

# Impact of Scholarships

Fall 2016



Office of Institutional Effectiveness  
and Analytics

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Office of Institutional Effectiveness and Analytics

## Executive Summary

Scholarships at BMCC must be earned. Only students who have proven their motivation and have at least 12 hours with a 3.0 GPA or better are invited to apply for the scholarships. Of the 9,342 students who met the criteria and were invited to apply for BMCC scholarships in the spring semesters of 2010, 2011, and 2012, just 587 students received a scholarship. The selective and competitive nature of the scholarship award means that some academic performance differences may be expected between students who earn scholarships and students who do not, even when all who are invited are eligible. Unfortunately, while lists of invited students were available, information to identify which of these students ultimately applied for the scholarships was not retained.

This study controls for the selection difference in two ways. The first is through a logistic regression analysis that statistically controls for a number of factors that could also influence a successful graduation outcome. These include the initial remedial exemption, the cumulative GPA of the student at the end of the semester when they were invited to apply for the scholarship, their initial score on the Compass Algebra exam, non-resident alien status, ethnicity, age, and nursing majors. After accounting for the effects of these other factors, the analysis shows that students who earn scholarships from BMCC have nearly 3.7 times greater odds of graduating than other students who were invited to apply but who did not ultimately earn a scholarship.

The second method used to control for selection is to identify a sub-set of the population of students invited to apply for scholarships that is statistically matched to the scholarship group. The model creates “propensity scores” using the student’s cumulative GPA, initial Compass Algebra score, the year when the students was invited<sup>1</sup>, and variables identifying ethnicity, age, and gender. Here among the scholarship recipients invited each year, between 82% and 86% earned a degree, while among the propensity matched students who did not receive scholarships, the percent earning degrees ranged from 47% to 61%.

Higher levels of additional degrees earned were also found among the scholarship students. Among those first invited in 2010, almost 29% have earned a second or even a third degree from a CUNY college, compared to just over 14% of those who did not get a scholarship in that group. Students first identified in a subsequent semester have slightly lower levels of earning additional degrees but they have also had less time to do so.

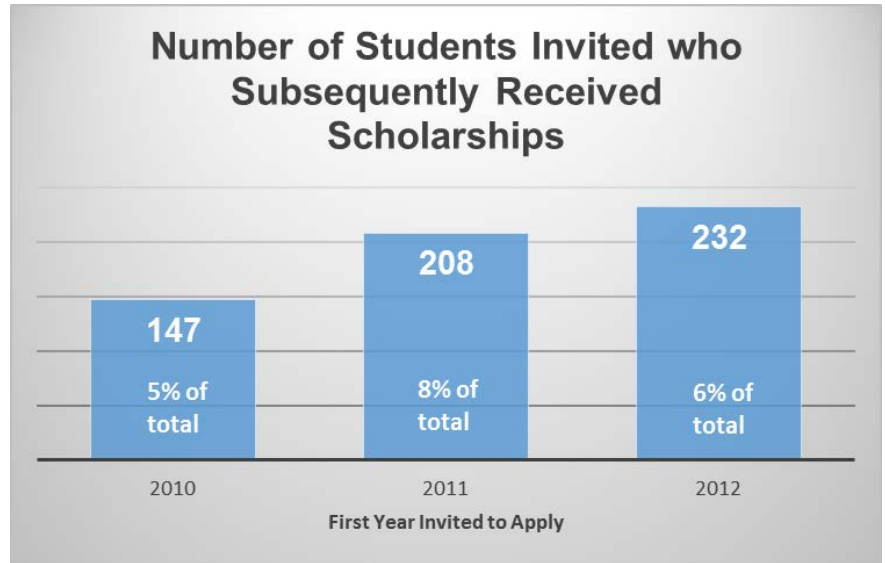
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<sup>1</sup> Students are not duplicated. The first potential year for being invited to apply for the scholarships was 2010. However, very few scholarships were awarded that fall and 80% of those on this list who received scholarship were awarded them after 2010. Students are counted as invited in the year they first appear on the invitation list, and are scholarship recipients if they receive a BMCC Foundation or Out-in-2 Scholarship in any of the three academic years from 2010-11 through 2013-14.

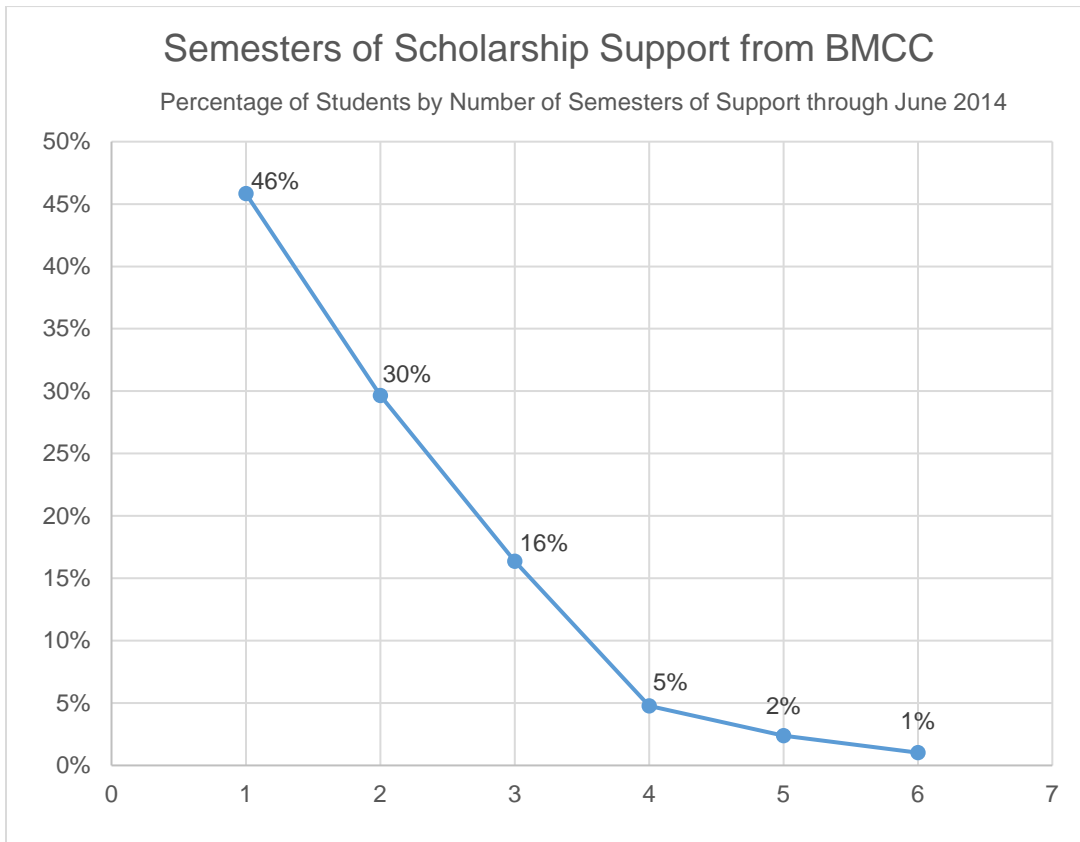
## Scholarship Population

BMCC sponsored scholarships were given to a total of 587 of the eligible students who were invited to apply. The application process is described in the appendix.

However, even among those who ultimately received scholarships, most did not receive a scholarship in the first year they appear on the eligible list. About 28% of the students who were scholarship students received their award in the first term after being invited; 51% received the scholarship one year later and 17% had to wait two years. A few students waited three or four years before they were awarded a scholarship.



Once a student receives the scholarship, the support will normally continue until the student graduates. However, of the total group of scholarship recipients tracked here through the end of Fiscal Year 2014, 46% had received only one semester of support up through June 30, 2014.



## Controlling for Selection Bias to Assess Scholarship Impact

### How scholarship recipients are different

Because BMCC Scholarships are competitive, certain differences in academic performance levels can be expected between those who receive scholarships and those who do not. The application process itself may discourage some students from applying, since students must seek two letters of recommendation and write an essay. In addition, the committee considers co-curricular activities as part of the ranking process. (See full description of the process in the Appendix.) But all students who are invited are eligible for the scholarships even as less than 1 in 10 receive them.

Academic performance differences between recipients and non-recipients were found in these areas:

1. Almost 80% of the scholarship recipients began college without any remedial or developmental needs. This compares to 67% of the non-recipients.

2. At the end of the semester in which they were first invited to apply, the scholarship recipients had an average cumulative GPA of 3.67, and non-recipients had an average cumulative GPA of 3.32.<sup>2</sup>

In addition to these differences in academic performance, some demographic characteristics distinguished scholarship recipients from the invited non-recipients. In each of the initial years of invitations, Hispanic students were under-represented among scholarship recipients and non-resident aliens and white students were proportionally better represented. In addition, significant differences were found by age. Among invited students 20 years old and older, 8.5% received scholarships. Among those over 30 years old, 9.4% received scholarships. But among those under 20 years old who were invited to apply, just 3.6% were scholarship recipients.

An examination of another type of difference may confirm that these discrepancies are most likely related to differing application rates, or the extent to which students from different backgrounds and ages are encouraged to apply for scholarships. Students in different majors are likely to receive different communication, which may or may not include encouragement to apply for scholarships. In this case, 31% of the Nursing students who were invited received a scholarship, while only 1% of the Early Childhood Education majors and only 4% of the Liberal Arts majors who were invited received a scholarship. It seems likely that nursing program students are actively being encouraged to apply. Other majors that showed higher than expected rates of scholarship awards include English, Math, Engineering, and Video Arts and Technology. In all these majors, at least 10% of those invited to apply ultimately received scholarships.

With so many factors potentially affecting the graduation rate of individual students, some methods are needed to control for these factors to isolate the impact that receiving a scholarship has on a successful outcome. For this study, two widely used methods were selected. The first is to develop a logistic regression model that identifies the strength of various factors thought to predict graduation, including receiving a scholarship. The second is to use the variables where significant differences are found between scholarship recipients and non-recipients, and to control for that by matching each scholarship student to another in the much larger invited sample, selecting the students who are most similar in these characteristics to those who received the scholarships. These two groups can then be compared in a variety of ways, knowing that the main identifiable difference between the groups is the receipt of a scholarship.

## Predictive Model for Graduation

Seven predictive models were attempted to predict graduation. Of these, three were able to correctly predict 64.2% of the graduation outcomes, somewhat better than the basic 57.5% which is the actual percentage of all those invited who graduated. In all 7 models, the top predictor of graduation was the scholarship recipient flag. Of all the models attempted, model 6 was selected as the one that identified the most relevant variables. The graphic below shows the range of strength in prediction for each of these items.<sup>3</sup> This is expressed in the direction of the impact, where arrows pointing up indicate increased odds of graduation while arrows pointed down show decreased odds. The model








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<sup>2</sup> 37 of the students invited had null or missing cumulative GPAs in that semester, including 2 students who were awarded scholarship and 35 who were not. These students were excluded from the averages calculated here, leaving 585 scholarship recipients compared to 8720 non-recipients.

<sup>3</sup> All items in this model are considered highly significant predictors of graduation at  $p < 0.001$ .



based on these groups of invited students predicts that the odds for graduation are 367% higher (nearly 3.7 times greater) if a student has received a BMCC scholarship, after taking into account the other variables here. If more students of similar background and achievement were added, this number could change and is expected to fall between 284% and 475%.

Factors identified as predictors of graduation	predicted impact direction	predicted % change in odds for graduation for scholarship eligible students
Receiving a Scholarship	 367%	<i>between</i> 284% <i>and</i> 475%
Entering BMCC without remedial needs	 272%	242%      304%
Each whole point on the semester GPA when invited	 205%	184%      229%
Being a non-resident alien	 25%	12%      36%
Being white	 28%	18%      36%
Being 20 or older when invited to apply	 19%	11%      27%
Being a nursing major (includes "undeclared health" and the older "pre-nursing" programs)	 36%	26%      46%

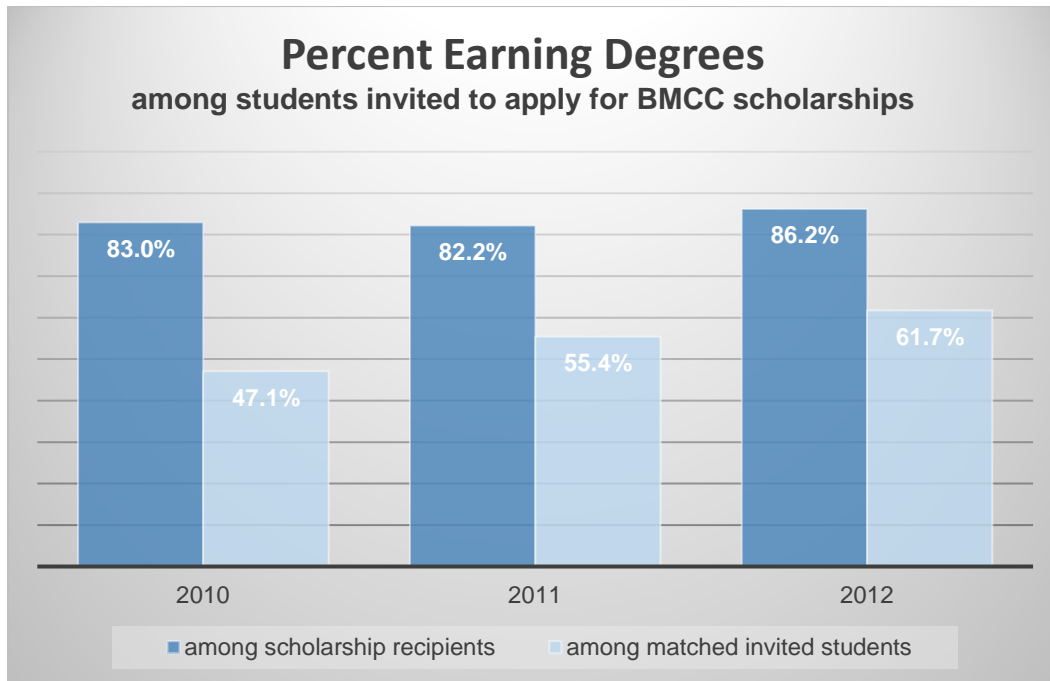
## Propensity Matched Groups

Propensity Score matching focuses largely on core areas where scholarship recipients are different than non-recipients and logically matches each student in the scholarship group to the student most like him or her in respect to these core variables. In this study, the core variables were:

- Cumulative GPA at the end of the semester the student was first invited to apply for the scholarship
- Their score on the Compass Algebra Test, with missing values imputed according to their overall remedial need<sup>4</sup>
- Year in which the student was first invited to apply for a scholarship. This was included to ensure a similar count of students for each group and to reflect the additional time available to graduate for the earliest group of students.
- Binary variables identifying students as Hispanic, White, Non Resident Alien, at least 20 years old, and female

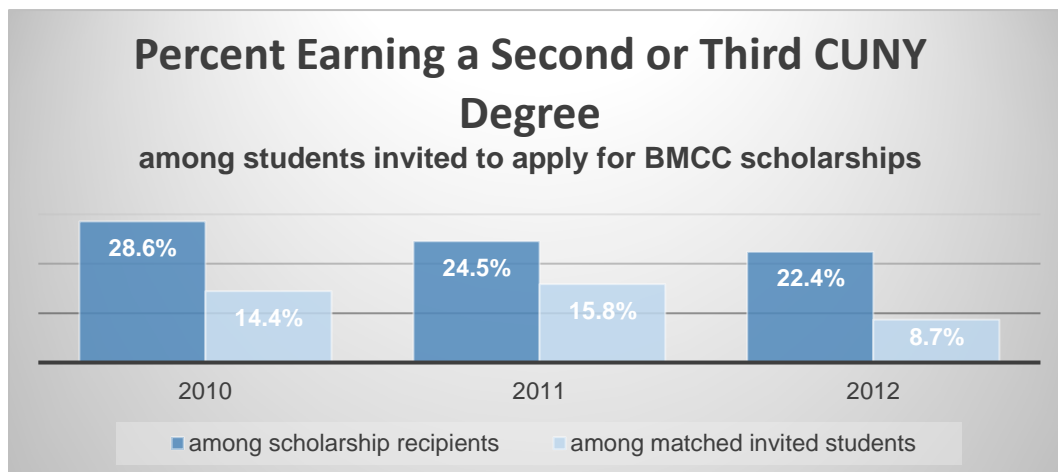
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<sup>4</sup> 37% of the sample was missing the Compass Algebra Score. For these student the value was imputed based on the mean for the overall group that had passed or was exempt from the same placement tests but did have test scores. This enabled us to combine a nominal (category) variable that code values for every possibility but no clear hierarchy, with a scale variable that had too many missing values.



This combination provided the best matching options and left a study sample of all 587 scholarship students matched to 585 who did not receive the scholarship. Two students could not be matched within the logic limits set to the matching, but were still included in the sample. These two groups were then compared for subsequent graduation based on the first semester they were invited to apply for a scholarship. As the chart above shows, a much greater portion of the students who had the scholarships were able to graduate when compared to those who did not graduate.

In the six years since the first group of invited students, there has been more than enough time to earn an Associate's degree. Among these same matched groups, BMCC scholarship recipients continue at a greater pace to earn second (and sometimes third) degrees at other CUNY schools, as shown in the chart below.



While this study looks at the scholarship invitation lists starting in 2010, the initial term at BMCC as an associate student across the population of scholarship recipients ranges from spring 1996 through fall 2012. However, 87% of these students started between fall 2008 and fall 2011, and it is this group that accounts for all but 5-7 of the additional degrees for scholarship recipients and non-recipients, respectively. The largest numbers of additional degrees have been for students starting in fall 2009.

Finally, we also compared the GPA upon graduation for the 493 scholarship recipients who graduated and the 321 non-recipients who also graduated. The average graduation GPA among the scholarship group was 3.57, while for the matched group of invited students the average graduation GPA was 3.42. This is a small but statistically significant difference of 0.15.<sup>5</sup>

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<sup>5</sup> A T-Test comparison of means was used. The 2-tailed significance level was  $p < 0.001$ .



## Appendix: Scholarship Eligibility and Process

### Eligibility:

- Full-Time students who have completed at least 12 non remedial credits and have a minimum cumulative GPA of 3.0. (Those with remedial, if selected must agree to complete all remedial requirements by the end of the first semester that the scholarship is received).
- Part-Time students who have completed at least 20 non remedial credits and have a minimum cumulative GPA of 3.3.
- Students who are pursuing their first degree. Those who hold an associate, bachelors, masters, or doctorate degree are ineligible.

### Application process:

Students who meets the above eligibility criteria are invited to apply for a BMCC Foundation Inc. Scholarship. The application is on-line and it consists of writing an essay (of no more than 900 words) describing factors and/or events that have had the most significance in shaping their academic, personal or career goals. They are also required to submit two letters of recommendation, with at least one being from a faculty or staff member.

### Selection:

After the applicants are deemed to be eligible for consideration (merit and financial need), their application are package and sent electronically to the Scholarship Committee, which is comprised of BMCC faculty and staff. The committee reviews the applications based on the strength of the entire application package (GPA, essay, recommendations and extra Co-Curricular activities). Recipients are then selected based on the committee ranking, as well as scholarship budget limitations.