ENROLLMENT YIELD AT UNION COLEGE 2014

By

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ABSTRACT

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This study examines why some admitted students decide to enroll at Union College while others go elsewhere. I use data on nearly nine thousand first-time full-time regular decision applicants admitted to Union starting in the academic years beginning in the Fall 2009 through Fall 2013.

There are significant differences between students who enroll at Union and those who enroll elsewhere. First, since Union's financial aid fully meets students' financial needs, students with large financial need are much more likely to enroll at Union than students with smaller financial need or no financial need. For example, controlling for demographic and academic variables, students with financial need of 75 percent or more of Union's annual cost of attendance are more than twice as likely to enroll than students who do not require any financial aid. Second, since academically stronger students are likely to also have been admitted to other selective colleges, the students who enroll at Union have SAT scores that are about four percent lower than students who go elsewhere. Third, students who do not submit their SAT scores to Union are about seven percentage points more likely to enroll than those who do. This is true even after controlling for high school GPA.

Fourth, privately-schooled students are less likely to enroll than publically-schooled students and students from outside the North East and New York are less likely to enroll than students from New York. Again, these effects persist even after controlling for high school GPA. Fifth, since qualified minority students are likely to have other post-secondary educational options, controlling for financial need, black and Latino students are less likely to enroll than white students. Finally, Union's program to attract highly qualified students (the Union Scholars Program) does not appear effective. Controlling for demographic and academic variables, students with a Union Scholars designation are no more likely to enroll than students without a Scholars designation. Overall, the results suggest that Union faces a competitive market for students where price (financial aid boosts enrollment) and perceived quality (stronger students enrolling at more selective schools) matter.

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CHAPTER ONE

INTRODUCTION

This paper examines the enrollment trends of admitted students at Union College in Schenectady, NY. While Union currently has a predictive yield model in place, the goal of this study is to first better understand how yield varies with student demographics, academic quality, and financial need and second, to see where admitted students go instead of Union with respect to their individual academic quality.

Enrollment yield is important to colleges for myriad reasons. First, it is a measure of a school's quality or attractiveness to admitted students. The number says something about an admitted student's preference for a given college. If a student prefers one college over all other options, he or she will choose to enroll. Second, the higher a school's yield, the lower the number of applications needed to fill a school's incoming class. Thirdly, to the extent that yield may vary across certain demographic, geographic, academic, or financial variables, enrollment yield information has implications for marketing strategies. Finally, better understanding the trends behind a university's enrollment yield allows the institution to better tailor its admitted pool, thereby having some impact on its selectivity.

CHAPTER TWO

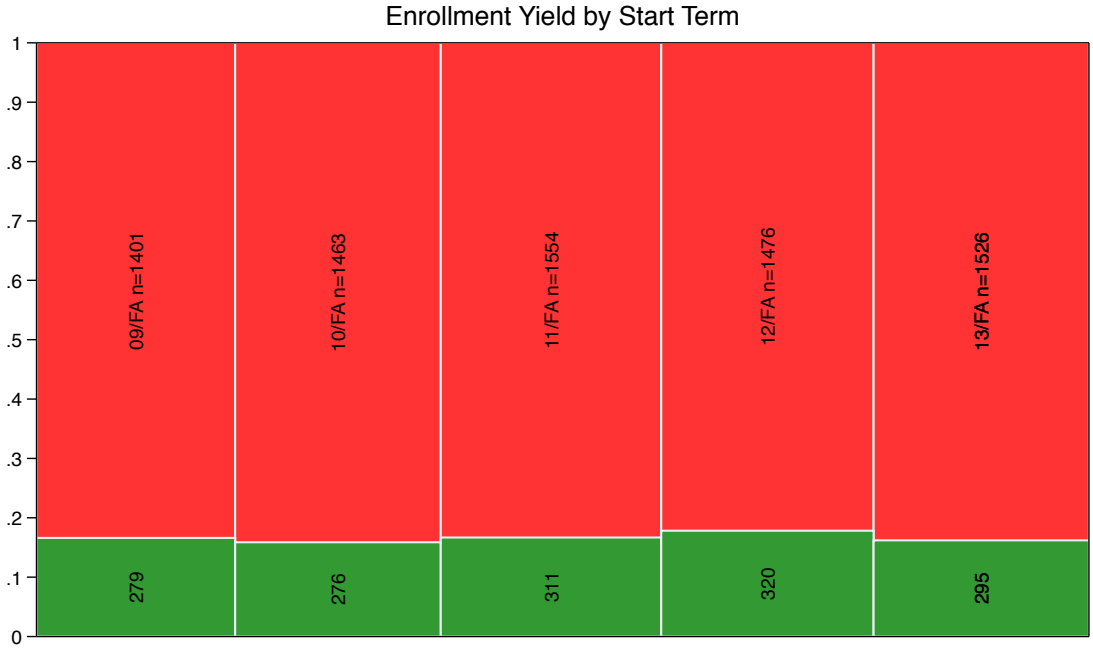
DATA

The first part of this study uses data from the Union College Admissions Office on first-time full-time regular decision applicants admitted to the academic years starting in Fall 2009 through Fall 2013. There are 8,901 observations (about 400 per year) with the annual admitted numbers provided in Table 3.1 of the Statistical Appendix.

The variables available for most of these 8,901 observations include whether or not a student enrolled, demographic variables, geographic variables, academic quality variables, financial aid variables, and "other" variables such as "start term" variables and "major" variables. Descriptions for each of these variables are provided in Section 2 of the Statistical Appendix. The total number of observations for each of these variables by start term are available in Section 3 of the Statistical Appendix.

Of the 8,901 regular decision undergraduate students admitted to Union College in Schenectady, NY in the last five years, 1,481 have chosen to enroll. This represents an enrollment yield on regular decision admissions of about 16.6% over the past five years. Figure 1 below shows the enrollment yield for each class year of students in our data. The red areas of the graph represent the students who were admitted but chose not to enroll, while the green areas represent those students who did decide to enroll at Union College. The area of each category in the graph is proportional to the number of students in that particular category. This type of chart will be used numerous times throughout this study.

Figure 1



CHAPTER THREE

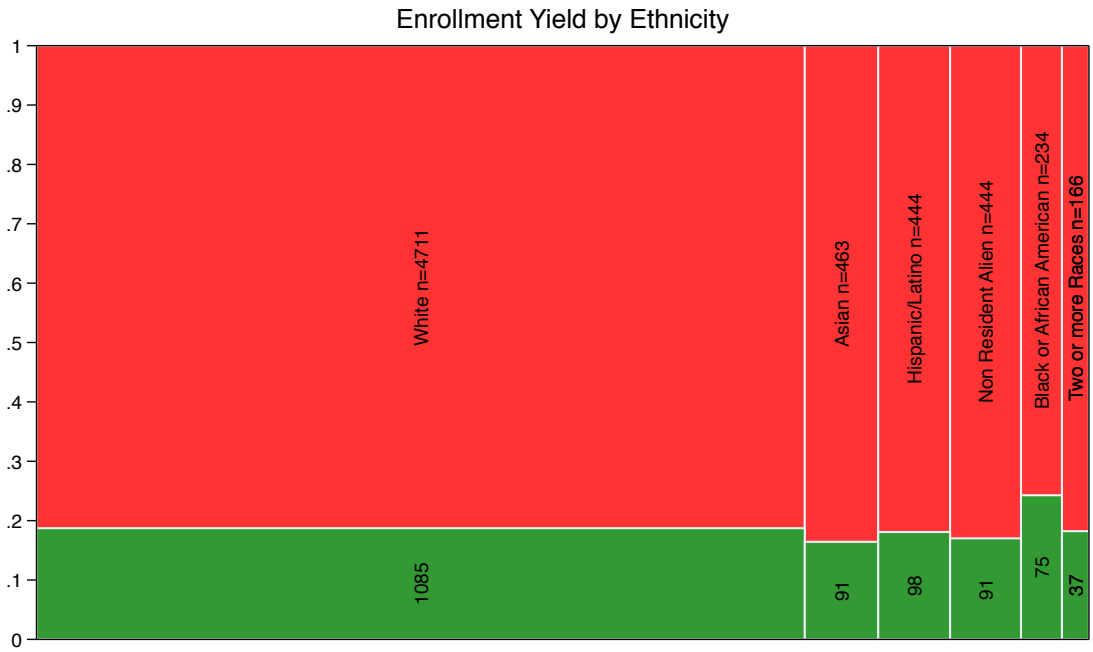
UNIVARIATE ANALYSIS

First we analyze yield across different categories without controlling for other variables. This allows us to better understand the basic, raw data.

3.1 Demographics

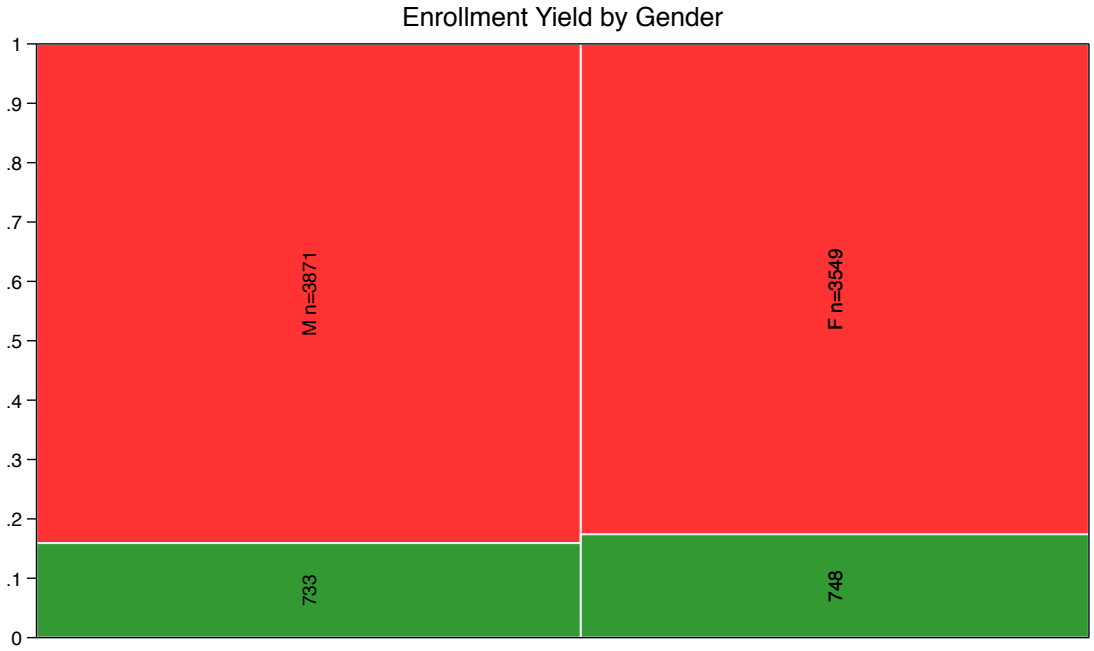
Figure 2 below shows the enrollment yields for each race/ethnic category in our data set.

Figure 2



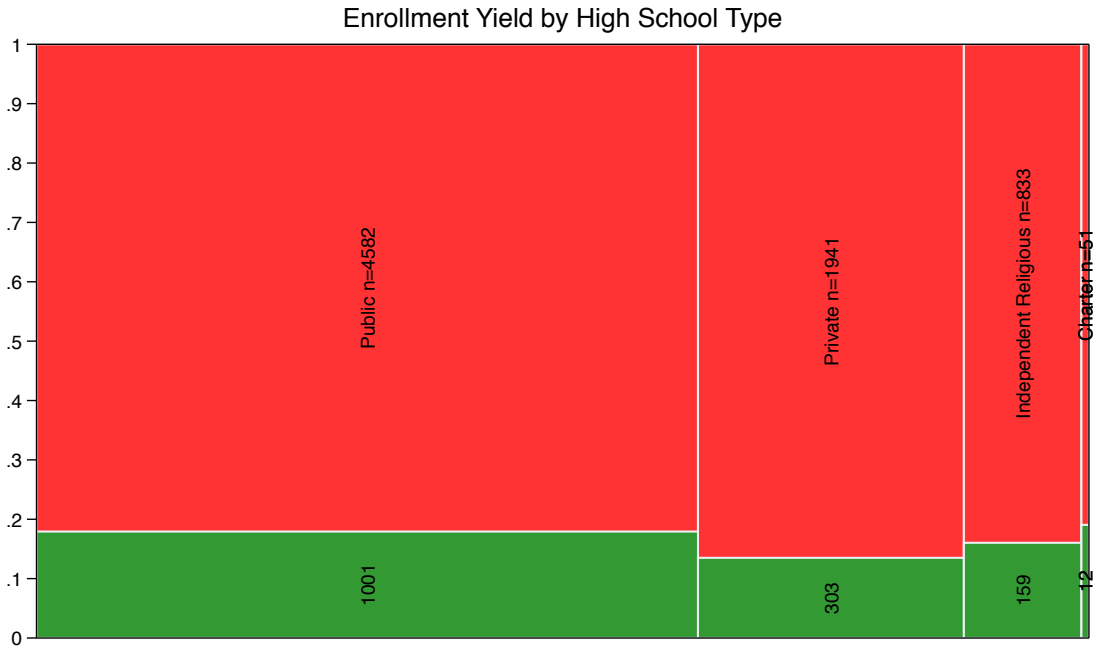
There appears to be few differences in enrollment yield across race with the exception of Black or African American students. These students yield at a rate of about 24.3% while all other students yield at a rate of 16.4%. This difference is statistically significant (Table 10.1).

Figure 3



As is apparent in Figure 3, males and females have yielded at essentially the same rate over the past five years. This can be verified statistically (Table 10.2).

Figure 4



Those students who were home schooled for high school yield at the highest rate when looking at students by high school type, with a yield of 40.0%. However, these students do not appear in Figure 4 because there are only 15 observations. Our intuition is that because Union requires these students to interview in person during the admissions

process this might cause them to be more likely to enroll. These students are followed by charter school students at 19.0%, public at 17.9%, independent religious school students at 16.0%, and finally private school students at 13.5%.

If we just compare students who attended public high schools to all other types of high schools, we see that the enrollment yield for public school students is 17.9% while the enrollment yield for all other students is 14.5%. This difference is statistically significant (Table 10.3).

3.2 Geography

Next we look at enrollment yield across the geographic variables in our data set.

Figure 5

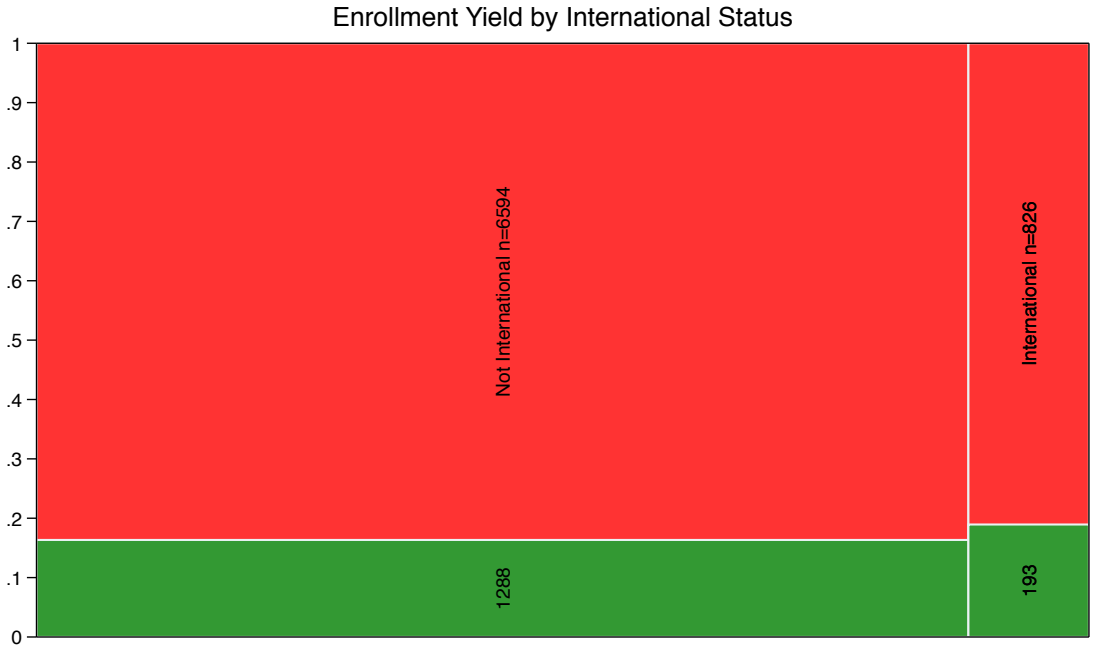
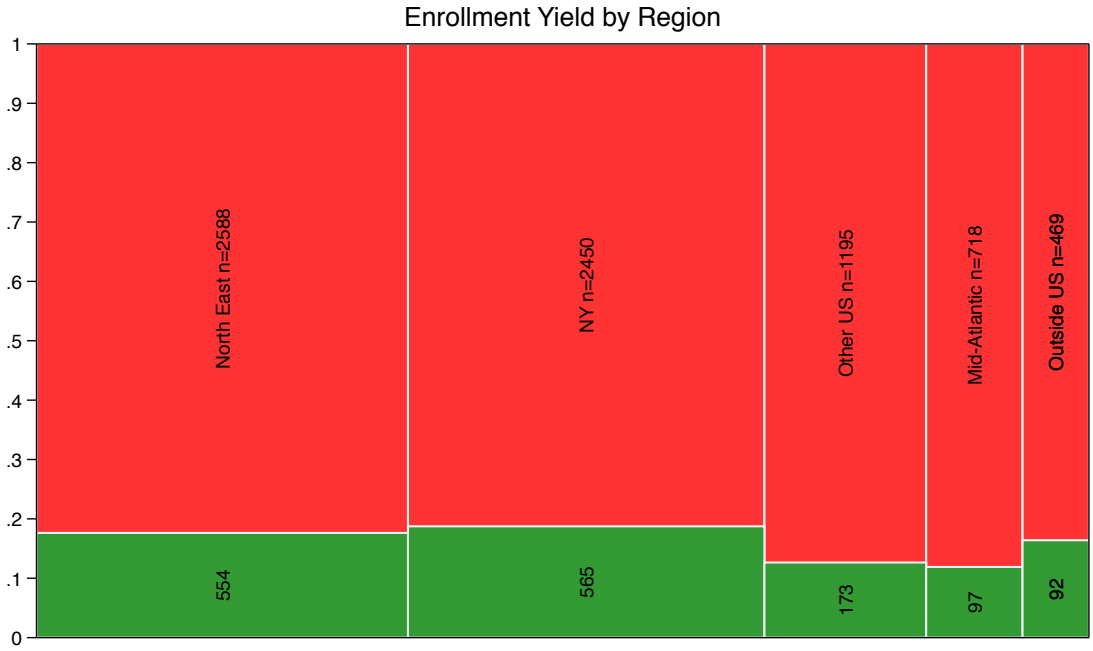


Figure 5 shows that the enrollment yield for international students is 18.9%, while the enrollment yield for domestic students is 16.3%. This difference is statistically significant (Table 10.4).

Figure 6



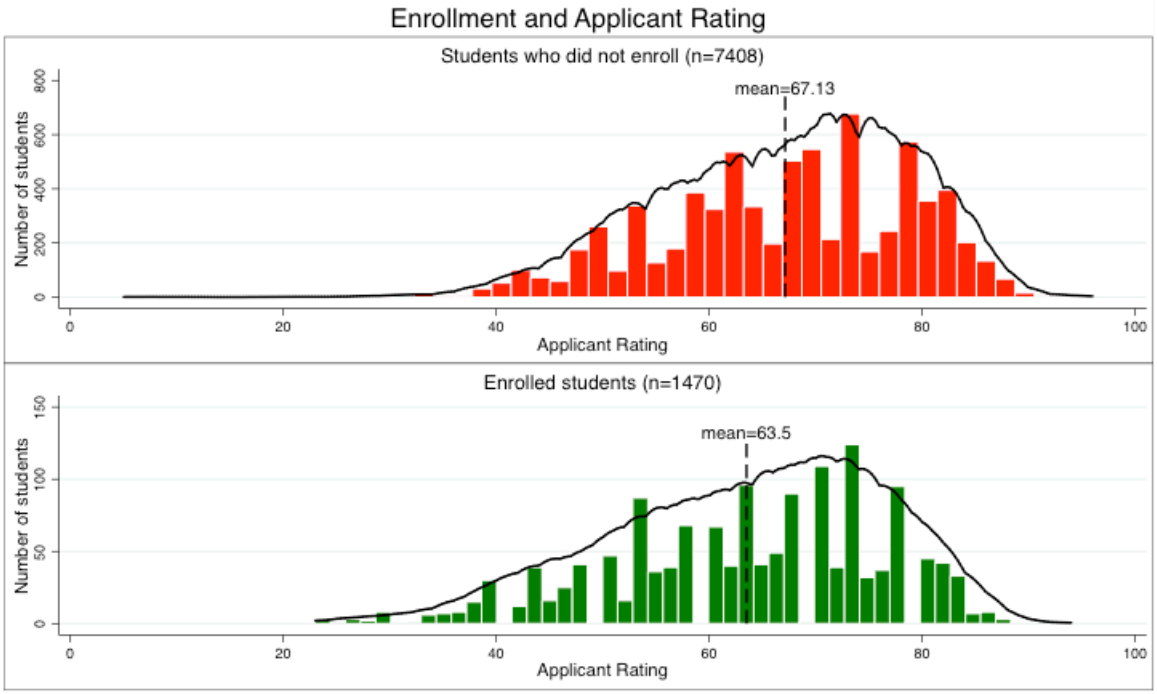
When we look at the enrollment yield by geographical region we see that the enrollment yield of students coming from New York State is the highest of any region at 18.7%, followed by the North East at 17.6%, outside of that United States[1] at 16.4%, other territories within the United States at 12.6%, and finally the Mid-Atlantic at 11.9%.

3.3. Academic quality of the student

Figure 7 compares the distribution of Applicant Rating – Union's composite measure of applicant's academic quality – for those students who do not enroll versus those students who do. The histogram of scores for non-enrolled students is presented first in red, while the histogram of scores for the enrolled students is presented beneath in green. The two graphs share the same scale on the horizontal axis and have the mean score marked with a vertical dotted line. This makes it easier to compare the mean score of the non-enrolled cohort to the mean score of the enrolled cohort. This type of graph will be used elsewhere throughout the study.

[1] This discrepancy between the yield value for students coming from outside of the United States (16.4%) and the yield value for international students (18.9%) should not be alarming. Region refers to a student's residency, while international status refers to a student's citizenship. Union has many international students who have their residency listed as within the United States.

Figure 7

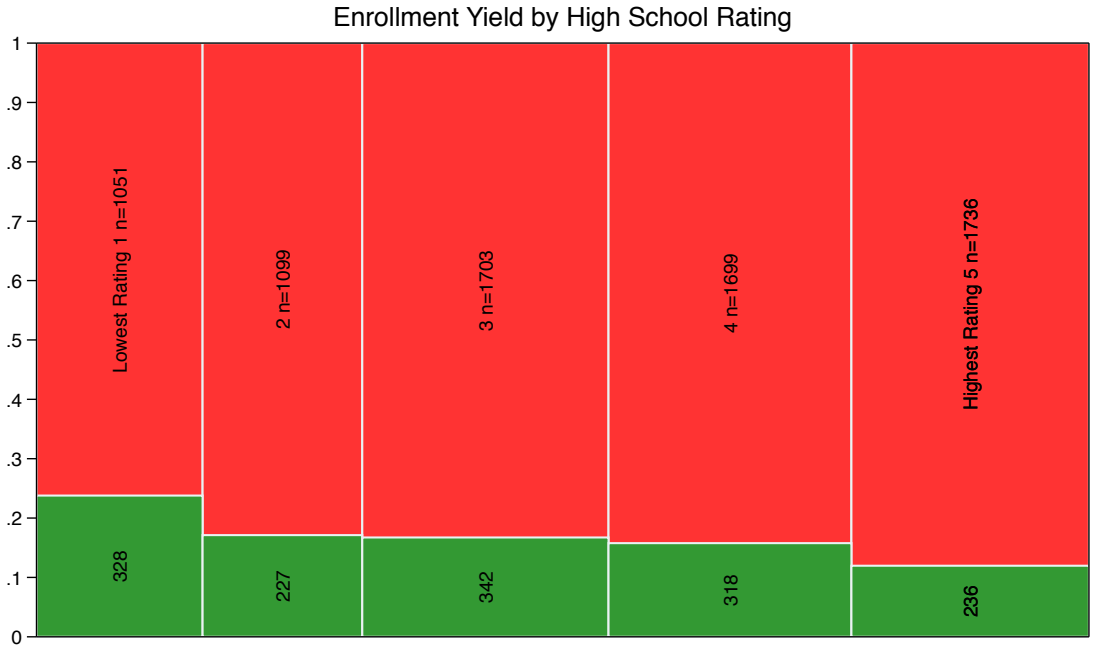


Students who do not enroll have an average applicant rating about four points higher than students who do enroll (67.1 vs. 63.5). This difference appears to be meaningful and is statistically significant (Table 10.5).

Figure 8

Figure 8 shows that, like applicant rating, the mean GPA for non-enrolled students is greater than the mean GPA for enrolled students. While the difference between a GPA of 91.22 and 90.78 seems small, it is statistically significant (Table 10.6).

Figure 9



The high school rating is how Union views each admitted student's high school on a 1 to 5 scale where 1 is the lowest, worst possible rating and 5 is the highest, best possible rating. There are some high schools without a rating. As shown in Figure 8, as high school rating increases (improves), students yield at a lower rate.

Figure 10

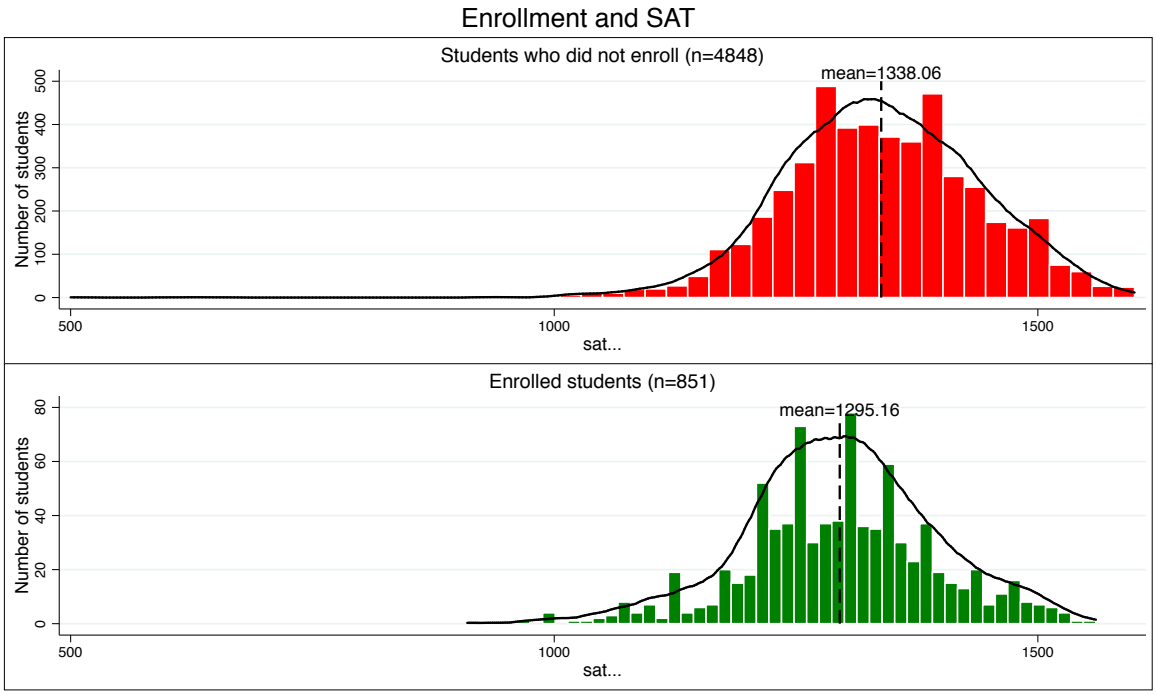


Figure 11

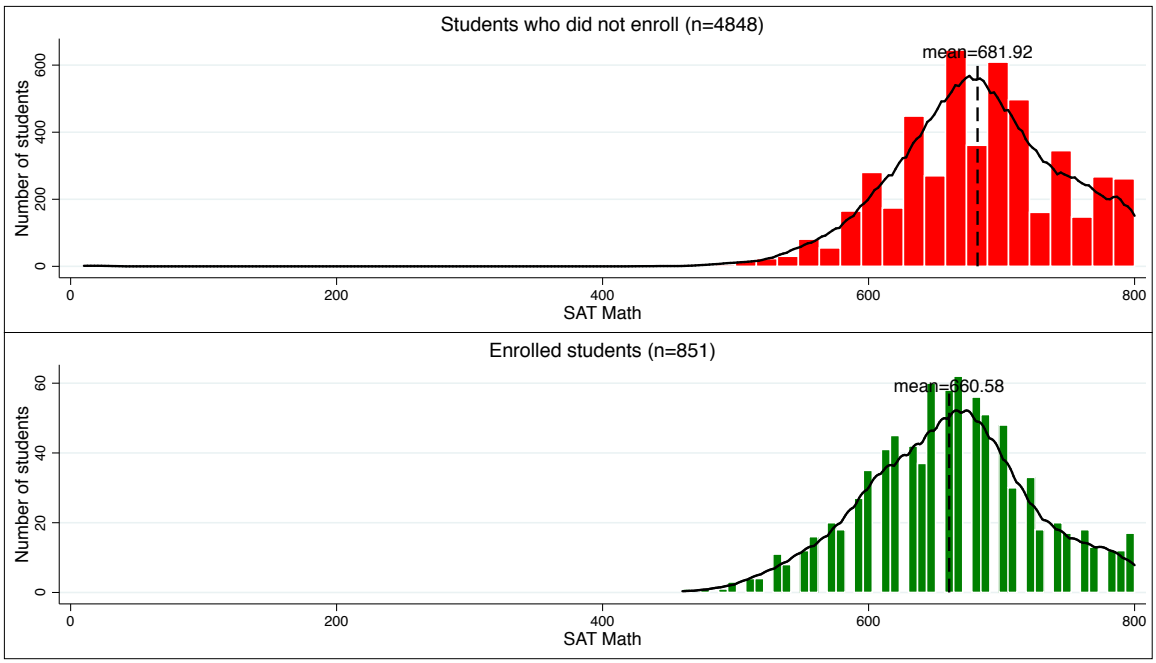
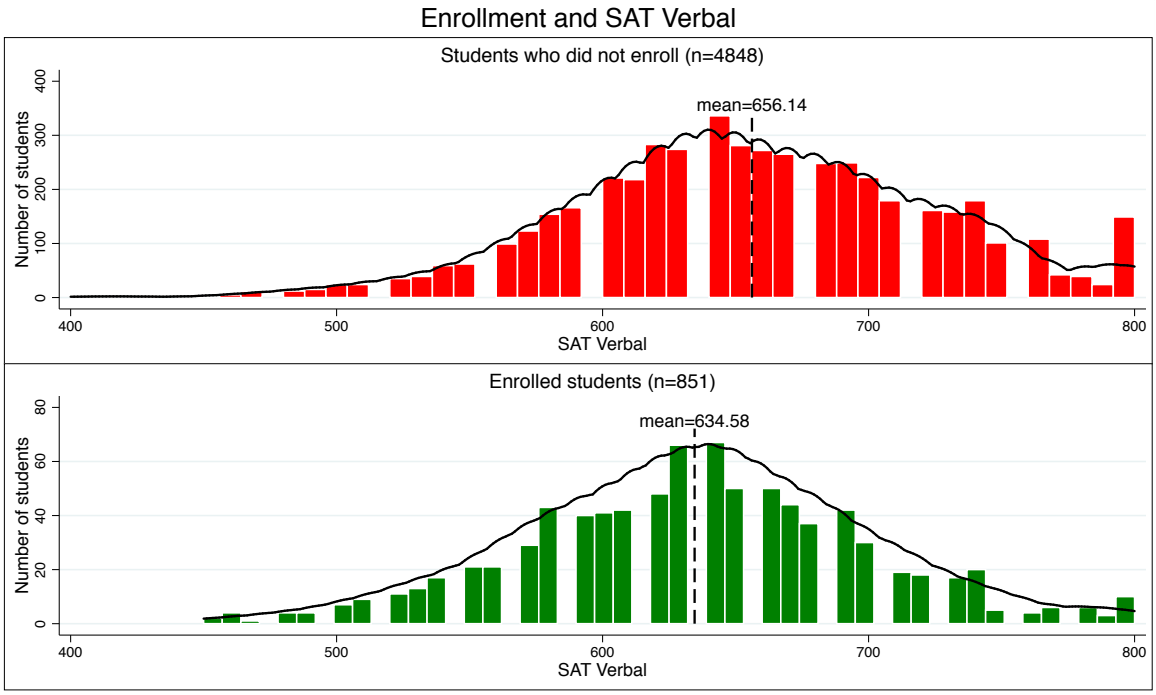


Figure 12

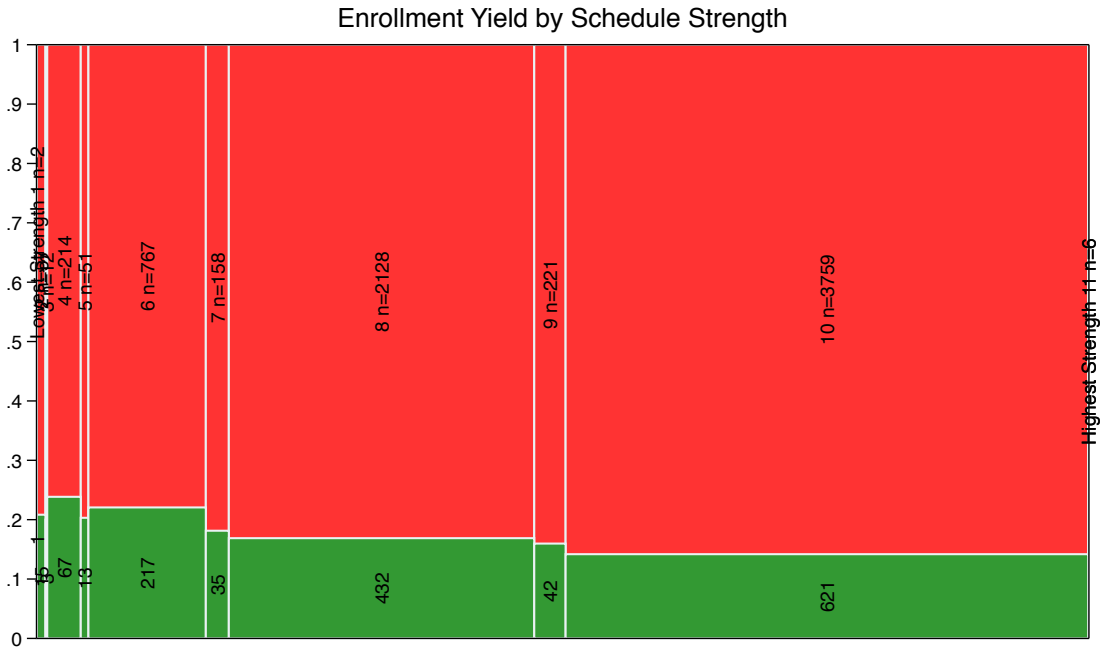


Perhaps the most striking difference in academic quality between students who enroll and students who do not appears in students' SAT scores. Figure 10 shows that the mean SAT score for non-enrolled students is about 3.3% higher than for students who do enroll (1338.1 vs. 1295.2[2]). This difference is statistically significant (Table 10.7).

The difference in SAT scores for enrolled students versus non-enrolled students is driven by differences in both components of the SAT composite score. Figure 11 shows that the difference between the SAT math scores of enrolled students versus non-enrolled students is 3.2% (21.34 points) while Figure 12 shows that the difference between the SAT verbal scores of enrolled students versus non-enrolled students is 3.4% (21.56 points).

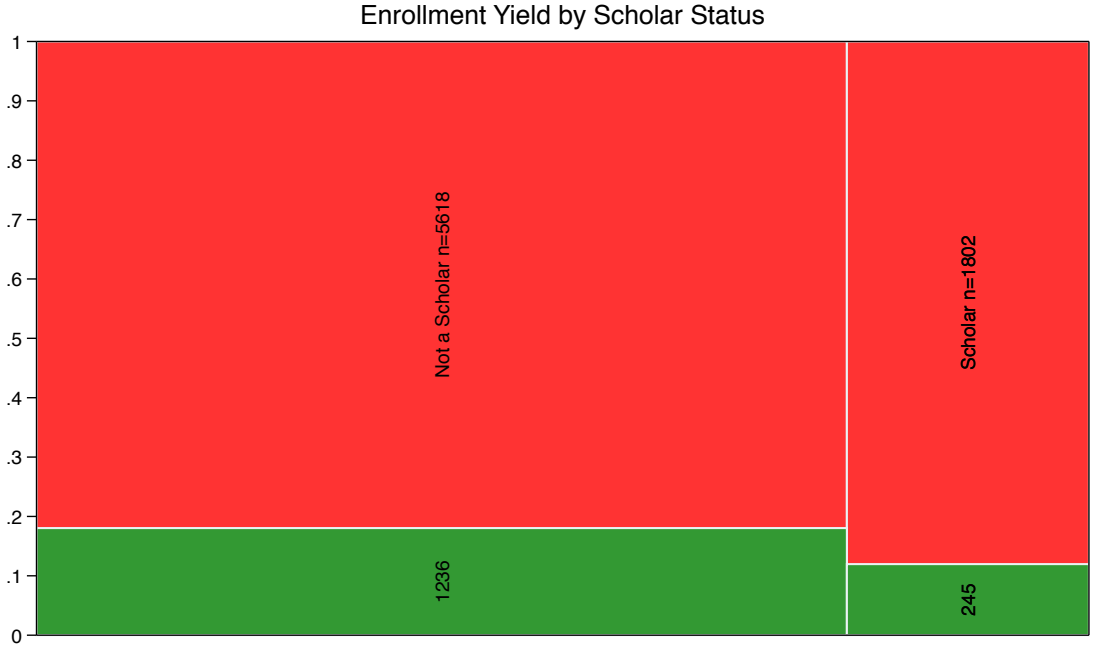
[2] It is important to note that this is the mean SAT score for enrolled first-time, full-time regular decision applicants for the academic years beginning Fall 2009 through Fall 2013 that asked Union to consider their scores during the admissions process. This is not Union's overall average SAT score.

Figure 13



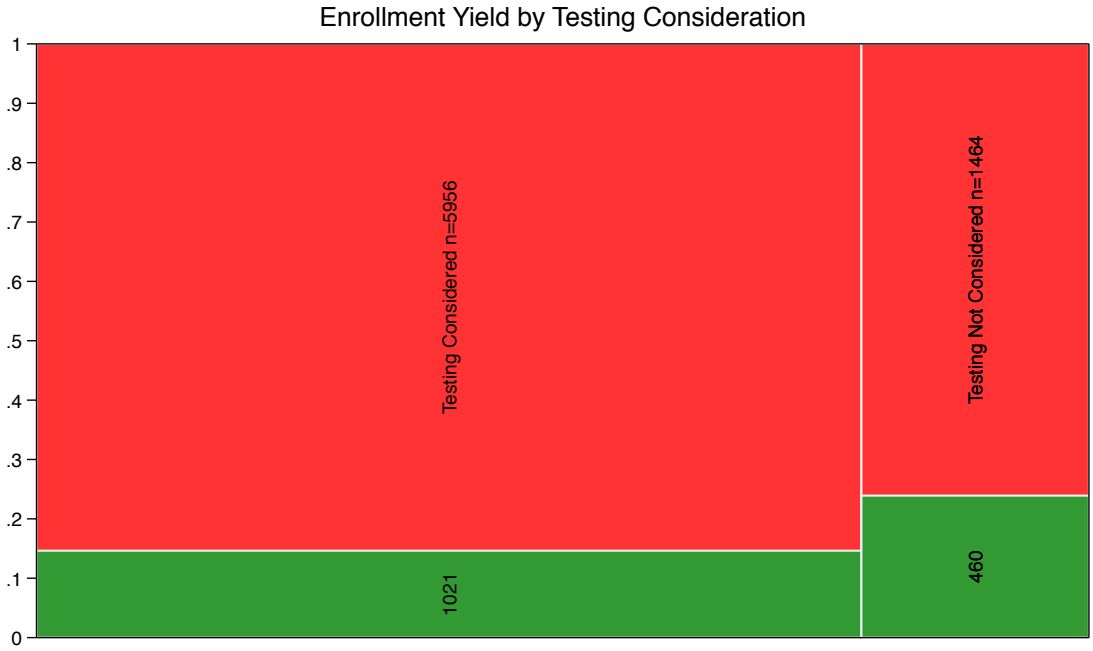
Like high school rating, a student's schedule strength is Union's assessment of the overall difficulty of an admitted student's high school academic schedule. The exact methodology of this system is outlined in Table 2.4 of the Statistical Appendix. The lowest, worst possible value is 1 while the highest, best possible value is 11. Again, as schedule strength increases (improves), students yield at a lower rate.

Figure 14



Union awards some of its top applicants admission to the Union Scholars program. Figure 14 shows that the enrollment yield for Scholars is 12.0% while the enrollment yield for non-scholars is 18.0%. This difference is statistically significant (Table 10.8)

Figure 15



Union College is a standardized testing optional school, meaning students do not need to submit SAT or ACT scores to the college for admissions consideration. When we compare students who have their standardized test scores considered to students who ask to not have their test scores considered, we see that those student who do not have their test scores considered yield at a rate of 23.9%, while those students who do have their test scores considered yield at 14.6%. This difference is statistically significant (Table 10.9).

3.4 Financial aid

Next we look at enrollment yield across financial aid variables.

Figure 16

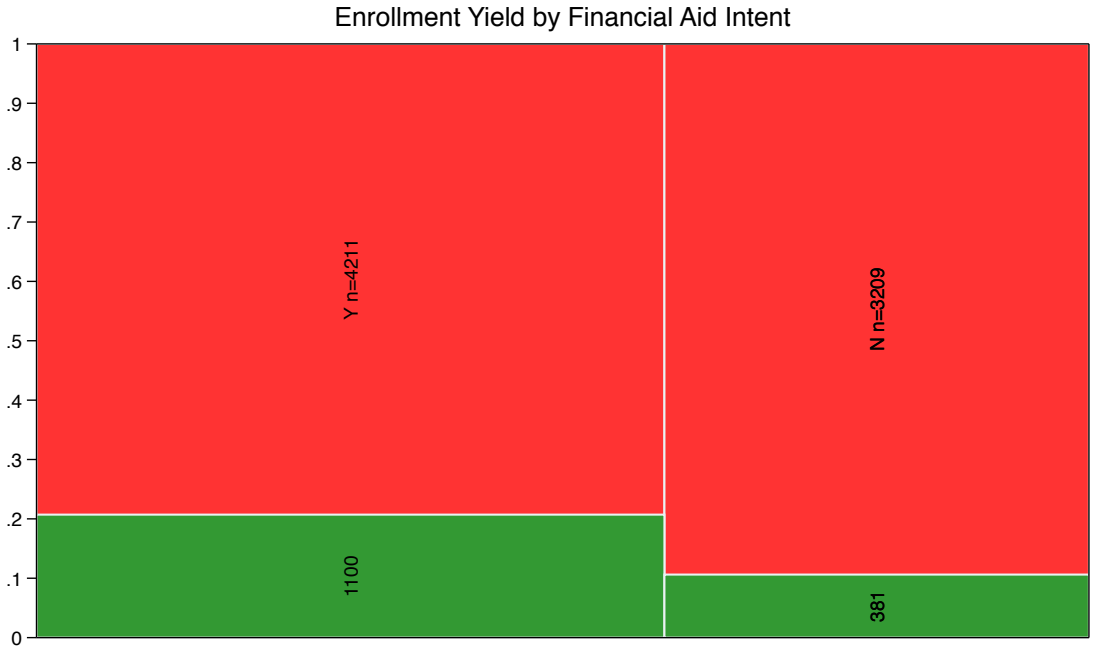


Figure 16 shows that the enrollment yield for those students who share with Union that they do intend on applying for financial aid is nearly double of that for students who do not intend on applying for financial aid (20.7% vs. 10.6%). This difference is statistically significant (Table 10.10).

Figure 17

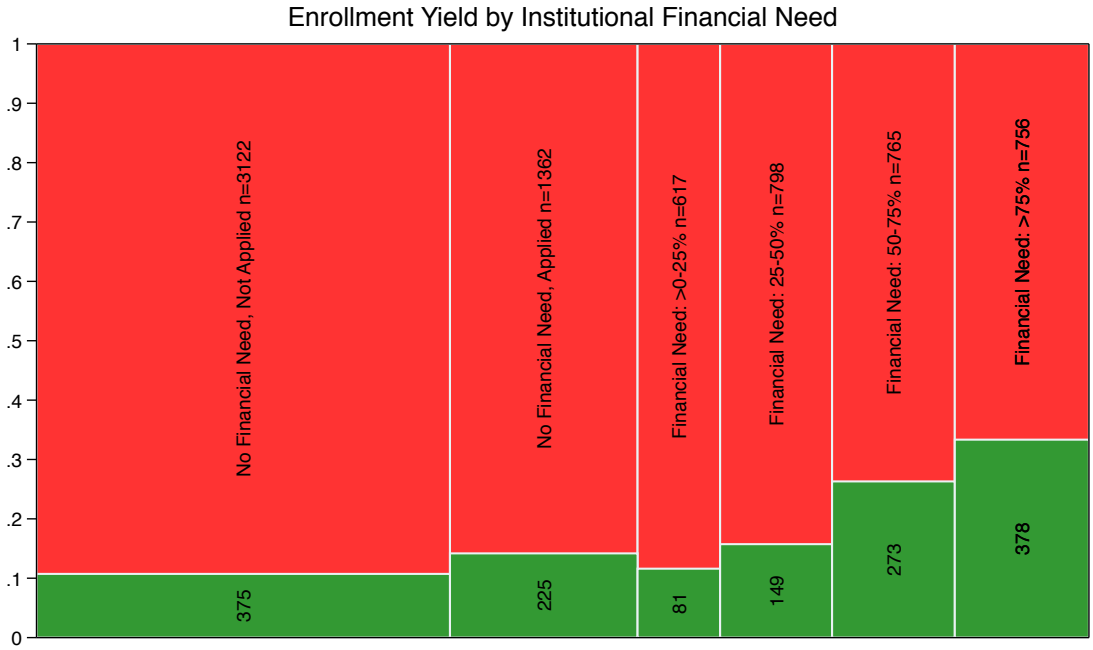


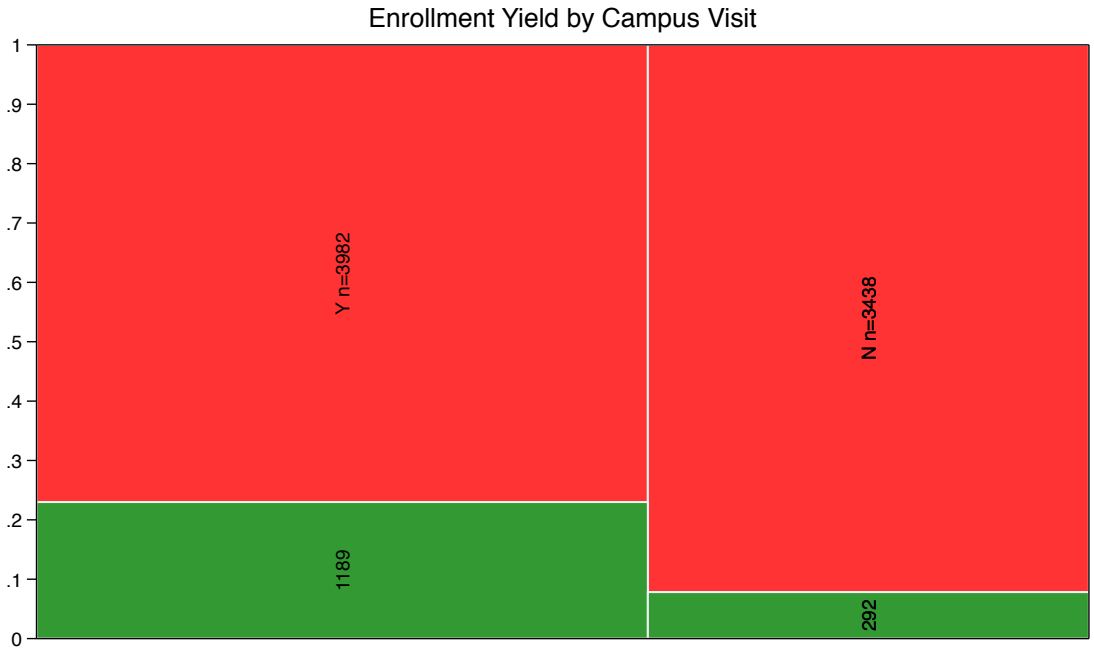
Figure 17 corroborates the story told by Figure 16. When admitted students are divided into brackets by financial aid as a percentage of Union's annual comprehensive fee, the

neediest students yield at the highest rate while those students who receive no financial aid and do not apply yield at the lowest rate. This trend generally holds as financial aid increases.

On average, the financial need of non-enrolled students is about 21.3% of Union's annual comprehensive fee while the financial need of enrolled students is 41.5%. This difference is statistically significant (Table 10.11).

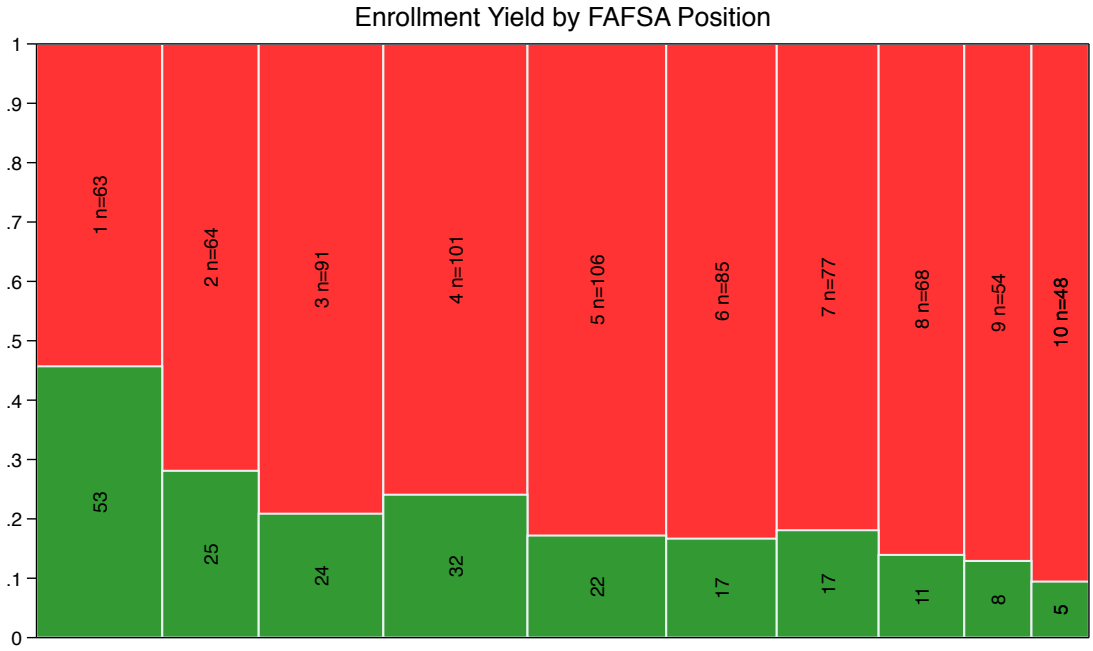
3.*5 Other*

Figure 18



As one might expect, the enrollment yield for students who visit Union on a campus visit is greater than that of students who do not visit. In fact, students who visit yield at a rate almost three times as great as that of students who do not visit (23.0% vs. 7.8%). This difference is statistically significant (Table 10.12).

Figure 19



When completing FAFSA forms for financial aid during the college admissions process, students are given the option to list up to ten schools where they would like to have their FAFSA information sent. The form does not prompt students to rank their colleges in any particular order, but there is some evidence to suggest that students often list their top-choice institution in position one, following by descending preferences. One might expect students who list Union in the number one position to yield at a higher rate than those students who list Union in the tenth position. Figure 19 shows this trend. Students who list Union in the first FAFSA position yield at an incredible 45.7%, with yield dropping almost perfectly as FAFSA position increases, and ending with those students who list Union in the tenth position yielding at just 9.4%.

Figure 20

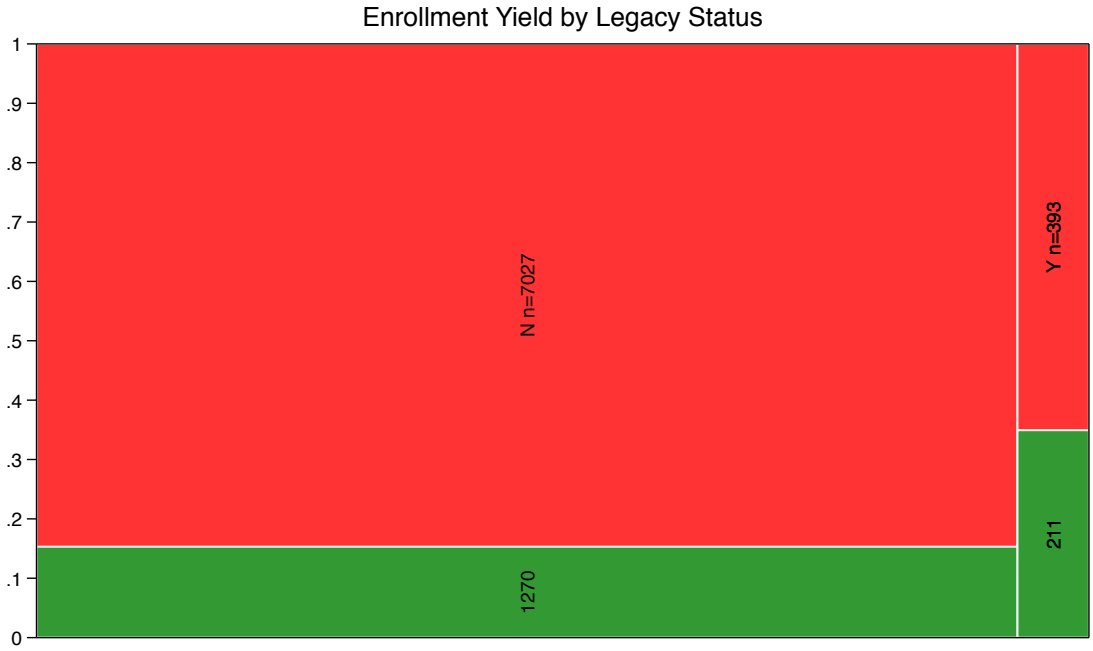
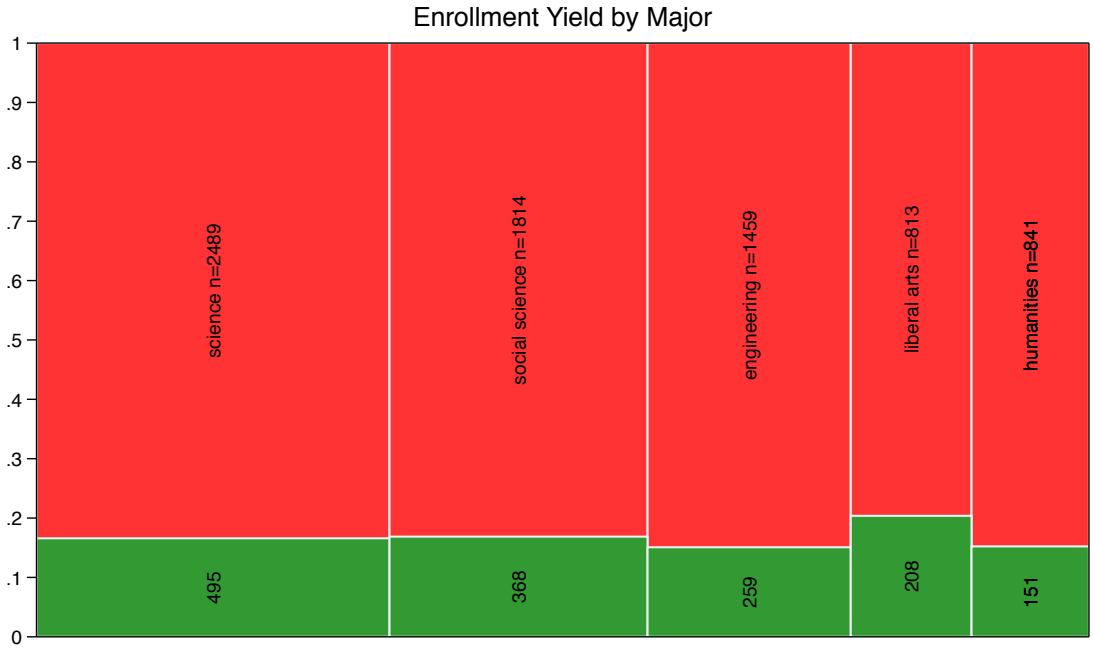


Figure 20 shows that legacy students yield at a rate almost twice as great as that of students who are not legacy students at Union College (34.9% vs. 15.3%). This difference is statistically significant (Table 10.13).

Figure 21



There appears to be few differences in enrollment yield across academic major designations. Over the last five years, those admitted students who identified their major

interest as “liberal arts” have yielded higher than all other majors at 20.4%. Potential engineering majors yielded the worst with a 15.1% enrollment yield.

CHAPTER FOUR

MULTIVARIATE ANALYSIS

The analysis above examined enrollment yield by one characteristic at a time. In the Statistical Appendix we present results from multivariate regressions where we are able to examine the effects of each characteristic while controlling for others.

4.*1 Demographics & geography*

From our univariate analysis we understand that men and women yield at essentially the same rate (Figure 3). When we regress enrollment yield on gender and ethnicity dummy variables in a probit model, we find that males are about one percentage point *less* likely to enroll than females. This effect is statistically significant even after we control for other demographic variables, such as ethnicity, high school type, and region (Table 11.1). This effect continues to persist when we control for academic variables (Table 11.2).

Black students are about four percentage points *more* likely to enroll than white students. This effect is statistically significant after we control for other demographic variables (Table 11.1), but disappears when we control for a student's applicant rating (Table 11.2). The effect is reversed when we control for financial aid (Table 11.8). This suggests that being black may just be a proxy for financial need. In fact, when we control for financial need black students are anywhere from five to twelve percentage points *less* likely to enroll than white students (Table 11.8). Our sense here is that these students might have many more options available to them when choosing a college due to affirmative action programs. Additionally, these students might be attracted elsewhere by differential packaging, a practice which Union does not take part in.

Controlling for gender and ethnicity, home-schooled students are about 22 percentage points *more* likely to enroll than students who attended public high schools. Students who attended private high schools are about four percentage points *less* likely to enroll than students who attended public high schools (Table 11.1). When we control for a student's applicant rating, the effect of being home-schooled goes up to 25.7%, while students that attended a religious independent high school are now 2.9 percentage points *less* likely to enroll than students who attended public high schools and the effect of attending a private high school now drops to -5.8% relative to those students who attended public high schools. We see similar effects when controlling for a student's GPA and SAT score (Table 11.2).

After controlling for other demographic variables, students from the Mid-Atlantic and students coming from a region outside of New York and the North Eastern states, but still inside the Unite States are both about five percentage points *less* likely to enroll than students coming from New York State (Table 11.1).

4.*2 Academic quality of the student*

When we control for a student's demographics, we see that for every additional point in one's applicant rating that student is *less* likely to enroll by a little less than a half of a percentage point. Albeit small, this effect is statistically significant. Similarly, when we control for gender and ethnicity we see that a one point increase in GPA makes a student about a half of a percentage point *less* likely to enroll than a student with a lower GPA. This effect is also statistically significant (Table 11.3). Similarly, after controlling for demographics, a student with a higher SAT score is on average *less* likely to enroll. A ten point increase in SAT scores leads to a one percentage point decrease in probability of enrolling. This effect is statistically significant (Table 11.3).

Students who do not have their standardized test scores considered throughout Union's application process are about eight percentage points *more* likely to enroll than students who do. Are these students simply of a poorer academic quality, which we know from our univariate analysis generally means that they will yield at a higher rate, seeing as overall non-enrolled students have stronger academic credentials? Even after we control for a student's academic quality using applicant rating we find that students who do not have their test scores considered are still about six percentage points *more* likely to enroll than students who do. Controlling for one's GPA makes such a student 7.8% *more* likely to enroll (Table 11.4). This supports remaining SAT-optional in order to help enrollment yield.

4.3 Union Scholars Program

Union offers some of its applicants of top academic quality admission to its Union Scholars program. Because these program designations are awarded based on academic performance, we might expect these students to yield at a lower rate on average, knowing that in general students of a higher academic quality tend to yield at a lower rate than those students of a lesser academic quality. At the same time, aside from rewarding some of Union's top students for their past academic excellence during their time at Union, the program is in part designed to attract students of high academic quality that would otherwise enroll at other institutions.

In our univariate analysis we saw that students with a Scholars designation yield at a rate of about six percentage points *less* than students without a Scholars designation (Figure 14). In Table 11.5 we ask if a Scholars designation has an effect while controlling for academic quality. In none of our specifications does Scholars designation increase the probability of enrollment. When we regress enrollment yield on a Scholar status dummy while controlling for demographic variables and students' GPAs, we find that students with a Scholars designation are about 4.7 percentage points *less* likely to enroll than students without a Scholars designation. The effect is statistically insignificant controlling for applicant rating and SAT scores (Table 11.5).

We can surmise that those students admitted to the Union Scholars program are probably extended similar offers by other schools. Perhaps students admitted to the Union Scholars program simply find it less attractive than related programs at other institutions. Many schools refer to these types of programs as "Honors" programs, some even admit students

into the school's "Honors College" as a way to attract bright students. Many of these programs include special housing where the members of the honors program can learn and live together. Union does not extend such an offer. Holding a student's academic quality constant, having a Scholars designation probably represents the extension of similar offers from other schools, which admitted students ultimately must find more attractive than Union's program.

4.4 Financial aid

Financial aid has a strong effect on the enrollment decision of Union's admitted students. We saw that as an applicant's financial aid increased, the enrollment yield also increased (Figure 17). The first component of the financial aid process at Union is intent – did the applicant tell the college that he or she intended to apply for financial aid? Apparently, a student who simply lets Union know that he or she intends on applying for financial aid is about 8.5 percentage points *more* likely to enroll than a student who does not intend on applying for financial aid. Controlling for a student's applicant rating or GPA increases the effect of aid intent to approximately ten percentage points more likely, while controlling for SAT scores keeps the effect at about 8.6 percentage points (Table 11.6). Clearly, Union's policy of meeting financial need is attractive to students with financial need.

When we regress enrollment yield on financial aid brackets and control for demographic variables, we find that every bracket except for the <25% category is *more* likely to enroll than those admitted students who do not receive any financial aid and did not apply. The significance of these effects persists even after we control for a student's academic quality. In fact, now even the <25% category is statistically significantly *more* likely to enroll than those students who do not receive any financial aid and did not apply. The magnitude of the effect is large. Students with need greater than 25% of Union's annual comprehensive fee are *more* likely to enroll by 5.8 to 25.5 percentage points (Table 11.7).

4.5 Other

Those applicants who have visited the Union campus yield a much higher rate than those applicants who have not (Figure 18). When regressed with demographic variables and controlling for geography, a student who visits the Union College campus is about fifteen percentage points *more* likely to enroll than a student who does not. Even after controlling for a student's academic quality this significance persists (Table 11.8). While these results are positive for Union's enrollment yield, we also understand that visiting campus has a certain "chicken-or-the-egg" quality to it; do students visit campus because they already know that they are going to enroll, or does the visit persuade them? It is difficult to tell.

We know from our univariate analysis that being a legacy applicant has very positive implications for enrollment, with the yield more than doubling for legacy students versus non-legacy students (Figure 20). When regressed with demographic variables, a student

who is a legacy student is about eighteen percentage points *more* likely to enroll than a student who is not. Controlling for academic quality yields the same effect (Table 11.9).

Applicants who have identified themselves as generic Liberal Arts majors yield at a higher rate than those students who have given Union a more specific major (Figure 21). When we control for a student's demographics we find that students who have specified a particular major are between two to four percentage points *less* likely to enroll than a student with a Liberal Arts designation. When we control for academic quality this effect persists (Table 11.10). One gets the sense that Union does better with students who are exploring their interests rather than students who really know what they want in terms of an academic major. These students might seek out specific programs not offered by a Liberal Arts college like Union.

CHAPTER FIVE

ANALYZING THE ACTIONS OF NON-ENROLLEES

Next we analyze the actions of non-enrollees. To take a closer look at the characteristics of the schools attended by Union's non-enrollees we use data from the Integrated Postsecondary Education Data System. We use two measures of school quality: average SAT score and admissions selectivity. These quality measures are taken from the year 2012 and merged with the Union College Admissions Data by school identification number.

5.1 Characteristics of schools attended by non-enrollees

SAT_mid is defined as the average SAT score of the enrolled students at a college. Higher values are more desirable. Selectivity is defined as the percent of applied students who are actually admitted by a college. Because this method would make lower values for selectivity mean that a college is relatively more selective, we invert this number so that higher values of selectivity represent a more selective school. In other words, selectivity is now the rejection rate (the higher the rejection rate, the higher the selectivity). The descriptive statistics for these variables are given in Section 9 of the Statistical Appendix.

Of the colleges attended instead of Union College by students admitted to Union, Virginia State University has the lowest average SAT score (of the colleges that report SAT data) and the California Institute of Technology has the highest average SAT score. Harvard University is the most selective college attended by Union admitted students instead of Union while the University of Wisconsin Colleges are the least selective.

In the IPEDS data, it is important to note that Union's selectivity is listed as 38.2% (which we invert to 61.8%). Union's selectivity means that it only admits 38.2% of the students who apply to the college. Union does not have an average SAT score listed in the IPEDS data because it does not require students to provide their SAT scores for the admissions process, but we know from the Admissions Department that this value is 1310.

5.2 Distribution of non-enrollees versus school quality measures

Now we look at how student enrollment varies across different measures of school quality. Of our approximately 7000 non-enrollees, we know where those students attended instead of Union for about 4000 of them.

First we see how many students attend schools with average SAT scores greater than, equal to, or less than Union's average value of 1310. We see that approximately 44% of admitted students for whom we know their destination school (and that school reports its average SAT score) attend schools with a higher average SAT score than Union. 54%

attend schools with a lower average SAT score and 2% attend schools with the same average SAT score. This information is presented in Panel A of Table 1 below.

Table 1

Distribution of Non-enrollees across School Average SAT Brackets

Panel A: Distribution Relative to Union College		
SAT Scores	Frequency	Percent
SAT above 1310	1560	43.56
SAT equal to 1310	82	2.29
SAT below 1310	1939	54.15
Total	3581	100.00
Panel B: Distribution Across Even Brackets		
SAT above 1380	680	17.00
SAT btwn 1380 & 1340	543	13.55
SAT btwn 1340 & 1290	545	13.63
SAT btwn 1290 & 1200	720	17.97
SAT below 1200	705	17.67
Schools not reporting SAT	808	20.17
Total	4,006	100.00

Next we want to better understand how far away students go from Union's mean. Are those students who attend schools with lower average SAT scores than Union going to schools with an average SAT score of 1300 (just 10 points below Union) or schools with an average SAT score of 1200 (100 points below Union)? We go through the following procedure:

First we find that about 20% of students for whom we know their destination school attend colleges that do not report average SAT scores. Next we take the remaining cohort of non-enrollees that we know destination schools for and divide them into quintiles to see what their schools look like in terms of mean SAT scores. Approximately one fifth of these non-enrollees attend schools with an average SAT score above 1380, one fifth attend schools with an average SAT score between 1380 and 1340, one fifth attend schools with an average SAT score between 1340 and 1290, one fifth attend schools with an average SAT score between 1290 and 1200, and one fifth attend schools with an average SAT score less than 1200. These brackets are listed in Panel B of Table 1 above.

We also look at how enrollment varies across school selectivity. We again first see how many students attend schools that are more selective than or less selective than Union. Because school selectivity values are extremely granular, no school in our data set has the same selectivity value as Union (approximately 62%). Therefore, we can divide schools into just two groups based on selectivity: those that are more selective than Union and those that are less selective than Union. We find that approximately 47% of non-enrollees attend schools that are more selective than Union and 53% of non-enrollees attend schools that are less selective. These values are presented in Panel A of Table 2 below.

Table 2

Distribution of Non-enrollees across School Selectivity Brackets

Panel A: Distribution Relative to Union College		
Selectivity	Frequency	Percent
Selectivity above 62%	2009	47.35
Selectivity below 62%	2234	52.65
Total	4,243	100.00
Panel B: Distribution Across Even Brackets		
Selectivity above 70%	680	17.00
Selectivity btwn 70% & 65%	543	13.55
Selectivity bwtn 65% & 55%	545	13.63
Selectivity btwn 55% & 40%	720	17.97
Selectivity below 40%	705	17.67
Total	4,006	100.00

As we did earlier with the schools' average SAT scores, we now divide our non-enrollees that we know destination schools for into quintiles to see what their schools look like in terms of selectivity. Approximately one fifth of these non-enrollees attend schools with selectivity greater than 70%, one fifth attend schools with selectivity between 70% and 65%, one fifth attend schools with selectivity between 65% and 55%, one fifth attend schools with selectivity between 55% and 40%, and one fifth attend schools with selectivity less than 40%. These brackets are listed in Panel B of Table 2 above.

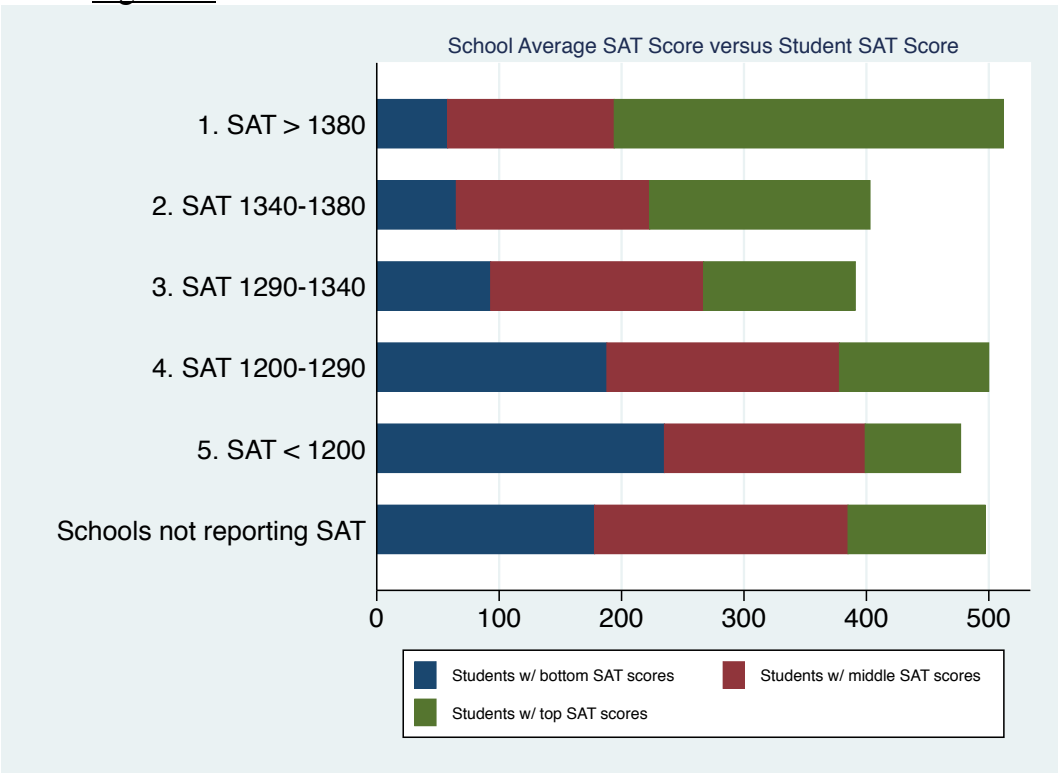
5.3 Do student quality measures match school quality measures?

We understand from Section 5.2 how different measures of school quality vary across enrollment, but do higher quality students choose to attend higher quality schools in a significant way? What kinds of applicants does Union lose to schools of various quality? We now take a closer look at the make-up of the students in each bracket of a given school quality. Across each bracket of school average SAT scores we see how students are distributed according to their own SAT scores. Across each bracket of school selectivity we see how students are distributed according to their applicant rating. We use bar charts like Figures 22 and 23 below to do this. The other combinations (student applicant rating across school average SAT score brackets and student SAT scores across school selectivity brackets) are not included here because they tell essentially the same story as the figures provided.

Students are divided into "top," "middle," and "bottom" based on their quality measure. For student SAT scores we take all of the students for whom we have SAT scores and divide them into three equal groups based on their SAT scores. We find that students in the top cohort have SAT scores greater than or equal to 1380, students in the middle cohort have SAT scores between or equal to 1280 and 1370, and students in the bottom cohort have SAT scores less than or equal to 1270. Bottom students are represented by the blue portion of each bar, while middle students are represented by the red portion of each bar, and top students are represented by the green portion of each bar.

Figure 22 below shows the bar chart describing the make-up of the students in terms of their own SAT scores in each bracket of school average SAT scores. We see that for the top bracket of school average SAT scores, many more students with the "top" SAT scores attend than students with the "bottom" SAT scores. Moving down the chart, for schools with average SAT scores between 1290 and 1340 the distribution of applicants is much more even; approximately the same number of students with the "top" SAT scores attend as students with the "middle" or "bottom" SAT scores. In the lowest bracket of school average SAT scores, those schools with average SAT scores less than 1200, many more students with the "bottom" SAT scores attend than students with the "top" SAT scores. This figure corroborates the hypothesis that higher quality students choose to attend higher quality schools.

Figure 22

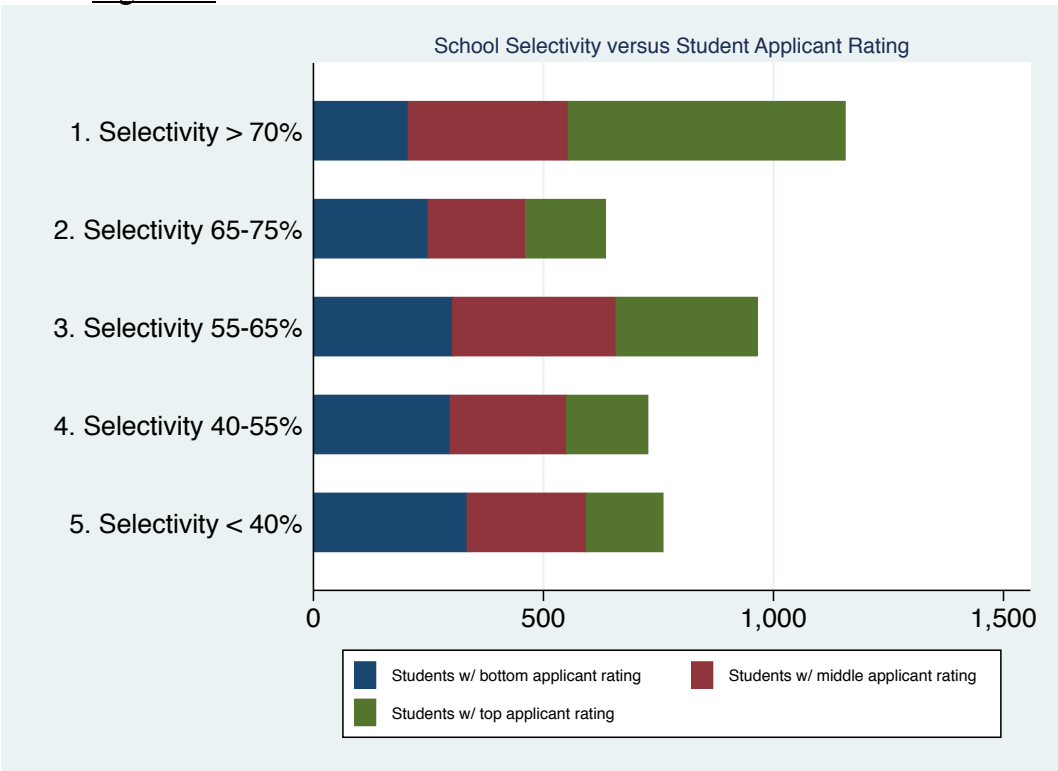


Next we examine student applicant rating across school selectivity brackets. This time we divide all the students for whom we have applicant rating values into three equal groups based on their applicant ratings. We find that students in the top cohort have applicant rating values greater than or equal to 74, students in the middle cohort have applicant rating values between or equal to 63 and 73, and students in the bottom cohort have applicant rating values less than or equal to 62. Once again, bottom students are represented by the blue portion of each bar, while middle students are represented by the red portion of each bar, and top students are represented by the green portion of each bar.

Figure 23 below shows the bar chart describing the make-up of the students in terms of their applicant rating values in each bracket of school selectivity. Like Figure 22, we see that for the top bracket of school selectivity, many more students with the "top" applicant

rating values attend than students with the "bottom" applicant rating values. In all of the other brackets of selectivity the distribution seems to be pretty even; approximately the same number of students with the "top" applicant rating values attend as students with the "middle" or "bottom" applicant rating values. Perhaps only in the lowest two brackets of school selectivity do we see more students with the "bottom" applicant rating values than other students.

Figure 23



5.4 Multivariate analysis of schools attended instead of Union

Like our multivariate analysis of students' enrollment decisions in Section 4, we now turn to multivariate analysis of the schools attended instead of Union by regressing schools' mean SAT scores and selectivity on student demographic and academic variables.

Looking at schools' mean SAT scores, when we control for gender and ethnicity, a one point increase in applicant rating means that a student will enroll at a school with a mean SAT score about 2.8 points higher on average. This positive correlation is corroborated by the top bracket of schools' SAT scores in Figure 22 above. A one point increase in a student's GPA means that he or she will choose to enroll at a school with a mean SAT score about 4.2 points higher on average. Finally, a ten-point increase in a student's SAT score means that he or she will enroll at a school with a mean SAT score 4.0 points higher on average (Table 11.11). All of these effects are statistically significant.

Controlling for gender and ethnicity, we see that a one point increase in a student's applicant rating means that he or she will choose to enroll at a school about 0.4% more

selective, while a one point increase in a student's GPA means that he or she will choose to enroll at a school about 0.6% more selective. A ten-point increase in a student's SAT score means that he or she will choose to enroll at a school about 0.6% more selective (Table 11.12). Again, all of these effects are statistically significant.

CHAPTER SIX

CONCLUSION

In the past five years Union has "done best" with white, public-schooled, financially needy females of lower academic quality and an undeclared major upon applying to Union as regular decision. Union loses students of high academic quality to high quality schools and programs like the Union Scholars program do little to counteract this.

Just as Union admits more students than it could ever accommodate in any given year in order to secure a complete class, students apply to many different colleges in order to make sure that they are accepted into some college that best meets their needs. Students of higher academic quality often have more choices because they meet the academic standards of the most selective institutions while also easily meeting the standards of less selective colleges. Many of the less selective colleges will admit students of extremely high academic standing even though they know that these students may be drawn to more selective colleges. Presented with so many choices, students of high academic quality often, though not always, choose to enroll at the most selective colleges.

That being said, the market for post-secondary education is a fairly competitive market and individual institutions must compete with one another on price and on quality. Caroline Hoxby, a notable academic in the field of education management, has noted that since the 1960s, students and their families began viewing a college education as a type of commodity. Thus, the market for post-secondary education must be approached like any other market. We see that Union does well with attracting enrollees through its financial aid packages, but there are myriad factors that determine where an individual student chooses to enroll and the data show that the students of highest academic quality do not necessarily sort themselves to the schools of highest quality. There is much more "mixing" than one might expect, suggesting that schools can not be complacent in the recruiting and admissions process, but must be well-managed to survive.

For the students for whom we have information about their destination schools, about 53% of those non-enrollees choose to attend schools that are less selective than Union. This number does not change much when look at it on a year-to-year basis. What makes a student go to a "lower quality" school when they have been admitted to a "higher quality" school? Clearly there are other factors that are influencing their decision making process when it comes to going to a certain college.

While Union routinely monitors its enrollment yield, a closer examination of the mix of students that decide to enroll could offer clues on how Union is perceived. Future work should focus on developing a measure of Union's ability to attract high quality students. As a first step we examine the comparative academic quality of enrolled students versus non-enrolled student over the past five years. While our median applicant rating and SAT score of our enrolled student body has always been lower than that of the non-enrollees for the past five years, there is little change in either measure of student academic quality

over the past five years. This is displayed visually in Figures 24 and 25 below, which show the median values for non-enrollees (N) versus enrollees (Y).

Figure 24

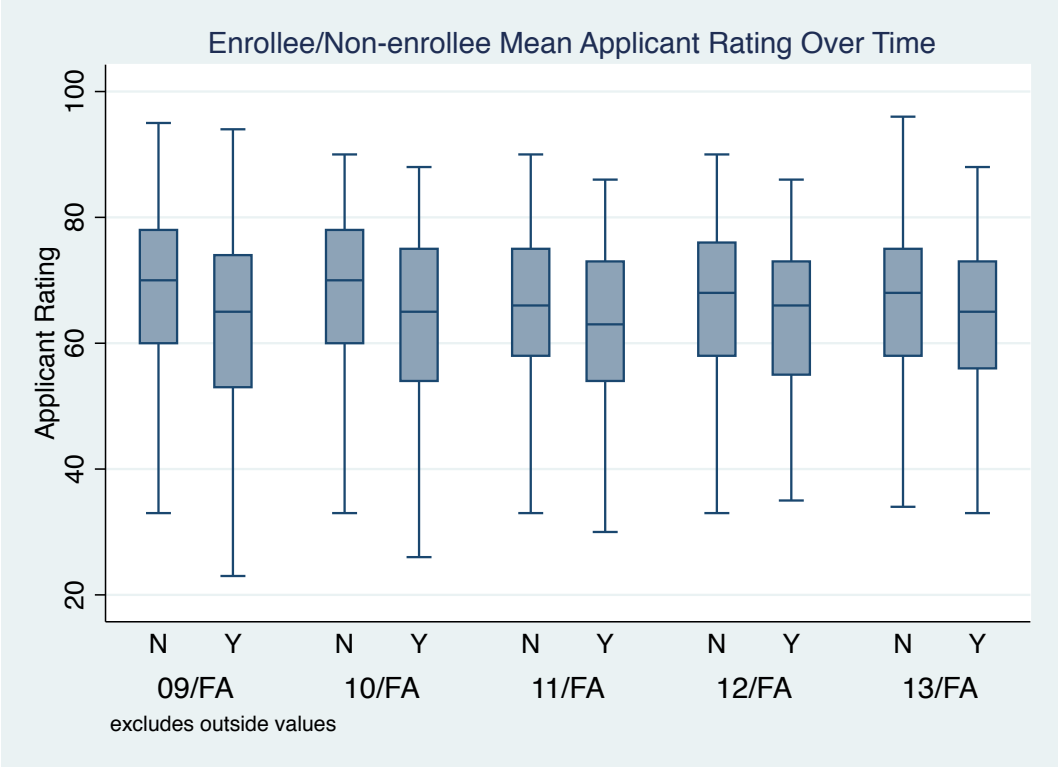
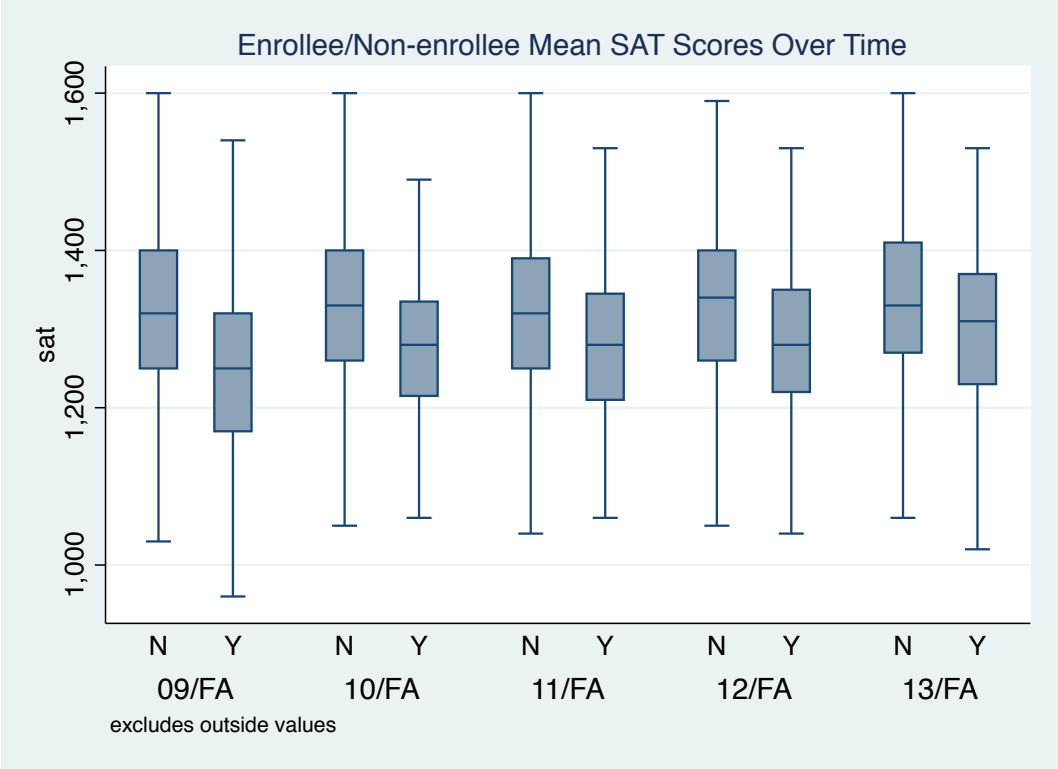


Figure 25



The most effective tool in Union's admissions toolbox seems to be financial aid; the needier the student, the more likely he or she is to enroll. Nevertheless, financial aid is a finite resource. Could there be a better way to structure or distribute the fixed pool of financial aid money that Union may give out each year in order to attract certain students? Future work could answer that question.

The discussion of financial aid calls to mind the changing effects that ethnicity had on the likelihood of enrolling at Union. We recall that when controlling for demographic variables, black students were about four percentage points *more* likely to enroll than white students. But after controlling for financial need, black students were five to twelve percentage points *less* likely to enroll than white students. A study presented at the 2009 National Association for College Admission Counseling found that African-American students were more likely to have chosen a school for the "scholarship/financial assistance" it offered. Many schools practice differential packaging in order to combat the difficulties of achieving diversity, but Union does not.

Finally, our beautiful campus and family loyalties seem to speak for themselves; students who have visited Union yield at a much higher rate and legacy students are much more likely to enroll. In a spring 2013 poll conducted by Noel-Levitz, college admissions officials at four-year private institutions rated campus visit days as the second most effective practice for marketing and student recruitment. That being said, students who make the effort to visit campus during the admissions process may already be more inclined to enroll.

In terms of other existing literature, unlike a study by Goenner and Pauls (2006), we found that applicants who expressed interest in a particular major were *less* likely to enroll. Tim Copeland of the blog, "Higher Education Marketing and Enrollment Management," suggests that schools tailor their marketing approaches to each individual student instead of a mass-marketing tactic and the results of our study certainly supports this.

This study showed that there are a number of strong predictors of enrollment at Union College. Union already has a predictive model in place that says if the school admits so many applicants, so many will enroll. This study explains what type of students are enrolling and calls for Union to tailor its marketing practices and financial aid packages in order to drive certain types of students to enroll. Future work should focus on developing a predictive model that explains how adjusting certain practices throughout the admissions process will better attract certain types of students to Union.

Enrollment Yield Study Statistical Appendix

Union College
March 2014

Prepared by
Catherine Ziac

This is an appendix to an Enrollment Yield at Union 2014 report. It contains detailed information regarding enrollment trends at Union for full-time first-time regular decision applicants for the academic years starting Fall 2009 through Fall 2013 as well as a brief summary of existing literature on enrollment management at the collegiate level. The appendix is organized as follows: In the first part, we look at the Union College admissions variables by start term. In the second part we use multivariate analysis and examine how the likelihood of enrolling at Union varies with some characteristics while controlling for others. Finally, we examine existing literature on the subject.

1. About the data

This data was last updated by the Union College Admissions Office on 2/11/2014.

2. Definition of terms

- ACT – American College Testing
- Admitted Student – Student accepted to Union College through the regular decision admissions process
- Enrolled Student – Student who decides to enroll as a full time first year undergraduate at Union College through the regular decision process
- FAFSA – Free Application for Federal Student Aid prepared annually by current and prospective college students in the United States to determine their eligibility for student financial aid
- GPA – Grade point average
- SAT – Scholastic Assessment Test

2.1 Key dependent variables

admitted_dummy =1 if student was admitted through the regular decision application process
enrolled_dummy =1 if student chose to enroll in the fall term of his or her freshman year

2.2 Demographic variables

alien_dummy =1 if student Non Resident Alien
asian_dummy =1 if student Asian
black_dummy =1 if student Black or African American
charter_dummy =1 if student attended a charter high school
ethnicity
= "American Indian or Alaska Native"
= "Asian"

= “Black or African American”
= “Hispanic/Latino”
= “Native Hawaiian or other Pacific Island”
= “Non Resident Alien”
= “Race/Ethnicity Unknown”
= “Two or more Races”
= “White”

gender
= “F” student female
= “M” student male

home_dummy =1 if student was homeschooled for high school

hstype
= “C” charter high school
= “H” home school high school
= “I” independent religious high school
= “N”
= “P” public high school
= “R” private high school

latino_dummy -1 if student Hispanic/Latino

male_dummy =1 if student male

other_dummy =1 if student American Indian or Alaska Native, Native Hawaiian or other Pacific Island, Two or more Races

private_dummy =1 if student attended a private high school

public_dummy =1 if student attended a public high school

relig_dummy =1 if student attended an independent religious high school

unknown_dummy = 1 if student unknown ethnicity

white_dummy = 1 if student White

2.3 Geographic variables

internationalstatus
= “Not International” student not an international student
= “International” student international student

internationalstatus_dummy =1 if student international student

region
= “NY” student from New York State
= “Mid-Atlantic” student from Pennsylvania or New Jersey
= “North East” student from Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, or Vermont
= “Other” student from any other American state or territory
= ”Outside US” student not from US state or territory

region_ma_dummy = 1 if student from Pennsylvania or New Jersey

region_ne_dummy = 1 if student from Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, or Vermont

region_other_dummy = 1 if student from any other American state or territory

region_out_dummy = 1 if student not from US state or territory

state

2.4 Academic quality of the student

applicantrating - rating system
gpa – high school grade point average
hsrating – how Union views the high school (higher numbers are better)
sat – combined SAT math and verbal score
satmath – SAT math score
satverbal – SAT verbal score
schedulestrength
=2 no advanced classes
=4 some honors or advanced; no top
=6 1 top class
=8 2-3 top classes
=10 4+ top classes
-1 if not carrying five majors (math, science, foreign language, social studies, English) senior year
+1 if in double curriculum
scholarstatus
= "N" student not admitted to Union Scholar program
= "Y" student admitted to Union Scholar program
scholarstatus_dummy =1 if student admired to some scholar program
testingnotconsidered_dummy =1 if student asked to have his or her test scores not considered in the admissions process

2.5 Financial variables

financialaidintent
= "N" student did not apply for financial aid
= "Y" student applied for financial aid
financialaidintent_dummy =1 if student responded yes to financial aid intent
finneed_0_a_dummy =1 if student received no financial aid, but applied
finneed_0_25_dummy = 1 if student received <25% financial aid as a percentage of the annual cost of attendance
finneed_25_50_dummy = 1 if student received 25-50% financial aid as a percentage of the annual cost of attendance
finneed_50_75_dummy = 1 if student received 50-75% financial aid as a percentage of the annual cost of attendance
finneed_75_dummy = 1 if student received >75% financial aid as a percentage of the annual cost of attendance
instneed – financial aid need (institutional methodology rather than federal)
blank if received some aid (Stafford Loans, merit scholarships) without submitting a CSS profile
need_pct – financial aid need as a percentage of Union's annual cost of attendance
u_finneed
= "No Financial Need, Not Applied" if student received no financial need and did not apply
= "No Financial Need, Applied" if student received no financial aid, but applied

= “Financial Need: >0-25%” if student received <25% financial aid as a percentage of the annual cost of attendance

= “Financial Need: 25-50%” if student received 25-50% financial aid as a percentage of the annual cost of attendance

= Financial Need: 50-75%” if student received 50-75% financial aid as a percentage of the annual cost of attendance

= Financial Need: >75%” if student received >75% financial aid as a percentage of the annual cost of attendance

2.6 Other

campusvisit

= “N” student did not visit campus during application process

= “Y” student did visit campus during application process

campusvisit_dummy = 1 if student did visit campus during application process

startterm

= “09/FA” fall 2009

= “10/FA” fall 2010

= “11/FA” fall 2011

= “12/FA” fall 2012

= “13/FA” fall 2013

legacystatus

= “N” student not an alumni child/grandchild/sibling

= “Y” student an alumni child/grandchild/sibling

legacystatus_dummy = 1 if student is an alumni child/grandchild/sibling

major

= “engineering” if student engineering major

= “humanities” if student humanities major

= “liberal arts” if student liberal arts major

= “science” if student science major

= “social science” if student social science major

majorengineering_dummy =1 if student engineering major

majorhumanities_dummy =1 if student humanities major

majorscience_dummy =1 if student science major

majorsocialscience_dummy =1 if student social science major

sat_mid – average SAT score for the college

selectivity – inverse of percent students admitted of applied students

union_fafsa_position

=0 Union not listed on FAFSA form

=1 Union listed in first position on FAFSA form

=2 Union listed in second position on FAFSA form

=3 Union listed in third position on FAFSA form

=4 Union listed in fourth position on FAFSA form

=5 Union listed in fifth position on FAFSA form

=6 Union listed in sixth position on FAFSA form

=7 Union listed in seventh position on FAFSA form

=8 Union listed in eighth position on FAFSA form
=9 Union listed in ninth position on FAFSA form
=10 Union listed in tenth position on FAFSA form
yield – percent students enrolled of admitted students

3. Union College enrollment rates

3.1 Admitted statistics

Start Term	Admitted Y
09/FA	1,680
10/FA	1,739
11/FA	1,865
12/FA	1,796
13/FA	1,821

3.2 Enrollment statistics

Start Term	enrolled_dummy 0	1
09/FA	1,401	279
10/FA	1,463	276
11/FA	1,554	311
12/FA	1,476	320
13/FA	1,526	295

3.3 Enrollment rates

Start Term	mean(enroll~y)
09/FA	.1660714
10/FA	.1587119
11/FA	.166756
12/FA	.1781737
13/FA	.1619989

4. Demographics

4.1 Ethnicity

Ethnicity	Start Term 09FA	10FA	11FA	12FA	13FA
American Indian/Alaska Native	2	4	4	2	2
Asian	127	99	96	134	98
Black or African American	80	67	59	60	43
Hispanic/Latino	110	100	118	98	116
Native Hawaiian/Pacific Islande	8		3		1
Non Resident Alien	74	84	106	106	165
Race/Ethnicity Unknown	196	232	201	161	146
Two or more Races	25	36	44	48	50
White	1058	1117	1234	1187	1200

4.2 Gender

Start Term	Gender F	M
09/FA	831	849
10/FA	857	882
11/FA	827	1,038
12/FA	864	932
13/FA	918	903

4.3 Percent male

Start Term	mean(male_d~y)
09/FA	.5053571
10/FA	.507188
11/FA	.5565684
12/FA	.518931
13/FA	.4958814

4.4 High school type

HS Type	Start Term 09/FA	10/FA	11/FA	12/FA	13/FA
Charter	6	7	11	21	18
Home School	3	1	4	3	4

Independent Religious	173	179	231	199	210
N	1			1	
Private	420	451	460	434	479
Public	1,076	1,101	1,159	1,137	1,110

5. Geography

5.1 International status

Start Term	international status N	Y
09/FA	1,513	167
10/FA	1,553	186
11/FA	1,664	201
12/FA	1,601	195
13/FA	1,551	270

5.2 Percent international

Start Term	mean(intern~y)
09/FA	.0994048
10/FA	.106958
11/FA	.1077748
12/FA	.1085746
13/FA	.1482702

5.3 Region

Start Term	region Mid-Atlantic	NY	North East	Other US	Outside US
09/FA	159	638	536	271	76
10/FA	173	603	601	279	83
11/FA	175	591	679	306	114
12/FA	153	604	667	252	120
13/FA	155	579	659	260	168

6. Academic qualifiers

6.1 Applicant rating

Start |

Term	mean(applic~g)	min(applic~g)	max(applic~g)
09/FA	67.7876	20	95
10/FA	67.7108	26	90
11/FA	65.331	5	90
12/FA	65.9787	28	90
13/FA	66.0203	10	96

6.2 GPA

Start Term	mean(gpa)	min(gpa)	max(gpa)
09/FA	92.19617	78.4	116.4
10/FA	91.84925	77.13	111.7
11/FA	90.81499	76.19	104.7
12/FA	90.53594	79.3	100
13/FA	90.42184	67.8	102.4

6.3 High school rating

Start Term	mean(hsrating)	min(hsrating)	max(hsrating)
09/FA	3.16233	1	5
10/FA	3.19707	1	5
11/FA	3.20952	1	5
12/FA	3.26518	1	5
13/FA	3.23604	1	5

6.4 SAT

Start Term	mean(sat)	min(sat)	max(sat)
09/FA	1303.1	500	1600
10/FA	1314.847	560	1600
11/FA	1310.757	490	1600
12/FA	1323.105	850	1590
13/FA	1328.969	930	1600

6.5 SAT math

Start Term	mean(satmath)	min(satmath)	max(satmath)
09/FA	662.02	20	800
10/FA	670.868	10	800
11/FA	668.635	40	800
12/FA	674.793	430	800
13/FA	679.949	440	800

6.6 SAT verbal

Start Term	mean(satver~l)	min(satver~l)	max(satver~l)
09/FA	641.08	20	800
10/FA	643.979	350	800
11/FA	642.122	400	800
12/FA	648.311	410	800
13/FA	649.019	400	800

6.7 Schedule strength

Start Term	mean(schedu~h)	min(schedu~h)	max(schedu~h)
09/FA	8.23633	1	10
10/FA	8.67901	1	10
11/FA	8.55833	2	11
12/FA	8.71325	2	11
13/FA	8.64388	1	11

6.8 Scholar status

Start	scholarstatus	
Term	Not a Scholar	Scholar
09/FA	1,162	518
10/FA	1,250	489
11/FA	1,423	442
12/FA	1,350	446
13/FA	1,329	492

6.9 Percent scholars

Start Term	mean(schola~y)
09/FA	.3083333
10/FA	.2811961
11/FA	.2369973
12/FA	.2483296
13/FA	.2701812

6.10 Special recruit

Start Term	specialrecruit_dummy 0	1
09/FA	1,598	82
10/FA	1,671	68
11/FA	1,743	122
12/FA	1,667	129
13/FA	1,668	153

6.11 Percent special recruit

Start Term	mean(specia~y)
09/FA	.0488095
10/FA	.0391029
11/FA	.0654155
12/FA	.0718263
13/FA	.0840198

6.12 Testing not considered

Start Term	testingnotconsidered_dummy 0	1
09/FA	1,304	376
10/FA	1,362	377
11/FA	1,470	395
12/FA	1,416	380
13/FA	1,425	396

6.13 Percent testing not considered

Start Term	mean(testin~y)
09/FA	.2238095
10/FA	.2167913
11/FA	.2117963
12/FA	.2115813
13/FA	.2174629

7. Financial aid

7.1 Financial aid intent

Start Term	Financial Aid Intent N	Y
09/FA	640	1,040
10/FA	737	1,002
11/FA	734	1,131
12/FA	720	1,076
13/FA	759	1,062

7.2 Percent financial aid intent

Start Term	mean(financ~y)
09/FA	.6190476
10/FA	.5761932
11/FA	.6064343
12/FA	.5991091
13/FA	.583196

7.3 Financial aid brackets

u_finneed	Start Term 09/FA	10/FA	11/FA	12/FA	13/FA
Financial Need: 25-50%	119	162	244	232	190
Financial Need: 50-75%	161	178	243	240	216
Financial Need: >0-25%	123	120	172	148	135
Financial Need: >75%	286	245	184	200	219

No Financial Need, Applied	366	315	309	274	323
No Financial Need, Not Applied	625	719	713	702	738

7.4 Institutional need

Start Term	mean(instneed)	min(instneed)	max(instneed)
09/FA	13083.56	0	60748
10/FA	12833.45	0	61695
11/FA	13030.31	0	64543
12/FA	14095.14	0	66403
13/FA	13906.74	0	68264

7.5 Percentage need

Start Term	mean(need_pct)	min(need_pct)	max(need_pct)
09/FA	.2593938	0	1.204386
10/FA	.2452455	0	1.178983
11/FA	.2400883	0	1.189229
12/FA	.2504066	0	1.17968
13/FA	.2387505	0	1.171954

8. Other

8.1 Campus visit

Start Term	Campus Visit N	Y
09/FA	744	936
10/FA	729	1,010
11/FA	822	1,043
12/FA	706	1,090
13/FA	729	1,092

8.2 Campus visit percent

Start Term	mean(campus~y)
09/FA	.5571429

```
    10/FA |       .5807936
    11/FA |       .5592493
    12/FA |       .6069042
    13/FA |       .5996705
--------------------------
```

8.3 FAFSA position

```
-------------------------------------------
union_faf |
sa_positi |            Start Term
on        | 09/FA  10/FA  11/FA  12/FA  13/FA
----------+--------------------------------
        0 |   730  1,720  1,863  1,796  1,821
        1 |   116
        2 |    86      3
        3 |   114      1
        4 |   131      2
        5 |   123      5
        6 |    98      3      1
        7 |    92      2
        8 |    77      2
        9 |    60      1      1
       10 |    53
-------------------------------------------
```

8.4 Legacy status

```
------------------------
Start     |Legacy Status
Term      |     N      Y
----------+-------------
    09/FA | 1,549    131
    10/FA | 1,594    145
    11/FA | 1,757    108
    12/FA | 1,679    117
    13/FA | 1,718    103
------------------------
```

8.5 Percent legacy

```
--------------------------
Start     |
Term      | mean(legacy~y)
----------+---------------
    09/FA |       .0779762
    10/FA |       .0833813
    11/FA |       .0579088
    12/FA |       .0651448
    13/FA |       .0565623
```

8.6 Major

major	Start Term 09/FA	10/FA	11/FA	12/FA	13/FA
engineering	248	308	370	384	408
humanities	262	198	182	186	164
liberal arts	212	198	222	174	215
science	561	587	595	614	627
social science	396	446	495	438	407

9. Descriptive statistics

variable	mean	p50	min	max	N
admitted_d~y	1	1	1	1	8901
enrolled_d~y	.1663858	0	0	1	8901
alien_dummy	.0601056	0	0	1	8901
asian_dummy	.0622402	0	0	1	8901
black_dummy	.0347152	0	0	1	8901
charter_du~y	.0070779	0	0	1	8901
home_dummy	.0016852	0	0	1	8901
latino_dummy	.060892	0	0	1	8901
male_dummy	.5172453	1	0	1	8901
other_dummy	.0243793	0	0	1	8901
private_du~y	.2521065	0	0	1	8901
public_dummy	.6272329	1	0	1	8901
relig_dummy	.1114482	0	0	1	8901
unknown_du~y	.1051567	0	0	1	8901
white_dummy	.6511628	1	0	1	8901
INTERNATIONAL STATUS DUMMY					
region_ma_~y	.0915627	0	0	1	8901
region_ne_~y	.352994	0	0	1	8901
region_oth~y	.1536906	0	0	1	8901
region_out~y	.0630266	0	0	1	8901
applicantr~g	66.53098	68	5	96	8878
gpa	91.1462	91.3	67.8	116.4	8780
hsrating	3.214784	3	1	5	8739
sat	1315.866	1320	490	1600	6190
satmath	671.0661	670	10	800	6190
satverbal	644.8	640	20	800	6190
schedulest~h	8.57091	9	1	11	8821
scholarsta~y	.2681721	0	0	1	8901
specialrec~y	.0622402	0	0	1	8901
testingnot~y	.2161555	0	0	1	8901
financiala~y	.5966745	1	0	1	8901
fin~25_dummy	.0784182	0	0	1	8901
finn~a_dummy	.1782946	0	0	1	8901
finneed_25~y	.1063925	0	0	1	8901
finneed_50~y	.1166161	0	0	1	8901
finneed_75~y	.1274014	0	0	1	8901
instneed	13396.06	0	0	68264	8901

```
    need_pct |   .2388696          0          0   1.166884       8901
campusvisi~y |    .580946          1          0          1       8901
legacystat~y |   .0678575          0          0          1       8901
majorengin~y |    .193012          0          0          1       8901
majorhuman~y |   .1114482          0          0          1       8901
majorscien~y |   .3352432          0          0          1       8901
majorsocia~y |    .245141          0          0          1       8901
     sat_mid |  1290.713       1300        820       1525       3581
 selectivity |  41.67139    39.3154    5.81307   98.96824       4243
union_fafs~n |  .5393776          0          0         10       8901
-------------------------------------------------------------------------
```

10. T-tests

10.1 Black versus all other

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    8592    .1636406    .0039914    .3699707    .1558166    .1714646
       1 |     309    .2427184    .0244289    .4294217    .1946497    .2907872
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |           -.0790779    .0215503               -.1213215   -.0368342
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -3.6694
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0001         Pr(|T| > |t|) = 0.0002          Pr(T > t) = 0.9999
```

10.2 Gender

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       F |    4297    .1740749     .005785     .379218    .1627333    .1854166
       M |    4604    .1592094    .0053927     .365911    .1486371    .1697817
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |            .0148656     .007899               -.0006183    .0303494
------------------------------------------------------------------------------
    diff = mean(F) - mean(M)                                      t =   1.8820
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9701         Pr(|T| > |t|) = 0.0599          Pr(T > t) = 0.0299
```

10.3 Public versus all other

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    3318    .1446655    .0061077    .3518162    .1326902    .1566407
       1 |    5583    .1792943    .0051343    .3836329     .169229    .1893595
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
```

```
---------+--------------------------------------------------------------------
    diff |           -.0346288    .0081564               -.0506172   -.0186404
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -4.2456
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

10.4 International status

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
Internat |    1019    .1894014    .0122806    .3920195    .1653031    .2134996
Not Inte |    7882    .1634103    .0041649    .3697631     .155246    .1715746
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |            .0259911    .0123964                .0016912    .0502909
------------------------------------------------------------------------------
    diff = mean(Internat) - mean(Not Inte)                        t =   2.0967
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9820         Pr(|T| > |t|) = 0.0361          Pr(T > t) = 0.0180
```

10.5 Mean applicant rating across enrollment

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    7408     67.1331    .1353146    11.64649    66.86784    67.39835
       1 |    1470     63.4966    .3335478    12.78841    62.84232    64.15088
---------+--------------------------------------------------------------------
combined |    8878    66.53098     .126501    11.91932      66.283    66.77895
---------+--------------------------------------------------------------------
    diff |            3.636501    .3381531                2.973642    4.299359
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  10.7540
Ho: diff = 0                                     degrees of freedom =     8876

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

10.6 Mean GPA across enrollment

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    7327    91.21957    .0459884    3.936507    91.12942    91.30972
       1 |    1453    90.77619    .1094111    4.170558    90.56157    90.99081
---------+--------------------------------------------------------------------
combined |    8780     91.1462    .0424684     3.97936    91.06295    91.22945
---------+--------------------------------------------------------------------
    diff |             .443382     .114187                .2195487    .6672153
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   3.8829
Ho: diff = 0                                     degrees of freedom =     8778

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
```

```
 Pr(T < t) = 0.9999         Pr(|T| > |t|) = 0.0001          Pr(T > t) = 0.0001
```

10.7 Mean SAT across enrollment

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    4848    1338.061    1.445824    100.6693    1335.227    1340.896
       1 |     851    1295.159    3.371649    98.35741    1288.541    1301.776
---------+--------------------------------------------------------------------
combined |    5699    1331.655    1.344223    101.4777     1329.02     1334.29
---------+--------------------------------------------------------------------
    diff |            42.90263    3.728843                35.59267    50.21258
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  11.5056
Ho: diff = 0                                     degrees of freedom =     5697

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

10.8 Scholar status

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    6854    .1803327    .0046443    .3844923    .1712285    .1894368
       1 |    2047    .1196873    .0071761    .3246749    .1056141    .1337606
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |            .0606453    .0093596                .0422984    .0789922
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   6.4795
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

10.9 Testing consideration

```
Two-sample ttest with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    6977     .146338    .0042317      .35347    .1380425    .1546335
       1 |    1924    .2390852    .0097265    .4266358    .2200097    .2581608
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |           -.0927473    .0095407               -.1114492   -.0740454
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -9.7213
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

10.10 Financial aid intent

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
```

```
---------+--------------------------------------------------------------------
       N |    3590    .1061281    .0051412    .3080445    .0960481    .1162081
       Y |    5311    .2071173    .0055612    .4052785    .1962151    .2180195
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |           -.1009892    .0079762               -.1166244    -.085354
------------------------------------------------------------------------------
    diff = mean(N) - mean(Y)                                      t = -12.6613
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

10.11 Mean percentage institutional need across enrollment

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |    7420    .2063467     .003615     .311393    .1992603    .2134331
       1 |    1481    .4018135    .0103453    .3981253    .3815205    .4221064
---------+--------------------------------------------------------------------
combined |    8901    .2388696     .003555    .3353923     .231901    .2458381
---------+--------------------------------------------------------------------
    diff |           -.1954668    .0093183               -.2137329   -.1772008
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t = -20.9766
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

10.12 Campus visit

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       N |    3730    .0782842    .0043989    .2686543    .0696598    .0869086
       Y |    5171    .2299362    .0058522    .4208323    .2184633     .241409
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |            -.151652    .0078383               -.1670168   -.1362872
------------------------------------------------------------------------------
    diff = mean(N) - mean(Y)                                      t = -19.3477
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

10.13 Legacy status

```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       N |    8297    .1530674     .003953    .3600741    .1453184    .1608163
       Y |     604    .3493377    .0194152     .477156    .3112081    .3874674
---------+--------------------------------------------------------------------
combined |    8901    .1663858    .0039477    .3724475    .1586474    .1741242
---------+--------------------------------------------------------------------
    diff |           -.1962704     .015559               -.2267696   -.1657712
```

```
------------------------------------------------------------------------------
    diff = mean(N) - mean(Y)                                      t = -12.6146
Ho: diff = 0                                     degrees of freedom =     8899

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

11. Probit regressions

11.1 Demographics, high school type, geography

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy
male_dummy	-0.014**	-0.012*	-0.013*
	(-2.08)	(-1.78)	(-1.84)
black_dummy	0.043**	0.048**	0.050***
	(2.32)	(2.52)	(2.63)
asian_dummy	-0.019	-0.021	-0.019
	(-1.38)	(-1.57)	(-1.41)
latino_dummy	-0.005	-0.004	-0.004
	(-0.38)	(-0.32)	(-0.29)
alien_dummy	-0.013	-0.002	0.014
	(-0.98)	(-0.16)	(0.44)
unknown_dummy	-0.185***	-0.184***	-0.183***
	(-7.32)	(-7.32)	(-7.42)
other_dummy	-0.003	-0.002	0.002
	(-0.14)	(-0.08)	(0.08)
charter_dummy		-0.011	
		(-0.28)	
home_dummy		0.221**	
		(2.15)	
relig_dummy		-0.016	
		(-1.45)	
private_dummy		-0.037***	
		(-4.54)	
region_ma_dummy			-0.055***
			(-4.68)
region_ne_dummy			-0.007
			(-0.87)
region_other_dummy			-0.050***
			(-5.00)
region_out_dummy			-0.041
			(-1.45)
Observations	8,901	8,899	8,901
r2_p	0.0452	0.0486	0.0508

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.2 Demographics, high school type, academics

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dummy
male_dummy	-0.012*	-0.017**	-0.019***	0.018*
	(-1.78)	(-2.51)	(-2.71)	(1.71)
black_dummy	0.048**	0.018	0.039**	-0.063**
	(2.52)	(0.99)	(2.11)	(-2.45)
asian_dummy	-0.021	-0.013	-0.020	-0.024
	(-1.57)	(-0.97)	(-1.51)	(-1.24)
latino_dummy	-0.004	-0.013	-0.008	-0.073***
	(-0.32)	(-0.97)	(-0.61)	(-3.84)
alien_dummy	-0.002	0.012	-0.006	-0.021
	(-0.16)	(0.82)	(-0.39)	(-1.11)
unknown_dummy	-0.184***	-0.178***	-0.182***	
	(-7.32)	(-7.02)	(-7.24)	
other_dummy	-0.002	-0.015	-0.005	-0.002
	(-0.08)	(-0.76)	(-0.22)	(-0.06)
charter_dummy	-0.011	-0.012	-0.014	-0.024
	(-0.28)	(-0.32)	(-0.36)	(-0.40)
home_dummy	0.221**	0.257**	0.200*	0.313**
	(2.15)	(2.47)	(1.92)	(2.40)
relig_dummy	-0.016	-0.029***	-0.022**	-0.023
	(-1.45)	(-2.76)	(-2.03)	(-1.40)
private_dummy	-0.037***	-0.058***	-0.053***	-0.049***
	(-4.54)	(-7.32)	(-6.33)	(-4.01)
applicantrating		-0.003***		
		(-11.74)		
gpa			-0.006***	
			(-6.02)	
sat				-0.001***
				(-14.06)
Observations	8,899	8,876	8,778	5,541
r2_p	0.0486	0.0664	0.0537	0.0445

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.3 Academics

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy
male_dummy	-0.020***	-0.019***	0.013
	(-2.86)	(-2.71)	(1.29)
black_dummy	0.016	0.037**	-0.068***

	(0.92)	(2.01)	(-2.66)
asian_dummy	-0.010	-0.017	-0.022
	(-0.76)	(-1.24)	(-1.13)
latino_dummy	-0.013	-0.008	-0.076***
	(-0.95)	(-0.60)	(-3.98)
alien_dummy	-0.008	-0.023	-0.037**
	(-0.61)	(-1.58)	(-2.05)
unknown_dummy	-0.181***	-0.183***	
	(-7.07)	(-7.28)	
other_dummy	-0.016	-0.005	-0.004
	(-0.77)	(-0.24)	(-0.13)
applicantrating	-0.003***		
	(-10.16)		
gpa		-0.004***	
		(-4.02)	
sat			-0.001***
			(-13.95)
Observations	8,878	8,780	5,542
r2_p	0.0584	0.0480	0.0400

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.4 Testing not considered

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy
male_dummy	-0.006	-0.012*	-0.009
	(-0.81)	(-1.74)	(-1.32)
black_dummy	0.014	-0.001	0.009
	(0.80)	(-0.06)	(0.54)
asian_dummy	-0.019	-0.012	-0.017
	(-1.44)	(-0.89)	(-1.31)
latino_dummy	-0.018	-0.021	-0.020
	(-1.34)	(-1.60)	(-1.52)
alien_dummy	-0.016	-0.012	-0.026*
	(-1.19)	(-0.85)	(-1.78)
unknown_dummy	-0.183***	-0.179***	-0.181***
	(-7.20)	(-7.01)	(-7.16)
other_dummy	-0.007	-0.017	-0.009
	(-0.34)	(-0.84)	(-0.41)
testingnotconsidered_dummy	0.079***	0.060***	0.078***
	(8.85)	(6.74)	(8.71)
applicantrating		-0.002***	
		(-8.62)	
gpa			-0.003***

			(-3.52)
Observations	8,901	8,878	8,780
r2_p	0.0549	0.0640	0.0574

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Note: testingnotconsidered_dummy is not run with SAT because only 491 students had their SAT scores submitted to Union, but not considered during the admissions process.)

11.5 Scholar status

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dummy
male_dummy	-0.020***	-0.018**	0.013	-0.008
	(-2.86)	(-2.57)	(1.23)	(-1.20)
black_dummy	0.016	0.030*	-0.068***	0.008
	(0.91)	(1.68)	(-2.66)	(0.44)
asian_dummy	-0.011	-0.017	-0.022	-0.019
	(-0.78)	(-1.26)	(-1.13)	(-1.43)
latino_dummy	-0.013	-0.012	-0.076***	-0.021
	(-0.96)	(-0.89)	(-3.99)	(-1.62)
alien_dummy	-0.009	-0.021	-0.037**	-0.014
	(-0.62)	(-1.44)	(-2.03)	(-1.04)
unknown_dummy	-0.181***	-0.182***		-0.182***
	(-7.08)	(-7.30)		(-7.21)
other_dummy	-0.016	-0.008	-0.005	-0.011
	(-0.78)	(-0.40)	(-0.15)	(-0.55)
scholarstatus_dummy	-0.005	-0.047***	-0.006	-0.043***
	(-0.51)	(-5.15)	(-0.45)	(-5.34)
applicantrating	-0.003***			
	(-7.84)			
gpa		-0.001		
		(-1.19)		
sat			-0.001***	
			(-12.97)	
testingnotconsidered_dummy				0.072***
				(8.01)
Observations	8,878	8,780	5,542	8,901
r2_p	0.0585	0.0514	0.0401	0.0585

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.6 Financial aid intent

RIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dumm
le_dummy	-0.011	-0.017**	-0.019***	0.017*
	(-1.58)	(-2.52)	(-2.77)	(1.66)
ck_dummy	0.011	-0.027*	-0.005	-0.083***
	(0.66)	(-1.76)	(-0.32)	(-3.48)
an_dummy	-0.031**	-0.023*	-0.030**	-0.033*
	(-2.39)	(-1.86)	(-2.42)	(-1.75)
no_dummy	-0.024*	-0.037***	-0.031**	-0.086***
	(-1.86)	(-3.14)	(-2.54)	(-4.73)
n_dummy	0.005	0.022	-0.003	-0.020
	(0.32)	(1.50)	(-0.19)	(-1.04)
nown_dummy	-0.179***	-0.172***	-0.176***	
	(-7.20)	(-6.79)	(-7.09)	
er_dummy	-0.014	-0.030	-0.021	-0.014
	(-0.69)	(-1.60)	(-1.06)	(-0.45)
ncialaidintent_dummy	0.085***	0.105***	0.100***	0.086***
	(11.88)	(14.66)	(13.64)	(8.21)
licantrating		-0.004***		
		(-13.62)		
			-0.007***	
			(-7.69)	
				-0.001***
				(-13.91)
servations	8,901	8,878	8,780	5,542
p	0.0634	0.0867	0.0725	0.0535

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.7 Financial aid brackets

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dummy
male_dummy	-0.005	-0.011*	-0.015**	0.023**
	(-0.77)	(-1.73)	(-2.30)	(2.27)
black_dummy	-0.051***	-0.079***	-0.067***	-0.117***
	(-3.42)	(-6.46)	(-5.05)	(-5.59)
asian_dummy	-0.060***	-0.055***	-0.062***	-0.065***
	(-5.08)	(-4.86)	(-5.49)	(-3.58)
latino_dummy	-0.060***	-0.073***	-0.069***	-0.113***
	(-5.11)	(-6.96)	(-6.31)	(-6.64)
alien_dummy	-0.009	0.012	-0.014	-0.030*
	(-0.63)	(0.83)	(-0.97)	(-1.65)
unknown_dummy	-0.174***	-0.165***	-0.170***	

	(-7.53)	(-7.09)	(-7.44)	
other_dummy	-0.031	-0.047***	-0.040**	-0.030
	(-1.60)	(-2.73)	(-2.21)	(-1.02)
finneed_0_a_dummy	0.036***	0.061***	0.057***	0.024
	(3.34)	(5.58)	(5.21)	(1.57)
finneed_0_25_dummy	0.011	0.034**	0.030**	0.000
	(0.73)	(2.28)	(2.00)	(0.01)
finneed_25_50_dummy	0.053***	0.090***	0.083***	0.058***
	(4.04)	(6.53)	(5.99)	(3.11)
finneed_50_75_dummy	0.161***	0.221***	0.205***	0.169***
	(11.86)	(14.94)	(14.00)	(9.05)
finneed_75_dummy	0.267***	0.342***	0.331***	0.255***
	(17.28)	(20.16)	(19.35)	(12.10)
applicantrating		-0.004***		
		(-15.60)		
gpa			-0.009***	
			(-10.21)	
sat				-0.001***
				(-13.24)
Observations	8,901	8,878	8,780	5,542
r2_p	0.0925	0.123	0.107	0.0796

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.8 Campus visit

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dummy
male_dummy	-0.006	-0.011*	-0.011*	0.021**
	(-0.94)	(-1.68)	(-1.66)	(2.16)
black_dummy	0.076***	0.041**	0.066***	-0.035
	(3.86)	(2.23)	(3.44)	(-1.29)
asian_dummy	0.015	0.019	0.014	0.031
	(1.04)	(1.33)	(1.02)	(1.44)
latino_dummy	0.020	0.006	0.014	-0.042**
	(1.38)	(0.47)	(1.01)	(-2.14)
alien_dummy	0.104***	0.112***	0.075**	0.127**
	(2.81)	(3.03)	(2.04)	(2.38)
unknown_dummy	-0.166***	-0.161***	-0.164***	
	(-7.56)	(-7.31)	(-7.52)	
other_dummy	0.013	-0.002	0.010	0.019
	(0.60)	(-0.08)	(0.46)	(0.59)
region_ma_dummy	-0.048***	-0.057***	-0.053***	-0.043**
	(-4.23)	(-5.36)	(-4.73)	(-2.49)
region_ne_dummy	-0.017**	-0.030***	-0.024***	-0.011

	(-2.18)	(-3.97)	(-3.02)	(-0.98)
region_other_dummy	-0.027***	-0.036***	-0.032***	-0.035**
	(-2.72)	(-3.73)	(-3.18)	(-2.20)
region_out_dummy	-0.010	-0.020	-0.005	-0.020
	(-0.35)	(-0.73)	(-0.18)	(-0.46)
campusvisit_dummy	0.144***	0.140***	0.142***	0.186***
	(19.12)	(18.97)	(19.15)	(16.40)
applicantrating		-0.003***		
		(-10.62)		
gpa			-0.004***	
			(-4.47)	
sat				-0.001***
				(-14.05)
Observations	8,901	8,878	8,780	5,542
r2_p	0.101	0.116	0.106	0.104

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.9 Legacy status

VARIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dummy
male_dummy	-0.012*	-0.018***	-0.017**	0.015
	(-1.81)	(-2.59)	(-2.47)	(1.44)
black_dummy	0.059***	0.030*	0.051***	-0.056**
	(3.08)	(1.66)	(2.74)	(-2.15)
asian_dummy	-0.006	0.002	-0.004	-0.009
	(-0.46)	(0.16)	(-0.32)	(-0.45)
latino_dummy	0.004	-0.004	0.001	-0.067***
	(0.30)	(-0.27)	(0.06)	(-3.48)
alien_dummy	-0.001	0.004	-0.011	-0.024
	(-0.05)	(0.31)	(-0.69)	(-1.31)
unknown_dummy	-0.181***	-0.177***	-0.180***	
	(-7.33)	(-7.08)	(-7.29)	
other_dummy	0.009	-0.004	0.007	0.009
	(0.44)	(-0.20)	(0.33)	(0.29)
legacystatus_dummy	0.184***	0.184***	0.183***	0.193***
	(11.59)	(11.63)	(11.52)	(8.82)
applicantrating		-0.003***		
		(-10.23)		
gpa			-0.004***	
			(-4.20)	
sat				-0.001***
				(-13.67)

Observations	8,901	8,878	8,780	5,542
r2_p	0.0615	0.0749	0.0643	0.0547

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.10 Majors

RIABLES	(1) enrolled_dummy	(2) enrolled_dummy	(3) enrolled_dummy	(4) enrolled_dumm
le_dummy	-0.011	-0.019***	-0.017**	0.017
	(-1.59)	(-2.64)	(-2.28)	(1.64)
ck_dummy	0.043**	0.015	0.037**	-0.068***
	(2.30)	(0.88)	(1.98)	(-2.69)
an_dummy	-0.018	-0.012	-0.017	-0.026
	(-1.35)	(-0.88)	(-1.29)	(-1.34)
no_dummy	-0.005	-0.013	-0.008	-0.076***
	(-0.39)	(-0.94)	(-0.60)	(-3.99)
n_dummy	-0.014	-0.009	-0.024	-0.037**
	(-1.02)	(-0.63)	(-1.59)	(-2.00)
nown_dummy	-0.184***	-0.180***	-0.183***	
	(-7.32)	(-7.08)	(-7.28)	
er_dummy	-0.002	-0.015	-0.004	-0.003
	(-0.09)	(-0.74)	(-0.20)	(-0.10)
jorsocialscience_dummy	-0.025**	-0.022*	-0.024**	-0.017
	(-2.17)	(-1.90)	(-2.05)	(-0.94)
jorhumanities_dummy	-0.038***	-0.033**	-0.036***	-0.021
	(-2.87)	(-2.50)	(-2.70)	(-1.01)
jorscience_dummy	-0.029***	-0.013	-0.021*	-0.001
	(-2.61)	(-1.17)	(-1.88)	(-0.04)
jorengineering_dummy	-0.039***	-0.022*	-0.032***	-0.032*
	(-3.28)	(-1.81)	(-2.63)	(-1.79)
licantrating		-0.003***		
		(-9.91)		
			-0.003***	
			(-3.79)	
				-0.001***
				(-13.77)
servations	8,901	8,878	8,780	5,542
p	0.0468	0.0594	0.0492	0.0413

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.11 Mean SAT scores

VARIABLES	(1) sat_mid	(2) sat_mid	(3) sat_mid

male_dummy	4.660	5.340	-10.390***
	(1.37)	(1.49)	(-2.65)
black_dummy	49.088***	33.880***	78.085***
	(4.94)	(3.29)	(6.32)
asian_dummy	-6.125	-1.821	2.682
	(-0.75)	(-0.21)	(0.29)
latino_dummy	32.941***	28.754***	46.017***
	(4.51)	(3.78)	(5.46)
alien_dummy	13.967	26.766**	35.503***
	(1.50)	(2.54)	(3.53)
unknown_dummy	0.542	1.556	5.243
	(0.10)	(0.29)	(0.87)
other_dummy	47.416***	46.160***	50.384***
	(4.22)	(3.92)	(3.75)
applicantrating	2.826***		
	(19.20)		
gpa		4.176***	
		(9.15)	
sat			0.398***
			(21.80)
Constant	1,092.619***	902.161***	761.146***
	(104.72)	(21.47)	(31.16)
Observations	3,581	3,552	2,549
R-squared	0.102	0.033	0.168
r2_p	.	.	.

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11.12 Selectivity

VARIABLES	(1) selectivity	(2) selectivity	(3) selectivity
male_dummy	1.378***	1.460***	-0.915
	(2.66)	(2.70)	(-1.48)
black_dummy	10.939***	8.851***	16.399***
	(6.97)	(5.49)	(8.13)
asian_dummy	3.625***	4.220***	4.016***
	(2.89)	(3.25)	(2.74)
latino_dummy	7.419***	6.875***	10.063***
	(6.52)	(5.87)	(7.36)
alien_dummy	-0.998	0.825	1.861
	(-0.71)	(0.52)	(1.18)
unknown_dummy	1.004	1.141	1.513
	(1.27)	(1.40)	(1.61)
other_dummy	7.919***	7.528***	7.637***

	(4.60)	(4.23)	(3.64)
applicantrating	0.419***		
	(18.72)		
gpa		0.619***	
		(8.95)	
sat			0.057***
			(19.68)
Constant	28.335***	-0.028	-18.243***
	(17.98)	(-0.00)	(-4.71)
Observations	4,243	4,209	2,948
R-squared	0.092	0.035	0.136
r2_p	.	.	.

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

12. Existing literature

The area of enrollment management is thought to have first begun at Boston College in the early to mid-1970s. Since then, a wide array of literature has been written on the subject ranging from traditional academic pieces to industry white papers and case studies.

Alan Seidman wrote a fine academic publication for the Center for the Study of College Student Retention looking specifically at enrollment models for Parkland College in Illinois. Cullen Goenner and Kenton Pauls also deal with the issue of predicting enrollment in their paper, "A Predictive Model of Inquiry to Enrollment," for Research in Higher Eductation. Christopher Avery and Jonathan Levin contributed a paper to the American Economic Review regarding early admissions at selective colleges. Caroline Hoxby is another notable academic who writes on the topic of selectivity and student choices when it comes to higher education. Her work can be found in academic journals such as the Journal of Economic Perspectives.

In terms of industry white papers, companies like Noel-Levitz and Maguire Associates have produced a number of pieces surrounding the latest findings in enrollment management in an effort not only to expand the field, but also to attract more business to their firms. The companies also share articles by the likes of John Maguire, who wrote about the phenomenon of offering early decision to prospective students at the college level in "A Level Playing Field; Is dropping early decision a good idea?" Additionally, a number of these companies send their senior consultants to speak about enrollment management at nation-wide conferences, such as the National Association for College Admission Counseling conference.

Finally, there are a number of blogs and forums concerning the area of enrollment management. Tim Copeland writes a notable blog titled "Higher Education Marketing and Enrollment Management," which includes everything from the most recent management analysis to detailed case studies. Similarly, the site University Business has a wide array of information regarding solutions for higher education management. Also,

the aforementioned Noel-Levitz has a blog where it shares the latest in higher education consulting findings.

A. Determinants of student choices

Since about the 1960s, the market for higher education has changed so that students and their families began viewing a college education as a type of commodity. Students began preferring colleges not for their proximity to that student's home, but for their resources and student body (Hoxby 2009). At the same time, the number of suppliers, or colleges, on the market began increasing substantially. Suddenly admissions officials found themselves in salesmen-like roles, needing to persuade students not only to apply to their colleges, but also to choose to enroll once accepted. Effectively managing these enrollment or yield numbers was and is absolutely crucial to college admissions officials as yield has significant implications for the college; the more prospects that can be turned into applicants and subsequently enrollees, the more even the revenue stream an institution can expect (Seidman 1995).

Over the past 50 years there has been a decrease in students' costs of obtaining information about colleges (Hoxby 2009). In the 1960s, college guides began including "hard" information on student's test scores and grades. In the 1970s, college guides sought universal coverage. In the 1980s, guides began to gather information in a uniform way. Finally, in the age of the internet, the volume of information available on any given institution exploded, making it even easier for students to find and compare the colleges that match their criteria.

Goenner and Pauls 2006 focuses on determinants of student choices. The pair looked at a sample consisting of 15,827 students that inquired to a medium-sized, public, Doctoral I university and were interested in attending in the fall of 2003. Of these students, 2067 decided to enroll. The study found that those applicants who expressed interest in a particular major were more likely to enroll. "The number of inquiry contacts, campus visits, and whether the inquiry was referred all had positive effects on enrollment probability." Additionally, Goenner and Pauls's analysis found that "The interaction variable between campus visit and distance traveled was highly significant."

At the 2009 National Association for College Admission Counseling a panel led by Mark Kantrowitz, John Maguire, James Murtha, and Tara Scholder presented a survey of 22,734 high school seniors, 8,132 high school juniors, and 5,705 parents. The survey showed that of the students who initially preferred a public college (64% of respondents), 84% ending up actually enrolling at a public institution while 14% "switched" to a private college. Among the students who preferred a private college initially (24%), 73% enrolled at a private institution while 27% "switched." The numbers show that "Students whose initial preference was to attend a private college were twice as likely to switch than those who preferred a public institution." This group was reported to be "more ethnically diverse with a higher proportion of Asian and Hispanic students, much more likely to cite 'total cost' and 'close to home' among their top reasons for choosing their enrollment school, and less likely to have chosen their enrollment school for its 'academic reputation,' 'campus setting,' or 'religious affiliation.'" The group who switched from public to private had a "higher proportion of African-American and first generation college students, lower household income/SES, slightly lower GPA, and was more likely to have chosen a school for the 'scholarship/financial assistance' it offered."

This study has interesting implications for Union College, especially as a private institution. One hypothesis that could be made is if private colleges, which are twice as likely as public universities to lose students whose initial preferences were for a private institution, could target Asian and Hispanic students, or those students who report "total cost" and "close to home" as imperative criteria when choosing an enrollment school, then those institutions might be able to achieve better yield rates.

B. Proposals to increase yield

i. Administrative suggestions

On the administrative and organizational side of enrollment management, many studies have shown ineffectiveness being born from administrative "silos." Effective enrollment management must span multiple offices, programs, and disciplines throughout the college. In an interview conducted by Kathy Kurz and Jim Scannell, Wayne Locust of the University at Albany suggests reaching beyond traditional enrollment offices, such as Admissions, Financial Aid, and the Registrar, and involving orientation committees, Public Relations, Alumni Relations, Institutional Research, and Student Affairs, among others, in the process in order to get accepted students to enroll.

Barbara Fritze of Gettysburg College recommends integrating the offices of Admissions, Financial Aid, Institutional Analysis, Intercollegiate Athletics, and Communications and Public Relations into one vice president's portfolio in order to better meet enrollment goals (Kurz and Scannell 2006).

Many articles have identified effective communication tools and programs to entice accepted student to enroll. Tim Copeland of the blog, "Higher Education Marketing and Enrollment Management," points out that consumers are super-sensitive to mass marketing and will be turned off from a school that "spams" them. Students don't want more marketing, rather they desire better conversation. Schools should "design multi-channel conversations using offers, information, and stories that communicate with students based on their needs, wants, and interests. An interactive approach to enrollment marketing is about addressing the student, remembering what she says, and then communicating again in a way that demonstrates you remember what they told you."

Similarly, in a spring 2013 poll conducted by Noel-Levitz, college admissions officials at four-year private institutions rated campus open house events as the most effective practice for marketing and student recruitment, followed by campus visit days for high school students, encouraging prospective students to apply on the admissions website, encouraging prospective students to schedule campus visits on the admission website, and using enrolled students in recruitment/marketing. The poll also found that sending an email message was the preferred method for making first contact with purchased names. Of course, as Copeland highlights, this method of communication should be used sparingly.

Noel-Levitz 2012 reports that the median 2012 yield rates from admission to enrollment for four-year private institutions were 34% for online applicants, 39% for paper applicants, 18% for common applicants, and 19% for outside applicants, which are defined as "any applications received from first-year students via an outside agency (other than Common Application) such as the Royall FastTrack application." These are important numbers to keep in mind as Union looks at its admissions metrics. Additionally

the benchmark report shares that the median 2012 yield rate from admission to enrollment for four-year private institutions was 29%, with 31% for in-state applicants, 23% for out-of-state applicants, and 23% for international applicants. The median capture rate from deposited to enrollment was 91%.

Finally, one innovative program that the University of Pittsburgh is using in increase its enrollment numbers is its Internship Preparation Program through which the school essentially guarantees every undergraduate the opportunity of an internship. Cheryl Finlay, the director of the University's Office of Career Development and Placement Assistance, says the "the effort to help students gain experience-based learning helps the University reach its goal of 95% employment placement for new graduates. The closer the office is to attaining that goal, the better Pitt is able to recruit and retain top students and to maintain an engaged alumni population."

ii. Application fees

Many interesting reports are available regarding using fees in the application process and what kind of application certain institutions should consider using. Apart from suggesting that schools only focus on securing those items that truly provide information on a student's admissibility during the admissions process, Coen 2012 reports that those campuses charging a fee of less than $35 had higher yield rates than those not charging a fee. Additionally, the benchmark data showed that institutions with the highest yield rates *are* charging a deposit fee, but keeping that fee less than $200.

Finally, the data from the benchmark study indicates that "paper applications will yield higher than online applications, and that campus applications will yield higher than applications provided by outside agencies."

iii. Early decision versus regular decision

While our study will only focus on the enrollment decisions of regular decision applicants, many publications have discussed the implications that an early decision admissions process might have on an institution's enrollment rates. Avery and Levin 2010 argue that, "colleges want to admit students who are enthusiastic about attending, and early admissions programs give students an opportunity to signal this enthusiasm." They also found that "students who are admitted early are more likely to enroll than students who are admitted through regular admissions." Finally, "a lower ranked school, by adopting an early decision policy, can attract some highly ranked but cautious students from a more highly ranked school."

Maguire 2007 says that, "so-called second-tier, high-quality schools often use early decision to lock in commitments from desirable candidates who might otherwise defect to the very top schools if they could delay deciding until spring." These schools use strategies such as offering Presidential Merit Scholarships and honor programs in order to "reduce the value differential" for top students who find it too risky to apply to the very top schools, but find it even riskier to not apply to anywhere until the spring. Early decision programs will also have implications for college rankings in the *U.S. News & World Report* as increased early decision enrollment rates could lead to overall decreasing acceptance rate, improving institutional rankings.

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