Four-Year Graduation Rate Analysis

By Jeff Bell

A major focus of the Chancellor's Office 2025 Graduation Initiative is to improve four-year graduation rates at all CSU campuses. As part of that effort, CSU Chico has been given the goal of improving its four-year graduation rate for first-time freshmen (FTF) from 27% to 41% by 2025 while reducing the URM gap from 9% to 0%. To better understand some of the impediments to FTF graduation in four years I analyzed the correlation between FTF characteristics at the time of initial enrollment at CSU Chico to their probability of graduating in four years. As the data used for this analysis included the period of the last graduation initiative, this study also sheds some light on how we were able to meet our goals last time, when we successfully raised four-year graduation rates from 15% to 25%.

The key incoming student factors analyzed in this report are high school preparation, as measured by the high school eligibility index score, gender, ethnicity, in particular Underrepresented Minority status (URM), and the college and department of the student's initial choice of a major. In addition, some analysis of graduation data for all of the CSU campuses, and analysis of grade data for all courses in the Fall 2012 to Spring 2016 terms is included where appropriate.

There are a couple of obvious problems with the results of this analysis. All of the results reported here are from correlations, and the student characteristics used probably represent other factors that are more difficult to measure. For instance, females graduate in four years at double the rate of males. This most likely is a consequence of better study habits, classroom attendance, etc. Second, when examining individual cohorts or small groups within the six year sample the sample size can get too small for consistent results, and none of the results reported here have been checked for statistical significance. For instance, the URM population is relatively small, especially in the first couple of years, so the "gap" in rates between non-URM and URM can vary significantly from one year to the next.

Summary of Results:

- The single most important factor affecting 4-year graduation rates is the students high school performance and preparation, as measured by the HS eligibility index, with 4-year graduation rates ranging from ~2% for students at the low end, 2.6 to 2.8, to over 48% for the students with scores over 4.6, a 24-fold variation in rates.
    - A 0.1 increase in the HS eligibility score correlates with a 2.3% increase in grad rates.
    - This effect can explain all of the increase from 15% to 25% in 4-yr rates that occurred from 2007 to 2012, as the average index score increased from 3.2 to 3.6 over this period, which would have increased grad rates by 9.2%.

        - Most of the improvement in the CSUs 4-yr rates is the result of large increases at a small number of campuses, including Chico.
    - The HS index score is also strongly correlated with the risk of failing a course, suggesting that failing courses may be the cause of the low graduation rate for low index students. If so, the failure rate for LD courses would need to be reduced from the current 7.3% to 3% to increase our 4-yr grad rate to 41%.
        - Note that a failure rate of 7.3% per course gives a 50:50 chance that a student will fail one of their first 10 courses.
- The next most significant factor is the department of the student's choice of an initial major, with 4-yr rates for white females (to control for gender and ethnicity effects) varying 3.5-fold, from a low of 16% in Chemistry to a high of 55% in Liberal Studies.
    - There is a strong correlation between departments with low graduation rates and those with high failure rates (>10% failure rates), suggesting that the cause of the low graduation rates in some departments is the high rate of failure in their courses.
    - There is wide variation, over 10-fold differences, in the percentage of females and URMs in different colleges and departments, making it important that these factors be controlled for before comparing college and department rates.
    - The incoming FTF sample size in each cohort is too small for accurate rate measurements in all departments and most colleges, so rates will vary randomly from year to year, making yearly targets useless.
- Gender is an important factor, with females graduating in 4 years at twice the rate of males. This is independent of all other factors, including choice of initial major.
    - At least some of this advantage comes from a lower failure rate in LD courses – females are 60% less likely to fail a LD course then males, even after correcting for HS eligibility score.
    - As the gender effect is so strong, any attempts to measure the effects of interventions designed to improve grad rates or course performance needs to control for differences in male and female participation.
- Ethnicity is also important, with White students having the highest graduation rates, followed by Asians, Hispanics, and Blacks. Grouped into non-URM and URM populations, the non-URM population currently graduates at a 27.8% rate, 10% higher than the URM population's 17.3%.
    - Approximately 30% of the URM "gap" is due to the URM FTF having an average HS eligibility score about 0.13 less than the non-URM students, which should lower their grad rates by 3%.
    - Non-URMs graduate at a 1.45-fold higher rate than URMs, after correcting for differences in HS eligibility scores and gender.
    - URM students are 40% more likely to fail a LD course than non-URM students with the same HS eligibility score, suggesting that the "gap" is a result of this increased failure rate.

        - This increased chance of failing is independent of gender or choice of major
        - In the more challenging majors the male URM failure rate exceeds 20%
        - Reducing the excess failure rate of URM students would probably eliminate most of the "gap"
    - The difference between non-URM grad rates and URM grad rates, the "gap", does not scale well so high grad rate campuses tend to have high gaps and the gap for the system has increased as grad rates have improved.
        - Chico has one of the highest "gaps", but this is an artifact of the use of differences in rates instead of correctly using ratios of rates.
    - It is likely that at least some of the URM gap is really a result of financial need and/or first-generation status, both conditions that are more likely to be an issue for the URM population.
        - Due to lack of access to this data the importance of these factors hasn't been measured.
    - In the four years since the 2012 cohort there have been slight increases in the average HS eligibility index (up 0.08) and the percentage of females (up 0.8%), which should increase the 4-yr rate, however there have been much larger increases in the percentage of URM FTF (from 27% in 2012 to 40% in 2016), and significant shifts in student's choices of majors to more STEM fields, both of which will negatively affect 4-yr rates
        - Given these trends the 2016 4-yr grad rate is likely to be 1 to 2% below the current rate
    - To the extent that the factors above only delay graduation they will have smaller effects on 6-yr grad rates, but all should still be important.
    - Besides financial need and first-generation status, there are many other possible factors not examined here, such as remediation status, number of units needed for a major, distance from the student's home, and the numerous factors that occur after the students arrive on campus such as switches between majors and the timing of switches, units attempted, units completed, advising experiences, social activities, exposure to high impact practices, etc.

Methodology

To get a large enough sample size to analyze under-represented groups I combined the applicant data of the 15,138 FTF who enrolled in Fall of 2007 to Fall of 2012 and merged that with the graduation data from Spring 2010 to Spring 2016. 3,200 of the 15,138 FTF graduated in four years or less, an average four-year graduation rate of 21.1%. 3,121 of the FTF were under-represented minorities (URMs) – 20.6%, and 8,092 were female, 53.4%, while 426 of the 3,200 graduates in four-years were URM, 13.3% and 2,230 were female, 69.7%. By cohort the four-year graduation rate improved from 15.3% for the Fall 2007 cohort to 24.9% for

the Fall 2012 cohort. The numbers reported here may vary from other sources as all FTF were used, including non-residents and part-time students. The FTF data and graduation data were merged and analyzed using the Tableau business intelligence database program. Data for the other CSU campuses and the system as a whole were extracted from the Chancellor's Graduation Dashboard, which only had data up to the 2011 cohort at the time the data was extracted. For the failure rate analysis data on all student's grades from Fall, 2012 to Spring, 2016 was extracted from a CRA report and combined with the enrolled data set using Tableau. 162,928 lower division (LD) course grades from this dataset were grouped into pass or fail (F, WU, or W) categories, on the theory that any of the fail results do not produce units needed for graduation.

High School Eligibility Index

The initial factor that showed the strongest effect on four-year graduation rates was the student's score on the high school eligibility index, a combination of their high school GPA and their quantitative and verbal SAT scores, with GPA have over twice the weighting as SAT scores. High school eligibility scores ranged from 2.6 at the low end to over 4.6 at the high end. Average four-year graduation rates were calculated for students with scores from 2.6 to 2.8, from 2.8 to 3.0, etc., and plotted in Fig.1.

Of the 131 students with high school eligibility scores between 2.6 and 2.8 only three graduated in 4 years, a rate of only 2.3%, while the ones with eligibility scores above 4.6 graduated at a rate of 48.7%. There is a clear linear relationship between high school eligibility scores and the probability of a student graduating in four years, with a 2.3% increase in the graduation rate for every 0.1 increase in the index. The 20-fold difference in graduation rates between the students with low scores and the students with high scores makes the high school eligibility index the best predictor of whether an incoming student will graduate in four-years.

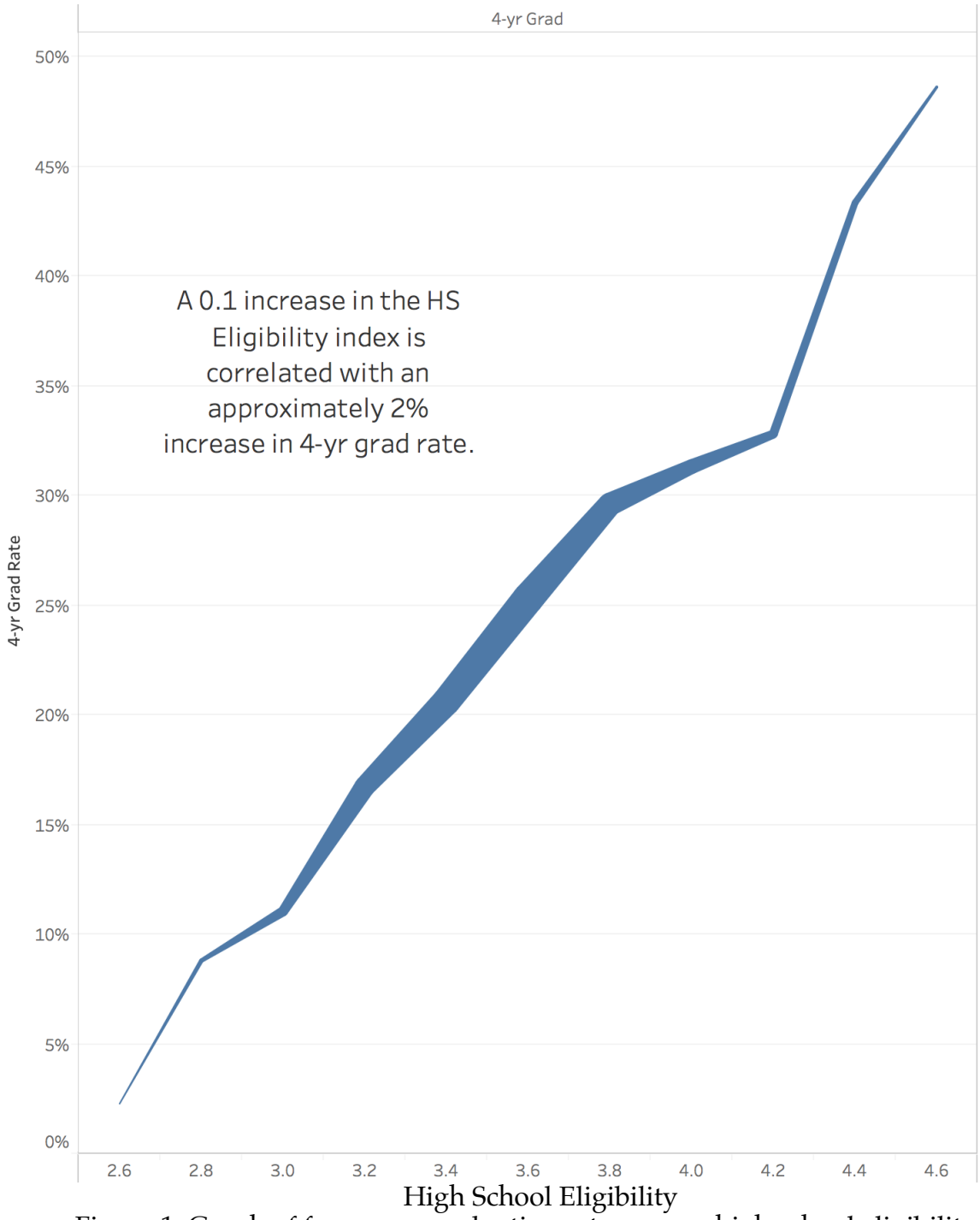

Figure 1. Graph of four-year graduation rates versus high school eligibility scores. The thickness of the line represents the sample size, which ranges from 130 students at the tips to over 2,900 in the middle of the graph.

An implication of this relationship between high school eligibility scores and graduating in four years is that increases in the average score of the incoming cohort should result in increases in four-year graduation rates. The plot in Fig. 2 of four-year graduation rates and HS eligibility scores vs. the cohort year shows

that, as expected, the increase in HS eligibility scores from 3.18 in Fall of 2007 to 3.58 in Fall of 2012, a 0.4 increase, correlated with an increase in four-year graduation rates from 15.4% to 24.9%. Given the relationship between eligibility scores and graduation rates, the 0.4 increase in the index should have increased the graduation rate by 9.2%, from 15.4% to 24.6%. As the actual increase was 9.5%, to 24.9%, this was well within the margin of error for this calculation. Thus, it is possible that all of the increase in graduation rates from 2007 to 2012 was a consequence of the improvement in the pool of FTF.

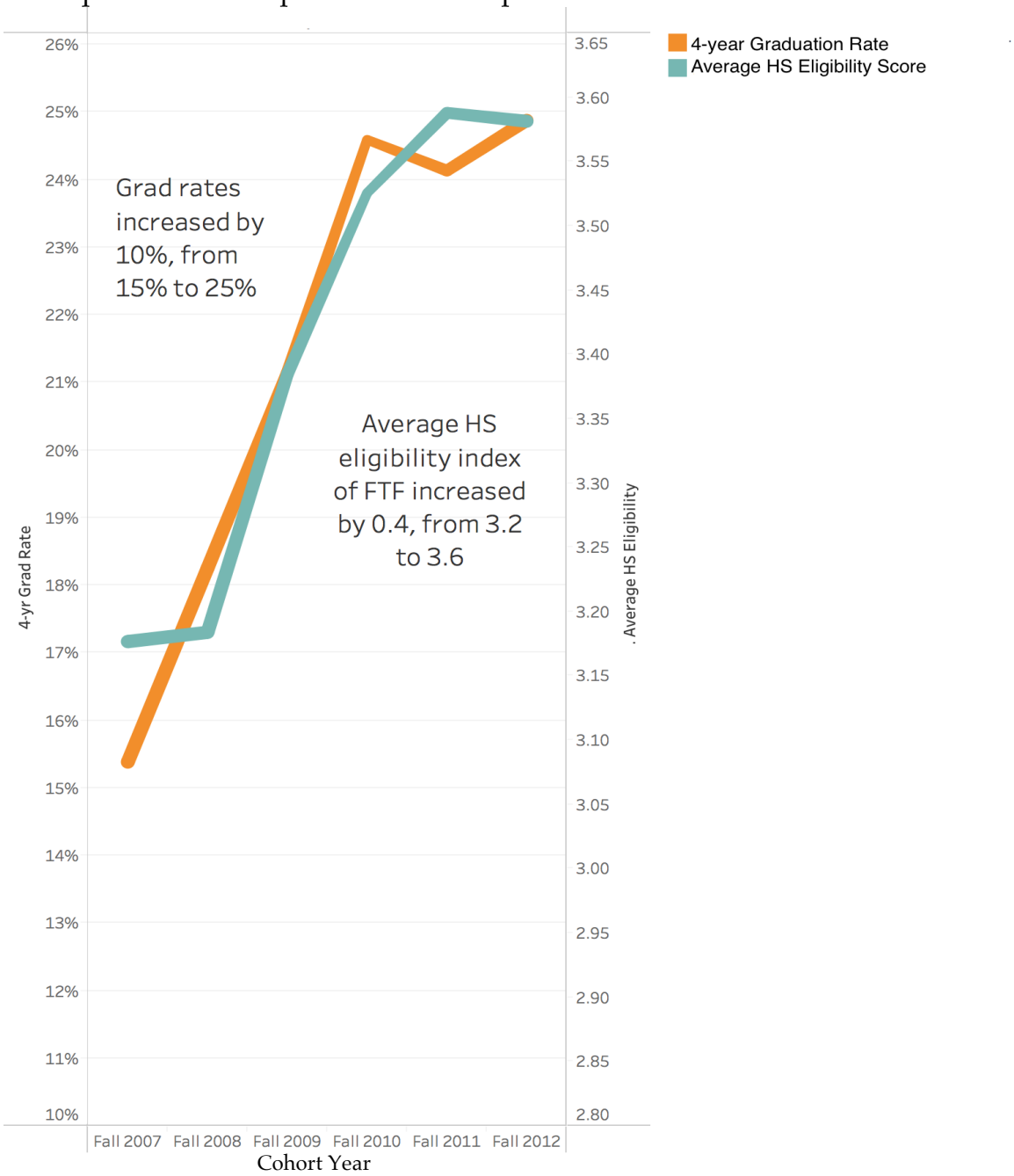

Figure 2. Plot of 4-yr graduation rates and HS eligibility scores vs. cohort year

Four-year graduation rates for the other campuses in the CSU show that while several others saw the same rapid increase, this was not a universal change. Many campuses were flat (Dominguez Hills, Fresno, Sacramento, etc.) and a couple actually saw large decreases in their grad rates (Los Angeles, Stanislaus), Fig. 3. In general, the poor performing campuses have struggled the most to increase their rates so most of the systems improvement has come from the top campuses, creating a much larger spread between the bottom and the top.

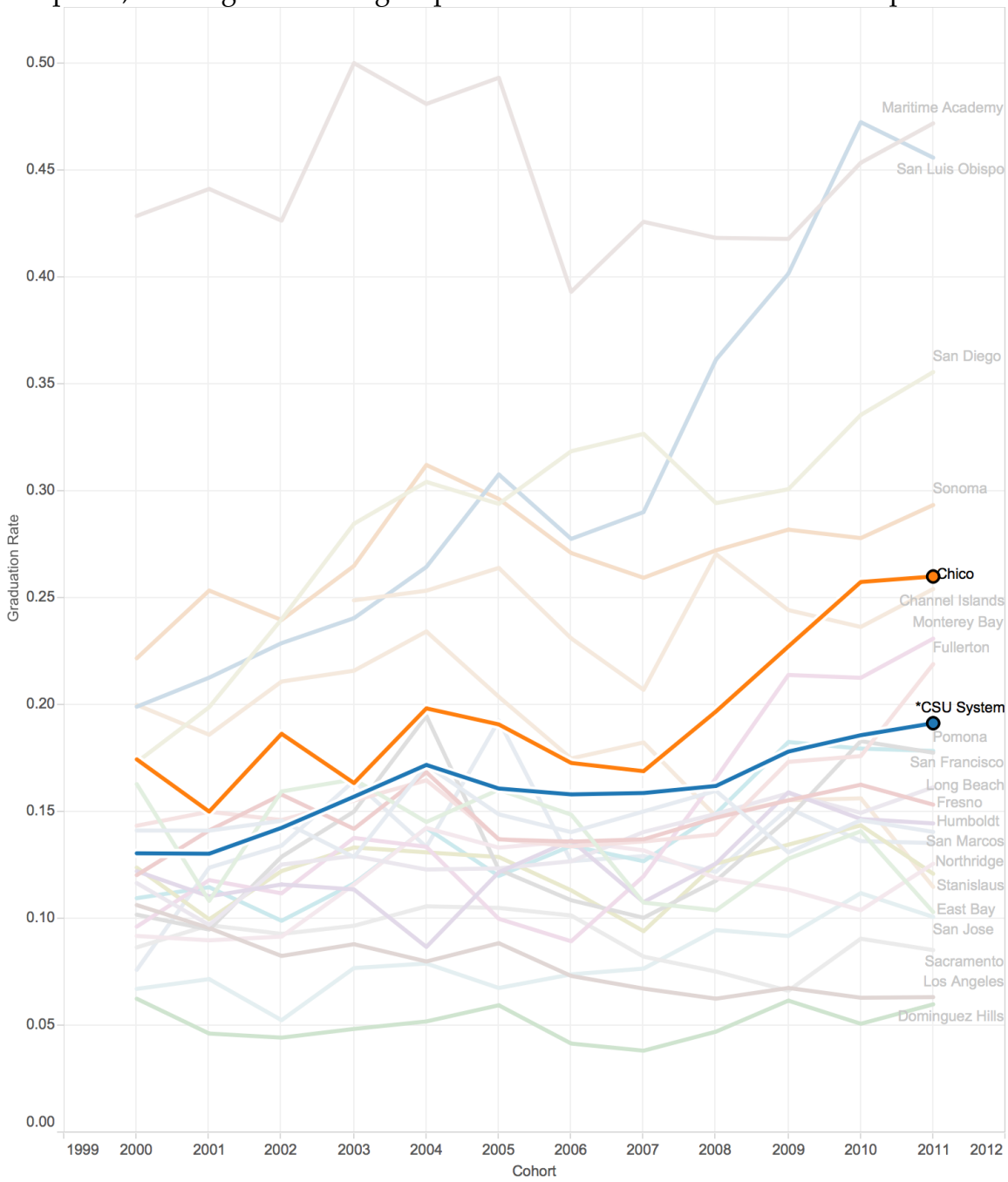

Figure 3. Four-year graduation rates for FTF cohorts at the CSU campuses.

To increase our four-year graduation rates to the target of 41% by further improving the qualifications of the incoming FTF would require an increase of the average eligibility score of incoming FTF to 4.3 from the current 3.6. An eligibility score of 3.6 is a student with a HS GPA of 3.3 and a composite SAT score of 1000, while a score of 4.3 would be a student with a 3.7 GPA and an SAT score of 1200. While unlikely, this is not impossible as that is the typical score for a FTF at San Luis Obispo. Alternatively, we will need to improve the graduation rate of students with a 3.6 index score so that they graduate at the same rate as students with a 4.3 score do now.

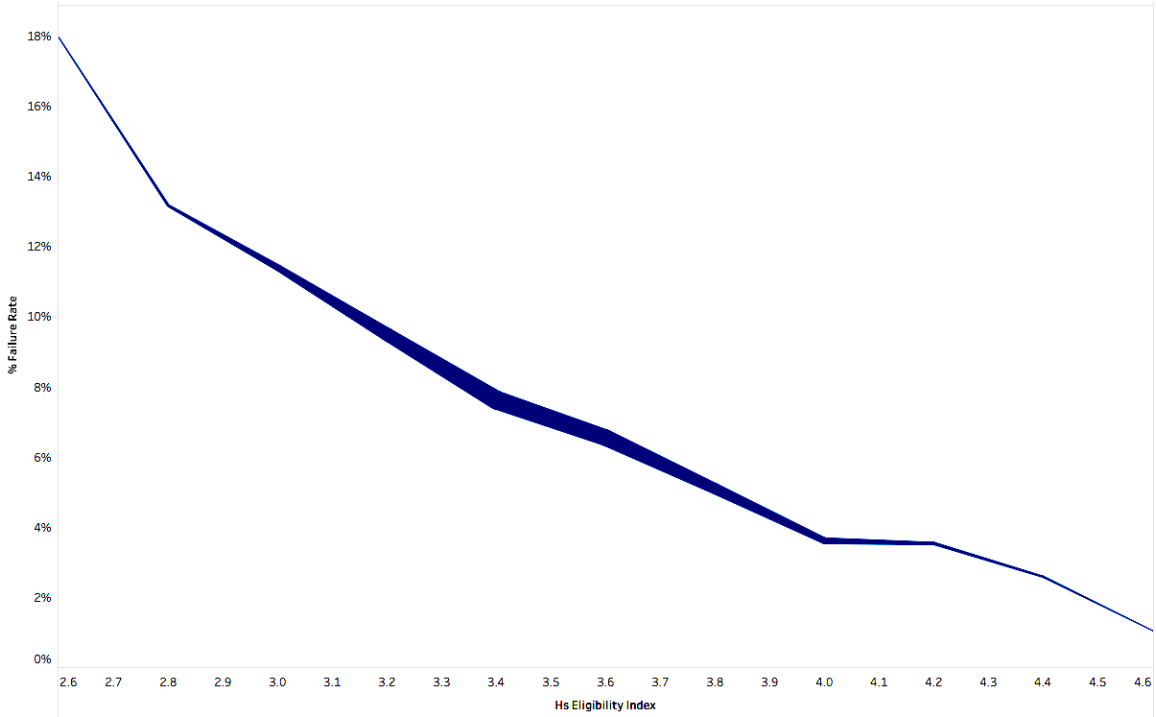

Figure 4. The correlation of a student's high school eligibility index score with failure rate (failure to pass a course - Fs, WUs, withdrawals, and incompletes) for graded lower division courses.

As the most likely way that HS GPA and SAT scores are influencing graduation rates is through effects on classroom performance, I looked at the effect of HS eligibility index scores on the failure rate (any grade requiring the student to retake the course - Fs, WUs,Ws, Is, etc.) of FTF in all enrolled sections of lower division graded courses for the Fall 2012 to Spring 2016 semesters, 162,928 grades or withdrawals. For this period, the average failure rate for all LD course attempts was 7.3%. A plot of failure rate vs. the students HS eligibility index, Fig. 4, shows a strong linear relationship that goes from a 18% failure rate for students with eligibility scores of 2.6 to 2.7 to only 1.05% for students in the 4.6 to 4.7 range, an 18-fold difference, very similar to the 20-fold effect of the eligibility index on graduation rates. An increase of 0.1 in the index correlates with a 0.8% decrease in the probability of failing. If failing courses is a strong contributing factor to students failing to graduate in four years, this would imply that we would need to reduce our current average failure rate in LD courses from 7.3%

down to the 3% rate for students with eligibility scores of 4.3, the group that has been graduating at the desired rate of 41%. Note that if a student took 10 classes in their first year a 7.3% chance of failing means that there is a 53% chance that they will have failed at least one of their first 10 courses, delaying graduation.

Gender

That almost two thirds of our four-year graduates are female implies that there is a strong gender effect on four-year graduation rates. Over the six years from 2007 to 2012 females consistently graduated at an approximately 15% higher rate than males, and this gap has been increasing, Fig. 5. The average 4-yr rate for females is 27.6%, while the male rate is only 13.8%, half of the rate for females.

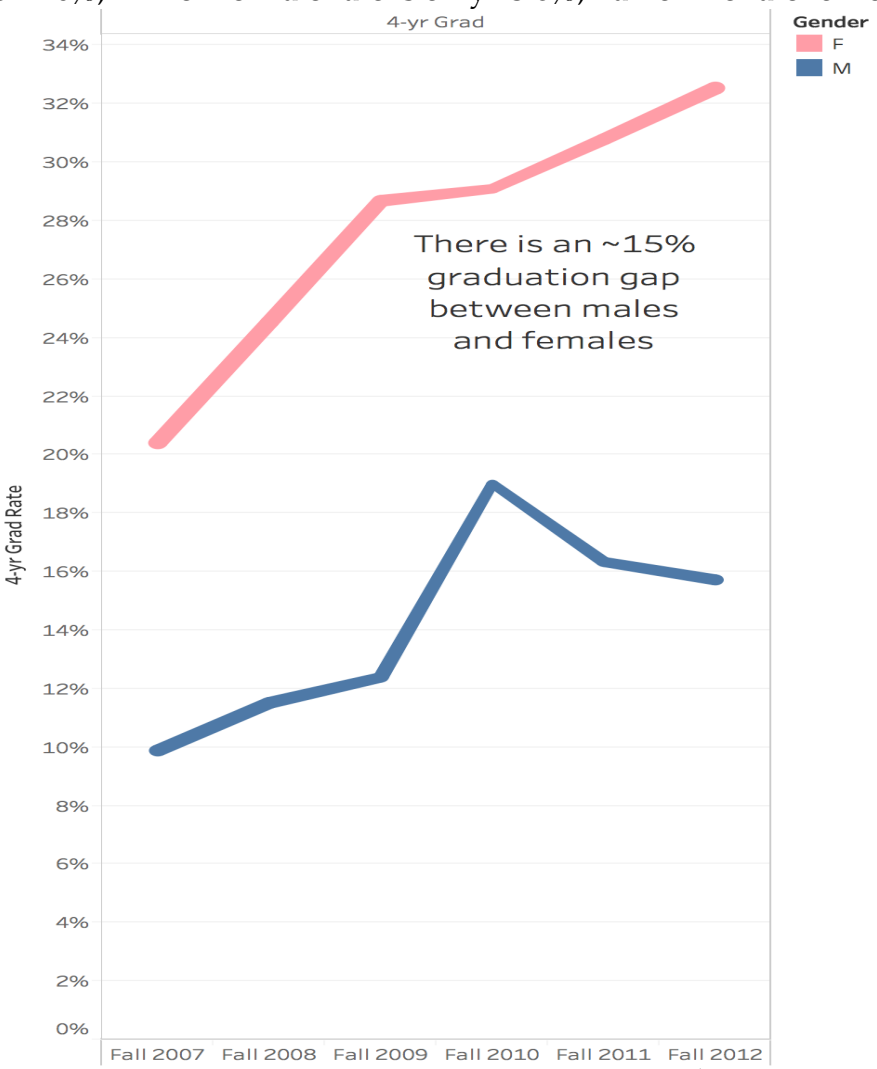

Figure 5. Four-year graduation rates for males and females

This gender gap has been fairly constant over the last 15 years, and is almost universal throughout the CSU, though our gap is well above the average, as is typical for the other high graduation rate campuses, Fig. 6.

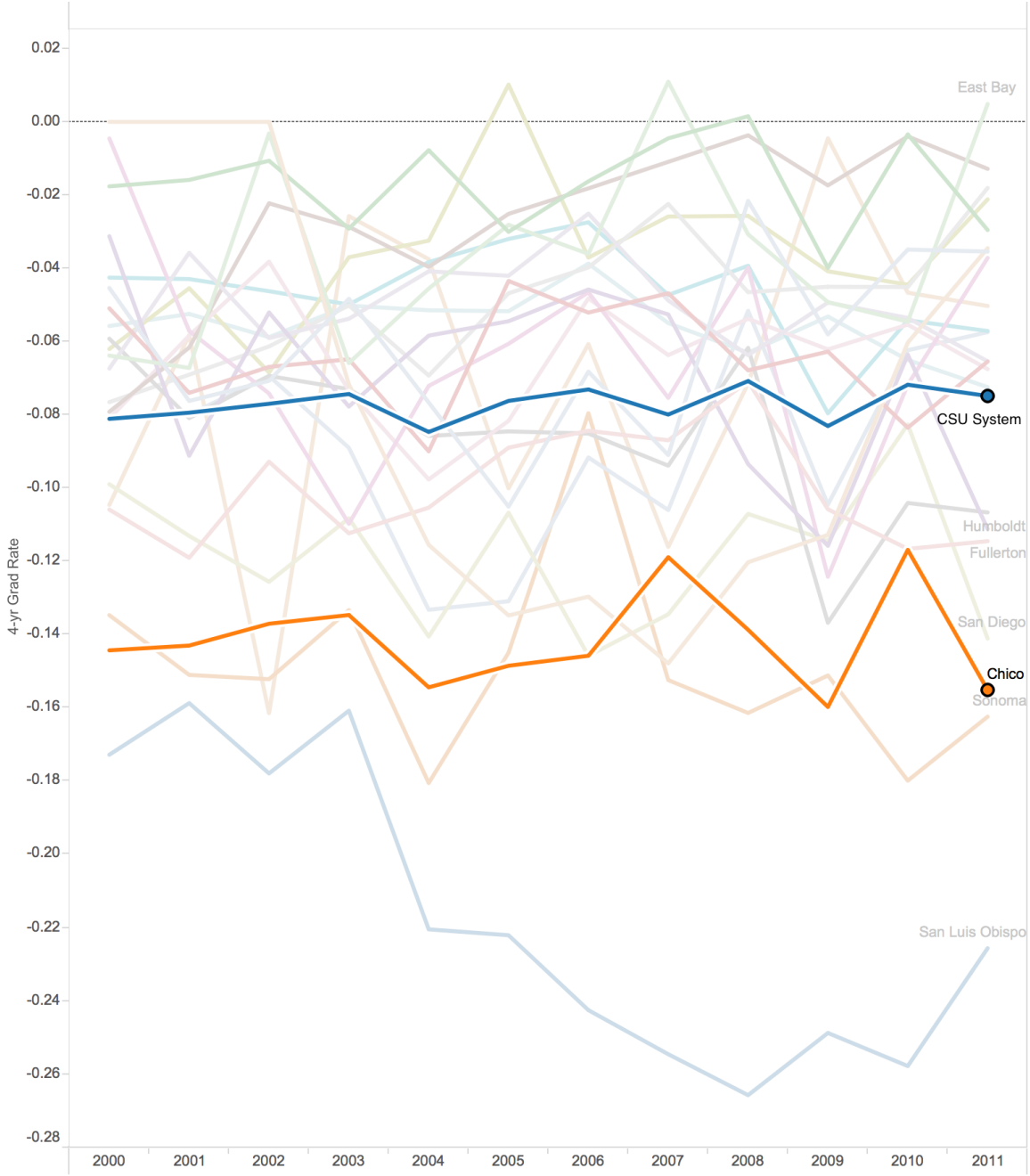

Figure 6. The four-year FTF graduation gap between male and female graduation rates for all the CSU campuses.

As female FTF have an average HS eligibility score of 3.43, only .08 higher than the 3.35 rate for males, the gender gap does not appear to be caused by a difference in HS preparation. A plot of 4-yr rates vs. HS Eligibility shows that this two-fold higher 4-yr rate gender gap is the same for all HS eligibility scores, so it is independent of high school preparation, Fig. 7. For males to have the same probability of graduating as females they need to have about a half a point higher GPA and 200 more SAT points.

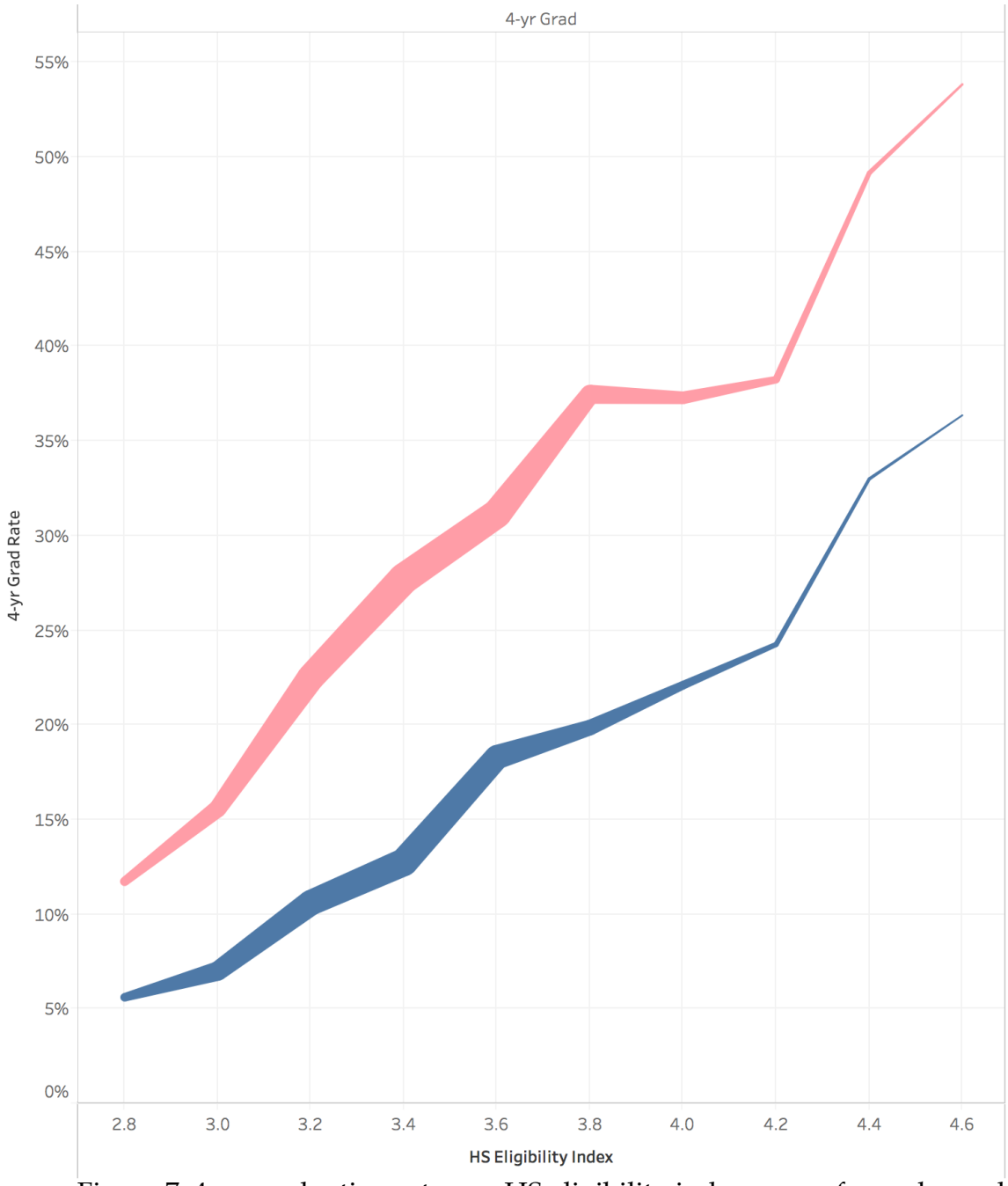

Figure 7. 4-yr graduation rates vs. HS eligibility index scores for males and females.

The average failure rate for female FTF in lower division (LD) classes is 5.4% vs. 9.3% for males, so females are 60% less likely to fail a course than males, and a plot of failure rate vs. HS eligibility index, Fig. 8, shows that this is also independent of HS eligibility scores. Thus, females have an advantage over males in the classroom that is independent of high school preparation. While these failure rates may appear low, they give the probability of failing a course, so the rates compound over al the courses a student takes. Thus, two thirds of males will fail at least one

course out of every ten they take, so it is likely that most males fail one or more courses in their first two years.

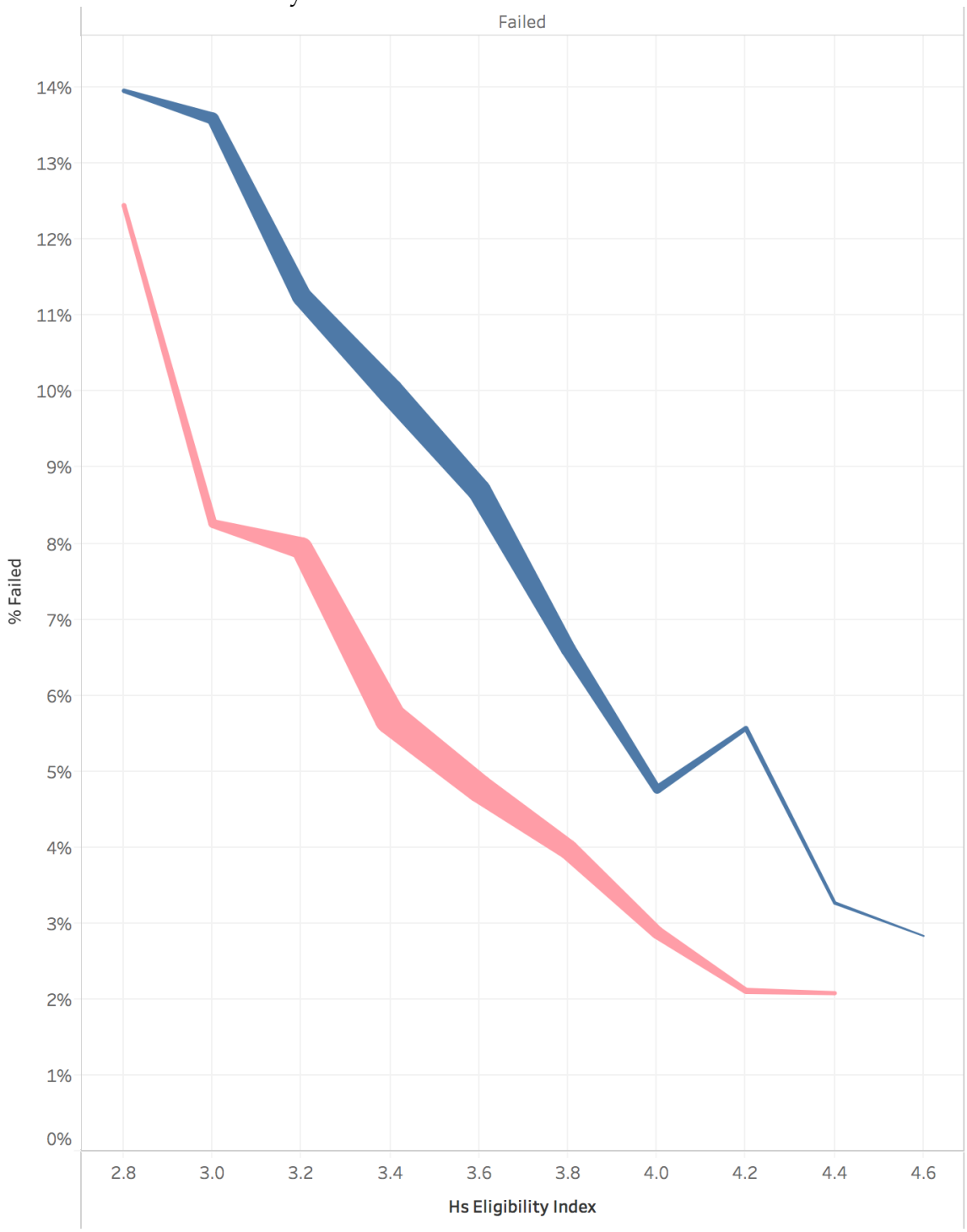

Figure 8. Failure rate vs. HS Eligibility Index for males and females

The female advantage could be a result of intrinsic differences between males and females. For instance, some studies have shown that female college students

are more likely to attend class and spend significantly longer time studying. Alternatively, there may be institutional biases that favor females. In any case, bringing males up to the same performance level as females would get us about halfway to the 41% 4-yr graduation rate target.

As females are more likely to participate in out-of class activities, and are more likely to attend class for in-class activities, gender effects must be considered when attempting to measure interventions designed to improve graduation rates or classroom performance. For instance, if an extra out-of class study session is offered and a higher percentage of females participate than males, the study group will have more females than the non-study group, and will appear to do better as a result of that, even if the study session accomplishes nothing.

Under Represented Minorities (URMs)

The Chancellor's Office 2025 targets call for reducing the graduation rate gap between URMs and non-URMs to zero. Over the six years from 2007 to 2012 non-URMs had an average 4-yr grad rate of 23% compared to 13.6% for URMs, a 9.4% gap, so non-URMs are 70% more likely to graduate in four years. This gap has been fairly consistent over the six years, finishing with a 10.3% gap in 2012, Fig. 9

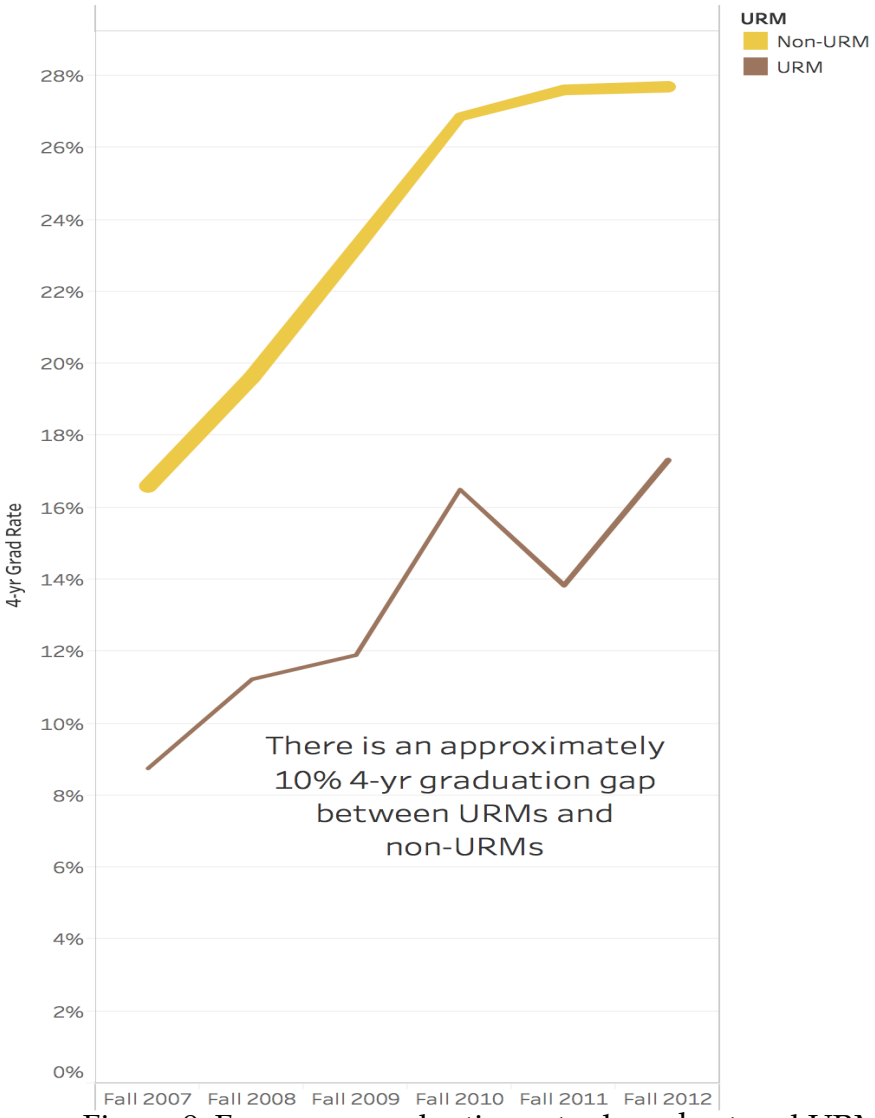

Figure 9. Four-year graduation rates by cohort and URM status

Compared to the other CSU's our gap is large and has been increasing at a faster rate than the system as a whole, Fig. 10, though it will improve significantly when they add the 2012 rates to their dashboard. Using the difference between the non-URM rates and URM rates is problematic as it doesn't scale–it will naturally increase if overall graduation rates increase. For instance, if non-URMs are 50% more likely to graduate in 4 years than URMs, then when URMs have a 10% grad rate the non-URM rate will be 15%, giving a 5% "gap". However if rates overall double, then URM rates will be 20% and non-URM rates will be 30%, increasing the "gap" to 10%. Thus, as the overall rates for the system have improved, the "gap" has appeared to worsen (compare Fig. 3 to Fig. 10) and the schools with the highest grad rates will also tend to have the largest "gaps" – there is a 0.67 correlation between the overall rate and the gap for the 2011 year. As the schools with the highest grad rates are also likely the ones with the fewest URMs this results in the system gap being larger than all but one of the campuses (Chico) – an example of Simpson's Paradox. Instead of using the

difference in rates, a better measure is the ratio of the rates – for Chico the non-URM rate is 60% greater than the URM rate. This more accurately reflects the magnitude of the difference in the rates and scales correctly between low rate schools and high rate schools.

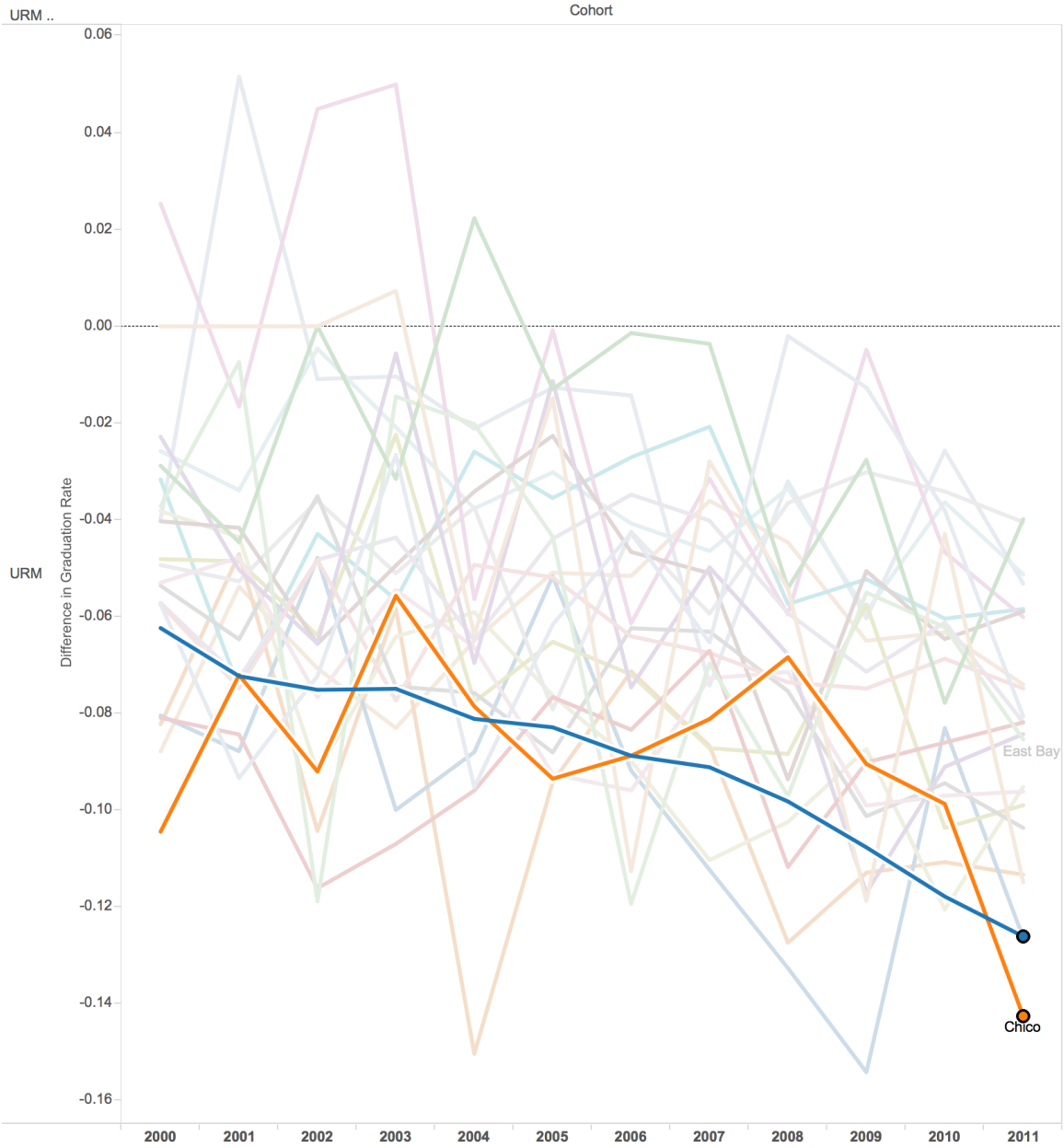

Figure 10. The gap between non-URM and URM four-year FTF graduation rates. Blue line is the CSU as a whole.

As the URM population had an average HS eligibility score of 3.29 vs. 3.42 for the non-URM population over the six years from 2007 to 2012, the difference in HS preparation would give a 3% difference in 4-yr rates, explaining 30% of the 10% graduation gap, Fig. 11. Note that this gap in preparation has increased in recent years, which could lead to an increase in our URM gap.

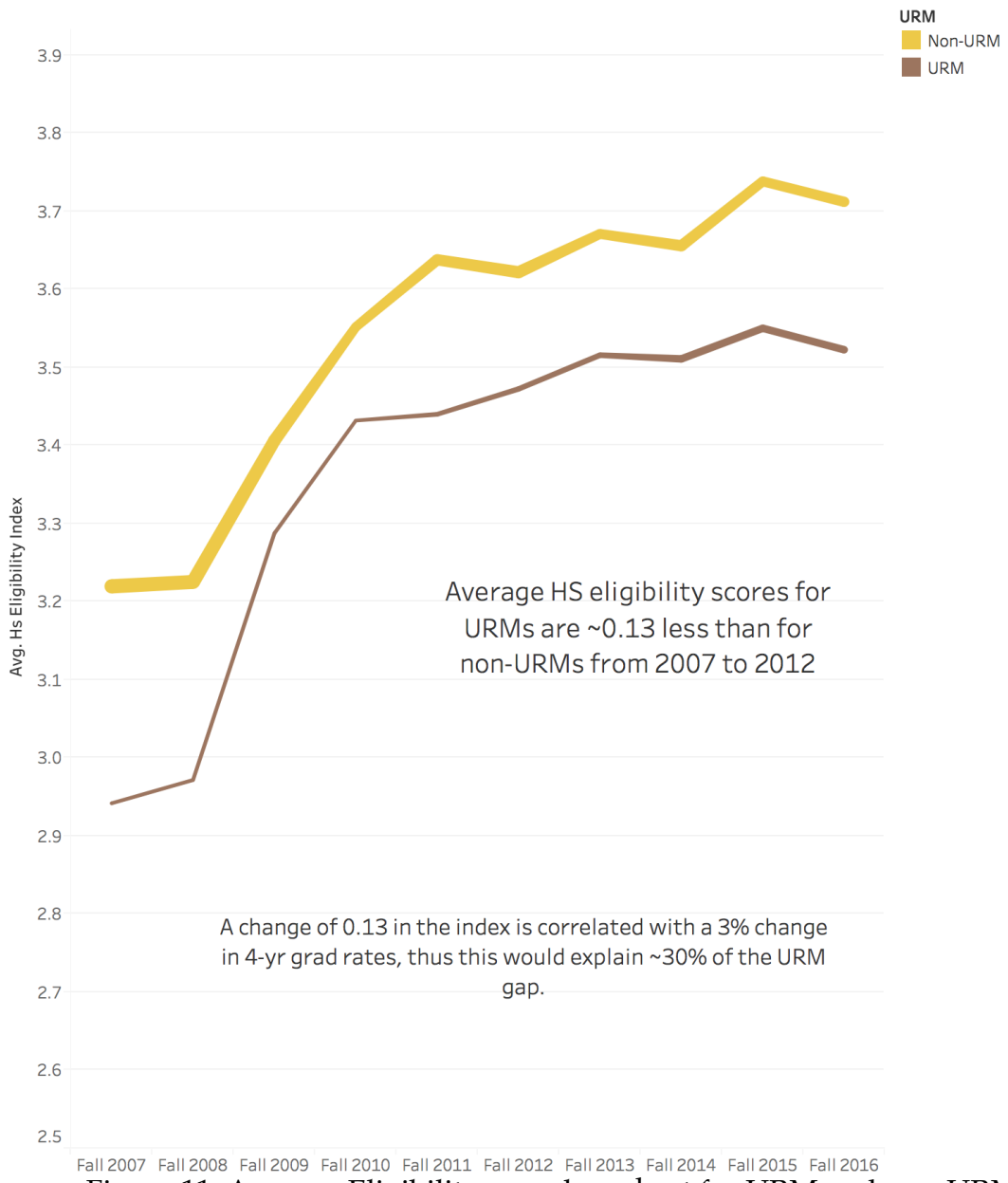

Figure 11. Average Eligibility score by cohort for URM and non-URMs

At CSU Chico, the non-URM and URM groups are made up of four different main ethnic groups, with the non-URM group mainly being white and a few Asians, while the URM group is mainly Hispanic with a small number of Blacks. Graduation rates for the four ethnic groups decrease from the whites, to the Asians, to the Hispanics, to the Blacks, Fig. 12. Including Asians in the non-URM group actually decreases our gap artificially, as they graduate at only a slightly higher rate than Hispanics. As the numbers of Asians and Blacks are so low, for all the following analyses only the non-URM and URM groups will be used to keep the sample size large enough for analysis.

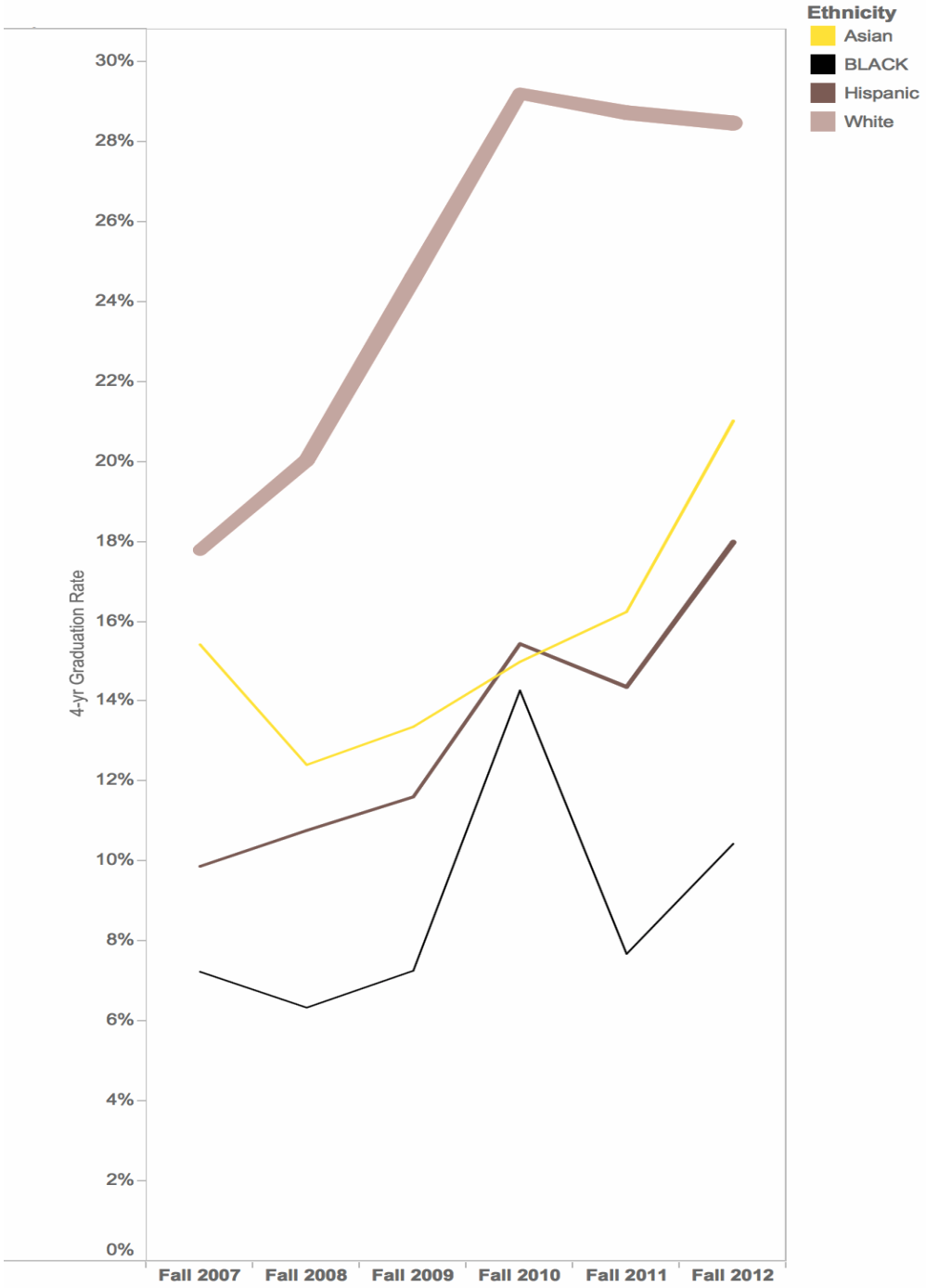

Figure 12. Four-year graduation rates by cohort for White, Asian, Hispanic and Black FTF.

A comparison of graduation rates vs. HS eligibility scores by URM or non-URM, Fig. 13, shows that URMs with the same eligibility score have a 4-yr grad rate that is 7% below that of non-URMs, thus non-URMs are about 45% more likely to graduate in four-years than URM students with similar HS GPA and SAT scores.

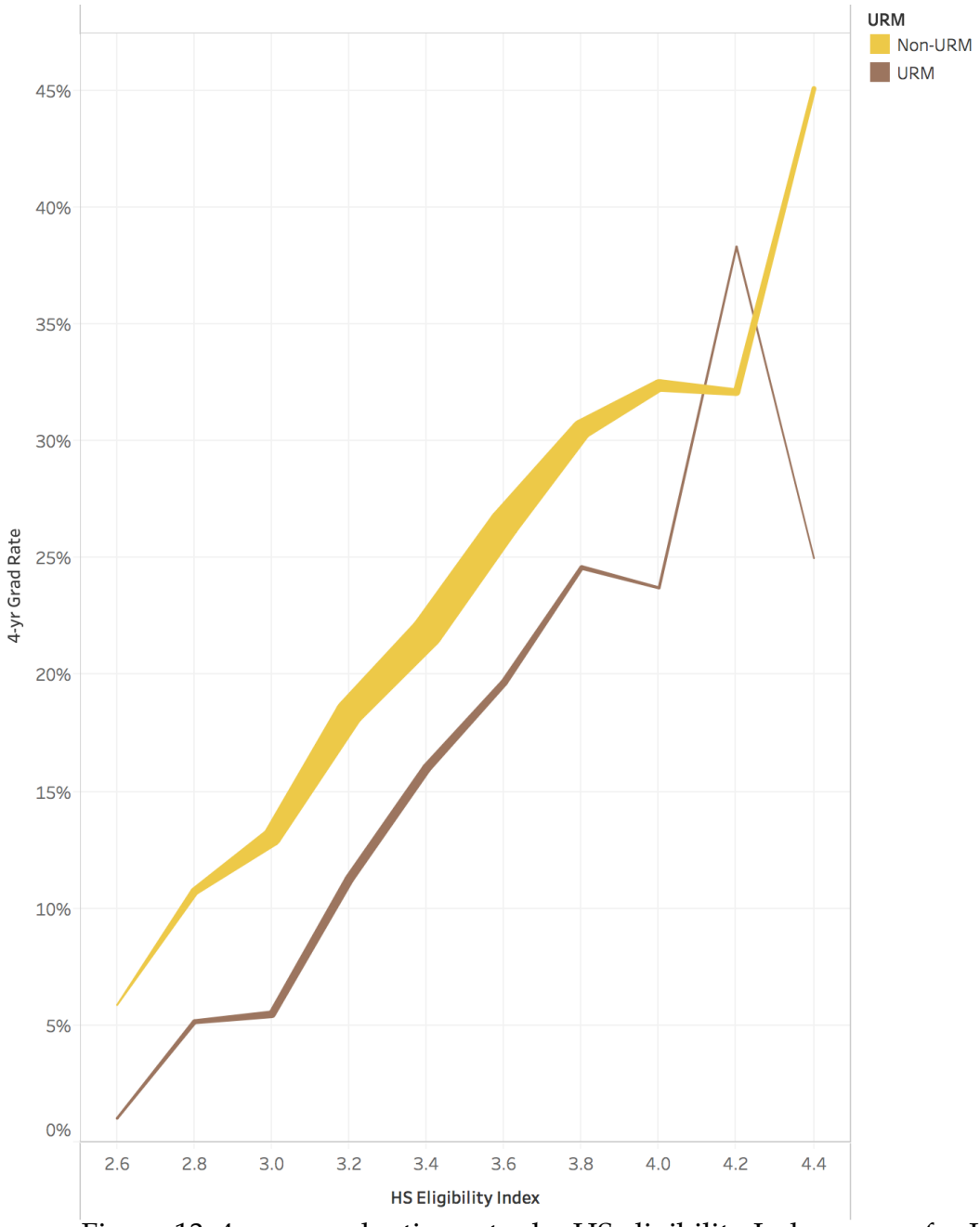

Figure 13. 4-year graduation rates by HS eligibility Index scores for URM and non-URM First time Freshmen.

As with gender, these differences in graduation rates for students with the same eligibility score are also reflected in their probability of failing courses, Fig. 14. The 2% to 3% difference in failure rates at the same eligibility score is only half the size of the gender gap, but may be enough to explain the smaller URM graduation gap. As with gender, this gap could be a result of differences in the study habits, etc. of the URM population relative to the non-URMs, or it could be the result of an institutional bias that favors non-URM students.

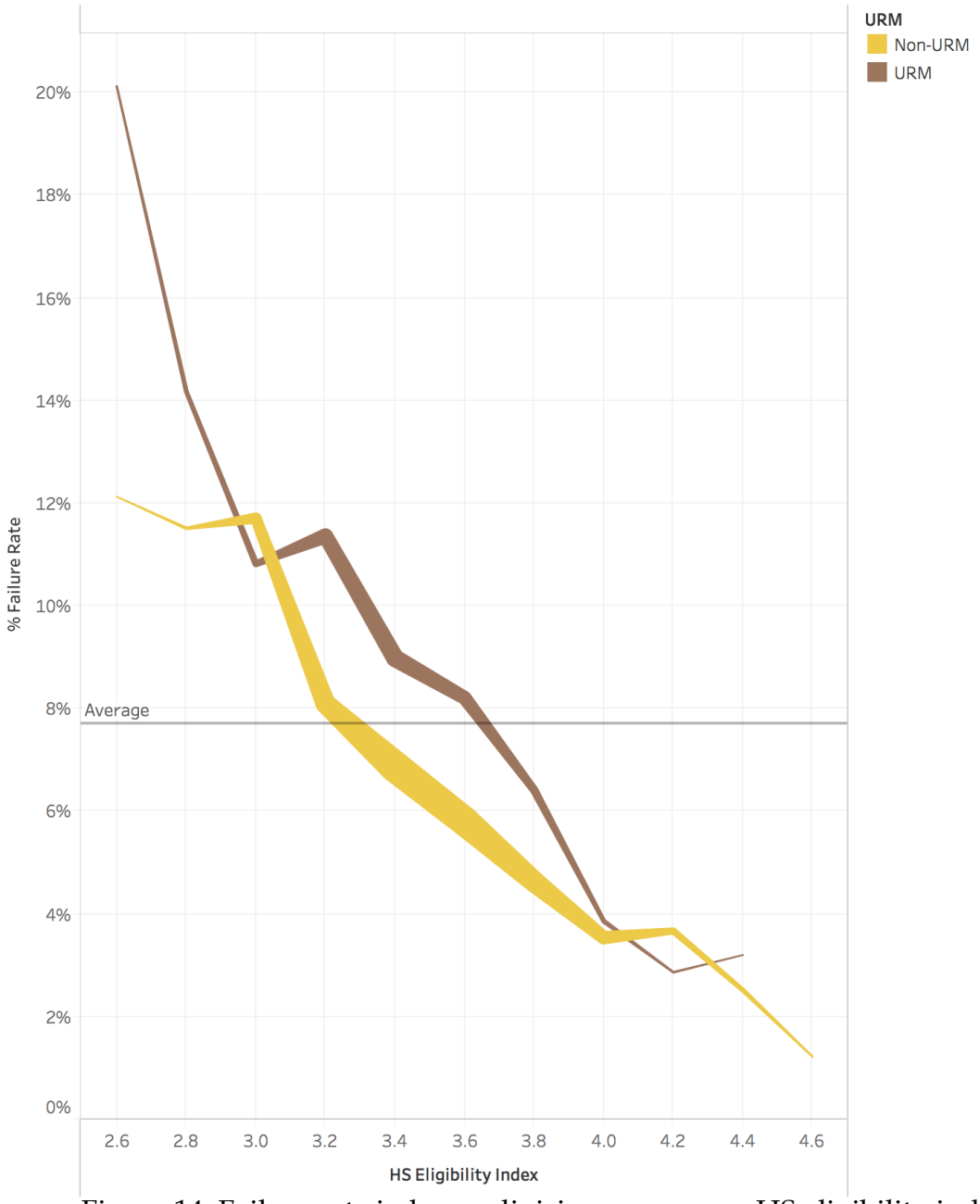

Figure 14. Failure rate in lower division courses vs. HS eligibility index scores for URM and non-URM FTF.

One likely factor effecting URM grad rates that is different from the gender effect is financial need and/or first-generation status. If financial need causes some students to drop out, whether they were doing well academically or not, and URMs have a higher proportion of financial need students, then that could explain part of the gap. First generation status may also have an effect, but as most of the first-generation students will also need financial aid it may not be possible to separate those two effects. Unfortunately, I have not been given access to this data, so these factors have not been analyzed.

Gender and URM effects

As the URM FTF have a higher percentage of females, 57%, than the non-URM FTF, 52.6%, these two factors were separated out in Fig. 15 to determine the URM gap independent of gender. Averaged over all six years the non-URM females had the highest graduation rate of 30.1%, followed by the URM females at 18.4%, non-URM males, 15.3%, and finally, URM males at 7.4%. Note that on average URM females graduate at a 3% higher rate than non-URM males, and in 2012 graduated at a 5% higher rate.

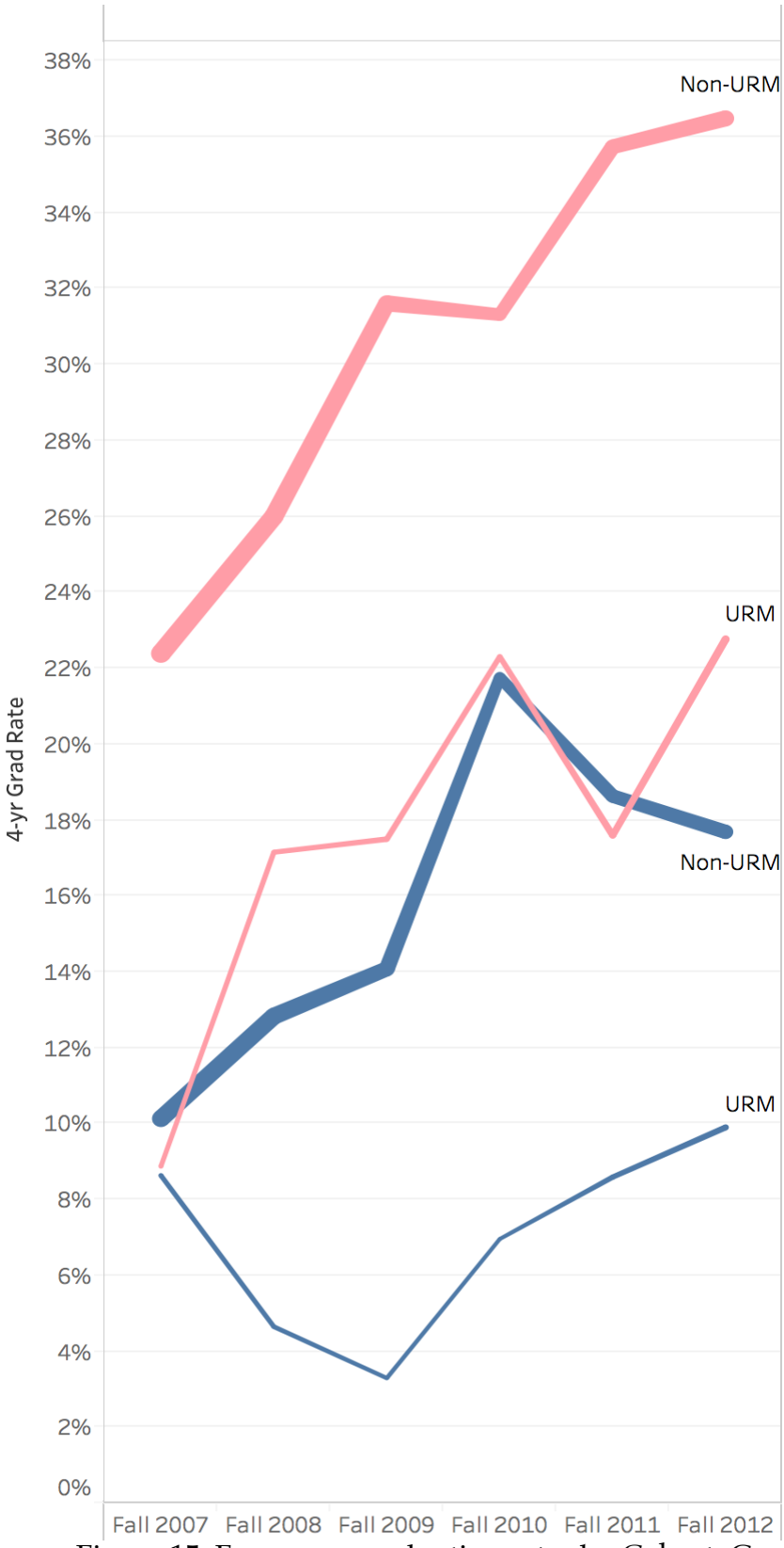

Figure 15. Four-year graduation rates by Cohort, Gender and URM status

Correcting for HS eligibility scores should give the "true" URM gap, Fig. 16. This shows that the gap between URM females and non-URM females, ~6%, is much smaller than the gap between URM males and non-URM males, ~11%, especially at higher index values. Non-URM females are graduating at 1.7 times the rate of non-URM males when corrected for HS eligibility scores and URM status. The sample size for the non-URMs is large enough to see how this causes the lines for male and females to diverge more at higher index scores. As was discussed with the URM "gap", this is why the "gap" doesn't scale well to higher grad rates, increasing only because the overall rate is higher. The flattening of the URM male line is probably an artifact caused by the small sample size.

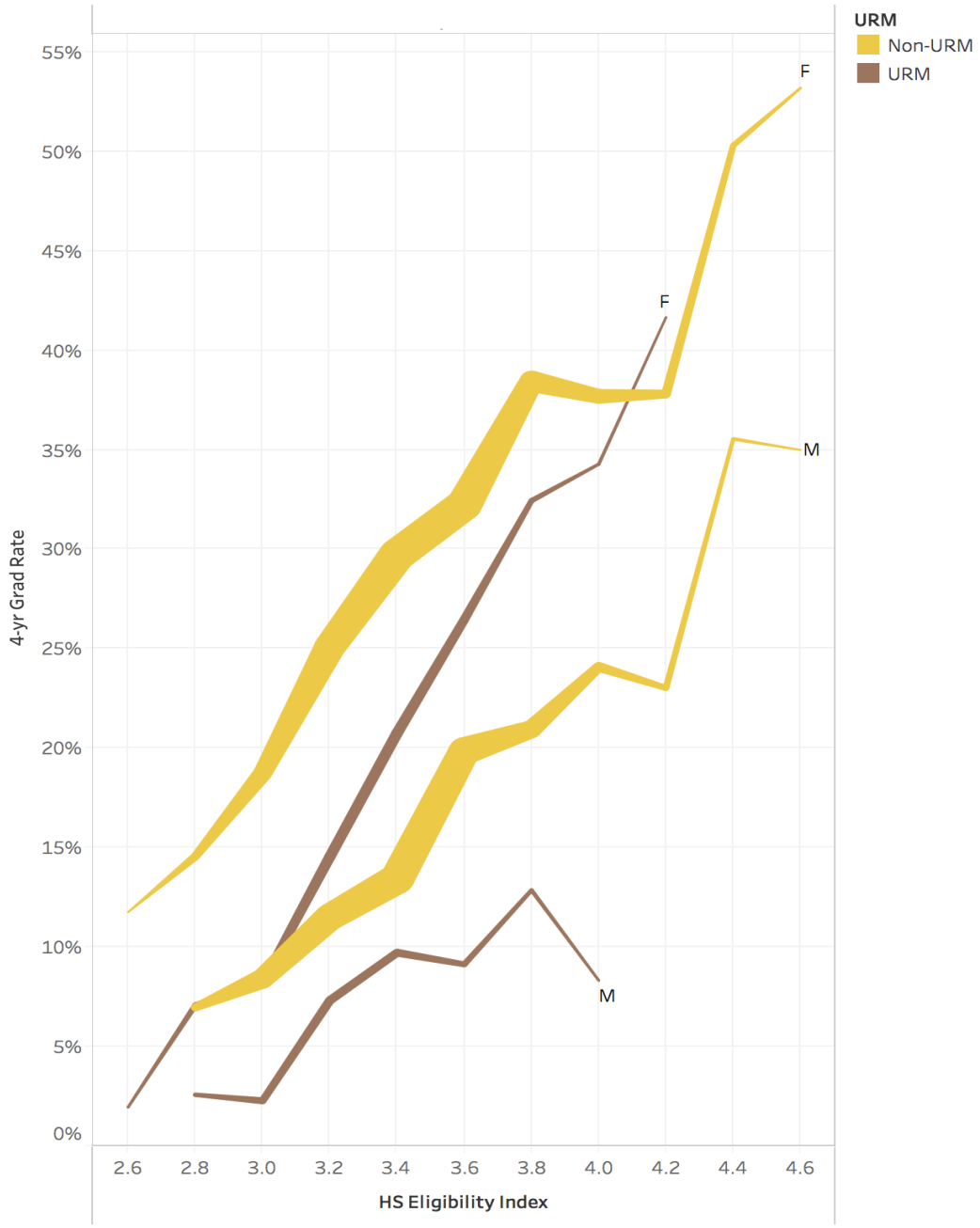

Figure 16. Four-year graduation rates vs. High School eligibility index separated out by URM status and gender.

Separating failure rates out by both gender and URM status, Fig. 17, shows a similar pattern of URM females catching up to the non-URM females at high index values, but being more similar to non-URM males at low index scores. Unlike with graduation rates, URM males show a steady decrease in failure rates at higher index scores, suggesting that the poor graduation rates for high index URM males is caused by some other factor besides classroom performance.

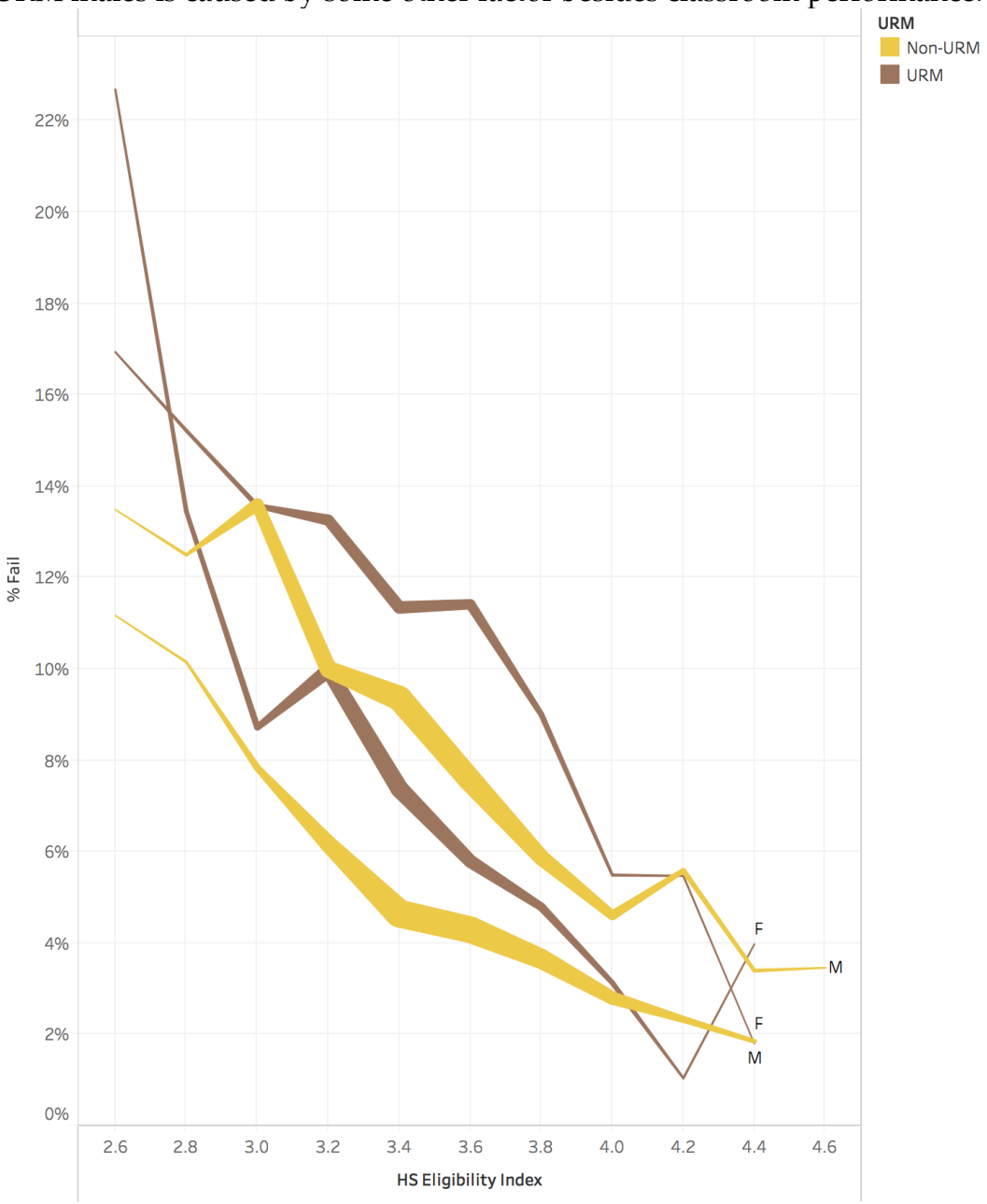

Figure 17. Failure rate of FTF in LD courses separated out by gender and URM status.

Financial Need/First Generation Effects
<waiting for access to data>

Initial College and Department Choices

Comparing the four-year graduation rates for FTF by the college of their choice of initial major shows an almost three-fold difference between Communication and Education (CME), with a 31% rate, and Engineering (ECC), with an 11% rate, Fig. 18.

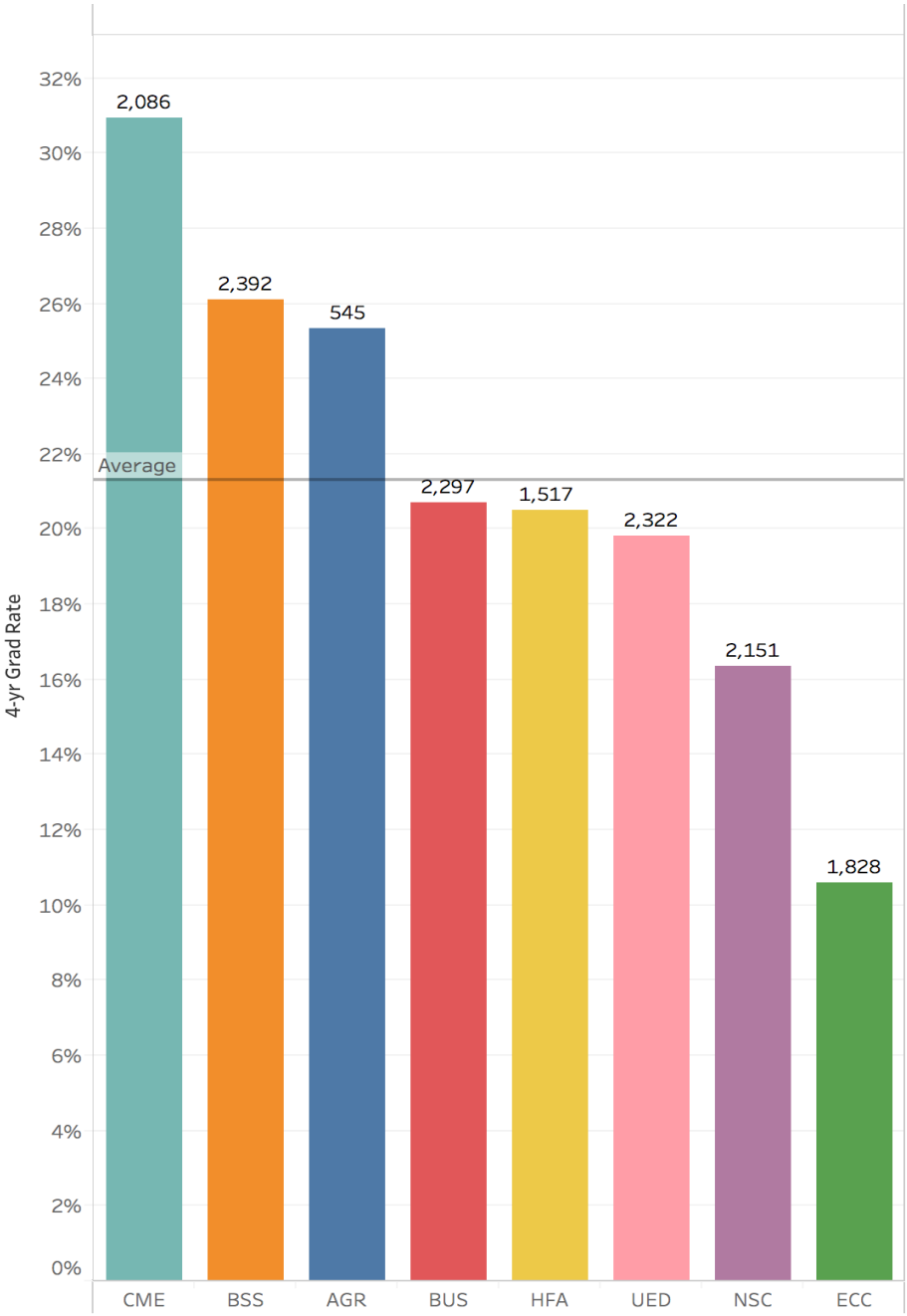

Figure 18. Four-year graduation rates for FTF by the college of their initial choice of major. Numbers above the bars are the total number FTF choosing a major in that college.

At the department level there is even more variation, Fig. 19, going from a high of 43% for Liberal Studies to a low of 7% in Electrical Engineering, a six-fold range. Even within one college the graduation rate by department can vary by over four-fold.

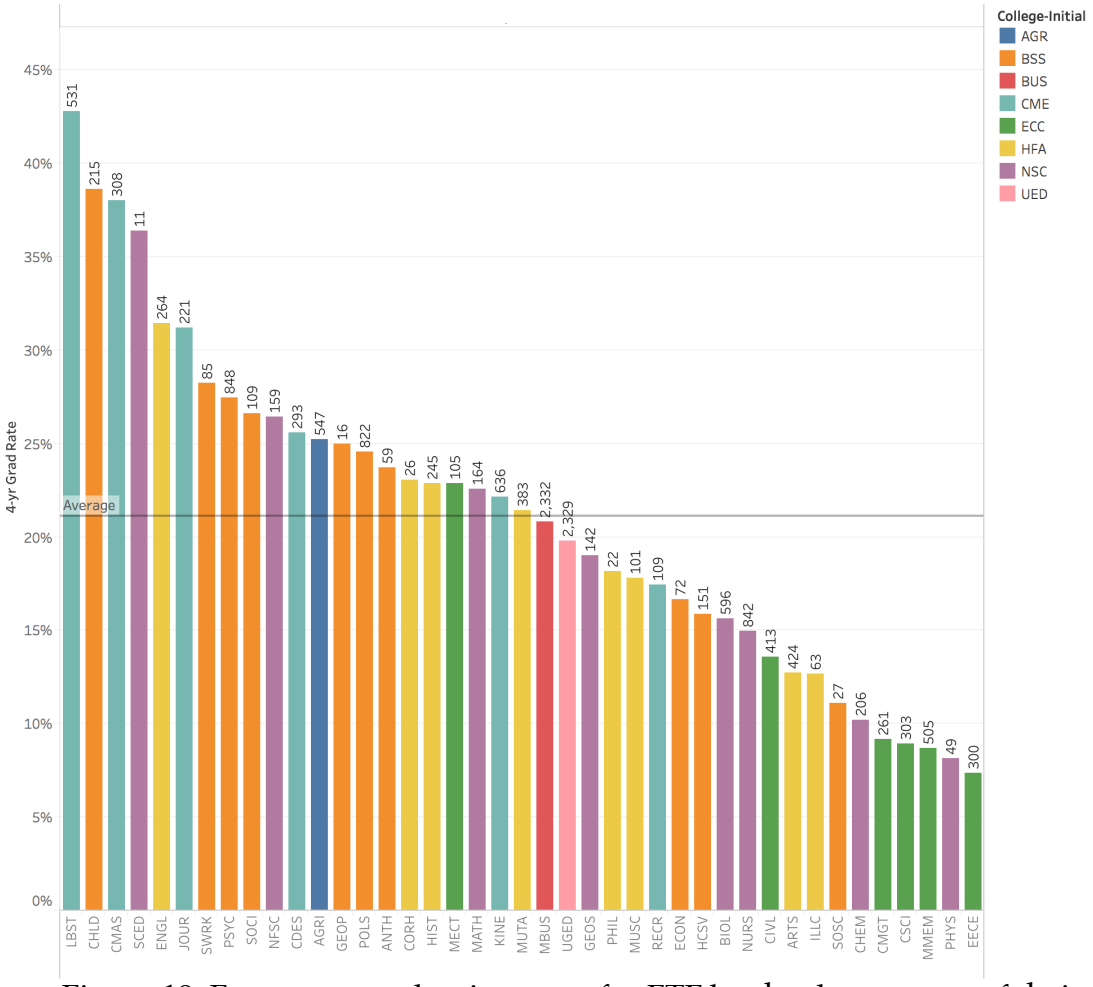

Figure 19. Four-year graduation rates for FTF by the department of their initial choice of major. Numbers above the bars are the total number FTF choosing a major in that department.

This large variation in rates is potentially confounded by an even greater variation in the gender and URM ratios between departments and colleges. The gender ratio of initial choice of major varies seven-fold by college, from a low of only 10% female in ECC to a high of 70% in NSC, Fig. 20, and 25-fold by department, from a low of only 4% female in Construction Management to a high of almost 100% in Child Development, Fig. 21. As females graduate in four-years at a two-fold higher rate than males, Child Development should have a two-fold higher rate than Construction Management from the gender effect alone, explaining about half of the four-fold rate gap between them.

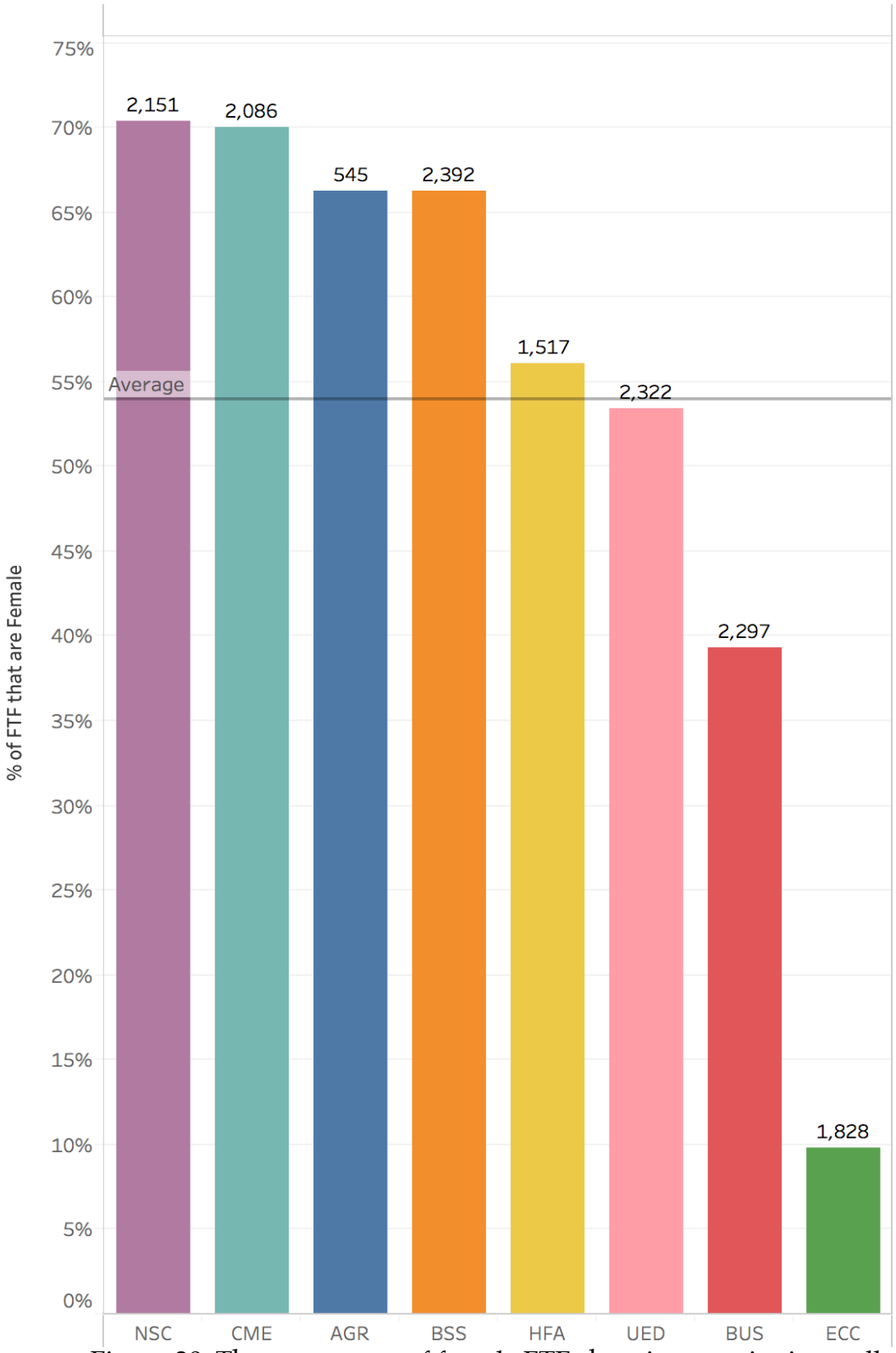

Figure 20. The percentage of female FTF choosing a major in a college. Numbers above the bars are the total number FTF choosing a major in that college.

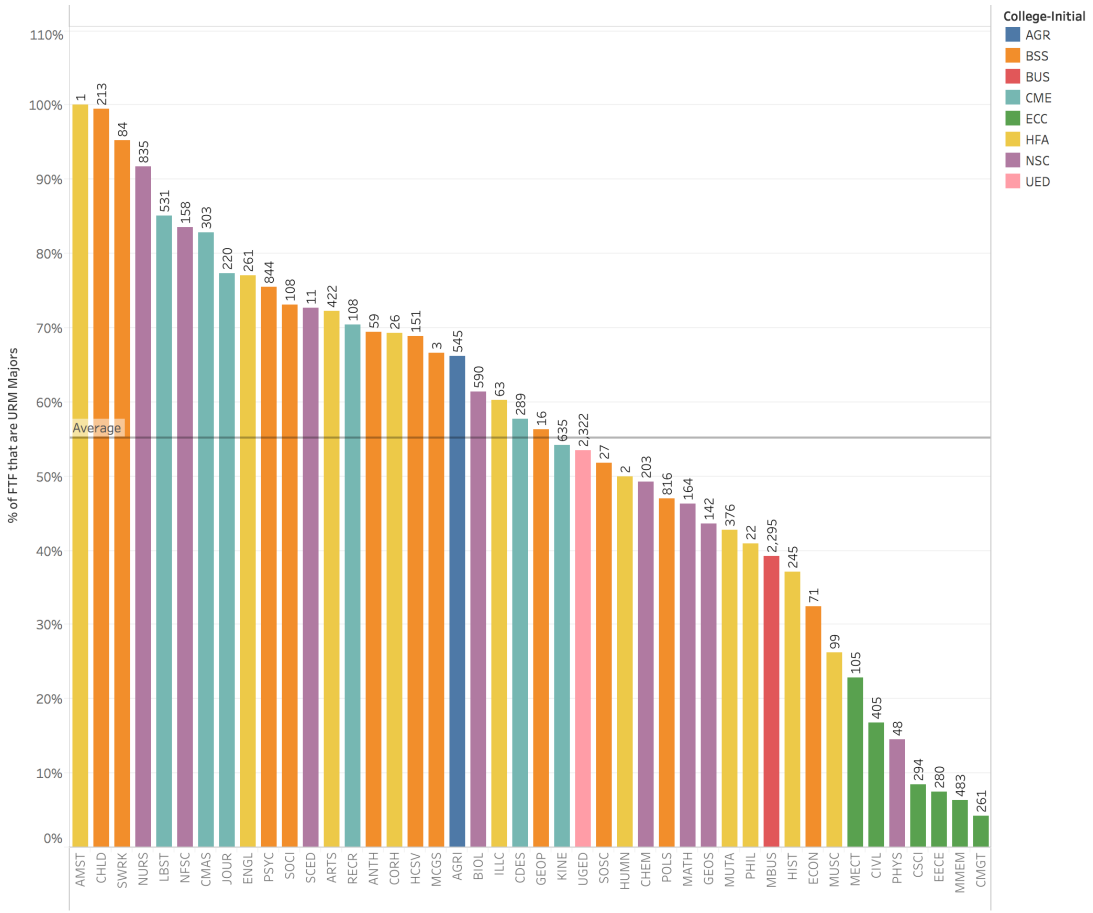

Figure 21. The percentage of female FTF choosing a major in a department. Numbers above the bars are the total number FTF choosing a major in that department.

While not as large, there are also significant differences in choice of major by URM FTF relative to non-URM FTF. There is almost a two-fold variation by college, from a low of 16% URM in Business to a high of 30% URM in BSS, Fig. 22. By department there is a ten-fold variation, from a low of 4% in Recreation to a high of 50% URM in Social Work, Fig. 23. As non-URM FTF are 60% more likely to graduate in four years, this factor can explain ~ 30% of the graduation rate differences between departments. As a result, a fair comparison of rates between colleges and departments must be controlled for the differences in gender and URMs.

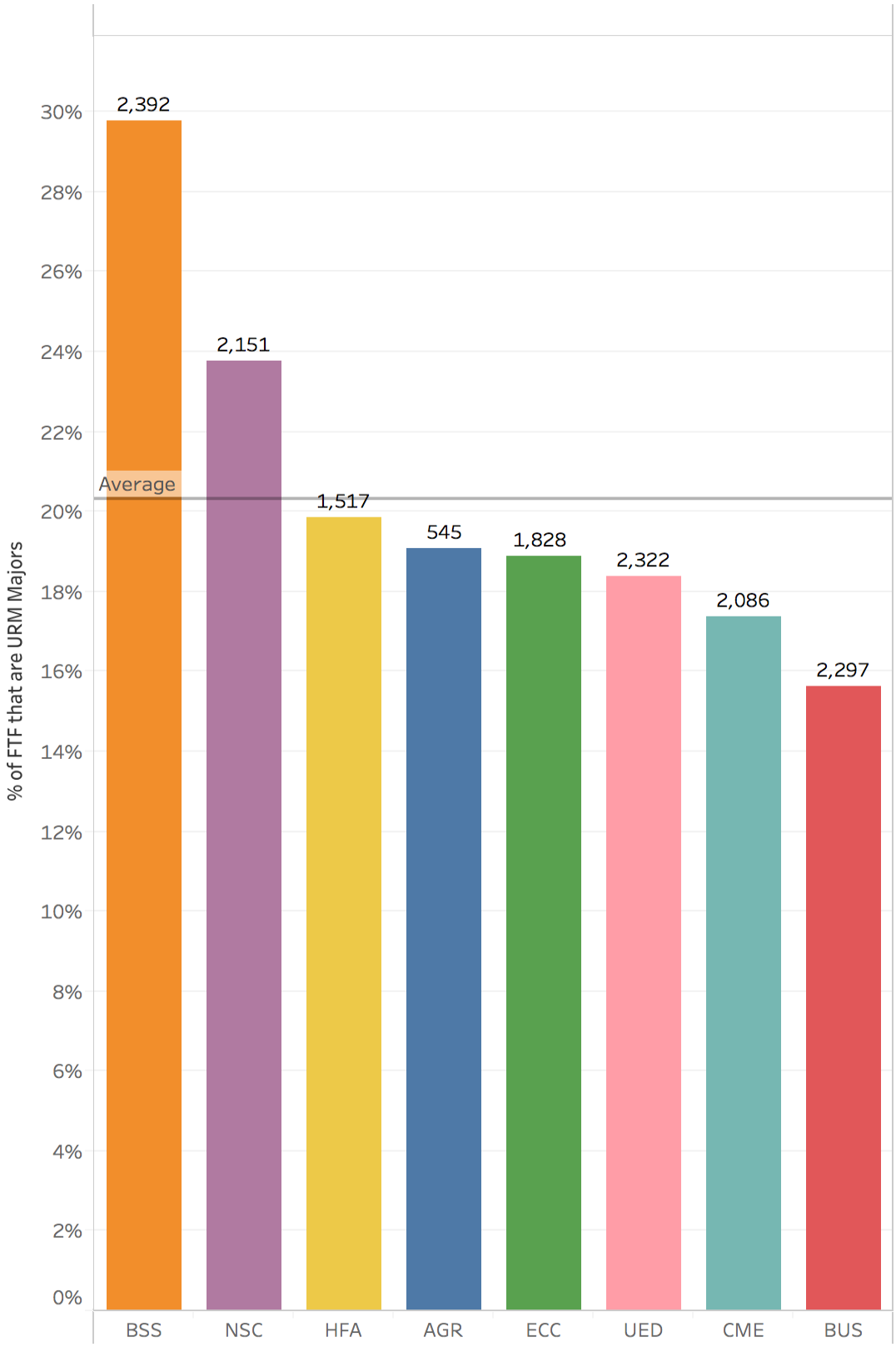

Figure 22. The percentage of URM FTF choosing a major in a college. Numbers above the bars are the total number FTF choosing a major in that college.

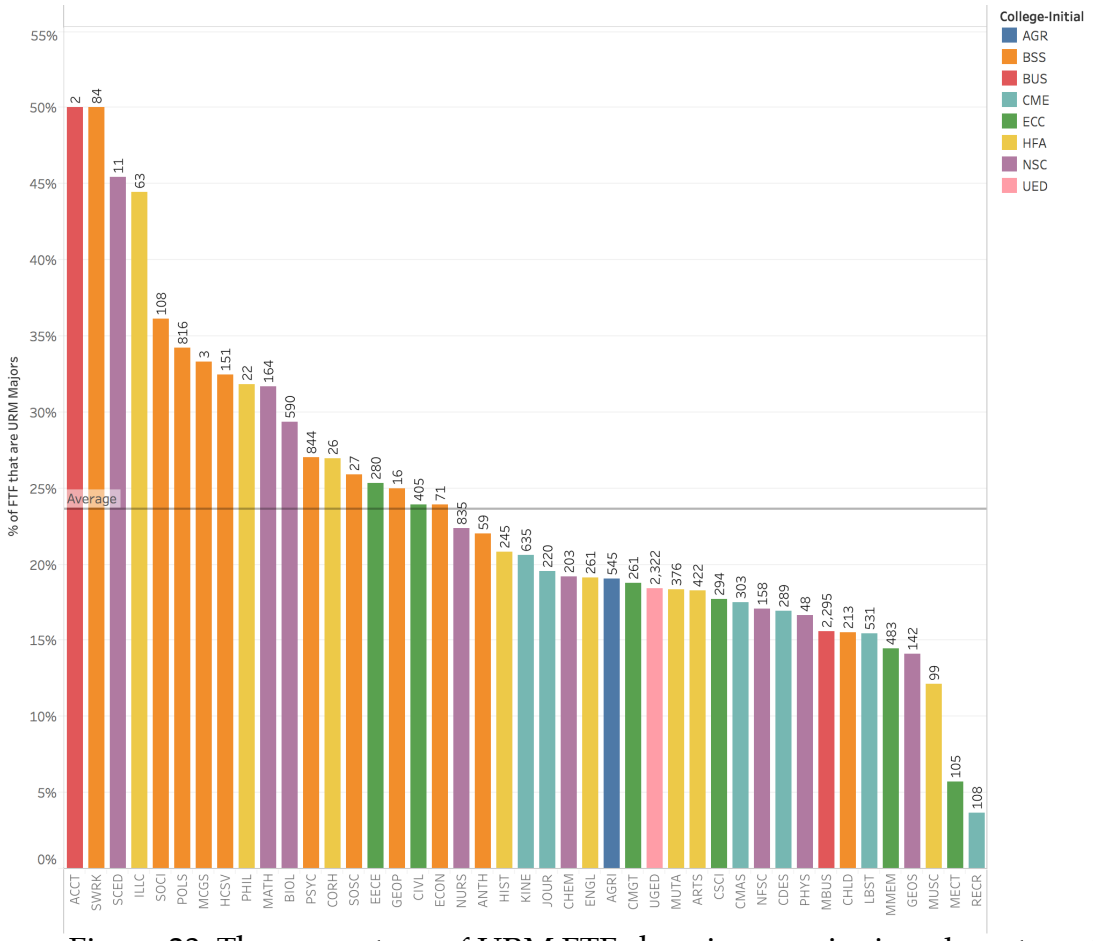

Figure 23. The percentage of URM FTF choosing a major in a department. Numbers above the bars are the total number FTF choosing a major in that department.

To control for both gender and URM status, Fig. 24 shows the 4-yr rates for White females (the largest single group in the data) by college. Removing gender and ethnicity still leaves about an 80% difference in rates between the low rate colleges, NSC and ECC at 22%, and the college with the highest graduation rate, CME at 40%. Males show a similar pattern, though with the lowest rate dropping to 11% for ECC and the rate for the highest college dropping to only 23% for BSS, about half the rates for females, as expected (data not shown). CME did have an unexpectedly large gender gap, as the white males only graduated at a 17% rate.

The pattern is similar by department, with a 3.5-fold range from the department with the lowest rate and a reasonable sample size, Chemistry, with a white female 4-yr rate of 16%, to Liberal Studies, with a White female rate of 55%, Fig. 25. Thus, while about 40% of the gap between the high grad rate colleges and departments is from differences in their proportions of females and URM majors, 60% of the difference is from some unknown factor.

Comparison of female to male rates and non-URM and URM rates in the same department show that the differences in rates described above are independent

of the department or the grad rate for a department–females graduate at twice the rate of males in Liberal Studies or Computer Science (data not shown).

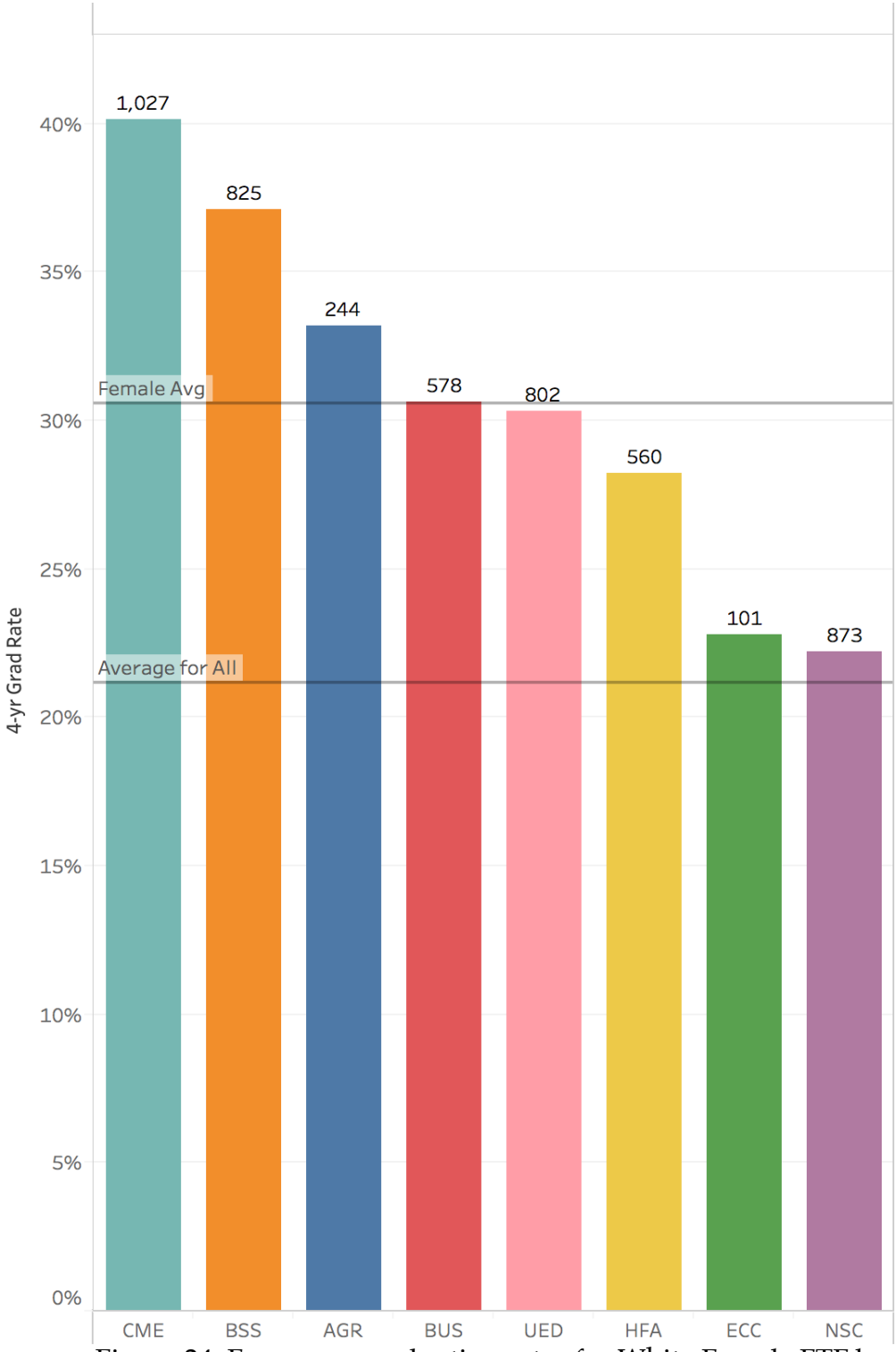

Figure 24. Four-year graduation rates for White Female FTF by the college of their initial choice of major. Numbers above the bars are the total number White Female FTF choosing a major in that college.

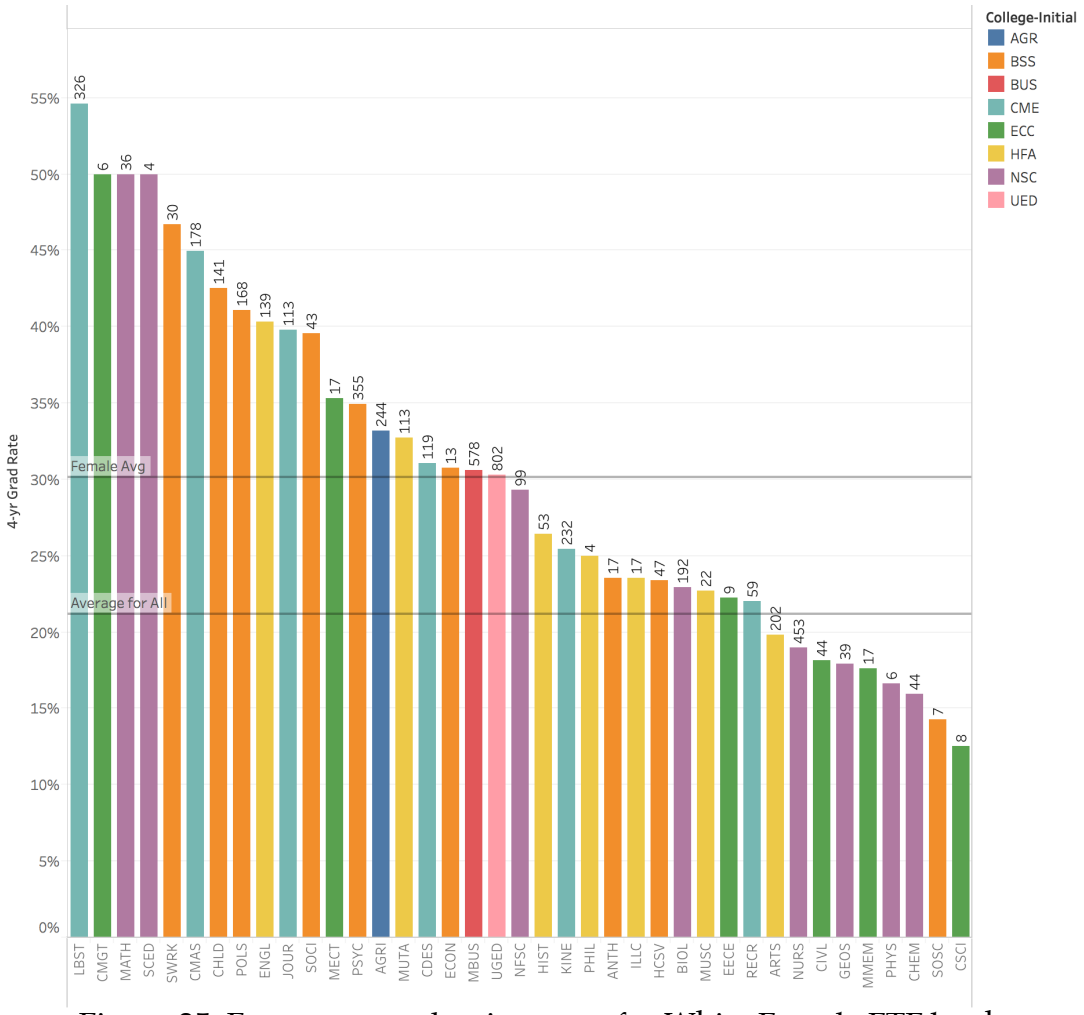

Figure 25. Four-year graduation rates for White Female FTF by the department of their initial choice of major. Numbers above the bars are the total number of White Female FTF choosing a major in that department.

While some of the remaining graduation gap between colleges and departments may have to do with factors such as the number of units required for a degree, one logical possibility is that the failure rate in courses in some departments are higher than in others, slowing progress to graduation or leading to students dropping out or switching majors. Figures 26a and 26b show the variation by subject in failure rates for LD courses, ranging from a low of 1% in CMSD to a high of 21% in TECH. Students in STEM majors needing to take CSCI, a 17% fail rate, PHYS, a 14% fail rate, CHEM, a 14% fail rate, and MATH, a 13% fail rate, are likely to have graduation delayed due to failing at least one of these courses. The correlation between failure rates for a subject and graduation rates for FTF initially choosing that department is ~0.4, despite the inclusion of GE courses.

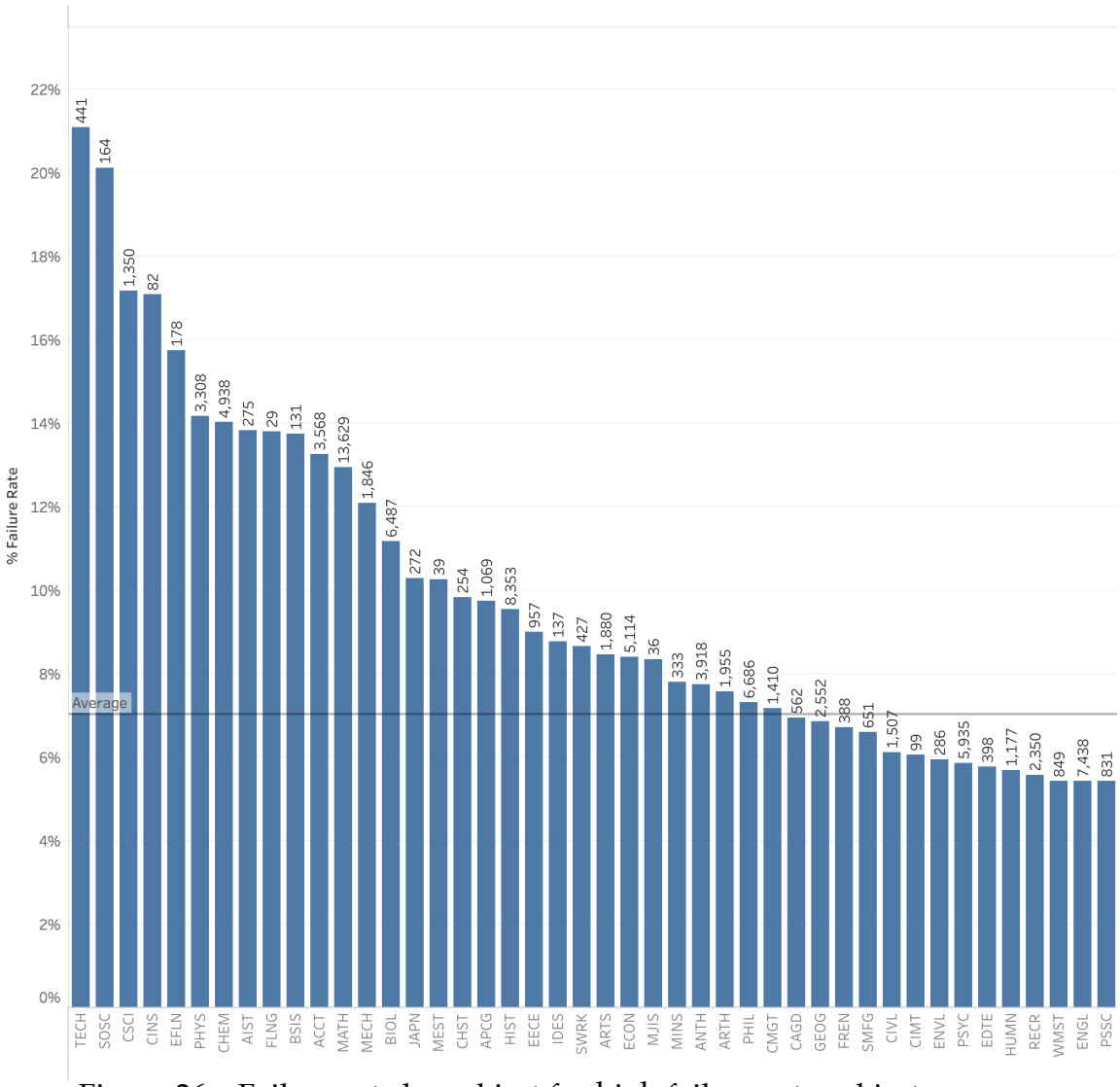

Figure 26a. Failure rate by subject for high failure rate subjects

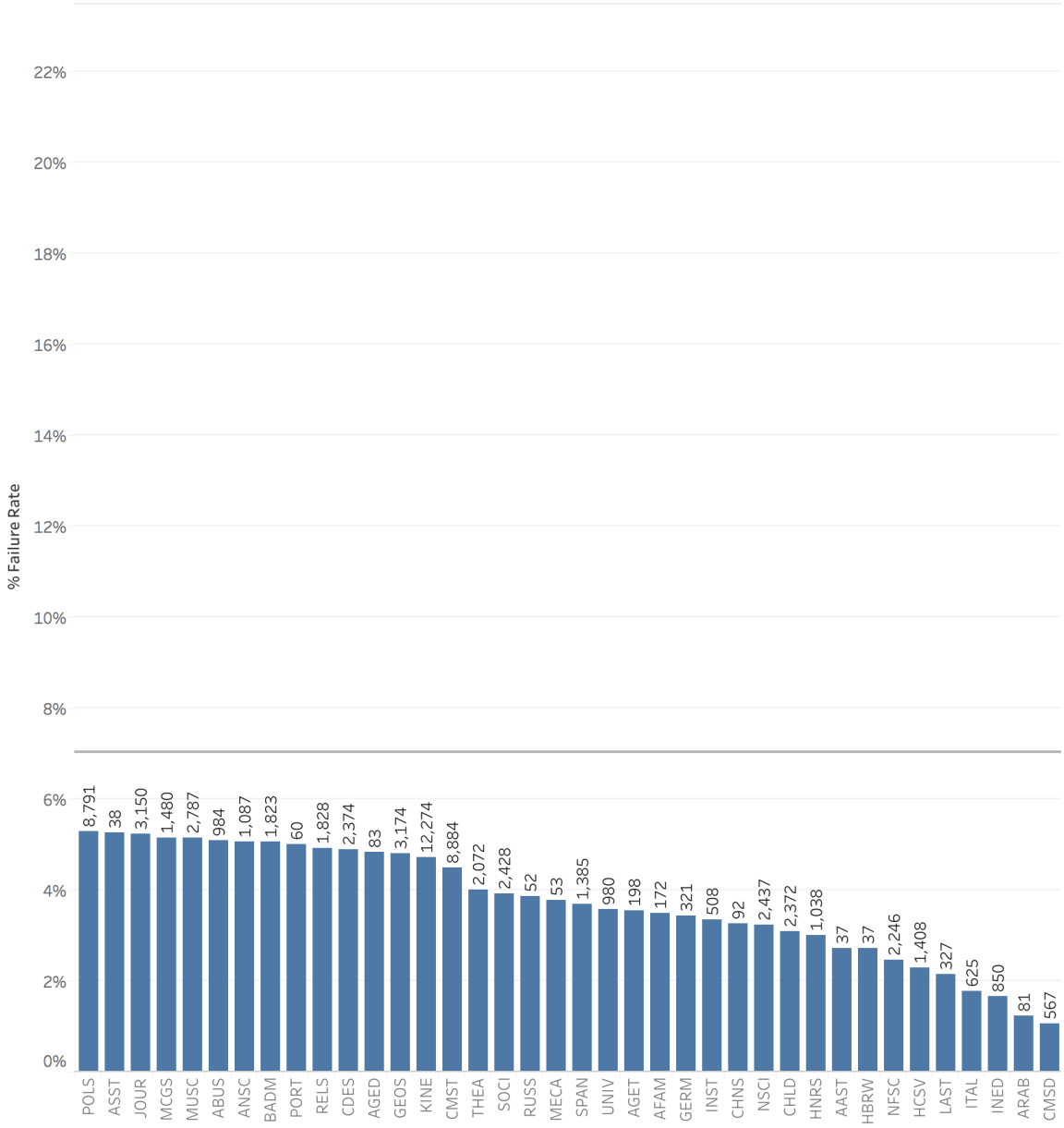

Figure 26b. Failure rate by subject for low failure rate subjects

Controlling for gender and URM effects by using just male URM students shows that failure rates go from a low of 2% for male URM FTF in NFSC to a high in TECH of 33%, with several subjects having URM failure rates for minority males over 20%, Fig. 27. Thus, at least one major cause of the differences in graduation rates between initial majors in colleges and departments is an increased risk of failing a class in that college or department.

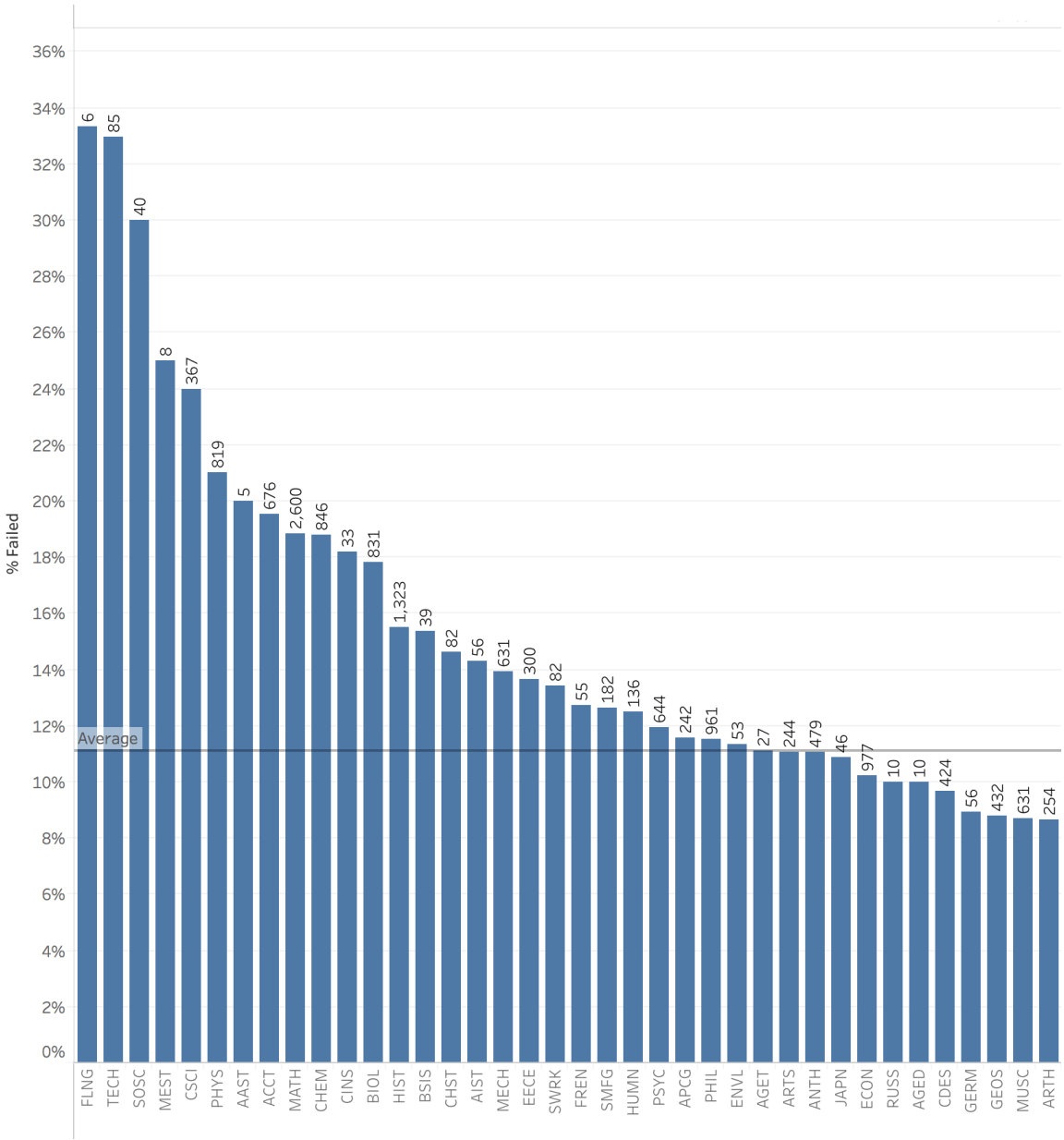

Figure 27a. Failure rate of male URMs by subject for high failure rate subjects.

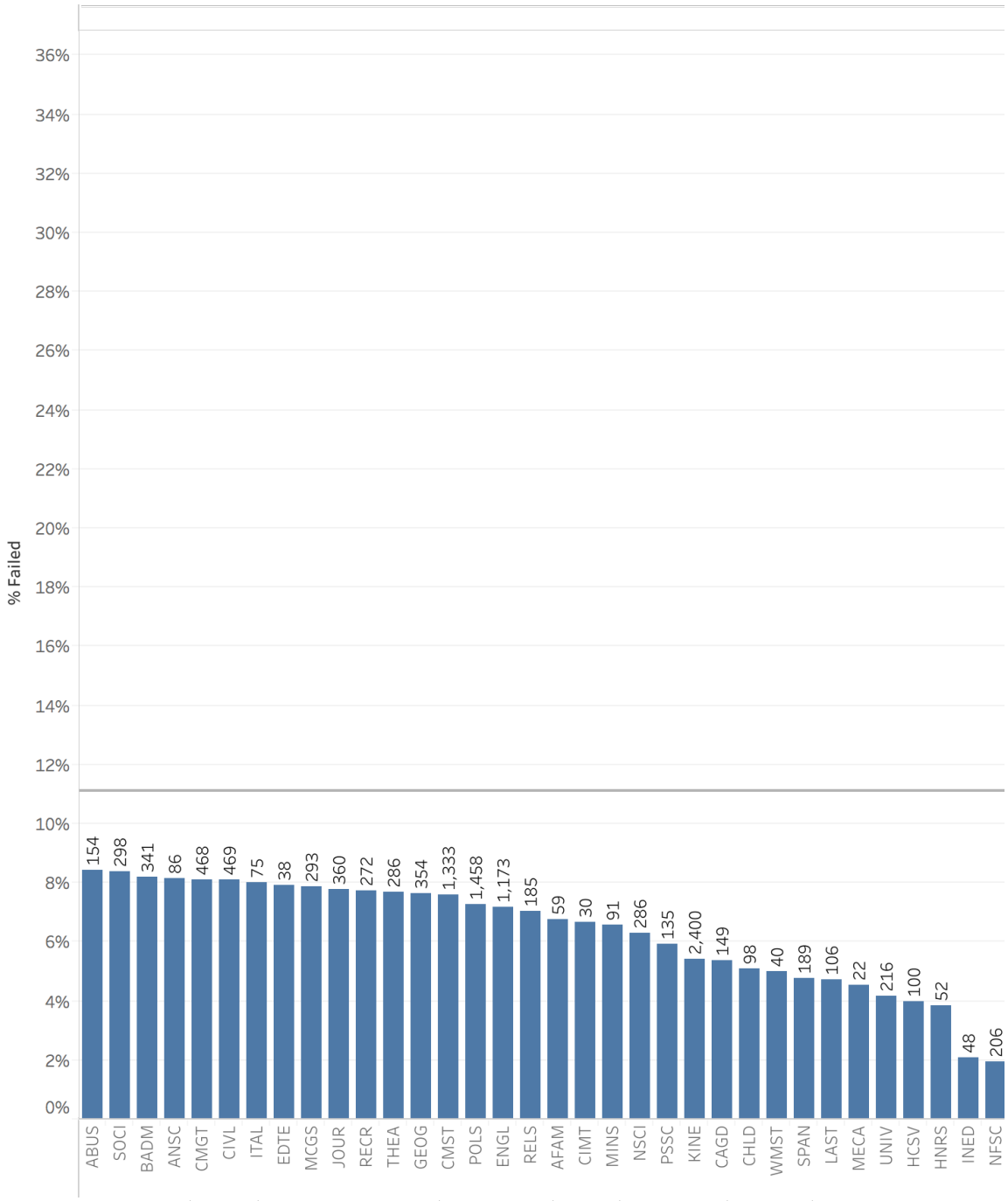

Figure 27b. Failure rate of male URMs by subject for low failure rate subjects

Implications of Current Trends in Enrollments

In the four years since the entry of the Fall, 2012 class there have been changes in the demographics of the incoming classes that should have some minor effects on 4-year graduation rates. The average HS eligibility index score has increased slightly from 3.58 in 2012 to 3.63 in 2016, which should increase the 4-yr grad rate by ~1% for the 2016 cohort, Fig. 28

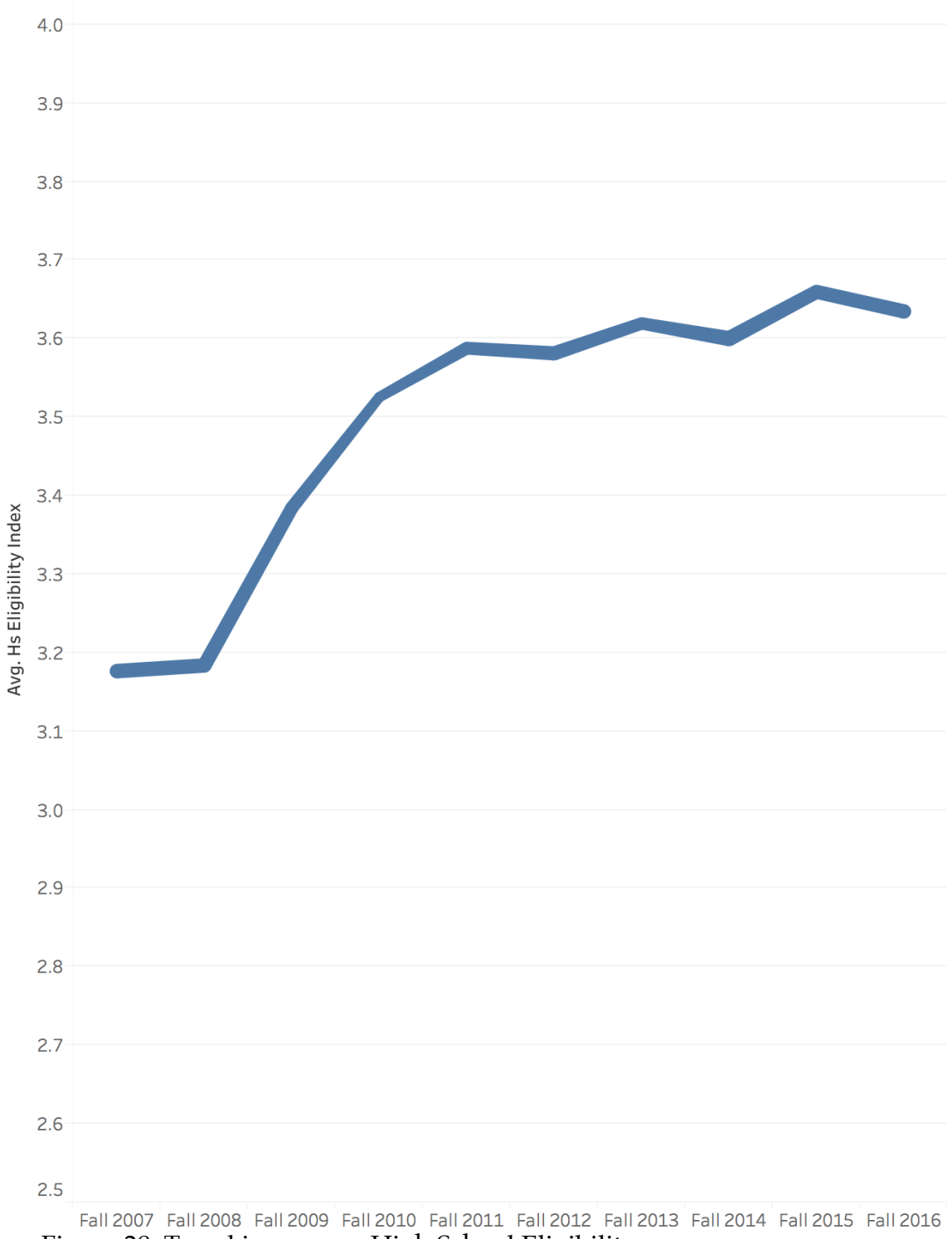

Figure 28. Trend in average High School Eligibility scores

The percentage of the incoming freshman class that is female has increased from 54.4% female to 55.2%, this 0.8% increase in the percentage of females should increase the 4-yr rate by ~0.2%, Fig. 29.

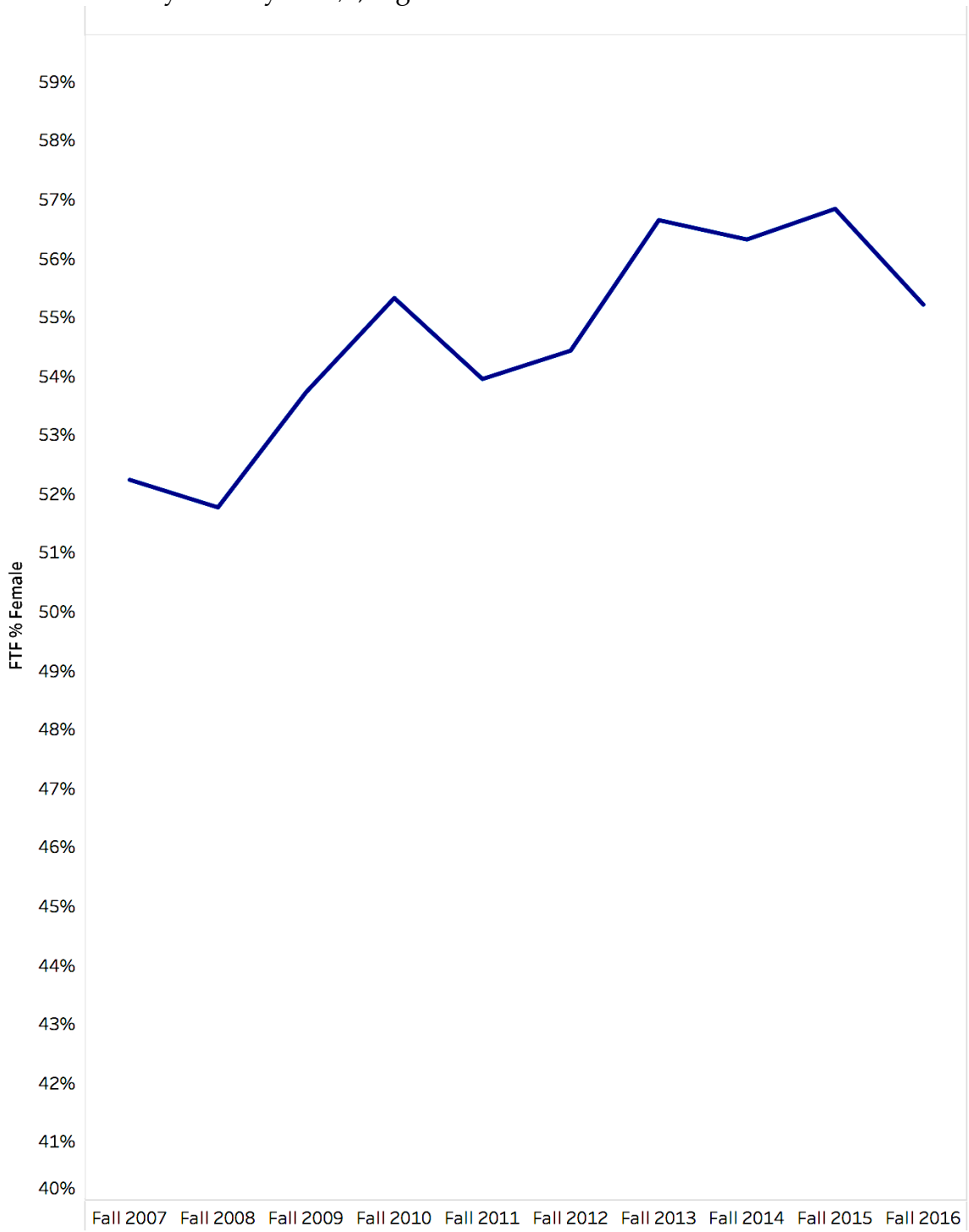

Figure 29. Trend in percentage of incoming freshmen that are female.

The percentage of the incoming class that is URM has increased dramatically, from 27.2% in Fall, 2012 to 40.9% in Fall, 2016, Fig 30. As non-URM graduate at

~1.6 times the URM rate, this should reduce the 4-yr rate by ~1.5% for the 2016 cohort, canceling out the ~1.2% increase from the increases in the HS eligibility index and the percentage of females.

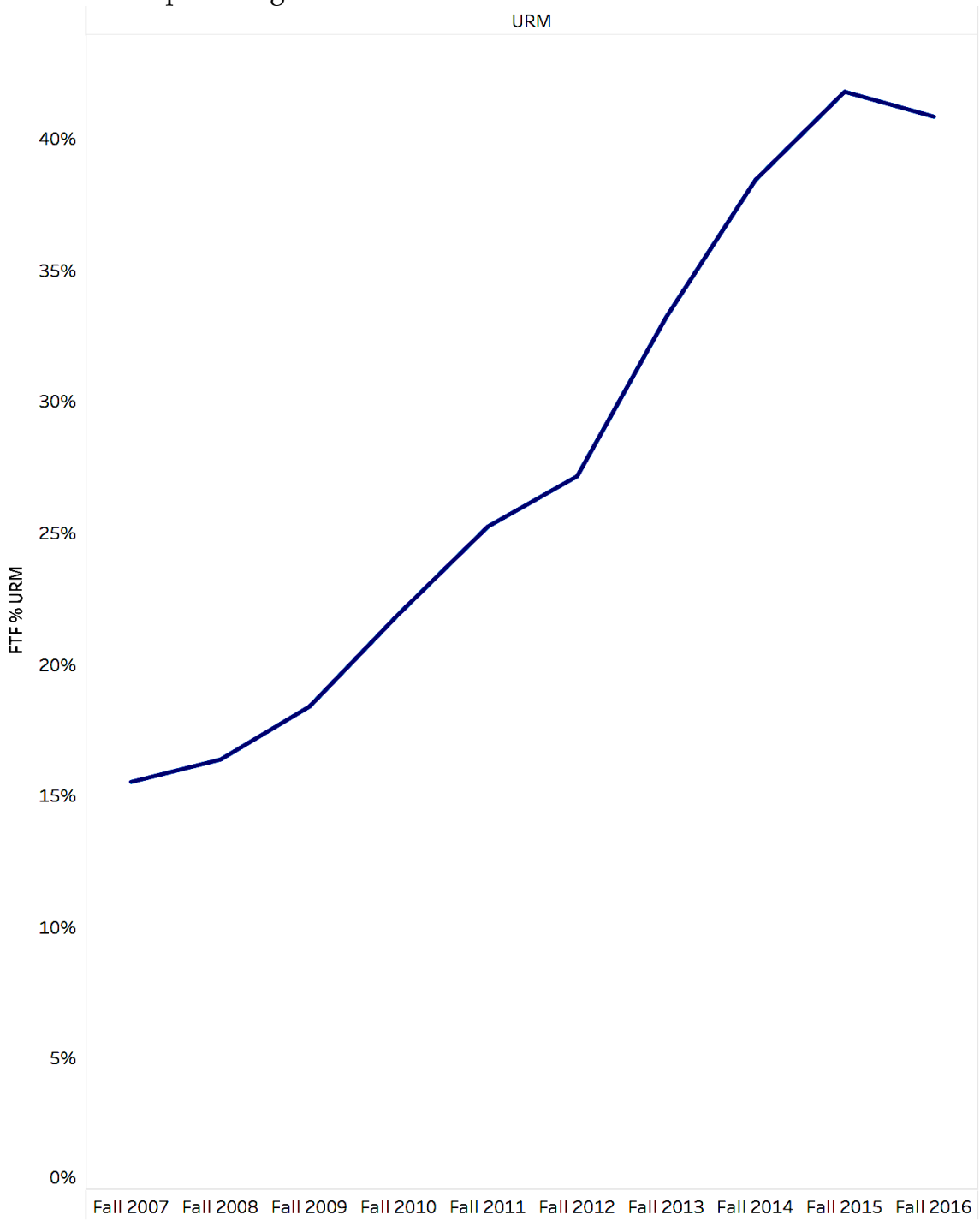

Figure 30. Trend in percentage of incoming class that is URM.

There have been several significant changes in the college of student choices of an initial major, Fig. 31. In particular, students choosing an engineering major (ECC) have increased from 11.8% of the incoming class in 2012 to 16.5% in 2016,

while the percentage choosing a major in the College of Communication and Education (CME) has decreased from 13.7% to 11.7% and those choosing an HFA major have declined from 8% to 5%. This, along with an increase in NS from 18% to 19.8%, should decrease the 4-yr rate by ~1 to 2% due to the lower rates for ECC and NS majors, relative to CME and HFA majors.

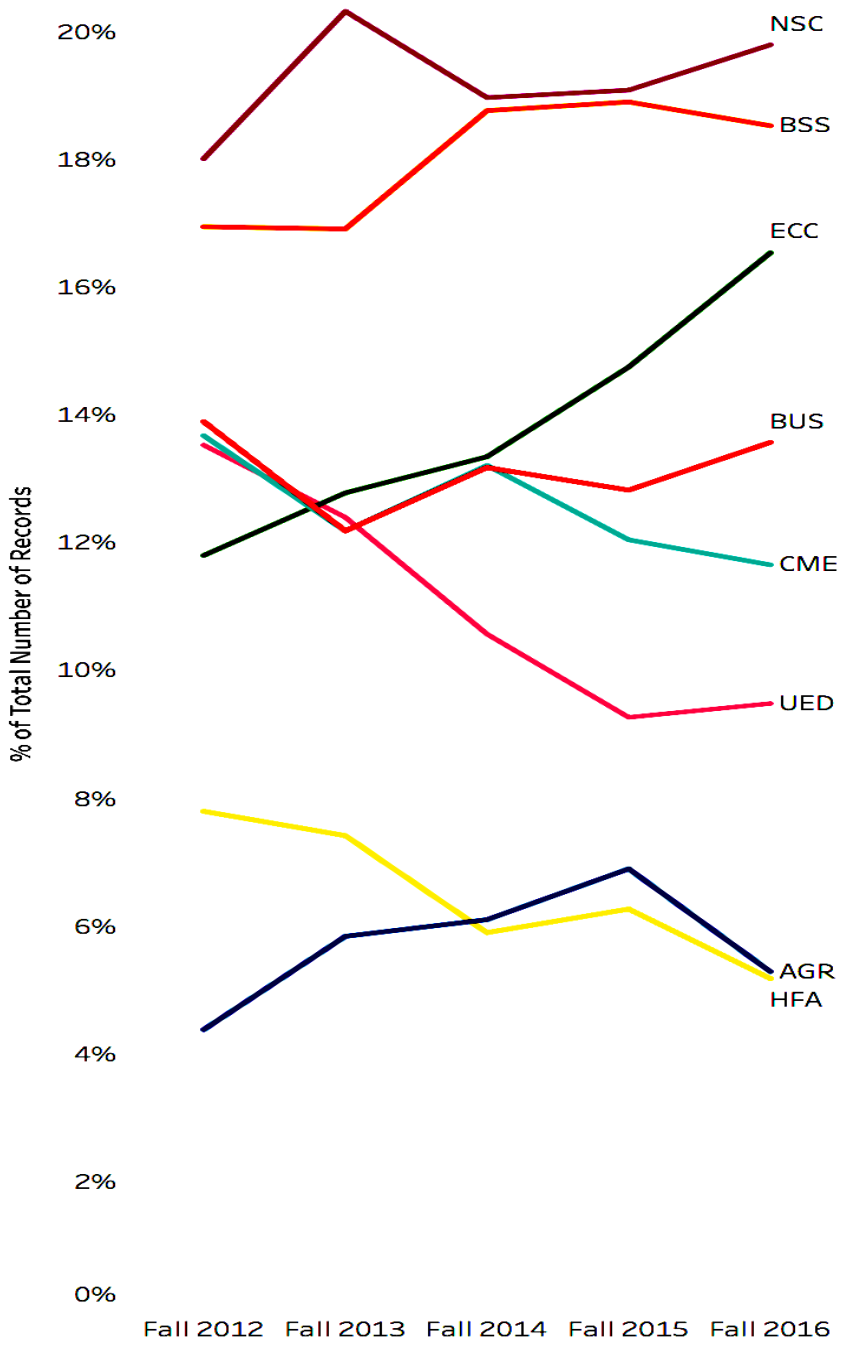

Figure 31. Trends in FTF choices of initial college.

Conclusions

The common element between the major factors identified here, HS eligibility score, gender, ethnicity, and initial choice of major, is the risk of failing a course. If we are to significantly increase our overall grad rates, we will need a plan that reduces the rate of failure in lower division courses. If we wish to reduce the gap between URM and non-URM grad rates we will need to eliminate the gap in failure rates between those two groups, and also reduce the gap between high index students and low index students, or improve the pool of URM FTF. This is a challenging problem as we already put a lot of effort into improving our instruction, so reducing failure rates in lower division courses without reducing the quality of those courses will require some new ideas.

Future research needed: Much more work is needed to completely understand the problem of students not graduating. In addition to the obvious addition of financial need, first generation status, and remediation status to the current study, this analysis needs to be extended to 6-yr rates and 2 and 4-yr rates for transfer students. Adding in data on student academic performance in their first year would make it possible to target students at most risk. Factors effecting first and second year retention also need to be determined. Importantly, we also need to know how many students are lost for non-academic reasons. Are we losing successful students who aren't failing classes? If so, we need to know what is responsible for those losses.