method over another. For example, the variance of the nearest neighbor estimator is smaller than the variance in the kernel estimator, but the kernel estimator uses all available data to form the counterfactual to reduce the probability of a bad match (Heckman *et al.* 1997; Abadie and Imbens 2006). Also, a tighter bandwidth creates a smoother estimate, but reduces the number of observations taken into consideration. The literature is divided regarding optimal bandwidth (Imbens 2004), so I use 0.06 as the bandwidth; which is common in other studies (e.g. Heckman *et al.* 1997). I check this bandwidth selection by repeating the routine using bandwidths of 0.03 and 0.10 and find that the alternative bandwidths do not significantly affect the results.

4 Results

4.1 Results from Probit Models

Understanding which personal, academic, and institutional characteristics affect a student's decision to complete FAFSA is important to policymakers because financial aid affects a myriad of education outcomes. Since cost of attendance and Expected Family Contribution are the only variables that directly affect aid eligibility, if students have perfect information then all other variables should not be statistically significant. Table 4 displays the partial

effects from the estimated probit models for both the full sample (columns 1 and 2) and the sub-sample comprised of only Pell eligible students (columns 3 and 4). Included with the covariates discussed in Section 3.1, columns 2 and 4 show models that include state effects to estimate if results are robust even across unobserved characteristics of the various states. These fixed effects should also control for particular state financial aid programs that require students to complete FAFSA to gain access to aid.

Demographic and family characteristics have considerable influence over the choice to complete FAFSA. In accordance with the descriptive statistics in Section 3.2, the probit model indicates that the probability that a student completes FAFSA declines as income increases, but the magnitude of the effect is surprising. An increase in a student's own or family income by \$10,000 decreases the probability of FAFSA completion by 3.29 percentage points. This decline in FAFSA completion is concerning because many low or moderate middle income households still would be eligible for some amount of Pell Grant or subsidized student loan.

Other student characteristics influence FAFSA completion. Probably as a result of extensive outreach programs at both high schools and universities (Alon 2007; Boschung *et al.* 1998, Fenske, Porter, and DuBrock 2000; and St. John and Noell 1989), black and Hispanic students are, on average, 12.5 and 7 percentage points more likely to complete FAFSA than their white classmates. For the sample of only Pell eligible students, blacks are around 10 percentage points and Hispanics are around 6 percentage points more likely to complete FAFSA than whites.¹¹ Females who are eligible for aid are also 1.8 percentage points more likely to complete FAFSA. While these increases are beneficial for underrepresented students, white students may erroneously believe that minority status is required for aid eligibility. Also, dependent students are 8.16 percentage points more likely

¹¹Recall that the NPSAS contains observation of only individuals who matriculate into college. These results may be different if the data included both students and those who never attend college.

to complete FAFSA than independent students. All results are robust when state fixed effects are added (columns 3 and 4). However when students who are not Pell eligible are omitted from the sample, many characteristics that do not directly affect aid eligibility become statistically insignificant. This result is probably because students who are eligible for a Pell Grant have a sufficiently low EFC and may have benefited from college and high school counselor outreach.

4.2 Results from Multinomial Logit Model

The complexity of the FAFSA form may prevent students who would be otherwise eligible for a Pell Grant or subsidized student loans from completing FAFSA. To understand which institutional, personal, and academic characteristics are associated with non-application, I estimate a multinomial logit model with the following categories: eligible and applied, not eligible but applied, not eligible and did not apply, and eligible but did not apply. I sort observed students into one of these three categories by subtracting each student's EFC from the cost of attendance of the college the student attends. Then using the indicator in the NPSAS for whether a student completed FAFSA, I sort students into the four categories described above. The students of interest are eligible for aid but do not complete FAFSA and thus were denied financial aid.

Figure 4 plots financial need (meaning cost of attendance net EFC) against parent or student income for students who did not complete FAFSA and thus forgo any federal financial aid. I limit this figure to students whose own or parent's income is less than \$100,000. Any student whose need is greater than the minimum Pell Grant¹² would have been eligible for federal aid. While the number of eligible students declines with income, there still is a significant number of eligible students who are not completing FAFSA. One surprising result from this figure is how many students are still eligible for financial aid

¹²During the 2007-2008 school year, the minimum Pell Grant amount was \$400.

despite their high parents' or own income. While not all of these students are eligible for Pell Grants, these students may be eligible for student loans, work study, or institutional aid.

Table 5 displays the results from the estimated multinomial logit model. Column 1 shows the outcome that is of most concern to policymakers: eligible students who do not apply. The omitted category is eligible for aid and complete FAFSA. Thus the coefficients represent the probability that an eligible student would not complete FAFSA compared to eligible students who do complete FAFSA. These students are eligible for at least some types of federal aid, but still do not complete FAFSA. Understanding which characteristics influence a student to not complete FAFSA despite the student's eligibility may help college administrators target students for FAFSA completion and policymakers to simplify the FAFSA form. The partial effects in Table 5 compare the probability that a student is classified in a certain group compared to a student being eligible and completing FAFSA.

If students are perfectly informed about their aid eligibility, then the only coefficients that should be significant are tuition and EFC. Table 5, shows that if a student's income increases by \$10,000 then the probability that an eligible student does not complete FAFSA increases by 1.37 percentage points. Race and gender also influence the decision not to complete FAFSA. Black and Hispanic students who are eligible for federal aid are nine and five percentage points more likely, respectively, to complete FAFSA than similar white students. Eligible female students are around 1.8 percent more likely to complete FAFSA than eligible male students. Eligible students who are dependent on their parents are 5.22 percentage points more likely to complete FAFSA. A student's age also decreases FAFSA completion by 0.10 percentage points.

Columns (2) and (3) are not as important to policymakers because they represent students who were either not-eligible and applied for aid, or where not-eligible and did not apply for aid. If students had complete information about the eligibility, then we would

expect the situation in column (3) to prevail for all non-eligible students, but not column (2). Tuition rates and EFC in both columns conform to expectations. If a student matriculates into a college with a higher tuition rate, then the probability that a student will not be eligible for aid declines (0.659 percentage points for not eligible and did apply and 2.40 for not eligible and did not apply). Females are less likely to find themselves in either category. Also students are dependent or black are 5.23 and 2.58 percentage points respectively more likely to complete FAFSA when they are not eligible.

4.3 Results from Propensity Score Matching

Finally, I use propensity score matching to measure the magnitude of the financial aid gap between FAFSA applicants and non-applicants. One of the primary conditions for propensity score matching is that the data must provide a region of common support (Bryson *et al.* 2002); meaning that the distributions of the estimated propensity scores for the treated and untreated must overlap and thus provide enough data to construct a counterfactual. Figure 5 displays a histogram of the propensity scores for federal aid applicants and non-applicants. The distributions of propensity scores for both categories overlap over the majority of propensity scores. The possibility of a non-match does exist however at the extreme ends, but for students on the margin of completing FAFSA this should not be of concern. I also estimate the financial aid gap for Pell-eligible students only, but I only estimate the gap by income level up to \$50,000 to \$60,000 a year because higher income levels do not have enough observations for the kernel matching.

First, I measure the total financial aid gap. This gap includes all forms of financial aid (both loans and grants) from all sources (private donors, institutions of higher education, state and federal governments). Table 6 contains the results from the propensity score matching that show that there is a large and significant gap between students who complete FAFSA and those who do not. Figure 6 also plots these results over income for

each wave of the data over household income. While the gap is the largest for very poor students, the gap still exists across income levels.

The most interesting result is the extent of the financial aid gap. The results from the propensity score matching show that even students who have high incomes lose considerable amounts of financial aid when they do not complete FAFSA. For example, for students making over \$100,000, the financial aid gap from the pooled sample is \$9,150.22 per year. The large gap may be a result of private, institutional, and state aid programs that are merit based but require the student to complete FAFSA. The gap also closes while student income increases, but has remained somewhat constant over time.

The total aid variable cannot measure how the composition of the financial aid package changes as income increases. For example, as income increases many students will not receive Pell Grant aid but the Federal Government may offer them a subsidized student loan. Also many higher income students may earn more merit aid if they attend a university with more financial resources. To better understand how the financial aid gap changes when income changes, I conduct the same propensity score matching technique on Pell Grants and subsidized Stafford Loans.

Table 7 shows results from the propensity score matching for Pell Grants. Unlike the total aid results, the financial aid gap is only positive for students whose income is less than \$60,000. While the gap is statistically significant at all levels, the minimum Pell Grant was around \$400 for all of the time period represented by the data. This result implies that lower and lower-middle income households forgo significant amounts of aid (for example, \$1,732.04 for households with incomes between \$30,000 to \$40,000). For the very poor, the effects of not completing FAFSA are very large. Households making less than \$10,000 forgo over \$3,000 in Pell Grant aid. The accompanying Figure 7 plots these results and shows how the stark downward trend of the financial aid gap for Pell Grants. Also since the federal government has expanded the Pell program over the last decade, the

amount of Pell Grant aid that a non-applicant forgoes increased with each wave of the data. The Pell aid gap almost doubles when only Pell eligible students are considered. The average Pell grant forgone across time and income is \$2,721.28, but even students whose families make between \$50,000 and \$60,000 and are eligible for Pell (probably because they come from a family with many dependents and few financial assets) forgo \$1,357.63

Table 8 displays results for the financial aid gap for subsidized student loans. The results are similar to those for Pell Grants except that the financial aid gap is bigger across income levels. While loans need to be repaid, they are valuable because the student does not pay while in school and the Federal Government subsidizes the interest rate after graduation. These results reflect the balance of the student loan and does not account for the interest paid by the federal government on the student's behalf but reflects the amount of payments postponed and lower interest rate the student could have paid on that balance.

Even high income students lose out on significant amounts of subsidized student loans by not completing FAFSA. Students whose families make more than \$100,000 forgo \$1,125 while students with family/own income around \$50,000 forgo almost \$3,300. The financial aid gap for subsidized student loans is consistent across each wave of the data. Figure 8 plots the financial aid gap across income levels. The downward trend reflects the need-based method of allocating subsidized student loans.

Table 9 displays results for unsubsidized student loan gap. These loans are offered by the federal government and accumulate interest while the student attends school. The amount of unsubsidized loans is determined by the university to fund the cost of attendance after other forms of financial aid. Students do not need to demonstrate financial need to receive unsubsidized loans, but students still must complete FAFSA to access these loans. The average balance of unsubsidized loans forgone by non-applicants is \$1,986.65. Figure 9 shows how the unsubsidized loan gap changes with income. Unlike the Pell Grant and subsidized student loan gaps, the amounts of forgone unsubsidized loans

increases as household income increases. Poorer households are eligible for other types of aid and thus do not need unsubsidized loans, so richer households are more likely to use these loans. For example the average amount of unsubsidized loan that a very poor (income less than \$10,000) forgoes is \$1,610.02, but a household making more than \$100,000 will lose \$3,303.61. Interestingly, being Pell eligible decreases the amount of unsubsidized student loans that a non-applicant household forgoes, probably because these loans are substituted with Pell Grants.

Table 10 displays results for the institutional aid gap. These results are not as clear as the previous categories because institutions vary widely on the amounts of aid that they are willing and able to allocate to students. As opposed to the previous aid categories where all estimates were statistically significant at the 99% level, some estimates of the institutional aid gap are not statistically significant. The the average aid gap across the waves of the data and income is statistically significant and estimated to be \$1,016.04. Figure 12 shows the aid gap across household income. While there is a clear trend like in previous categories, it does show that students regardless of income forgo significant amounts of institutional aid when they do not complete FAFSA.

Table 11 shows results for the total grant aid gap. While FAFSA completion is not required for all types of aid, many institutions and states do require a student to complete FAFSA even when the aid eligibility for a particular program is not based on financial need. Thus these results may help test the hypothesis that students to fail to complete FAFSA do so because they already have sufficient grant aid that is not tied to the form. However, these propensity score matching results indicate that students who do not complete FAFSA forgo large amounts of grant aid which may include aid funded by the federal government, state governments, and institutions. This total grand aid gap ranges from \$5,464.45 for family/student incomes less than \$10,000 to \$1,784.43 for families or individuals making more than \$100,000. The average forgone aid across years and income levels is \$3,254.87.

The aid gap for only students who are Pell eligible is not significantly higher than the general student population. Thus institutions may be substituting Pell Grant funds for institutionally based financial aid. Figure 11 plots the total aid gap over income levels.

One possible reason that students may not complete FAFSA is that they could already be receiving sufficient amounts of financial aid from their employer. Particularly for non-traditional working students, employer funded tuition assistance can be an important part of the financial aid package. Table 12 shows propensity score matching results for students receiving employer aid across income levels, NPSAS waves, and Pell Grant eligibility. I find that students who do not complete FAFSA do receive more employer aid however, in some cases, the gap is neither statistically nor economically significant. While some point estimates are significant, there is no discernible trend across income levels that gives evidence to the idea that employer aid is influencing the FAFSA completion decision for a significant number of students. There is also no difference between the amount of aid between Pell Eligible and the complete sample of students. Figure 12 plots the employer aid gap across income levels.

The propensity score matching results confirm that it is important that low-income students complete FAFSA, but also suggest that lower middle and middle income students lose significant financial aid if they do not complete FAFSA. Thus while focus is still needed on lower income students, policymakers and educators should encourage middle income students to complete FAFSA.

5 Conclusion

Since the creation of the Federal Pell Grant Program, federal need-based aid has become a major portion of university tuition revenue (McPherson and Schapiro 1991). There is considerable evidence that financial aid increases access to higher education, the quality of

match between the student and college, and the probability that a student persists to graduation. However, little is known about the types of people who apply for federal financial aid, the characteristics that influence this decision, and the amount of financial aid that a student forgoes by not applying.

The results from this study show that parents' or student's own income reduces the probability that a given student completes FAFSA. Many eligible, lower to middle income students do not complete FAFSA and forgo significant amounts of financial aid. Also, female and minority students are more likely to complete FAFSA. Whites, males, independent students, residents and upperclassmen are less likely to apply for aid even when they are eligible. These results are conditional on attending college and may not be reflect the general population. Data including observations of people who chose not to attend college may yield different results. The results in this study are helpful because students who forgo financial aid may reduce the probability of persisting to graduation and may have a higher student loan burden.

Finally, I use prosperity score matching to measure the amount of forgone financial aid for non-applicants. I find that there is a large and statistically significant aid gap that may have a substantial effect on education outcomes. Overall, the average financial aid gap for all types of aid is \$9,741.05. While this gap is declining in income, it is surprising that even upper middle and high income students lose significant amounts of aid when they do not complete FAFSA. The financial aid gap is also significant for Pell Grants, subsidized student loans, unsubsidized student loans, and, in most cases, institutional aid. For Pell Grants the financial aid gap is very large for poor students, but even students whose families make around \$40,000 lose \$1,1730 in aid, while most students forgo large amounts of subsidized student loans including very generous interest and repayment benefits. The balance of unsubsidized loans increases with income. While unsubsidized loans do not come with the same benefits as subsidized loans, students who do not complete FAFSA will

have to find other ways to pay their tuition including using credit cards or private loan sources that have higher interest rates than unsubsidized loans. There is no clear pattern with institutional aid, but the gap does trend upwards with regards to income. Not all institutions require FAFSA completion to access aid, but the average student could forgo \$1,016 by not completing FAFSA.

These findings are significant because many studies show that financial aid is important in school choice, enrollment, and persistence to graduation. The complexity of the FAFSA or lack of knowledge of federal financial aid programs deprive students of important resources that can help to succeed in college. Simplifying the FAFSA form and promoting FAFSA completion may be effective policies to boost the number of college graduates.

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A Construction of Expected Family Contribution

For a student to be eligible for federal, need based financial aid, she must first complete the Free Application for Federal Student Aid (FAFSA). The government uses the information gathered from the FAFSA to calculate the Expected Family Contribution (EFC) that measures how much she or her family could potentially contribute to her education. Colleges and universities use the EFC to determine student need which is the difference between cost of attendance and the EFC.

This section will describe in detail how the government calculates the EFC including the formula and the variables that the government uses. Also, this section will explain rules that the Department of Education proscribes to individual colleges and universities who calculate the cost of attendance for their college.

The EFC is a summation of two types of financial assets: income and savings. The Department of Education requires colleges to take into account income when calculating the EFC for all applicants. For a student's savings and assets to be exempted from inclusion in the EFC, the student (or her parents) must either have an adjusted gross income (AGI) less than \$50,000, not be required to file an IRS Form 1040, be a dislocated worker, or received a means-tested federal benefit.

To calculate the income component of EFC, the student must report her and her parents' (if dependent) AGI from the previous year tax form. The federal government then allows the following to be deducted from the reported AGI: federal taxes paid, state taxes paid, Social Security allowance for both parents, and the income protection allowance. The income protection allowance is a function of total family members and the number of college students in the household. The difference between AGI and the exceptions equals the portion of income that counts towards the EFC. If the student is a dependent, then this process is used for both student and parent income and the sum of the two equals the

portion of the EFC from income. If the student is an independent then the parents' contribution is considered to be zero.

If a student does not qualify for the simplified EFC formula (income only), then the government adjusts the EFC for student's and family's savings and net worth. The federal government considers the student's and family's cash savings (including college savings), investments (not including 401k or pension funds, annuities, non-education IRA, or the value of a home), and net worth of a family own business or investment farm. This sum equals the student's and family's net worth. Finally, the government allows an adjustment for education savings and asset protection. This allowance depends on the age of the oldest parent and is increasing with age. Subtracting the asset protection allowance from the family's net worth yields the family's discretionary net worth. Students are not allowed to adjust their net worth for asset protection.

Finally, to calculate the student's and family's contribution from assets, the government multiplies the student's net worth by .20 and the family's discretionary net worth by .12. To calculate the final EFC, the government sums the contributions from income and the contributions from assets.

Table 1: Summary Statistics for Overall Sample

Variable	Observations	Mean	Std. Dev.	Min	Max
Financial Aid					
Completed FAFSA	83,600	0.672	0.470	0	1
Total Aid	83,600	8,140	8,690	0	58,540
Pell Grant	83,600	760	1,380	0	4,620
Sub. Student Loans	83,600	1,600	2,250	0	10,830
Personal Characteristics					
EFC	83,600	10,640	13,690	0	127,210
Income	83,600	60,260	54,090	0	611,640
GPA	83,060	3.01	67.86	0	4.00
Dependent	83,600	0.652	0.476	0	1
Female	83,600	0.569	0.495	0	1
Asian	83,600	0.053	0.223	0	1
Black	83,600	0.109	0.311	0	1
Hispanic	83,600	0.082	0.274	0	1
Age	83,600	23.73	6.90	15	65
Father's Education	83,600	12.68	5.18	0	20
Resident	83,600	0.834	0.372	0	1
Freshman	83,600	0.196	0.400	0	1
Sophomore	83,600	0.150	0.359	0	1
Junior	83,600	0.152	0.358	0	1
Senior	83,600	0.436	0.496	0	1
Fifth Year	83,600	0.048	0.214	0	1
Other Class	83,600	0.019	0.138	0	1
Institutional Characteristics					
Tuition	72,380	7,490	7,510	100	45,110
Enrollment (000)	83,370	14,580	12,150	120	54,090
Public	83,600	0.716	0.451	0	1

Note: All summary statistics are rounded to the nearest ten to comply with NPSAS restricted-use license agreement.

Table 2: Summary Statistics of Key Variables by Eligibility and FAFSA Completion-Total Sample

VARIABLES	(1) E, A	(2) E, NA	(3) NE, A	(4) NE, NA
Financial Aid				
Total Aid	11,820 (8,720)	2,300 (4,880)	8,690 (6,710)	1,210 (2,900)
Pell Grant	1,290 (1,590)	0 (0)	0 (0)	0 (0)
Sub. Student Loans	2,720 (2,360)	0 (0)	0 (0)	0 (0)
Individual Characteristics				
EFC	5,410 (7,450)	10,640 (10,060)	29,980 (18,740)	23,360 (16,590)
Income	43,290 (38,770)	56,720 (45,920)	120,150 (65,300)	102,730 (64,910)
GPA	2.99 (67.46)	3.06 (65.75)	3.01 (67.17)	3.02 (72.49)
Dependent	0.646 (0.478)	0.589 (0.492)	0.896 (0.306)	0.619 (0.486)
Female	0.586 (0.493)	0.540 (0.498)	0.564 (0.500)	0.541 (0.498)
Asian	0.053 (0.223)	0.065 (0.246)	0.033 (0.180)	0.047 (0.211)
Black	0.142 (0.350)	0.061 (0.239)	0.066 (0.247)	0.057 (0.233)
Hispanic	0.097 (0.297)	0.063 (0.243)	0.050 (0.218)	0.060 (0.237)
Age	23.25 (6.13)	24.54 (7.53)	21.47 (5.18)	26.05 (8.99)
Institutional Characteristics				
Tuition	8,390 (7,700)	7,810 (8,220)	7,170 (6,800)	3,970 (4,860)
Observations	49,240	16,180	6,930	11,250
% of Observations	58.90	19.35	8.29	13.46

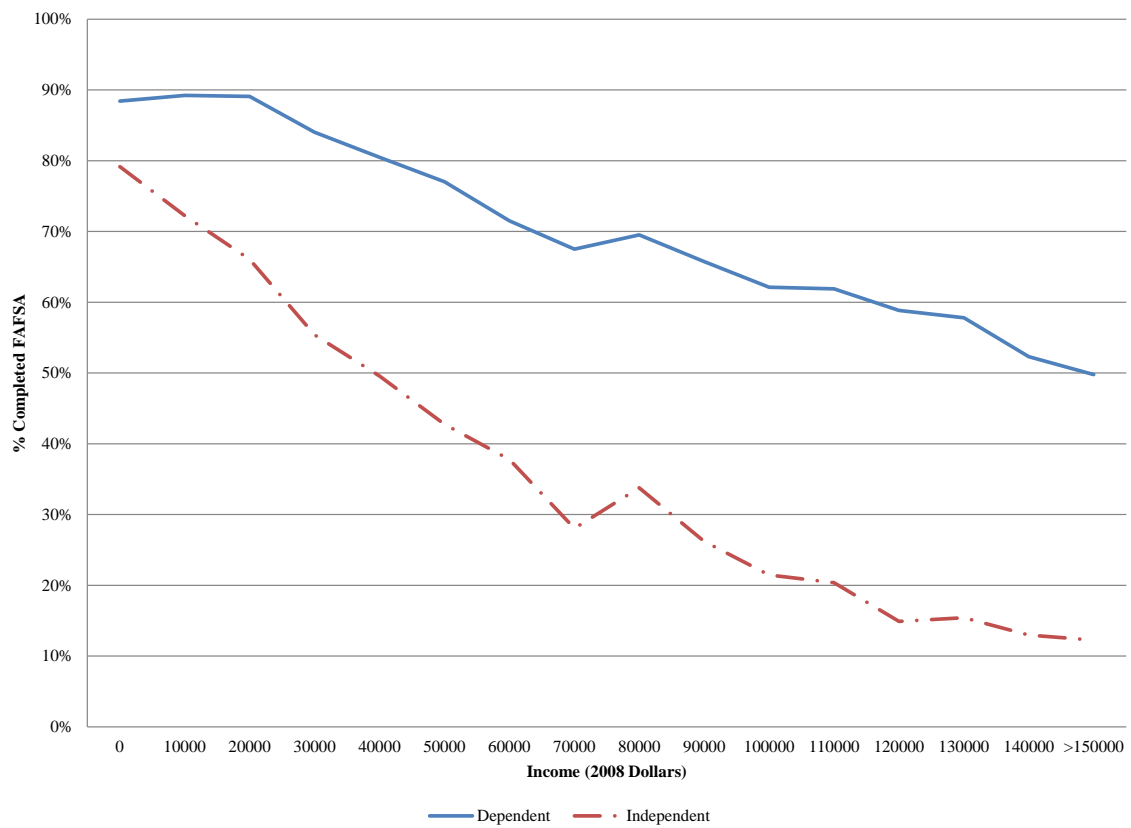
Note: *E* represents eligible students, while *NE* represents non-eligible students. *A* represents applicants, while *NA* represents non-applicants. Other demographic and institutional characteristics such as father's education, resident, class, enrollment and institutional control were not significantly different across categories. All summary statistics are rounded to the nearest ten to comply with NPSAS restricted-use license agreement.

Table 3: Summary Statistics of Key Variables by Eligibility and FAFSA Completion-Only Pell-Eligible Students

VARIABLES	(1) E, A	(2) E, NA
Financial Aid		
Total Aid	12,080 (8,460)	1,780 (4,190)
Pell Grant	2,200 (1,520)	0 (0)
Subsidized Student Loans	2,960 (2,360)	0 (0)
Individual Characteristics		
EFC	1,080 (1,260)	1,180 (1,360)
Income	21,970 (18,180)	21,920 (20,130)
GPA	2.96 (0.693)	2.97 (0.693)
Dependent	0.525 (0.499)	0.356 (0.479)
Female	0.589 (0.492)	0.511 (0.500)
Asian	0.063 (0.243)	0.078 (0.268)
Black	0.184 (0.388)	0.091 (0.287)
Hispanic	0.123 (0.328)	0.084 (0.279)
Age	24.02 (6.46)	25.40 (7.59)
Institutional Characteristics		
Tuition	7,050 (6,720)	4,800 (5,580)
Observations	28,950	5,310

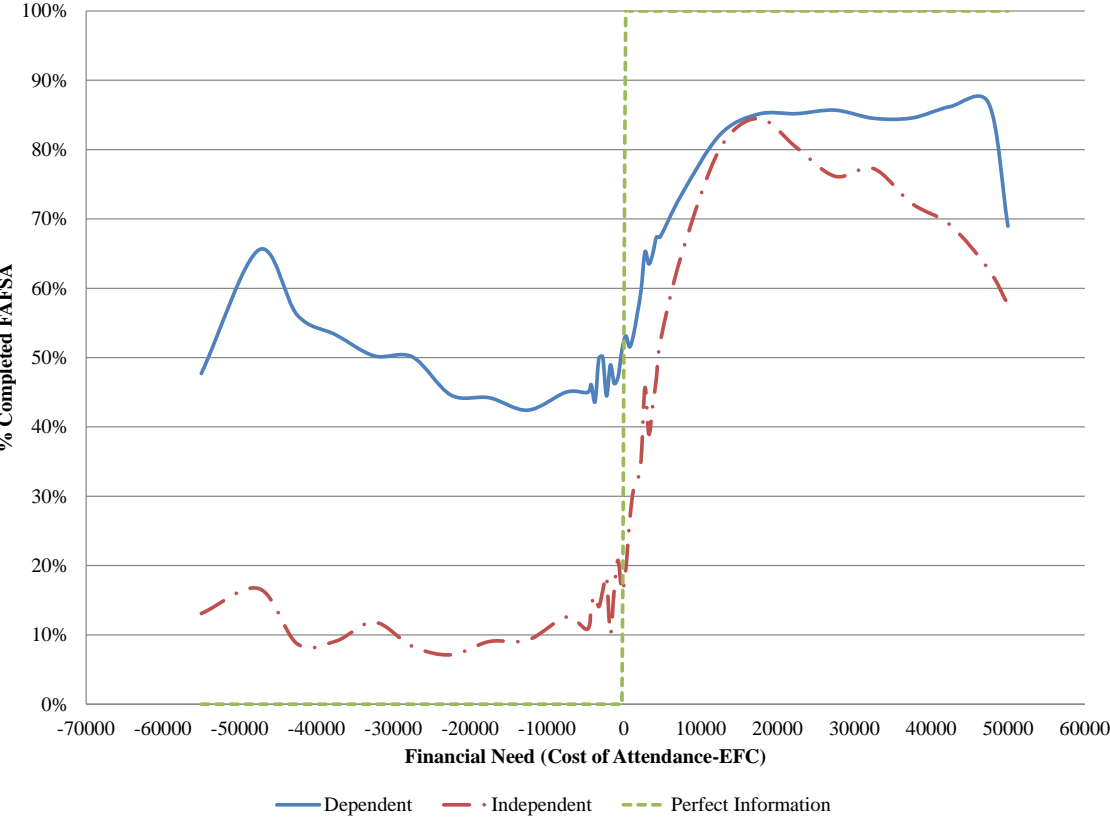
Note: *E* represents eligible students, while *NE* represents non-eligible students. *A* represents applicants, while *NA* represents non-applicants. Other demographic and institutional characteristics such as father's education, resident, class, enrollment and institutional control were not significantly different across categories. All summary statistics are rounded to the nearest ten to comply with NPSAS restricted-use license agreement.

Figure 1: Percent of Independent/Dependent Students who Completed FAFSA by Parents'/Own Income (2008 dollars)



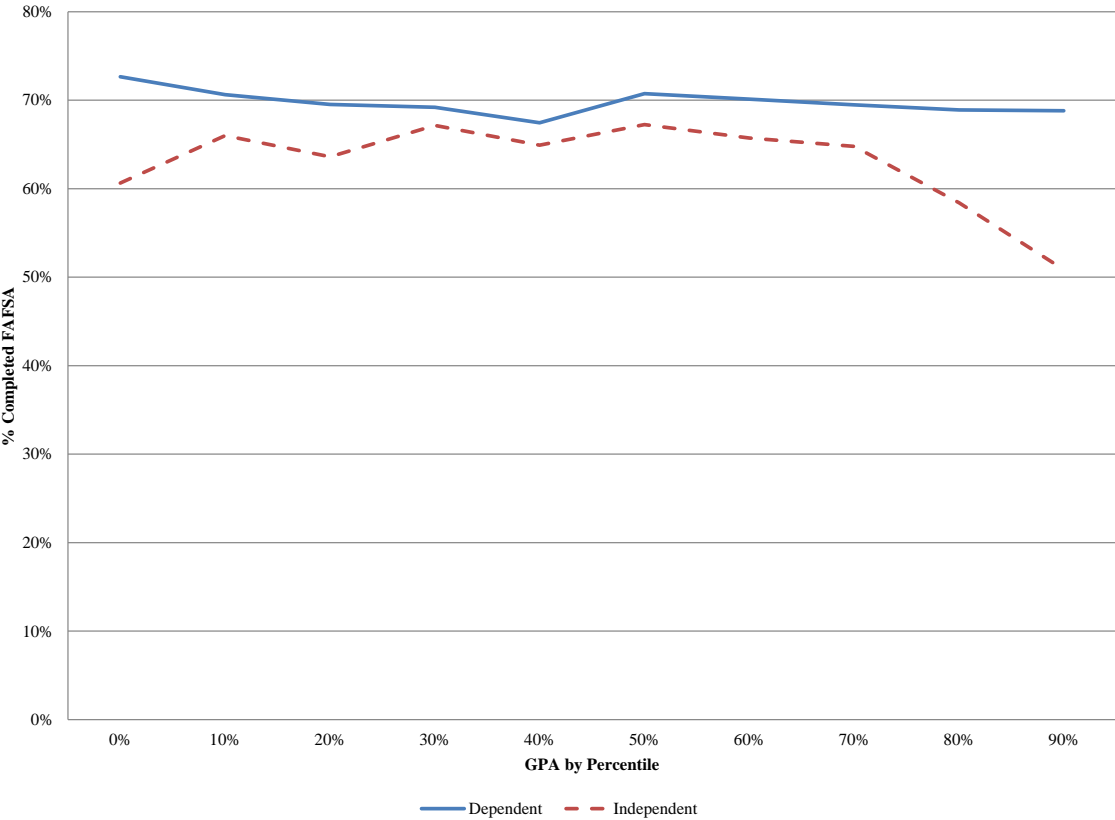
Note: Data drawn from the 1999-2000, 2003-2004, and 2007-2008 waves of the NPSAS. Income expressed in 2008 dollars.

Figure 2: Percent Completed FAFSA by Financial Need or (Tuition-EFC)



Note: Data drawn from the 1999-2000, 2003-2004, and 2007-2008 waves of the NPSAS. Income expressed in 2008 dollars.

Figure 3: Percent of Students who Completed FAFSA by GPA (by quantile)



Note: Data drawn from the 1999-2000, 2003-2004, and 2007-2008 waves of the NPSAS.

Table 4: Probit Model Estimating FAFSA Completion (Marginal Effects)

VARIABLES	(1) Probit	(2) Probit	(3) Probit	(4) Probit
Tuition (\$000)	0.00997*** (3.436e-4)	0.00843*** (5.071e-4)	0.00997*** (3.680e-4)	0.00964*** (5.469e-4)
EFC (\$000)	-0.00340*** (1.951e-4)	-0.00789*** (0.00188)	-0.00333*** (1.946e-4)	-0.00697*** (0.00187)
Income (\$000)	-0.00329*** (8.450e-5)	-8.798e-4*** (2.102e-4)	-0.00326*** (8.440e-5)	-9.19e-4*** (2.103e-4)
Income ² (\$000)	7.83e-09*** (2.21e-10)	7.53e-10 (1.37e-09)	7.72e-09*** (2.21e-10)	1.04e-09 (1.38e-09)
GPA	0.0685*** (0.0122)	0.00678 (0.0146)	0.0666*** (0.0121)	0.00638 (0.0146)
GPA ²	-1.05e-06*** (2.20e-07)	3.87e-08 (8.53e-07)	-1.02e-06*** (2.20e-07)	2.68e-08 (2.69e-07)
Dependent	0.107*** (0.00523)	0.0821*** (0.00570)	0.101*** (0.00524)	0.0816*** (0.00572)
Female	0.0281*** (0.00324)	0.0232*** (0.00412)	0.0277*** (0.00320)	0.0256*** (0.00411)
Asian	-0.0293*** (0.00717)	-0.00494 (0.00825)	-0.0257*** (0.00730)	-0.00149 (0.00844)
Black	0.127*** (0.00592)	0.0930*** (0.00646)	0.132*** (0.00603)	0.100*** (0.00666)
Hispanic	0.0577*** (0.00625)	0.0595*** (0.00702)	0.0712*** (0.00649)	0.0650*** (0.00751)
Age	-0.00541*** (3.253e-4)	-1.329e-4 (3.736e-4)	-0.00539*** (3.258e-4)	1.313e-4 (3.754e-4)
State FE	NO	NO	YES	YES
Year FE	YES	YES	YES	YES
Only Pell Eligible	NO	YES	NO	YES
Observations	71,700	29,600	71,660	29,590

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Note: Demographic controls include father's education, resident, class, enrollment and institutional control.

Figure 4: Financial Need for Students who Did Not Complete FAFSA

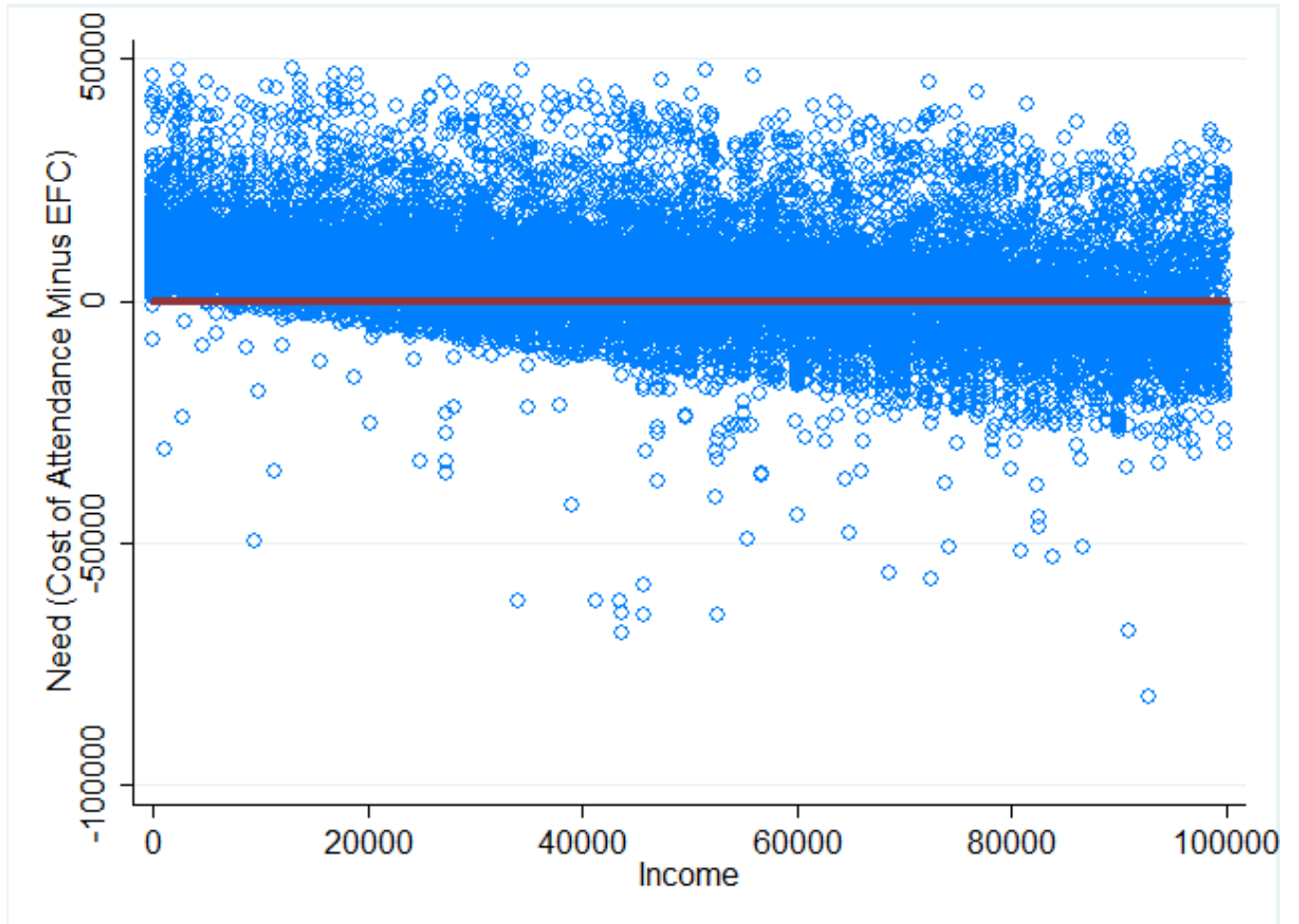


Table 5: Multinomial Logit Results for Eligible Non-applicant Students

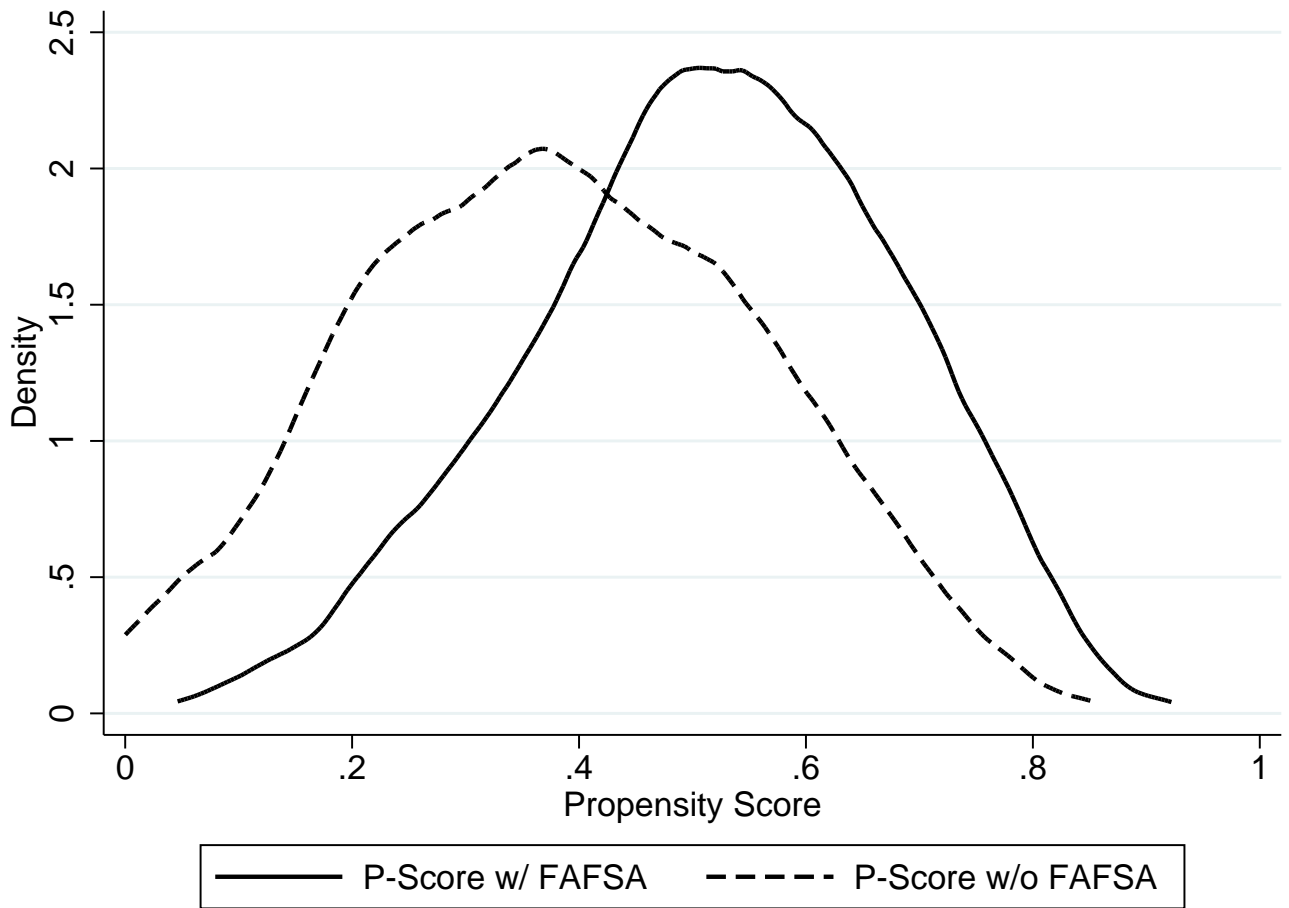
VARIABLES	(1) E, NA	(2) NE, A	(3) NE, NA
Tuition (\$000)	0.0221*** (3.345e-4)	-0.00659*** (2.650e-4)	-0.0240*** (3.299e-4)
EFC (\$000)	-0.0235*** (3.024e-4)	0.00888 (1.160e-4)	0.0139*** (1.426e-4)
Income (\$000)	0.00137*** (1.251e-4)	-0.0005285*** (5.07e-5)	-1.267e-4** (6.140e-5)
Income ²	-9.53e-09*** (6.82e-10)	8.68e-10*** (1.34e-10)	1.20e-09*** (1.88e-10)
GPA	-0.01581*** (1.048e-4)	0.01052*** (0.00651)	-0.03168*** (0.00673)
GPA ²	2.90e-07 (1.89e-7)	-1.12e-07 (-1.19e-7)	3.96e-07*** (1.24e-7)
Dependent	-0.0522*** (0.00442)	0.0523*** (0.00401)	-0.0579*** (0.00392)
Female	-0.0180*** (0.00268)	-0.00735*** (0.00179)	-0.00863*** (0.00198)
Asian	0.0141** (0.00572)	-0.0111** (0.00482)	0.0128** (0.00502)
Black	-0.0916*** (0.00534)	0.0258*** (0.00372)	-0.0260*** (0.00415)
Hispanic	-0.0543*** (0.00558)	0.00114 (.00402)	-0.00382 (0.004268)
Age	0.001534*** (2.727e-4)	-0.00111*** (2.428e-4)	0.00207*** (0.00221)
Observations	71,660	71,660	71,660

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Note: *E* represents eligible students, while *NE* represents non-eligible students. *A* represents applicants, while *NA* represents non-applicants. Demographic controls include father's education, resident, class, enrollment, and institutional control.

Figure 5: Overlap or area of common support for propensity scores for students who did or did not complete FAFSA



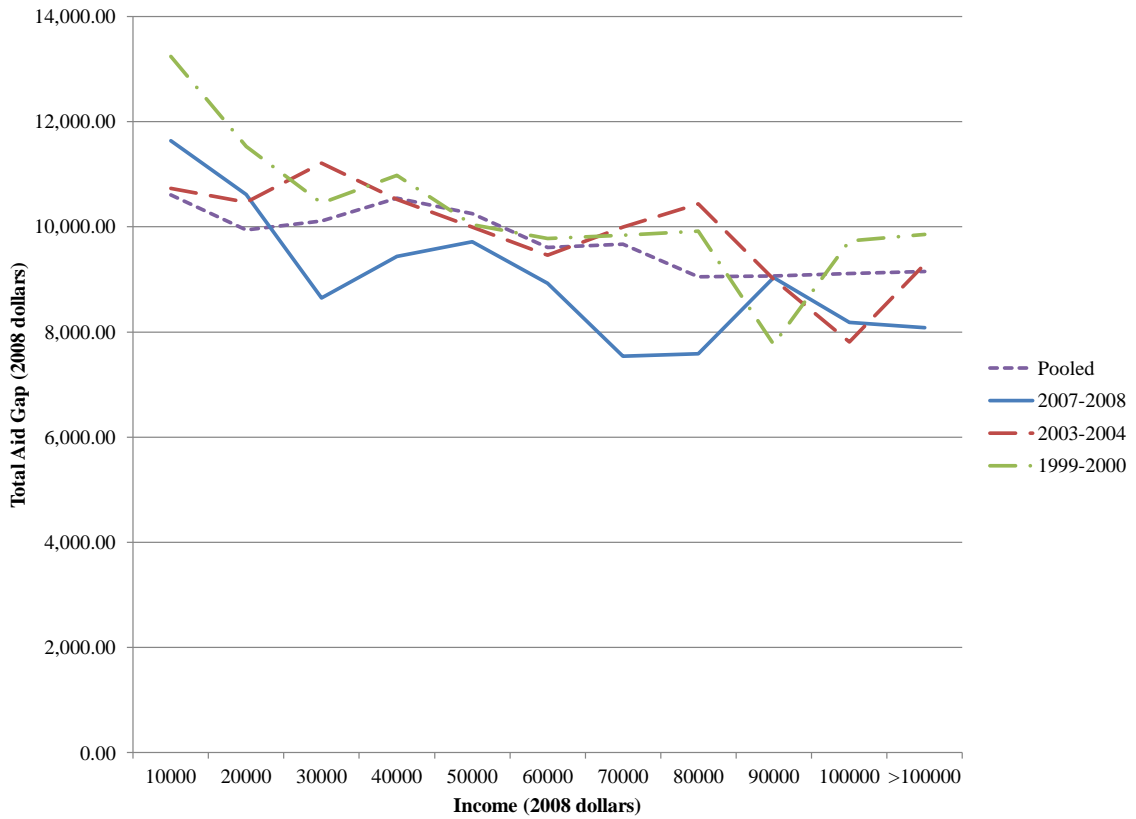
Note: This figure shows the distribution of propensity scores associated with completing FAFSA. Propensity score matching requires that a significant amount of the two distributions overlap so that there is enough data to construct a counterfactual.

Table 6: Total Aid Gap by Income

Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	9,741.05 (100.62)	9,312.67 (126.74)	10,358.39 (173.89)	8,275.39 (155.84)	11,780.59 (109.58)	11,212.01 (196.87)	11,143.31 (276.08)	12,500.61 (170.36)
<10,000	10,610.37 (226.91)	11,639.75 (301.85)	10,729.69 (596.42)	13,244.54 (285.95)	12,414.80 (181.94)	11,681.12 (313.04)	10,724.54 (612.83)	13,246.83 (294.43)
10,000 to 20,000	9,939.78 (249.74)	10,614.50 (322.29)	10,467.30 (657.33)	11,529.17 (276.01)	11,410.56 (212.18)	10,868.78 (349.79)	10,867.22 (714.40)	11,795.12 (335.55)
20,000 to 30,000	10,111.26 (262.49)	8,646.14 (522.36)	11,215.34 (684.63)	10,450.27 (412.55)	11,560.51 (337.72)	10,231.10 (793.94)	12,031.89 (1,003.31)	12,000.82 (595.35)
30,000 to 40,000	10,545.58 (223.12)	9,440.36 (487.84)	10,524.40 (709.58)	10,981.73 (324.61)	12,096.53 (362.36)	10,966.81 (827.11)	11,703.00 (908.81)	13,282.05 (640.08)
40,000 to 50,000	10,253.71 (245.70)	9,719.38 (438.53)	9,993.10 (570.00)	10,039.16 (401.29)	11,252.38 (435.72)	10,341.06 (913.90)	10,023.97 (843.92)	11,793.34 (1,016.71)
50,000 to 60,000	9,610.00 (253.45)	8,927.48 (446.57)	9,464.93 (550.78)	9,778.44 (415.90)	12,789.67 (713.70)	12,394.16 (2,156.69)	14,594.57 (1,435.14)	13,071.90 (2,474.84)
60,000 to 70,000	9,670.08 (277.08)	7,542.90 (570.62)	9,996.28 (640.98)	9,838.74 (418.00)				
70,000 to 80,000	9,048.08 (258.89)	7,583.63 (472.24)	10,438.45 (556.28)	9,914.46 (436.75)				
80,000 to 90,000	9,063.48 (300.19)	9,035.62 (478.68)	9,005.92 (651.91)	7,764.89 (583.89)				
90,000 to 100,000	9,115.30 (318.69)	8,181.23 (435.77)	7,810.64 (789.80)	9,731.38 (605.92)				
>100,000	9,150.22 (143.95)	8,079.11 (235.89)	9,287.27 (285.23)	9,852.85 (257.76)				

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. Standard errors in parentheses. All estimates are statistically significant at 99% level. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 6: Total Aid Gap by Income



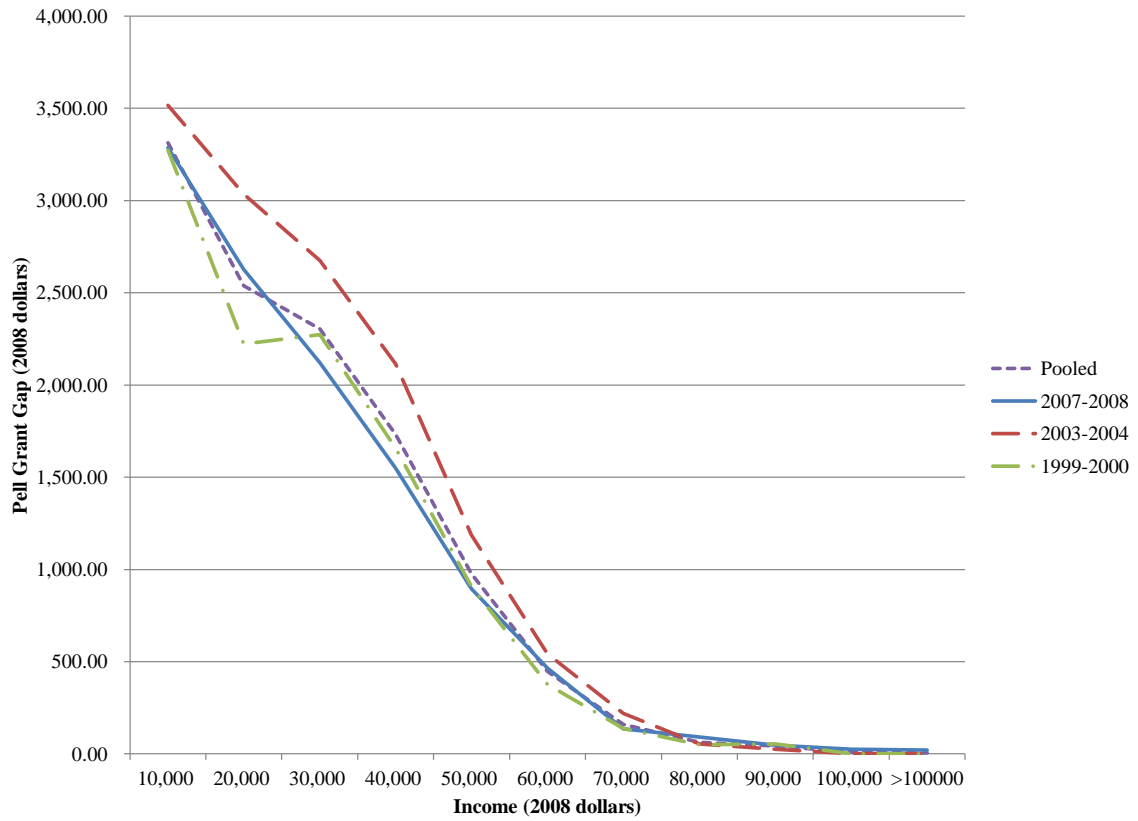
Note: I use kernel matching with a bandwidth of 0.06 to construct the total aid gap. Total aid includes all forms of assistance to the student including grants, loans, and work-study. Income and aid amounts are expressed in 2008 dollars.

Table 7: Pell Grant Gap by Income

Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	1,281.36 (10.54)	1,403.04 (13.34)	1,081.03 (17.02)	920.18 (11.67)	2,721.28 (10.46)	2,662.97 (15.15)	2,834.94 (22.69)	2,719.55 (18.19)
<10000	3,313.98 (18.66)	3,287.40 (25.34)	3,517.23 (47.79)	3,273.18 (32.16)	3,684.90 (36.62)	3,326.75 (24.80)	3,558.44 (47.01)	3,347.80 (31.55)
10000 to 20000	2,538.30 (23.28)	2,626.76 (32.87)	3,033.91 (56.51)	2,222.60 (38.99)	2,832.49 (22.86)	2,821.84 (31.81)	3,241.44 (53.98)	2,641.46 (40.12)
20,000 to 30,000	2,303.81 (24.96)	2,120.65 (35.74)	2,676.02 (56.38)	2,272.30 (42.46)	2,978.40 (23.83)	2,685.04 (33.44)	3,310.10 (51.12)	3,059.85 (42.35)
30,000 to 40,000	1,731.79 (23.01)	1,549.80 (33.75)	2,114.40 (50.62)	1,656.06 (38.53)	2,388.55 (23.26)	2,090.85 (34.61)	2,710.34 (48.99)	2,493.54 (43.41)
40,000 to 50,000	977.66 (19.96)	895.12 (30.47)	1,186.78 (43.48)	908.01 (32.96)	1,659.41 (25.52)	1,503.61 (40.28)	1,809.08 (52.70)	1,696.70 (48.33)
50,000 to 60,000	447.72 (15.40)	464.50 (26.01)	542.07 (33.19)	375.85 (23.42)	1,357.63 (33.84)	1,327.17 (55.49)	1,532.85 (70.27)	1,346.76 (69.81)
60,000 to 70,000	159.65 (10.21)	135.14 (16.25)	219.62 (21.74)	136.91 (16.02)				
70,000 to 80,000	63.04 (7.33)	91.48 (17.85)	53.21 (10.77)	50.11 (9.71)				
80,000 to 90,000	43.17 (7.40)	46.53 (13.57)	25.68 (9.11)	52.71 (13.86)				
90,000 to 100,000	9.88 (3.80)	26.14 (10.44)	1.40 (0.99)	0.00 (0.00)				
>100000	6.23 (1.55)	20.78 (5.16)	0.00 (0.00)	0.00 (0.00)				

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. Standard errors in parentheses. All estimates are statistically significant at 99% level. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 7: Pell Grant Gap by Income



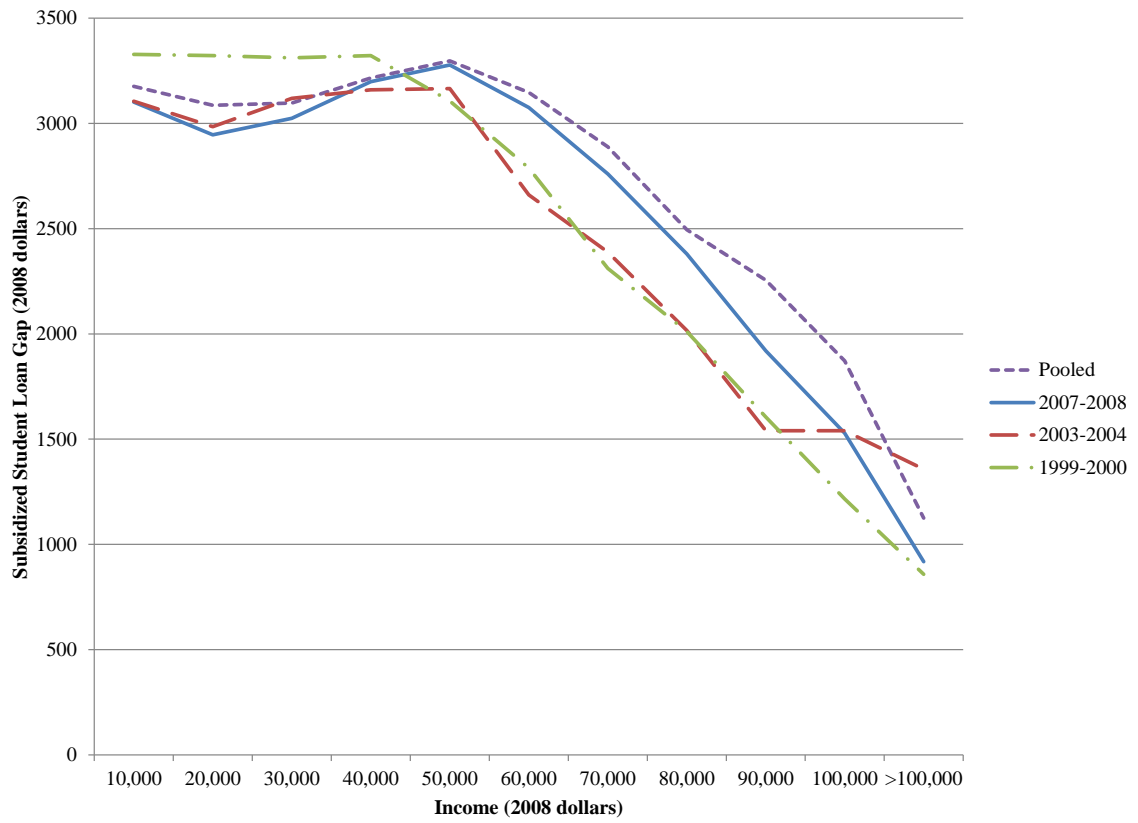
Note: I use kernel matching with a bandwidth of 0.06 to construct the Pell grant gap. The federal government requires students to complete FAFSA to determine financial need. Students do not need to repay Pell Grants. Income and aid amounts are expressed in 2008 dollars.

Table 8: Subsidized Student Loan Gap by Income

Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	2,875.32 (13.27)	2,628.71 (18.60)	2,292.40 (22.53)	3,489.01 (25.03)	3,521.36 (19.07)	3,157.28 (25.20)	3,018.17 (35.98)	4,186.69 (36.02)
<10,000	3,176.09 (39.66)	3096.74 (48.73)	3,124.82 (117.01)	3,314.49 (86.27)	3,684.90 (36.62)	3,189.74 (45.44)	3,036.37 (81.35)	4,423.80 (66.87)
10,000 to 20,000	3,085.53 (42.02)	2,944.49 (52.17)	3,009.91 (123.13)	3,451.87 (91.39)	3,024.66 (40.26)	2,790.85 (50.62)	4,207.13 (86.90)	(75.71)
20,000 to 30,000	3,096.93 (42.92)	3,027.12 (57.01)	3,025.63 (98.43)	3,224.82 (93.90)	3,304.49 (45.09)	3,013.50 (62.33)	2,916.27 (86.63)	3,795.09 (86.19)
30,000 to 40,000	3,215.37 (45.71)	3,198.13 (63.76)	3,029.23 (98.33)	3,291.46 (95.65)	3,473.01 (50.36)	3,159.30 (71.96)	2,917.42 (93.93)	3,992.92 (104.85)
40,000 to 50,000	3,296.93 (48.64)	3,268.52 (70.66)	3,187.41 (98.06)	3,391.95 (101.60)	3,623.17 (61.54)	3,460.92 (92.66)	3,043.22 (106.43)	4,209.95 (130.11)
50,000 to 60,000	3,146.56 (51.30)	3,077.31 (77.12)	3,083.50 (97.94)	3,310.34 (100.13)	3,555.25 (87.34)	3,443.34 (140.31)	3,324.94 (166.54)	3,986.82 (187.21)
60,000 to 70,000	2,888.37 (50.84)	2,759.88 (78.86)	2,624.33 (93.85)	3,371.92 (96.03)				
70,000 to 80,000	2,494.64 (51.36)	2,371.67 (81.56)	2,296.92 (90.05)	2,807.79 (99.11)				
80,000 to 90,000	2,255.38 (54.25)	1,928.25 (78.65)	2,036.87 (102.42)	2,749.45 (109.19)				
90,000 to 100,000	1,872.01 (53.21)	1,529.33 (79.4)	1,500.89 (90.31)	2,605.94 (105.43)				
>100,000	1,125.01 (22.37)	914.28 (35.93)	901.61 (36.94)	1,447.84 (39.79)				

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. Standard errors in parentheses. All estimates are statistically significant at 99% level. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 8: Subsidized Loan Gap by Income



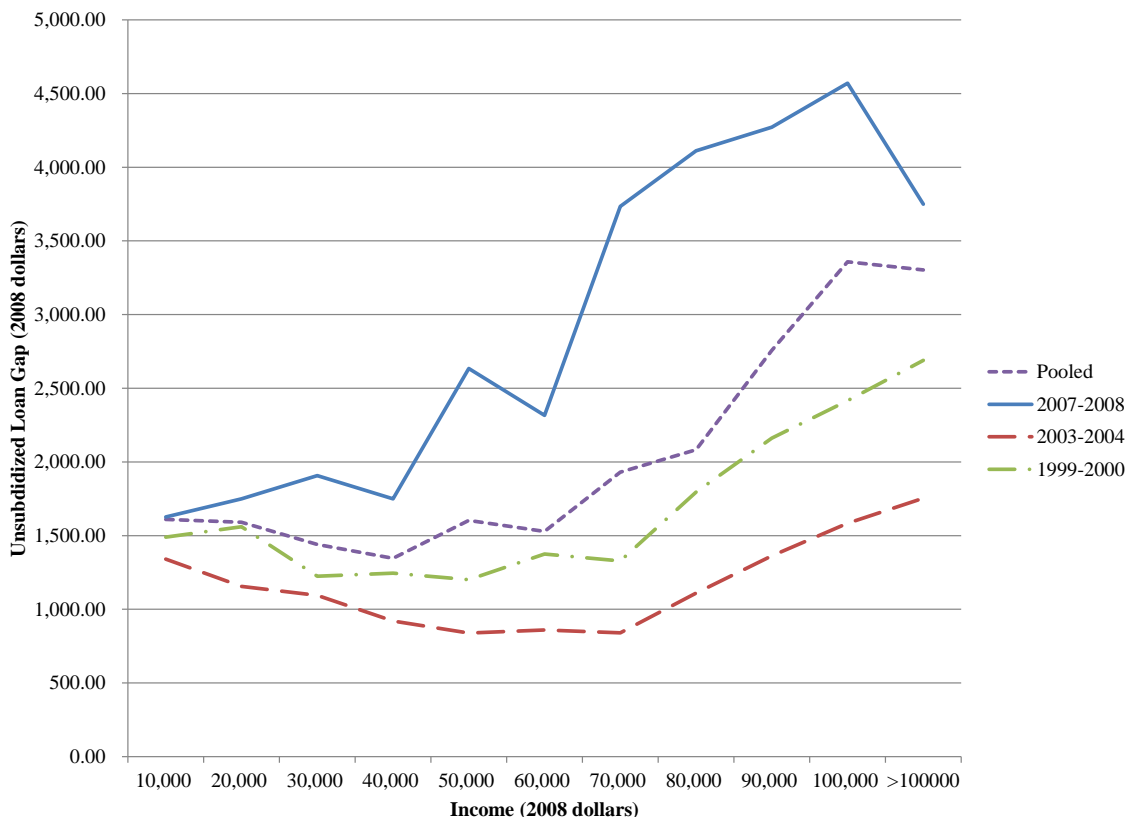
Note: I use kernel matching with a bandwidth of 0.06 to construct the subsidized student loan gap. The federal government requires students to complete FAFSA to determine financial need. The government does not charge interest and students do not need to repay the loan until they graduate. Income and aid amounts are expressed in 2008 dollars.

Table 9: Unsubsidized Student Loan Gap by Income

Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	1,986.65 (23.63)	2,801.15 (69.63)	1,264.28 (18.94)	1,671.18 (19.47)	1,332.45 (38.90)	1,514.41 (115.47)	951.65 (26.05)	1,180.06 (23.36)
<10000	1,610.02 (71.01)	1,626.56 (209.09)	1,340.58 (66.25)	1,489.59 (45.49)	1,577.28 (73.16)	1,533.82 (218.84)	1,338.68 (66.61)	1,468.64 (45.70)
10000 to 20000	1,591.14 (58.00)	1,749.98 (184.06)	1,155.51 (65.34)	1,560.55 (50.22)	1,488.72 (68.47)	1,687.34 (207.52)	1,065.28 (65.68)	1,370.82 (52.32)
20,000 to 30,000	1,440.16 (84.64)	1,906.96 (300.71)	1,094.75 (62.33)	1,224.82 (49.65)	1,177.29 (121.82)	1,633.53 (443.15)	799.19 (58.63)	906.45 (50.63)
30,000 to 40,000	1,346.02 (69.97)	1,749.81 (259.67)	919.93 (57.42)	1,245.77 (58.94)	973.36 (130.01)	615.80 (446.07)	720.03 (56.94)	872.34 (64.65)
40,000 to 50,000	1,602.66 (75.43)	2,634.69 (240.43)	838.52 (61.86)	1,201.49 (61.50)	1,386.64 (109.38)	2,485.84 (384.30)	694.20 (66.45)	909.01 (74.10)
50,000 to 60,000	1,529.10 (86.56)	2,316.46 (290.15)	860.09 (67.83)	1,375.26 (71.22)	1,103.99 (288.23)	1,116.57 (1,494.03)	649.73 (104.68)	754.95 (104.01)
60,000 to 70,000	1,930.07 (98.31)	3,734.23 (347.11)	839.75 (61.62)	1,328.19 (68.41)				
70,000 to 80,000	2,081.94 (103.60)	4,110.79 (109.12)	1,109.56 (68.92)	1,795.66 (96.90)				
80,000 to 90,000	2,757.62 (120.37)	4,271.83 (129.42)	1,363.02 (83.29)	2,161.62 (93.72)				
90,000 to 100,000	3,358.21 (127.79)	4,570.67 (131.20)	1,584.03 (88.94)	2,415.68 (114.71)				
>100,000	3,303.61 (60.64)	3,749.63 (59.55)	1,753.53 (41.09)	2,689.51 (56.54)				

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. Standard errors in parentheses. All estimates are statistically significant at 99% level. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 9: Unsubsidized Loan Gap by Income



Note: I use kernel matching with a bandwidth of 0.06 to construct the unsubsidized student loan gap . The federal government requires students to complete FAFSA to access unsubsidized loans, but demonstrated financial need is not required. The government does charge interest while students are in school, but students can defer loan payments until graduation. Income and aid amounts are expressed in 2008 dollars.

Table 10: Institutional Aid Gap by Income

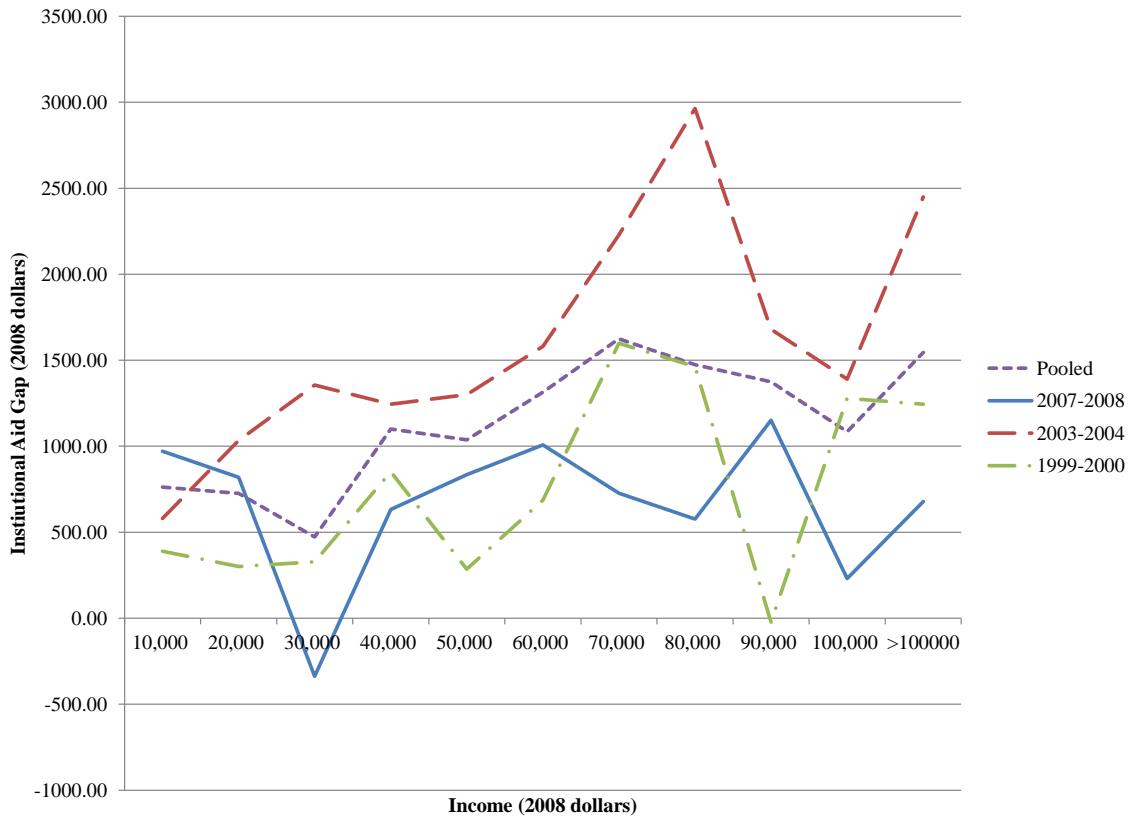
Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	1,016.04*** (38.72)	551.29*** (66.43)	1,827.67*** (102.34)	1,420.21*** (51.98)	1,154.23*** (63.78)	1,221.40*** (100.57)	1,394.38*** (201.90)	877.55*** (91.20)
<10000	762.35*** (99.03)	971.38*** (131.91)	580.37 (371.91)	389.65** (166.44)	761.19*** (101.10)	1,064.98*** (133.77)	493.42 (373.66)	319.73* (173.23)
10000 to 20000	725.77*** (105.39)	819.92*** (178.03)	1,033.87*** (371.93)	300.68** (135.98)	894.53*** (124.42)	830.73*** (196.21)	1,389.70*** (438.48)	435.78*** (186.27)
20,000 to 30,000	471.92*** (142.70)	-337.46 (310.21)	1,355.68** (610.65)	327.53 (176.55)	1,106.19*** (201.88)	460.54 (470.09)	1,818.42** (944.74)	816.78*** (250.76)
30,000 to 40,000	1,100.08*** (128.98)	632.40** (291.95)	1,244.29** (557.13)	851.16*** (157.02)	1,836.84*** (209.68)	2,304.89*** (461.83)	1,871.48*** (717.62)	1,884.96*** (224.96)
40,000 to 50,000	1,037.23*** (150.62)	835.28*** (268.89)	1,300.13*** (411.27)	285.40 (228.48)	1,410.24*** (285.34)	2,085.17*** (481.41)	893.88 (609.12)	1,129.03 (709.21)
50,000 to 60,000	1,313.85*** (146.78)	1,008.10*** (257.75)	1,581.14*** (373.44)	686.30*** (223.29)	2,857.62*** (378.19)	2,599.54*** (896.77)	4,152.20*** (1,076.88)	2,213.09 (1,356.35)
60,000 to 70,000	1,624.96*** (158.11)	726.91*** (311.59)	2,228.75*** (443.35)	1,598.84*** (219.52)				
70,000 to 80,000	1,473.73*** (148.41)	576.96** (267.22)	2,963.28*** (396.95)	1,463.93*** (222.09)				
80,000 to 90,000	1,374.70*** (163.93)	1,151.11*** (260.40)	1,680.74*** (460.14)	-22.15 (268.74)				
90,000 to 100,000	1,084.58*** (187.14)	230.76 (263.12)	1,389.53*** (503.91)	1,278.31*** (332.22)				
>100,000	1,544.82*** (81.02)	678.52*** (131.94)	2,449.68*** (172.25)	1,244.47*** (126.41)				

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 10: Institutional Aid Gap by Income



Note: I use kernel matching with a bandwidth of 0.06 to construct the institutional aid gap. Not all institutions require FAFSA completion to access either aid or need based aid. The aid displayed in this chart is grant aid, and thus does not need to be re-paid by the student. Income and aid amounts are expressed in 2008 dollars.

Table 11: Total Grant Aid Gap by Income

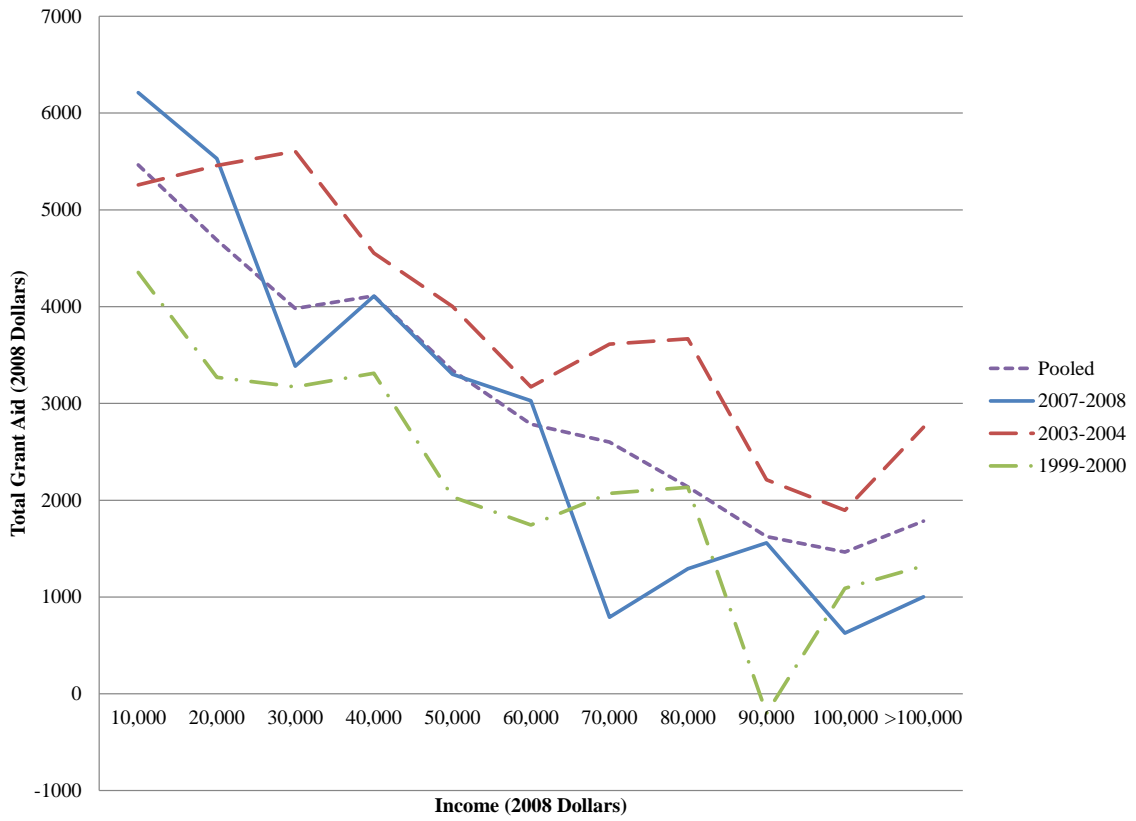
Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	3,254.87*** (47.59)	3,414.98*** (87.15)	4,013.19*** (119.81)	2,583.40*** (63.35)	5,428.27*** (77.90)	6,093.22*** (138.55)	5,819.98*** (235.80)	4,341.86 (105.48)
<10000	5,464.45*** (120.68)	6,210.89*** (181.78)	5,257.77*** (477.49)	4,354.09*** (187.56)	5,527.57*** (123.24)	6,337.79*** (186.20)	5,187.13*** (485.96)	4,360.68*** (194.50)
10000 to 20000	4,687.93*** (124.66)	5,529.88*** (229.85)	5,458.33*** (522.04)	3,269.56*** (148.68)	5,222.61*** (142.43)	5,812.35*** (242.40)	6,114.95*** (539.14)	3,628.70*** (197.51)
20,000 to 30,000	3,979.98*** (178.90)	3,385.27*** (404.64)	5,604.93*** (651.21)	3,171.39*** (225.48)	5,483.28*** (258.77)	5,154.10*** (618.21)	6,846.79*** (982.27)	4,490.76*** (387.96)
30,000 to 40,000	4,112.20*** (161.39)	4,108.45*** (375.03)	4,552.36*** (667.49)	3,311.24*** (192.31)	5,943.20*** (270.30)	6,898.88*** (634.13)	6,116.56*** (859.60)	5,535.67*** (293.10)
40,000 to 50,000	3,342.29*** (178.13)	3,301.42*** (335.68)	4,001.75*** (480.25)	2,035.49*** (260.07)	4,760.67*** (330.74)	4,273.20*** (718.01)	4,350.40*** (688.20)	4,008.90*** (723.24)
50,000 to 60,000	2,785.33*** (179.85)	3,027.40*** (320.60)	3,170.65*** (450.97)	1,745.09*** (268.98)	6,370.47*** (448.67)	7,364.32*** (1,011.53)	8,041.04*** (1,197.19)	4,686.58*** (1,725.60)
60,000 to 70,000	2,601.61*** (191.96)	791.47* (408.24)	3,612.44*** (514.78)	2,070.30*** (258.06)	3,668.36*** (259.71)	2,211.91*** (383.91)	1,090.66*** (394.13)	
70,000 to 80,000	2,137.69*** (173.90)	1,291.78*** (311.72)	3,668.36*** (473.71)	2,133.58*** (259.71)	1,559.06*** (316.48)	1,896.30*** (503.59)	1,090.66*** (383.91)	
80,000 to 90,000	1,623.59*** (202.06)	1,559.06*** (316.48)	2,211.91*** (503.59)	-200.79 (383.91)	1,465.45*** (218.87)	1,896.30*** (562.17)	1,090.66*** (394.13)	
>100,000	1,784.83*** (92.85)	1,000.99*** (155.02)	2,754.04*** (190.73)	1,322.11*** (146.59)	1,000.99*** (155.02)	2,754.04*** (190.73)	1,322.11*** (146.59)	

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 11: Total Grant Aid Gap by Income



Note: I use kernel matching with a bandwidth of 0.06 to construct the total grant aid gap. Not all institutions require FAFSA completion to access either aid or need based aid. The aid displayed in this chart is grant aid, and thus does not need to be re-paid by the student. Income and aid amounts are expressed in 2008 dollars.

Table 12: Employer Grant Aid Gap by Income

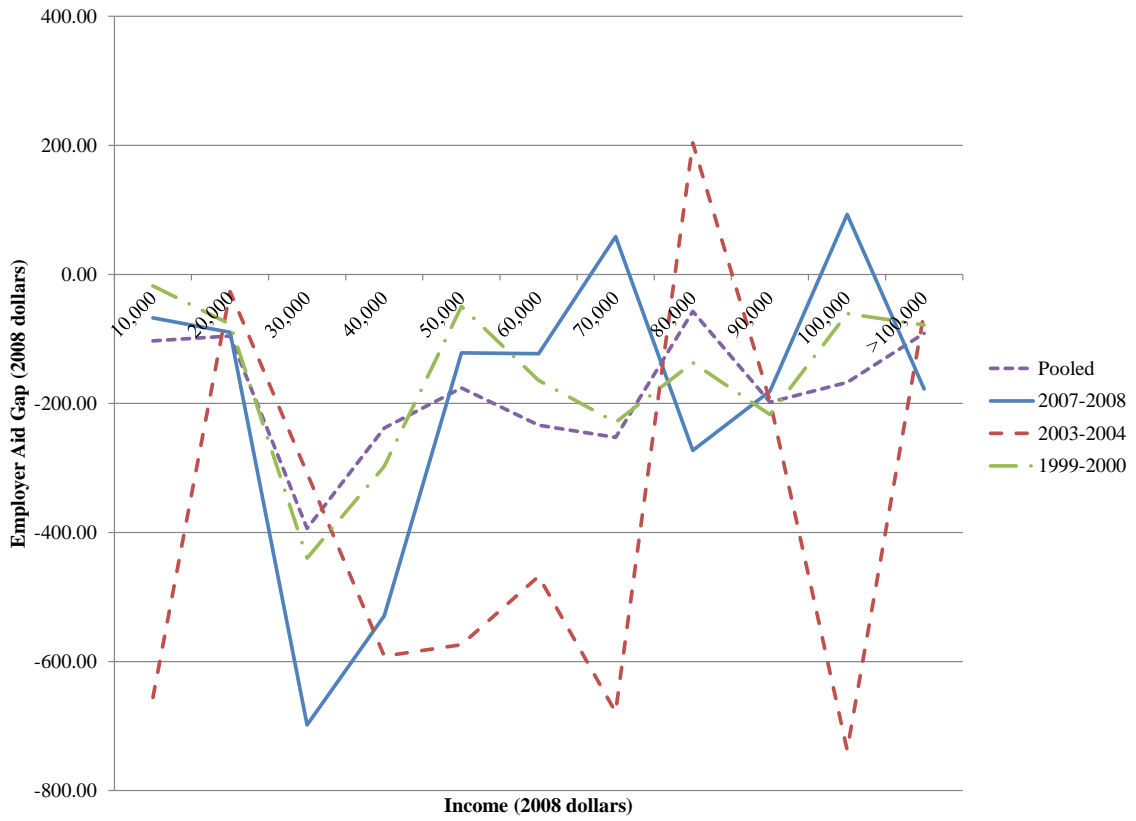
Income	Full Sample				Pell-Eligible			
	(1) Pooled	(2) 2007-2008	(3) 2003-2004	(4) 1999-2000	(5) Pooled	(6) 2007-2008	(7) 2003-2004	(8) 1999-2000
Overall	-209.52*** (17.03)	-190.26*** (35.88)	-260.18*** (46.87)	-188.62*** (20.31)	-172.97*** (29.68)	-165.13*** (54.46)	-358.23*** (125.34)	-84.83*** (27.17)
≤10000	-102.99*** (41.10)	-67.37 (69.73)	-655.71*** (281.56)	-17.96 (33.73)	-108.90*** (42.63)	-73.42 (72.97)	-687.49*** (295.65)	-25.07 (35.22)
10000 to 20000	-95.36*** (33.58)	-89.75 (95.53)	-26.58 (83.26)	-77.16*** (32.85)	-128.40*** (34.97)	-91.15 (80.75)	-47.38 (97.94)	-139.44*** (45.53)
20,000 to 30,000	-393.58*** (69.80)	-698.24*** (173.82)	-308.16 (344.95)	-439.80*** (70.47)	-477.48*** (114.81)	-369.40 (242.51)	-245.29 (587.59)	-262.20 (166.13)
30,000 to 40,000	-238.13*** (67.31)	-529.15*** (176.31)	-591.47*** (288.68)	-297.37*** (75.84)	-104.46 (104.83)	-101.39 (233.74)	-488.63 (354.77)	65.73 (140.14)
40,000 to 50,000	-175.79*** (61.12)	-121.75 (126.86)	-573.80*** (236.25)	-49.60 (77.09)	-124.58 (111.21)	-755.28*** (276.20)	-1,224.71*** (315.20)	88.16 (118.28)
50,000 to 60,000	-233.77*** (67.02)	-122.93 (126.39)	-467.79*** (178.52)	-164.40 (103.38)	96.17 (117.04)	81.78 (519.48)	117.92 (165.48)	324.08*** (118.81)
60,000 to 70,000	-252.61*** (81.12)	58.53 (172.32)	-678.48*** (277.95)	-229.31*** (98.46)				
70,000 to 80,000	-57.26 (59.79)	-272.92*** (120.83)	203.72*** (94.60)	-136.92 (105.27)				
80,000 to 90,000	-197.97*** (75.19)	-180.85 (154.89)	-196.23 (124.14)	-217.37 (156.79)				
90,000 to 100,000	-167.27*** (82.50)	92.93 (118.41)	-737.04*** (305.71)	-60.67 (133.78)				
≥100000	-91.32*** (30.50)	-177.65*** (62.91)	-59.18 (67.10)	-78.31 (41.56)				

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Note: Controls include tuition, EFC, income, GPA, dependent, gender, race, age father's education, resident, class, distance, enrollment and institutional control. All values expressed in 2008 dollars. Pell-Eligible capped at \$60,000 because of lack of observations.

Figure 12: Employer Grant Aid Aid Gap by Income



Note: I use kernel matching with a bandwidth of 0.06 to construct the employer grant aid gap. Not all institutions require FAFSA completion to access either aid or need based aid. The aid displayed in this chart is grant aid, and thus does not need to be re-paid by the student. Income and aid amounts are expressed in 2008 dollars.