

2019

Impact of Need-Based Financial Aid on College Completion

An Event History Analysis



AUTHOR

Gary Benson

Education Research and Data Center

ABOUT THE ERDC

The research presented here uses data from the Education Research and Data Center, located in the Washington Office of Financial Management. ERDC works with partner agencies to conduct powerful analyses of learning that can help inform the decisionmaking of Washington legislators, parents, and education providers. ERDC's data system is a statewide longitudinal data system that includes de-identified data about people's preschool, educational and workforce experiences.

ADDRESS

Education Research and Data Center
106 11th Ave SW, Suite 2200
PO Box 43124
Olympia, WA 98504-3113

PHONE

360-902-0599

FAX

360-725-5174

EMAIL

erdc@ofm.wa.gov

Executive Summary

This study is about a group of students who entered public higher education in Washington State in the first year after high school graduation. All of the students received need-based financial aid in the first year of attending college. They are followed for six years. The students are stratified into quartiles based on the percentage of financial aid they received as a share of their financial need. Study highlights include:

Students with better financial aid packages complete at higher rates and at a faster pace than students with lesser financial aid packages

Students who have a higher percentage of their financial need met by need-based financial aid are more likely to complete college and do so earlier. This pattern is consistent for the four cohorts of the study (men and women who began at a 4-year institution and men and women who began at a community or technical college). On average, the students in the highest (4th) quartile of financial aid as a percent of need completed at higher rates and sooner than students in the next (3rd) quartile; students in the third quartile completed at higher rates and sooner than students in the second quartile; and students in the second quartile completed at higher rates and sooner than students in the lowest (1st) quartile.

Needy students who receive greater amounts of financial aid are more likely to attend full-time; or, alternatively, needy students who attend college full-time are more likely to receive greater amounts of financial aid

The causality is not clear:

- Are needy students who attend college full-time more likely to receive greater amounts of financial aid?; or
- Are needy students who receive higher amounts of aid compared to their need more likely to attend college full-time?

In either case the evidence is that the students who have higher amounts of their financial need met by financial aid are also more likely to attend college full-time and earn more college-level credits. This pattern holds for the first four years for all four cohorts and the four quartiles of aid recipients. After the fourth year the pattern begins to break down as the remaining students who have not completed or dropped out are more likely to be attending college part-time.

Student who did not receive financial aid in the second year were less likely to complete

All students in this study received need-based financial aid in their first year of college. Not all of the students who continued after the first year received aid in the second year. Of the students who continued, 85 percent received aid and 15 percent did not. The students who did not receive need-based aid in the second year were more likely to be attending less than full-time, more likely to be working, and less likely to graduate.

The amount of unmet need for students still receiving aid increases every year and the problem is worse for the students with lesser aid packages

Unmet need is the difference between a student's financial need and the amount of financial aid received by the student. The amount of unmet need tends to increase from year-to-year as need-based aid does not keep pace with financial need. Financial need is the difference between the cost of attending a university or college and the expected family contribution toward that cost. As the costs go up (and/or the expected family contributions go down), financial need increases. Students with the better financial aid packages see year-to-year increases in the amount of aid – but not as much as the increase in financial need. The lesser aid packages remain relatively constant from year-to-year. Thus, these students have a bigger problem with unmet need.

Students with the lowest financial aid package drop out at substantially higher rates, but even a bit more financial aid goes a long way toward decreasing dropout rates

The students who had the least amount of their financial need met by financial aid drop out at the highest rates. However, there is not such a clear distinction among the students in the top quarter of financial aid recipients and the middle half of students. Generally, the average dropout rate for students in the second quartile is closer to the average dropout rate in the highest quartile than to the lowest quartile.

Introduction

This study is an event history analysis of students who received need-based financial aid when they entered postsecondary education. The study follows these students for six years as they progress through higher education.

The events of interest for these students consist of either completing or dropping out. For students who began at a 4-year institution, completion is considered to be earning a Bachelor's degree; for students who began at a community or technical college (CTC), completion is considered to be earning a Bachelor's or Associate's degree or a long-term certificate.¹ Dropping out means that the student did not earn any additional college-level credits within the six year time frame.

The students, all of whom have received need-based financial in at least their first year of postsecondary education, have been stratified into quartiles based on the cumulative amount of need-based aid that they received compared to their cumulative financial need while attending a university or college.² Comparisons of completion and dropping out are made between the students based on their level of "treatment" or "dosage" of financial aid while attending college.

Study Cohorts

The students studied in this analysis consist of 2007-08 and 2008-09 Washington public high school graduates who subsequently entered Washington public postsecondary institutions and earned at least 15 college-level credits. These students all entered postsecondary education in the first year after graduating from high school and received need-based financial aid in the first year.³ Each student was followed for up to six years.

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- 1 The highest degree earned by a student is considered to be the completion and end point for the student. Credits earned and any financial aid received after this point have not been included. Thus a CTC student who has earned an AA degree and thereafter transfers to a 4-year institution with the intent to earn a BA degree, but does not earn a BA degree, is considered to have completed at the point of obtaining the AA degree.
 - 2 "Need-based aid" consists of all aid received by a needy student, excluding any unsubsidized loans. A needy student is one who has "financial need" which is determined by comparing the cost-of-attendance at the university or college to the expected family contribution towards the student's education. Need only exists if the cost-of-attendance is greater than the expected family contribution.
 - 3 This study excludes students who did not receive any need-based financial aid in their first year of postsecondary education. The excluded students may not have been eligible for any need-based aid (they exhibited no financial need as the expected family contribution exceeded the cost-of-attendance) or some may have exhibited financial need but failed to complete the application process, specifically "FAFSA verification" which requires proving that the information contained in the aid application is correct.

The students are divided into four cohorts by gender and the institutional sector in which they began postsecondary education:

- 4-Year Men: 3,696 men who first entered a public 4-year institution;
- 4-Year Women: 5,083 women who first entered a public 4-year institution;
- CTC Men: 3,504 men who first entered a public CTC; and
- CTC Women: 4,729 women who first entered a public CTC.

Quartiles

Each cohort is stratified into quartiles based on the amount of financial need that is met by financial aid over the years while in postsecondary education. The metric used to divide the students into quartiles is the total amount of need-based financial aid the student received while attending postsecondary education as a percent of the student's total financial need.⁴ Students who received the most aid as a share of their need are in the higher quartiles; the students who received the least amount of aid compared to their need are in the lower quartiles.

“Financial need” is the difference between the cost of attending an institution (COA) and the “expected family contribution” towards the costs of attending an institution (EFC). The COA includes tuition and fees, room and board, books and supplies, transportation and personal expenses. The EFC is based on student's family's income and assets, family size, and the number of family members attending college during the year. Financial need is the gap between the costs of higher education and what the family and student are expected to pay. For there to be financial need the COA must be greater than the EFC. If the EFC is greater than or equal to the COA, there is no financial need. In this study all students have some financial need, at least in their first year.

Need-based financial aid (i.e., grants, subsidized loans and work study) is used to meet financial need.⁵ If the amount of financial aid the student receives over all the years is equal to the amount of financial need, then that student will have received 100 percent of their need. All students received at least some financial aid in their first year.

The top or highest quartile consists of the 25 percent of students in the cohort who had the most of their need met. These students had the best financial aid packages compared to need while attending postsecondary education. The bottom or lowest quartile consists

4 This stratification based on aid as a percent of need differs from the stratification based on unmet need used in a previous study, “Unmet Need among Financially Needy College Students in the State of Washington,” and is described in Appendix A.

5 Grants may be called grants, scholarships or tuition waivers and do not need to be repaid. Loans may either be subsidized or unsubsidized. Federal subsidized loans require that a student have financial need to participate and may be taken out up to the amount of need; unsubsidized loans do not require that a student have financial need and may be taken out in excess of financial need. Federal and state work-study programs provide part-time jobs for students with financial need, either on or off-campus, to help pay for college expenses.

of the 25 percent of students who had the least amount of their need met by need-based financial aid. These students had the worst financial aid packages in their cohort.

Table 1. Need-based aid as percent of financial need

	25th Percentile	Median	75th Percentile
4-Year Men	54.7%	68.4%	81.7%
4-Year Women	56.6%	69.5%	82.8%
CTC Men	41.9%	54.9%	68.5%
CTC Women	40.5%	53.8%	67.8%

The dividing lines between the quartiles are the 25th percentile, the median, and the 75th percentile. As shown in Table 1, the 25 percent of 4-year men with the best financial aid packages had 82 percent or more of their need covered by financial aid. The 25 percent of 4-year men with the smallest financial aid packages had less than 55 percent of their need covered. The financial aid packages at the CTCs were less generous. For CTC women the 25 percent best financial aid packages averaged 68 percent or more of need being covered by financial aid. The relatively smallest aid packages averaged less than 40 percent of need being covered.

Quartile Characteristics

The placement of the students into the quartiles or treatment groups is not random. While all the students applied for, were eligible for, and received financial aid in their first year of college, the amount they received in relation to their need was contingent on many factors. They include, for example, their choice of school and that institution's capability of providing financial aid; the student's eligibility for federal, state or institutional aid programs; and a student's ability to acquire aid from outside sources. In addition, whether a student received aid beyond the first year depended on their application for and continued eligibility for aid. FAFSA verification, essentially an audit of a student's aid application, could also hinder a student's ability to continue receiving aid.

The impact or treatment effect of need-based financial aid is confounded by the effects of other co-variables. These other co-variables include such things as the student's socioeconomic status and the student's academic abilities. The results of just looking at the level of financial aid a student received, as this study does, may be misleading. Tables 2 and 3 show the values for several co-variables. (See also Table B1)

Among all the cohorts, the students with the better high school academic records (as measured by high school grade point averages and whether the student met the high school math assessment standard) received the better financial aid packages. Stronger high school academic records alone makes it more likely that a student will earn a postsecondary degree or certificate. From this analysis, it is not clear what impact the better high school academic record or the better financial aid package had on the resulting higher college completion rates.

Students eligible for free or reduced price lunches (FRPL) sometime while in high school on average received better financial aid packages while attending a 4-year institution. Less than one-fourth of the students receiving the lowest financial aid packages had been FRPL eligible compared to nearly one-half of the students receiving the highest aid packages. At the CTCs students with the lowest aid packages were slightly less likely to have been FRPL eligible while in high school.

At the 4-year institutions the students with the better financial aid packages were more likely to be non-white. At the CTCs the racial/ethnic mix of students does not appear to have much bearing on the financial aid groupings.

Table 2. 4-Year student characteristics

	Men		Women	
	Lowest Quartile	Highest Quartile	Lowest Quartile	Highest Quartile
% BA Degree	55%	79%	61%	85%
Average High School GPA	3.25	3.46	3.36	3.57
% Met Math Standard	90%	90%	82%	87%
% FRPL in High School	22%	47%	23%	49%
% White	76%	59%	75%	59%
% Asian	13%	20%	11%	20%
% Hispanic/Latino of any race	6%	11%	5%	6%
% African-American	4%	7%	6%	12%

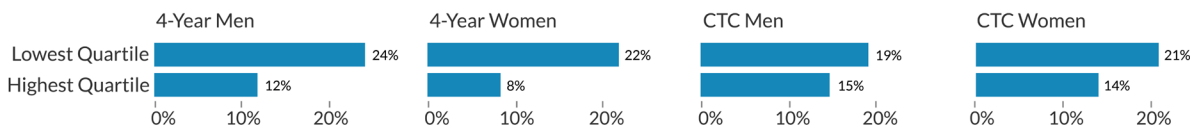
Table 3: CTC student characteristics

	Men		Women	
	Lowest Quartile	Highest Quartile	Lowest Quartile	Highest Quartile
% BA, AA or LTC	28%	60%	29%	64%
Average High School GPA	2.59	2.84	2.80	3.05
% Met Math Standard	62%	69%	50%	61%
% FRPL in High School	61%	65%	63%	68%
% White	60%	61%	63%	62%
% Asian	12%	13%	8%	12%
% Hispanic/Latino of any race	9%	7%	8%	6%
% African-American	16%	14%	17%	15%

Annual Reduction in the Size of the Study Groups

The number of students remaining in the study groups is reduced every year by the number of students who either graduated or dropped out. By the start of Year 6 about one-fifth of the students who started in the first year remained. The share of remaining students varied by the amount of financial aid received. As shown in Figure 1 (also see Table B2), among men who started at a 4-year institution 24 percent of the students with the lowest financial aid packages were still attending postsecondary education in Year

Figure 1. Share of students attending year 6 by quartile (see also Table B2).

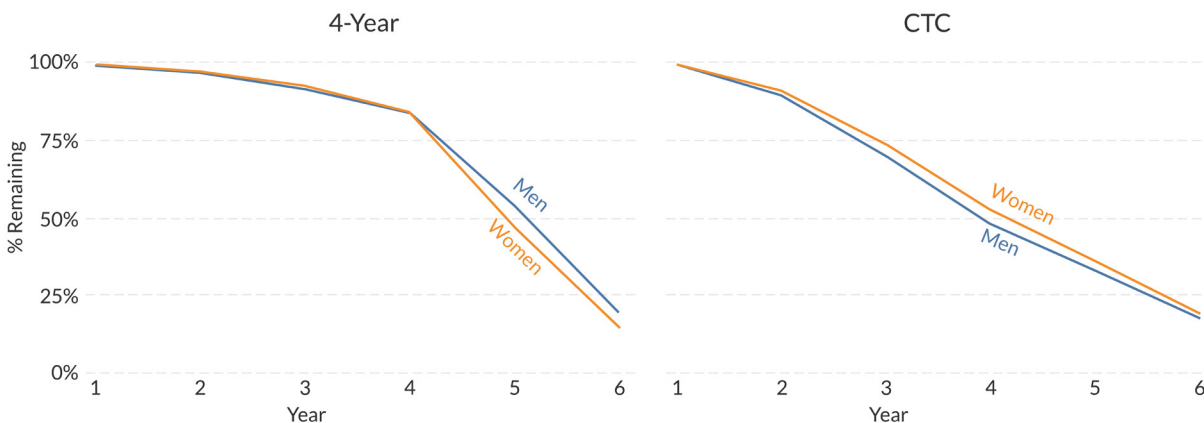


6 while 12 percent of the students with the better aid packages were still attending. As will be demonstrated later this reflects that students with the lesser aid packages are more likely to attend part-time and take longer to graduate.

As shown in Figure 2, at the 4-year institutions the number of students remaining had a big drop-off after Year 4 reflecting the four year nature of the bachelor’s degree programs. In Year 4, about 85 percent of the students were still enrolled and it drops to 47 percent (women) and 55 percent (men) in Year 5.

At the CTC’s there was slightly bigger drop-off after Year 2 which reflects the two year nature of CTC programs and then a fairly constant decline thereafter. Many students who start at a CTC either attend part-time or transfer to a four-year program extending their time in postsecondary education.

Figure 2. Share of students remaining in risk set (see also Table B3).

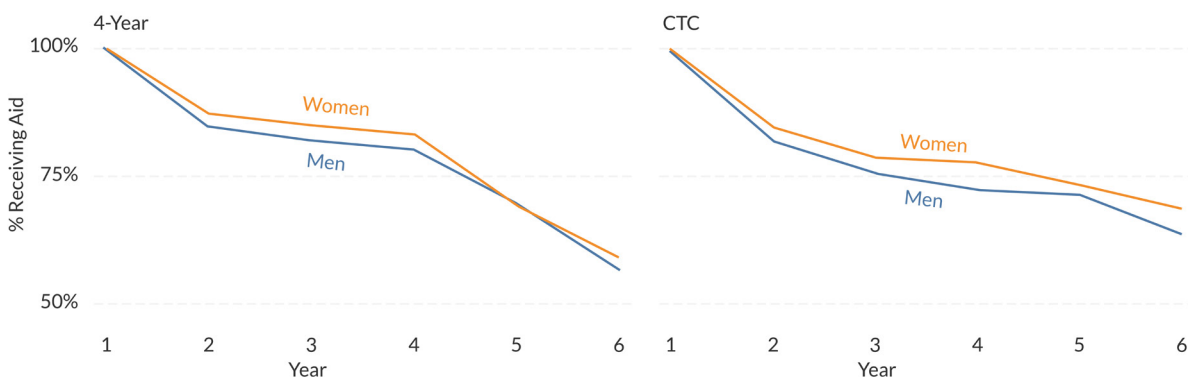


Share of Students Receiving Need-Based Aid

In this study, every student received need-based financial aid in their first year. After the first year not every student received financial aid every year. The share of students receiving aid declined over the six year study period – as shown in Figure 3 (and Table B4).

Among the 4-year students there was a greater falloff after the fourth year – coinciding with the falloff in the share of students remaining in the cohort and the remaining students attending full-time. In Year 5, only about half of the students were left in the risk pool as the other half have either graduated or dropped out. The remaining students were more likely to be attending less than full-time making them less likely to be eligible for financial aid (or, alternatively, because they are not receiving financial aid they are more likely to be attending part-time).

Figure 3. Share of students receiving need-based aid (see also Table B4).

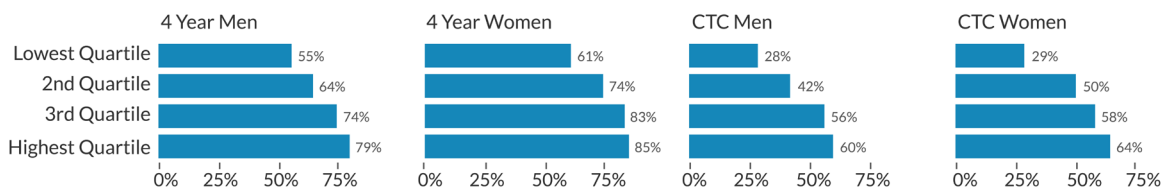


Findings

Students with better financial aid packages completed at higher rates and at a faster pace than students with lesser financial aid packages

Figure 4 presents the sixth year cumulative completion rates by cohort and by financial aid quartile. Across-the-board, students who received higher financial aid packages completed at higher rates than students who had less of their financial need met by financial aid.

Figure 4. Cumulative completion rates by year 6 (see also Table B5).



The yearly cumulative completion rates are shown for the four cohorts in Figure 5 and Figure 6 (see also Table B5). Again, across-the-board, students who had more of their financial need met by financial aid completed at higher rates sooner than students who had lesser financial aid packages.

For students who began at a 4-year institution, completion is considered to be earning a Bachelor’s degree. For women who began at a 4-year institution, nearly half of the students with the most amount of their financial need met by financial aid earned a BA degree by the end of Year 4 compared to 31 percent of the students with the least amount of financial need met by financial aid (see Figure 5). By the end of Year 6, 85 percent of the students with the better aid packages earned a BA compared to 61 percent of the students with the lesser aid packages.

Completion for students who began at a community or technical college is considered to be the highest award earned by the student – either a Bachelor’s or Associate degree or a

long-term certificate. For women who began at a CTC, slightly over one-fourth of the students with greater financial aid packages had completed their highest award by the end of Year 3 compared to 12 percent of the students with the lesser aid packages (see Figure 6). By the end of Year 6 nearly two-thirds of the women with the better aid packages had completed compared to 29 percent of the students with the lesser aid packages.

Figure 5. Cumulative completion rates by quartile – 4-year institutions (see also Table B5).

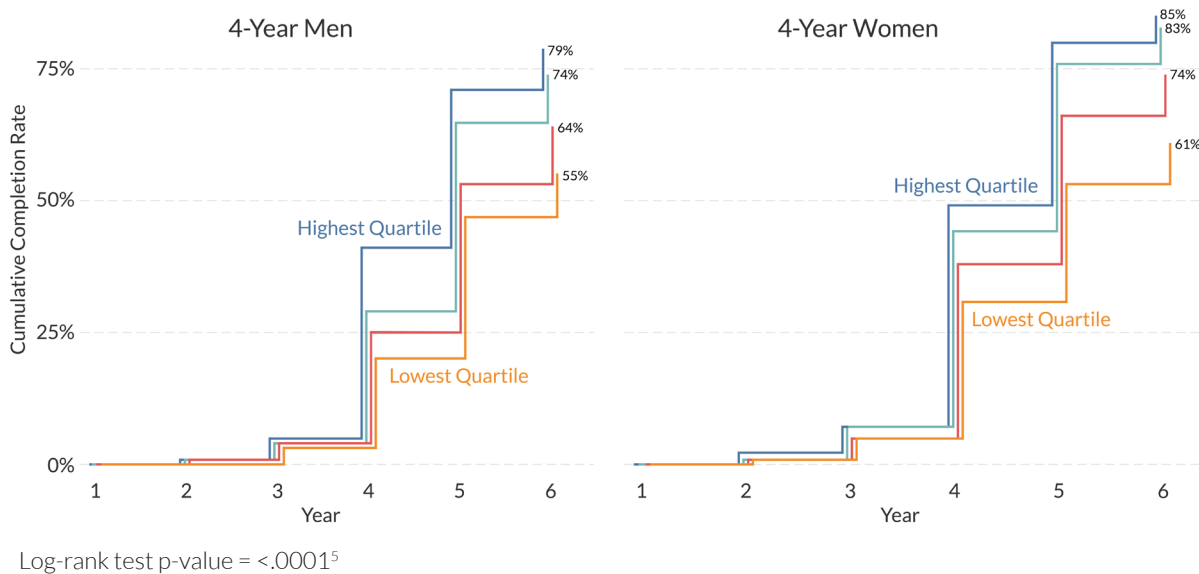
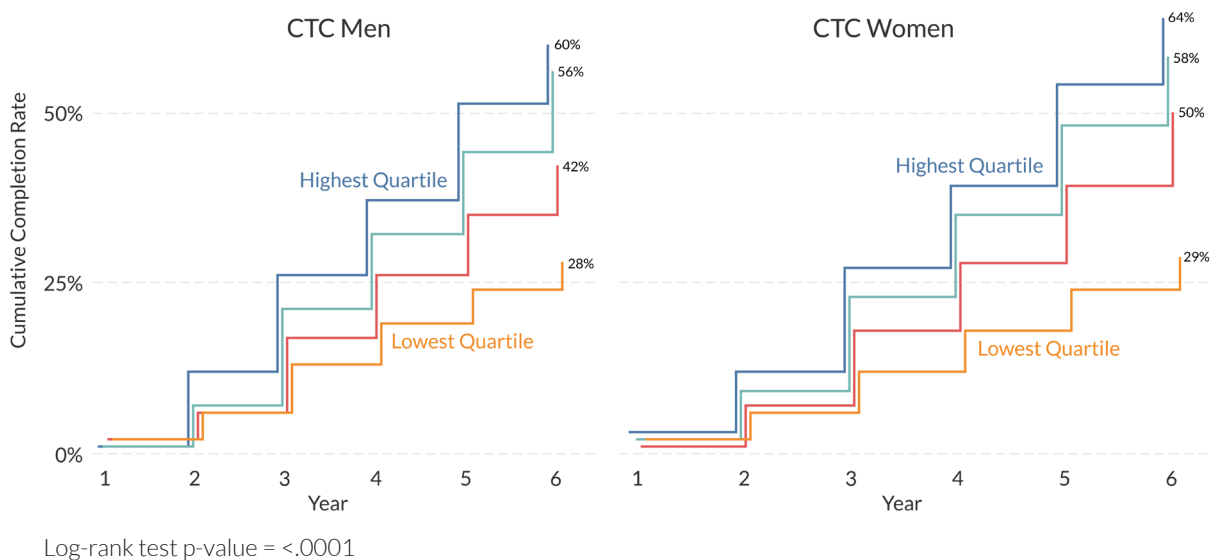


Figure 6. Cumulative completion rates by quartile – CTCs (see also Table B5).



6 The log-rank test compares the completion curves of the quartiles. It tests the null hypothesis that there is no difference between the quartiles in the probability of completion at any point in time. A p-value of less than 0.0001 means that differences between the quartiles are statistically significant (there is less than one chance in 10,000 that the completion rates for the quartiles are the same).

Needy students who receive greater amounts of financial aid are more likely to attend full-time; or, alternatively, needy students who attend college full-time are more likely to receive greater amounts of financial aid

The causality of attendance and receipt of financial aid is not clear:

- (a) Students who receive more aid may be better able to afford to attend college full-time and earn more credits; or
- (b) Students who attend college full-time are eligible for more financial aid programs and can receive additional aid compared to their need.

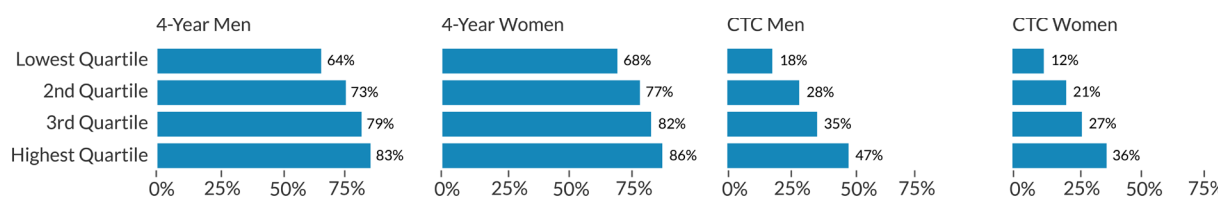
Figure 7 (and also Table B6) presents the share of students attending full-time by financial aid quartile. Attending full-time is defined as earning 36 or more college-level credits in the academic year.

As with completion, students with the greatest amount of financial aid compared to need were more likely to attend full-time in their first year than students with lesser financial aid packages. Looking at just the first year of attendance, students with least amount of aid were least likely to attend full-time and students with the best financial aid packages were more likely to attend full-time.

During the first year 83 percent of the 4-year men students (86 percent for 4-year women students) with the best financial aid packages earned over 36 credits compared to about two-thirds of the students with least amount of aid compared to need.

At the CTCs in the first year, nearly half of the men students and one-third of the women students with the better aid packages earned 36 college-level credits while less than a fifth of the men students and an eighth of the women students with smaller packages earned 36 college-level credits. In the first year, the appearance of a majority of CTC students going less than full-time may have more to do with CTC students taking remedial courses – they may be taking a “full-load” but not all the courses taken may count as “college-level.” The share of CTC students going full-time earning college level credits peaks in Year 2 (not shown, see appendix for details) with 59 percent of the men students and 56 percent of the women students with the best financial aid packages going full-time. Year 2 may be when most students have completed their remedial coursework.

Figure 7. Percentage of first-year students going full time (see also Table B6).

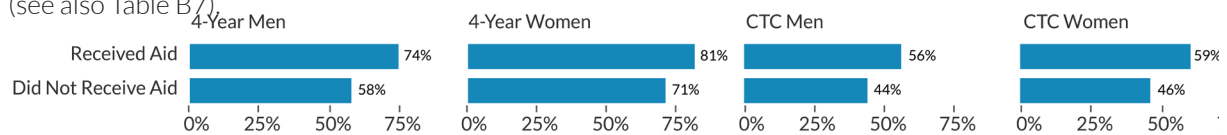


Students who did not receive aid in the second year were less likely to complete

Overall, 15 percent of the students who received need-based financial aid in Year 1 and continued to earn credits in Year 2 did not receive need-based aid in Year 2. This second year drop off in need-based aid varied from 12 percent for 4-year women to 18 percent for CTC men.

As shown in Figure 8 (and Table B7), students who continued to receive aid in Year 2 completed at higher rates than the students who did not receive aid in Year 2. For example, 74 percent of the 4-year men who continued to receive need-based aid in Year 2 eventually earned a Bachelor's degree whereas 58 percent of the students who did not receive aid in Year 2 went on to earn a Bachelor's degree.

Figure 8. Completion rates for students who did and did not receive need-based aid in Year 2 (see also Table B7).



The students who did not continue to receive aid in Year 2 were not as financially needy relative to the students who continued to receive aid. As shown in Table 4, these students on average had less financial need in Year 1 than students who continued to receive aid in Year 2. For example, 4-year women students who did not receive aid in Year 2 had average need of \$9,100 compared to an average need of \$15,000 for the women who continued to receive aid in Year 2.

Also, students who did not receive need-based aid in Year 2 received less aid in Year 1 than students who continued to receive aid. Again, 4-year women who did not receive aid in Year 2 received an average \$6,100 in Year 1 compared to an average \$12,000 for the women who continued to receive aid in Year 2. Unmet need in Year 1 was roughly the same for the 4-year students who continued to receive aid and those who did not. Year 1 unmet need was slightly higher for the CTC students who continued to receive aid in Year 2 than the students who did not receive aid in Year 2.

Table 4. Average Financial Aid Amounts in Year 1 by Whether a Student Received Aid in Year 2

	Financial Need	Financial Aid	Unmet Need
4-Year Men			
Received Aid Year 2	\$14,860	\$11,608	\$3,252
No Aid Year 2	\$9,161	\$5,912	\$3,249
4-Year Women			
Received Aid Year 2	\$15,045	\$11,970	\$3,076
No Aid Year 2	\$9,067	\$6,147	\$2,920

	Financial Need	Financial Aid	Unmet Need
CTC Men			
Received Aid Year 2	\$9,580	\$5,770	\$3,810
No Aid Year 2	\$7,346	\$3,647	\$3,699
CTC Women			
Received Aid Year 2	\$9,944	\$5,989	\$3,955
No Aid Year 2	\$7,339	\$3,826	\$3,513

Students who did not receive need-based aid in Year 2 were less likely to have received either the federal Pell grant or the State Need Grant (or both) in Year 1 (shown in Table 5). For both men and women who began at a 4-year institution, 67 percent who continued to receive aid in Year 2 had received either the Pell grant or State Need Grant in Year 1 whereas only 27 percent of those students who did not receive aid in Year 2 had received either of those grants in Year 1. For the CTC students, 91 percent of the students who received aid in Year 2 had received the Pell grant or State Need Grant in Year 1 compared to 69 percent of the students who did not receive aid in the second year.

Students who did not receive aid in the second year were also more likely to have borrowed federal unsubsidized loans in the first year. For example, among the 4-year women who did not receive aid in Year 2, 57 percent borrowed unsubsidized loans compared to 45 percent of the women who continued to receive aid. At the CTCs taking out federal unsubsidized loans was not common for either group, but students not receiving aid in the second year were about twice as likely to have borrowed in the first year (15 percent compared to 8 percent).

Table 5. Participation in Financial Aid Programs in Year 1 by Whether a Student Received Aid in Year 2

	Pell Grant	State Need Grant	Either Pell or State Need Grant	Federal Unsubsidized Loans
4-Year Men				
Received Aid Year 2	61%	59%	67%	49%
No Aid Year 2	20%	22%	27%	59%
4-Year Women				
Received Aid Year 2	64%	60%	67%	45%
No Aid Year 2	20%	21%	26%	57%
CTC Men				
Received Aid Year 2	87%	69%	90%	8%
No Aid Year 2	61%	48%	70%	15%
CTC Women				
Received Aid Year 2	88%	71%	92%	7%
No Aid Year 2	59%	47%	68%	15%

The students who did not receive need-based aid in Year 2 were less likely to be attending full-time in both Years 1 and 2. Table 6 shows the share of students earning 36 or more college-level credits in Years 1 and 2. At the 4-year institutions, about 80 percent of the students who received aid in Year 2 earned more than 36 college-level credits in both Years 1 and 2. About two-thirds of the men and three-fourths of the women 4-year students who did not receive aid in Year 2 earned more than 36 credits in both years. At the CTC's about three-fourths of the students who did not receive aid in Year 2 earned less than 36 college-level credits in Years 1 and 2. About one-half of the students who did receive aid in the second year earned more than 36 credits in Year 2.

Table 6. Share of Students Earning 36 or More College-Level Credits by Whether a Student Received Aid in Year 2

	Year 1	Year 2
4-Year Men		
Received Aid Year 2	80%	79%
No Aid Year 2	67%	63%
4-Year Women		
Received Aid Year 2	82%	82%
No Aid Year 2	75%	71%
CTC Men		
Received Aid Year 2	38%	50%
No Aid Year 2	28%	25%
CTC Women		
Received Aid Year 2	27%	45%
No Aid Year 2	24%	23%

As noted in Table 7, students who did not receive aid in the second year were more likely to be working and earning more than the students who did receive aid – in both Years 1 and 2. For example, among the CTC women, 77 percent of the students who received no aid in Year 2 had worked in Year 1, compared to 70 percent of the students who did receive aid in Year 2. By Year 2, 82 percent of the students not receiving aid were working while 71 percent who continued to receive were working. The average hours worked per week increased from Year 1 to Year 2 from 16.4 to 19.8 for those students who did not receive aid in Year 2 compared to an increase of 15.0 to 17.2 hours per week for those students who continued to receive aid. Earnings for those students not receiving aid in Year 2 increased from \$6,000 to \$8,200 while the earnings of student who continued on aid went from \$5,300 to \$6,600.

Table 7: Year 1 and Year 2 Work History by Whether a Student Received Aid in Year 2

	Percentage Who Worked		Average Wages		Average Weekly Hours	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
4-Year Men						
Received Aid Year 2	45%	47%	\$1,904	\$2,832	5.3	7.1
No Aid Year 2	51%	61%	\$2,290	\$4,428	6.0	10.9
4-Year Women						
Received Aid Year 2	52%	56%	\$2,201	\$3,223	6.3	8.4
No Aid Year 2	54%	65%	\$2,242	\$4,308	5.9	11.3
CTC Men						
Received Aid Year 2	62%	66%	\$4,839	\$5,890	13.1	15.0
No Aid Year 2	68%	72%	\$5,625	\$7,632	14.7	18.7
CTC Women						
Received Aid Year 2	70%	71%	\$5,285	\$6,604	15.0	17.2
No Aid Year 2	77%	82%	\$6,015	\$8,176	16.4	19.8

It cannot be determined from this data what caused what. Were students who did not receive aid in the second year of college forced to work more hours and earn more income to stay in school? Or were students who worked and earned more in the labor force eligible for less need-based financial aid.

Unmet need increases every year as financial need increases faster than the financial aid packages and the problem is worse for the students with lesser aid packages

“Unmet need” is the difference between a student’s “financial need” and the amount need-based aid provided to the student. “Financial need” takes into consideration the cost of attendance at the university or college (tuition, room and board, books, etc.) less the expected family contribution – the amount of college costs expected to be paid by the student and student’s family based on the family’s income and assets. The amount of unmet need is an additional amount that a student must raise by some means – such as working, borrowing, or increased family contributions. The basic formulas are:

- a) $\text{Unmet Need} = \text{Financial Need} - \text{Need-Based Financial Aid}$
- b) $\text{Financial Need} = \text{Cost of Attendance} - \text{Expected Family Contribution}$

Over time, if financial need changes by an amount different than the change in need-based financial aid, the amount of unmet need will also change. On average the amount of unmet need increases as need-based aid does not keep pace with financial need. Caused by increasing college costs and/or decreasing expected family contributions. All the student cohorts faced a problem of growing unmet need after the first year. Students with the lesser financial aid packages faced a bigger problem of unmet need than students with the better aid packages; and this difference also grows over time.

The most favorable aid packages for all the cohorts and quartiles were in the first year – as time progresses the average amount of unmet need increased as need-based aid does not keep pace with financial need. The students with the better financial aid packages, those students in the highest quartile, averaged the least amount of unmet need.

The difference between the high and low aid packages grew as time went on because the amount of unmet need increased more for those students with the lesser aid packages than for the students with the better aid packages. The amount of aid received per year by those students with the lesser aid packages is relatively stable while aid increased significantly for the students with the better aid packages. Even with the growth in aid packages, the better aid packages did not keep pace with growth in financial need – as the combination of increasing costs and/or decreasing family contributions outpace financial aid.

Table 8 presents the average need-based aid amounts in Years 1 and 4 for the lowest and highest quartile financial aid packages for each of the cohorts. The best aid packages increased significantly from Year 1 to Year 4, while the lowest aid packages remained relatively stable without much change. For example, for 4-year men, the average amount of need-based aid for students with the lowest aid packages increased by \$200 compared to an increase of \$6,200 for the students with the better financial aid packages. The difference between the lowest and highest aid packages went from \$6,300 in Year 1 to \$12,300 in Year 4.

Table 8. Average Need-Based Aid in Years 1 and 4 (see additional data in Table B8)

	Year 1	Year 4	Change
4-Year Men			
Lowest Quartile	\$6,820	\$7,024	\$204
Highest Quartile	\$13,149	\$19,324	\$6,175
Difference	\$6,329	\$12,301	
4-Year Women			
Lowest Quartile	\$7,028	\$7,288	\$260
Highest Quartile	\$13,984	\$19,570	\$5,586
Difference	\$6,955	\$12,282	
CTC Men			
Lowest Quartile	\$3,559	\$4,121	\$562
Highest Quartile	\$6,467	\$15,193	\$8,726
Difference	\$2,908	\$11,072	
CTC Women			
Lowest Quartile	\$3,714	\$3,663	-\$51
Highest Quartile	\$6,886	\$14,612	\$7,726
Difference	\$3,173	\$10,950	

The most favorable aid packages for all quartiles and cohorts, as measured by the amount of unmet need, are in the first year. For example, as shown in Table 9, for women who began attending 4-year institutions, the top aid packages (highest quartile) left an average \$900 in unmet need in the first year rising to \$2,300 for those receiving aid in the fourth year. The women receiving the least generous aid packages (lowest quartile) in the first year had unmet need of \$5,200 which rose to nearly \$9,700 by the fourth year.

Table 9. Average Unmet Need in Years 1 and 4 (see additional data in Table B8)

	Year 1	Year 4	Change
4-Year Men			
Lowest Quartile	\$5,619	\$9,680	\$4,060
Highest Quartile	\$1,046	\$2,249	\$1,203
Difference	\$4,573	\$7,431	
4-Year Women			
Lowest Quartile	\$5,219	\$9,666	\$4,447
Highest Quartile	\$938	\$2,325	\$1,388
Difference	\$4,282	\$7,341	
CTC Men			
Lowest Quartile	\$6,066	\$9,025	\$2,959
Highest Quartile	\$1,875	\$3,397	\$1,522
Difference	\$4,191	\$5,628	
CTC Women			
Lowest Quartile	\$6,248	\$9,809	\$3,561
Highest Quartile	\$1,935	\$3,859	\$1,924
Difference	\$4,313	\$5,949	

Students with the better financial aid packages had the least amount of unmet need. In the first year, when all students in this study were receiving aid, the difference between the best aid packages and the worst was over \$4,000 in unmet need for all the cohorts. For example, among CTC women, students with the lowest quartile of aid packages had an average unmet need amount of \$6,200 while students in the highest quartile of aid packages had an average unmet need amount of \$1,900 – a difference of \$4,300.

The amount of unmet need for the students still receiving aid increased every year. It increased more for the students with the lesser aid packages than for the students with the better aid packages. For example, for 4-year men, unmet need increased by \$4,100 from Year 1 to Year 4 for the students in the lowest quartile of financial aid packages while unmet need increased by \$1,200 for the students in the highest quartile of aid packages.

Students with the least financial aid packages drop out at substantially higher rates; but even a bit more financial aid goes a long way to decreasing dropout rates

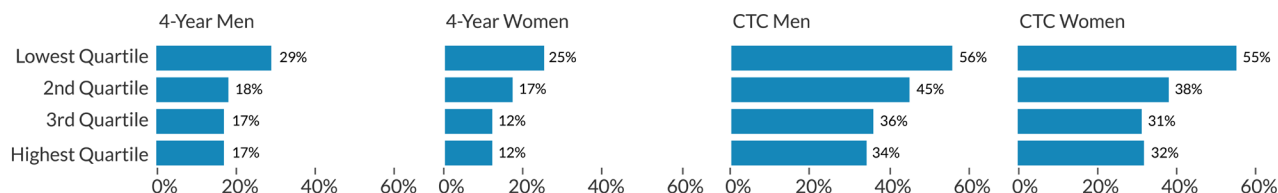
A dropout is considered to be a student who has earned some college-level credits, does not complete by earning an award, and does not acquire any additional credits in subsequent years. For example, if a student earned some college-level credits in Year 3, did not graduate, and did not earn any credits in years 4, 5 or 6, they are considered a dropout after Year 3. Dropping out includes students who may later enroll but who do not earn any additional college-level credits. These students are not making any forward progress toward a degree or certificate.

The pattern of financial aid and dropping out is not a mirror image of completion. As shown in Table 9, students with the least amount of financial aid compared to need did drop out at the highest rates. But students in the middle quartiles did not always fare that much worse than the students with the greatest amount of financial aid compared to need.

Among the men who started at a 4-year institution, 29 percent of the students with the least amount of aid had dropped out by the end of Year 5 compared to 17-18 percent of the students with aid packages anything better than the least (quartiles 2, 3 and highest).

Table B9 provides the year-to-year dropout rates by cohort by financial aid quartile by year. For example, of the women who began at a CTC, 35 percent of the students with the least aid had dropped out by the end of Year 3 compared to 26 percent of the students with the best aid packages, 21 percent of the students in the third tier of aid packages and 25 percent of the students in the second tier of aid packages. After Year 5 some 55 percent of the students with the least amount of financial aid had dropped out (they did graduate and did not return in Year 6) while under 40 percent of the students in the next three quartiles had dropped out.

Figure 9. Cumulative dropout rate by year five (see also Table B9).



Appendix A: Comparison to prior study

Unmet need v. Aid as Percent of Need

In an earlier study, “Unmet Need among Financially Needy College Students in the State of Washington,” the quartiles were based on the dollar amount of unmet need. Unmet need is the difference between a student’s financial need and the need-based financial aid provided to the student. Financial need is the difference between the cost of attending the university or college and the expected family contribution towards those costs.

- $\text{Unmet Need} = \text{Financial Need} - \text{Need-Based Financial Aid}$
- $\text{Financial Need} = \text{Cost of Attendance} - \text{Expected Family Contribution}$

In the earlier study, the lowest (or best) quartile were those 25 percent of students with the least amount of unmet need and were considered to have the best financial aid packages. The 25 percent of students with greatest amount of unmet need were in the highest quartile with the greatest amount of unmet need and the relatively worst financial aid packages.

In this analysis, “Impact of Need-Based Financial Aid on College Completion: An Event History Analysis,” the quartile divisions are based on need-based aid as a percent of financial need.

- $\text{Need-Based Aid as Percent of Need} = \frac{\text{Need-Based Financial Aid}}{\text{Financial Need}} \times 100$

The 25 percent of students with the highest percentage of aid compared to need are in the highest (or best) quartile. The students receiving the least amount of aid as a percentage of need are in the lowest (or worst) quartile.

The prior study ranked the adequacy of financial aid packages based on the dollar difference between the aid package and financial need, with those students with smallest dollar differences considered to be the best aid packages (and in the lowest quartile). This study ranks the adequacy of financial aid packages based on the amount of need that is met by financial aid, with those students having the greatest percent of need being met considered to be the best aid packages (and in the highest quartile).

Comparison of Completion Rates

The basis for the formulation of the treatment groups or quartiles has a bearing on the results. In the prior study the quartiles were based on the average annual amount of unmet need – the difference between financial need and the amount of need-based financial aid provided. In this analysis, the quartiles are based on the amount of need-based aid provided as a percent of financial need. Part 1 included all the high school graduates who entered college within six years of graduation and received need-based aid sometime during those six years. This study includes only students who started postsecondary education in the first year after graduating from high school and received need-based financial aid in the first year. The cohort in this study is a subset of the cohort

included in the prior study. In the prior study, students may or may not have started in the first year and may or may not have had financial need in the first year.

The differences in the quartile completion rates are starker in this analysis – the gaps between the students with the relatively best aid packages compared to the students with the relatively worst aid packages are greater. The overall graduation rates between the earlier study and this one are not much different. For the 4-year students, including the students who may have taken a “gap year” and not started right after high school graduation and who may not have needed financial aid in the first year (the prior cohort of students) slightly improves the graduation rates. For the CTC students, excluding students who do not immediately begin postsecondary education and students who do not receive need-based aid in the first year (the cohort students studied here) appears to slightly improve the graduation rates.

At the 4-year institutions the non-completers are more concentrated in the lowest 25 percent of aid packages if the aid packages are measured as a percent of need rather than as the amount of unmet need. This is shown in Table A1 where, for example, 55 percent of 4-year men with the worst aid packages graduate if aid packages are measured by aid as a percent of need compared to 61 percent if aid packages are measured by unmet need. The 25 percent of the students with the “best” financial aid packages graduate at about the same rate – no matter if “best” means the lowest amount of unmet need or the highest percentage of aid compared to need. Differences appear when looking at the 25 percent of the students with the “worst” financial aid packages. At the CTCs there are differences between completion rates for both the “best” and the “worst” financial aid packages. Measuring the level of financial aid as a percent of need appears to concentrate completers in the one-fourth of the “best” aid packages and concentrates non-completers in the “worst” aid packages. The percentage point difference between the best and worst aid packages increases from 11 percentage points to 32 percentage points for CTC men and from 17 percentage points to 35 percentage points for CTC women.

Table A1: Comparison of Completion Rates

	All	Best Aid Packages	Worst Aid Packages	Percentage Point Difference
4-Year Men				
Part 1: Unmet Need	70%	78%	61%	17 pp
Part 2: Aid/Need	68%	79%	55%	24 pp
4-Year Women				
Part 1: Unmet Need	78%	84%	71%	13 pp
Part 2: Aid/Need	76%	85%	61%	24 pp
CTC Men				
Part 1: Unmet Need	46%	51%	40%	11 pp
Part 2: Aid/Need	47%	60%	28%	32 pp
CTC Women				
Part 1: Unmet Need	48%	56%	39%	17 pp
Part 2: Aid/Need	50%	64%	29%	35 pp

Appendix B: Tables for Figures

Table B1: Quartile Characteristics

	Lowest Quartile	Quartile 2	Quartile 3	Highest Quartile
4-Year Men				
% BA Degree	55%	64%	74%	79%
Average High School GPA	3.25	3.32	3.38	3.46
% Met Math Standard	90%	89%	89%	90%
% FRPL in High School	22%	35%	45%	47%
% White	76%	67%	62%	59%
% Asian	13%	14%	20%	20%
% Hispanic/Latino of any race	6%	10%	10%	11%
% African-American	4%	5%	5%	7%
4-Year Women				
% BA Degree	61%	74%	83%	85%
Average High School GPA	3.36	3.43	3.50	3.57
% Met Math Standard	82%	83%	82%	87%
% FRPL in High School	23%	38%	49%	49%
% White	75%	64%	60%	59%
% Asian	11%	19%	19%	20%
% Hispanic/Latino of any race	5%	6%	7%	6%
% African-American	6%	8%	12%	12%
CTC Men				
% BA, AA or LTC	28%	42%	56%	60%
Average High School GPA	2.59	2.70	2.79	2.84
% Met Math Standard	62%	63%	68%	69%
% FRPL in High School	61%	66%	72%	65%
% White	60%	59%	56%	61%
% Asian	12%	13%	16%	13%
% Hispanic/Latino of any race	9%	9%	7%	7%
% African-American	16%	15%	17%	14%
CTC Women				
% BA, AA or LTC	29%	50%	58%	64%
Average High School GPA	2.80	2.89	2.97	3.05
% Met Math Standard	50%	52%	53%	61%
% FRPL in High School	63%	72%	70%	68%
% White	63%	63%	61%	62%
% Asian	8%	10%	11%	12%
% Hispanic/Latino of any race	8%	7%	7%	6%
% African-American	17%	17%	17%	15%

Table B2. Percent of Students Remaining in Risk Set at the Start of Year 6

	Lowest Quartile	Quartile 2	Quartile 3	Highest Quartile
4-Year Men	24%	29%	18%	12%
4-Year Women	22%	18%	13%	8%
CTC Men	19%	19%	21%	15%
CTC Women	21%	23%	21%	14%

Table B3. Remaining Students

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Men						
Lowest Quartile	924	894	821	747	527	224
Quartile 2	926	910	870	808	568	268
Quartile 3	920	902	853	790	528	166
Highest Quartile	926	894	856	777	413	110
4-Year Women						
Lowest Quartile	1,273	1,221	1,153	1,051	645	278
Quartile 2	1,266	1,247	1,206	1,097	625	223
Quartile 3	1,278	1,251	1,213	1,111	612	162
Highest Quartile	1,266	1,228	1,165	1,081	527	105
CTC Men						
Lowest Quartile	882	760	588	407	276	170
Quartile 2	868	787	630	450	313	168
Quartile 3	876	826	664	460	321	182
Highest Quartile	878	782	598	410	274	131
CTC Women						
Lowest Quartile	1,184	1,057	830	625	436	249
Quartile 2	1,181	1,104	910	669	466	277
Quartile 3	1,176	1,108	926	665	456	244
Highest Quartile	1,188	1,049	816	564	382	167

Table B4. Percentage Still Receiving Need-Based Aid

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Men						
Lowest Quartile	100%	79%	74%	71%	58%	50%
Quartile 2	100%	87%	84%	82%	74%	65%
Quartile 3	100%	91%	88%	88%	75%	59%
Highest Quartile	100%	83%	80%	80%	73%	51%

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Women						
Lowest Quartile	100%	82%	77%	72%	60%	61%
Quartile 2	100%	90%	87%	85%	73%	61%
Quartile 3	100%	93%	91%	90%	77%	64%
Highest Quartile	100%	86%	83%	83%	69%	46%
CTC Men						
Lowest Quartile	100%	72%	64%	55%	59%	54%
Quartile 2	100%	85%	78%	73%	70%	62%
Quartile 3	100%	90%	81%	81%	80%	75%
Highest Quartile	100%	82%	77%	77%	76%	67%
CTC Women						
Lowest Quartile	100%	77%	69%	70%	67%	63%
Quartile 2	100%	88%	79%	80%	73%	71%
Quartile 3	100%	90%	85%	80%	76%	69%
Highest Quartile	100%	83%	79%	79%	79%	73%

Table B5: Cumulative Completion Rate

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Men						
Lowest Quartile	0%	0%	3%	20%	47%	55%
Quartile 2	0%	1%	4%	25%	53%	64%
Quartile 3	0%	1%	4%	29%	65%	74%
Highest Quartile	0%	1%	5%	41%	71%	79%
4-Year Women						
Lowest Quartile	0%	1%	5%	31%	53%	61%
Quartile 2	0%	1%	5%	38%	66%	74%
Quartile 3	0%	1%	7%	44%	76%	83%
Highest Quartile	0%	2%	7%	49%	80%	85%
CTC Men						
Lowest Quartile	2%	6%	13%	19%	24%	28%
Quartile 2	2%	6%	17%	26%	35%	42%
Quartile 3	1%	7%	21%	32%	44%	56%
Highest Quartile	1%	12%	26%	37%	51%	60%
CTC Women						
Lowest Quartile	2%	6%	12%	18%	24%	29%
Quartile 2	1%	7%	18%	28%	39%	50%
Quartile 3	2%	9%	23%	35%	48%	58%
Highest Quartile	3%	12%	27%	39%	54%	64%

Log-rank test p-value = <.0001

Table B6. Percentage Students Attending Full-Time

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Men						
Lowest Quartile	64%	62%	62%	64%	35%	30%
Quartile 2	73%	73%	67%	65%	41%	26%
Quartile 3	79%	78%	78%	75%	44%	24%
Highest Quartile	83%	83%	81%	80%	47%	25%
4-Year Women						
Lowest Quartile	68%	67%	63%	63%	38%	30%
Quartile 2	77%	77%	73%	75%	40%	28%
Quartile 3	82%	84%	81%	78%	44%	37%
Highest Quartile	86%	89%	87%	83%	41%	23%
CTC Men						
Lowest Quartile	18%	20%	15%	17%	16%	15%
Quartile 2	28%	34%	32%	31%	30%	27%
Quartile 3	35%	52%	38%	41%	50%	35%
Highest Quartile	47%	59%	48%	51%	52%	35%
CTC Women						
Lowest Quartile	12%	16%	12%	10%	13%	23%
Quartile 2	21%	34%	25%	23%	24%	21%
Quartile 3	27%	45%	37%	39%	41%	35%
Highest Quartile	36%	56%	48%	56%	57%	38%

Table B7. Completion Rates for Students who Did and Did Not Receive Need-Based Aid in Year 2

	Completion Rate
4-Yr Men	
Received Aid Yr2	74%
No Aid Yr2	58%
4-Yr Women	
Received Aid Yr2	81%
No Aid Yr2	71%
CTC Men	
Received Aid Yr2	56%
No Aid Yr2	44%
CTC Women	
Received Aid Yr2	59%
No Aid Yr2	46%

Table B8. Average Amount of Need-Based Aid and Unmet Need

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4-Year Men						
Average Amount of Need-Based Aid						
Lowest Quartile	\$6,820	\$6,283	\$6,245	\$7,024	\$6,030	\$6,689
Quartile 2	\$10,243	\$10,115	\$10,552	\$11,358	\$9,896	\$10,093
Quartile 3	\$12,498	\$13,434	\$14,537	\$15,633	\$13,539	\$11,421
Highest Quartile	\$13,149	\$16,143	\$17,894	\$19,324	\$16,471	\$11,704
Average Amount of Unmet Need						
Lowest Quartile	\$5,619	\$7,953	\$8,730	\$9,680	\$10,244	\$11,689
Quartile 2	\$3,766	\$5,988	\$6,815	\$7,366	\$7,856	\$8,937
Quartile 3	\$2,841	\$4,404	\$4,942	\$5,503	\$5,588	\$7,954
Highest Quartile	\$1,046	\$1,595	\$2,040	\$2,249	\$2,873	\$3,360
4-Year Women						
Average Amount of Need-Based Aid						
Lowest Quartile	\$7,028	\$6,650	\$6,915	\$7,288	\$6,540	\$6,384
Quartile 2	\$10,686	\$10,827	\$11,169	\$12,199	\$9,967	\$9,437
Quartile 3	\$13,011	\$13,874	\$14,673	\$15,781	\$13,323	\$11,673
Highest Quartile	\$13,984	\$16,775	\$18,713	\$19,570	\$15,905	\$12,174
Average Amount of Unmet Need						
Lowest Quartile	\$5,219	\$7,467	\$8,926	\$9,666	\$9,772	\$10,561
Quartile 2	\$3,765	\$5,760	\$7,018	\$7,233	\$7,370	\$9,280
Quartile 3	\$2,563	\$3,851	\$5,076	\$5,557	\$5,346	\$6,219
Highest Quartile	\$938	\$1,626	\$2,136	\$2,325	\$2,743	\$3,607
CTC Men						
Average Amount of Need-Based Aid						
Lowest Quartile	\$3,559	\$3,703	\$3,746	\$4,121	\$3,872	\$4,632
Quartile 2	\$5,167	\$5,583	\$5,682	\$7,138	\$7,716	\$8,450
Quartile 3	\$5,864	\$6,900	\$7,559	\$10,322	\$11,846	\$10,714
Highest Quartile	\$6,467	\$8,456	\$10,483	\$15,193	\$15,982	\$14,258
Average Amount of Unmet Need						
Lowest Quartile	\$6,066	\$7,374	\$7,875	\$9,025	\$9,906	\$10,427
Quartile 2	\$4,475	\$5,637	\$6,983	\$7,597	\$8,349	\$8,142
Quartile 3	\$3,379	\$4,109	\$5,313	\$6,424	\$7,155	\$6,749
Highest Quartile	\$1,875	\$2,447	\$3,140	\$3,397	\$4,051	\$3,809
CTC Women						
Average Amount of Need-Based Aid						
Lowest Quartile	\$3,714	\$3,787	\$3,729	\$3,663	\$4,112	\$4,816
Quartile 2	\$5,397	\$5,798	\$5,890	\$6,267	\$7,536	\$7,081
Quartile 3	\$6,068	\$7,040	\$7,713	\$9,631	\$10,954	\$11,012
Highest Quartile	\$6,886	\$8,735	\$10,656	\$14,612	\$15,592	\$13,500

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Average Amount of Unmet Need						
Lowest Quartile	\$6,248	\$8,088	\$8,473	\$9,809	\$10,123	\$10,305
Quartile 2	\$4,569	\$5,829	\$7,376	\$8,326	\$8,287	\$8,379
Quartile 3	\$3,345	\$4,368	\$5,641	\$6,500	\$7,040	\$6,565
Highest Quartile	\$1,935	\$2,531	\$3,418	\$3,859	\$3,913	\$4,033

Table B9. Cumulative Dropout Rate

	Year 1	Year 2	Year 3	Year 4	Year 5
4-Year Men					
Lowest Quartile	3%	11%	16%	23%	29%
Quartile 2	2%	5%	9%	14%	18%
Quartile 3	2%	6%	10%	13%	17%
Highest Quartile	3%	7%	11%	15%	17%
4-Year Women					
Lowest Quartile	4%	8%	13%	19%	25%
Quartile 2	2%	4%	8%	12%	17%
Quartile 3	2%	4%	6%	8%	12%
Highest Quartile	3%	6%	7%	9%	12%
CTC Men					
Lowest Quartile	12%	28%	41%	50%	56%
Quartile 2	8%	21%	31%	38%	45%
Quartile 3	5%	18%	26%	32%	36%
Highest Quartile	10%	20%	27%	31%	34%
CTC Women					
Lowest Quartile	9%	24%	35%	45%	55%
Quartile 2	6%	16%	25%	32%	38%
Quartile 3	4%	13%	21%	26%	31%
Highest Quartile	9%	20%	26%	29%	32%



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