

Who Loses Out?

Registration Order, Course Availability, and Student Behaviors in Community College

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Abstract

The recent economic downturn has resulted in significant budget cuts at all levels of California's higher education system, resulting in fewer course offerings and large numbers of students being turned away from classes. This paper uses data from a large California community college, including previously underutilized data on students' registration attempts, to explore a number of student and institutional behaviors that provide insight into overcrowding. By directly assessing the exact time each course section closes, I find there are significant numbers of open seats available to almost all continuing students and many new students when they are first eligible to register, except in math and biological science courses. I highlight a number of student and institutional behaviors that illustrate the complexities of student enrollment, and estimate the impact of two policy changes related to priority registration. Most importantly, I find that fully matriculated new students attempt about twice as many units as non-matriculated students who are given later registration times, but have only marginally better course performance. These results suggest that changes to matriculation may negatively impact qualified students who have less knowledge of the steps required to navigate the challenging transition from high school to college.

Keywords: Community college, Overcrowding, Registration

Introduction

The Great Recession led to extreme cuts in support for higher education, with 48 states spending less money in 2013 than 2008 (Oliff, Palacios, Johnson, & Leachman, 2013). Broad-access institutions have always fulfilled multiple missions, but budget cuts have forced policy makers to decide which of these missions to prioritize, and for whom. In California, whose students make up approximately one-fifth of the nation's community college population (American Association of Community Colleges, 2013), appointed panels have focused on the idea that community colleges may have overinvested in higher education, both in courses that are not part of the core mission of basic skills education, career technical education, and transfer, and in students who do not exhibit college completion behaviors (California Community Colleges Student Success Task Force, 2012; Little Hoover Commission, 2012). One proposed strategy, currently utilized by a small number of colleges, is to provide priority registration for new students who exhibit what are considered appropriate behaviors, including timely completion of matriculation steps and early development of an educational plan. Conversely, continuing students with high unit counts or lower academic performance will lose their priority and be placed at the end of the registration line beginning in Fall 2014 (Ortiz-Mercado & Dumont, 2012). Critics of state budget cuts argue that restricted access has already prevented many qualified students from attending college, and future policy changes will disproportionately harm the most vulnerable students, including ethnic minorities and first-generation college-goers (Johnson, 2013; Rhoades, 2012).

This paper provides information on two key questions in the debate on overcrowding and course allocation. First, I empirically examined the relationship between registration and course availability in a large California community college experiencing a significant increase in course demand. By directly assessing the exact time at which each course section closed, I found that there are a significant number of open seats in key courses available to all continuing students and many new students. I identify a number of issues that illustrate the complexities of student enrollment: most students did not use their registration time effectively; many students who successfully registered in a course later dropped or withdrew from the section; and most students closed out of general education courses did not attempt to register in alternative but equivalent courses. These results provide additional evidence that community college students, even those who have been enrolled for multiple semesters, would benefit from additional structure to help them identify and make progress toward their goals (Rosenbaum, Deil-Amin, & Person, 2006; Scott-Clayton, 2011). Utilizing these results, I estimate that removing priority enrollment for high-unit and low-academic students will open approximately 4% to 6% of seats in the most heavily impacted courses. As new students constitute approximately 15% of total registrants during the semester, this change constitutes only a partial solution to meeting excess demand.

Second, I investigated whether there are significant differences in academic outcomes between matriculated students, who are provided earlier registration, to non-matriculated students. I found that matriculated students attempt about twice as many units as non-matriculated students but, perhaps surprisingly given the potential selection issues involved in

matriculating on-time, had only marginally better course performance. Nonetheless, non-matriculated students were significantly more likely to leave the college at the end of the semester. Given the lack of structure between the K-12 and community college system, providing priority registration through early matriculation may negatively impact qualified students who have less knowledge of the steps required to navigate this challenging transition.

Literature Review

Undergraduate enrollment in U.S. postsecondary institutions has steadily climbed since the 1970s, but postsecondary completion rates have stagnated or declined, with students increasingly taking six or more years to earn their degree (Aud et al., 2012; Turner, 2004). Research has identified a number of barriers to college completion, including low levels of academic preparation, lack of social or academic integration into the college context, and financial constraints (Adelman, 1999; Rosenbaum et al., 2006; Tinto, 1993). These findings have led to renewed efforts to increase student retention, but simply retaining students will not increase completion rates unless the infrastructure is in place to serve them. Due to the recent economic recession and declining tax revenue, California has cut billions of dollars in general fund support for higher education, dramatically increasing the cost of tuition and fees for students at most of the state's higher education institutions (Baum & Ma, 2012; Center for the Study of Education Policy, 2012; Taylor, 2012). Four-year institutions have been forced to reduce course offerings and restrict access to new and transfer students, which has pushed more students into the community college system (Clark, 2009; Varlotta, 2010). Community colleges have also cut courses, as higher tuition does not directly translate into increased institutional revenues due to California's complex funding formulas (Murphy, 2004). The combination of decreased resources and increased enrollments have resulted in oversubscribed courses, and a recent survey by the Pearson Foundation found that California's community college students were almost twice as likely to report being unable to enroll in courses than the national average (Johnson, 2013; Pearson Foundation, 2011).

Policy reports at the state (Reed, 2008), national (Carnevale, Smith, & Strohl, 2010), and global level (Dobbs et al., 2012) frequently cite the need to produce more college-educated workers, and overcrowded and underfunded colleges could exacerbate this problem. Some evidence suggests that when colleges are unable to increase supply to accommodate demand that resources per student are reduced, university quality may decrease, and students' degree completion rates decline (Bound, Lovenheim, & Turner, 2010; Bound & Turner, 2007; Kane & Orszag, 2003). If students are unable to enroll full-time they may lose financial aid, or be induced to register in unnecessary courses. Overcrowding, especially if centered in specific areas, may also help explain previous research findings, such as delayed enrollment into core courses and attrition of successful students from remedial sequences (Bahr, 2012; Bailey, Jeong, & Cho, 2010). Studies have also highlighted the importance of students' course-taking patterns, especially during the first year of college, without being able to measure whether units attempted is the product of individual decisions or institutional constraints (Adelman, 1999; Bahr, 2010).

Not all of the available evidence suggests that declining resources, at least historically, are a significant problem in the community college setting. Bound, Lovenheim, and Turner (2010), examining declining postsecondary completion rates at community colleges, found that “conventionally measured academic resources...explain little of the completion rate decline, while declines in college preparation account for almost 90% of the total drop in completion rates” (p. 131). Evidence on the relationship between institutional resources and completion rates is mixed (Goldrick-Rab, 2010), with recent work on community colleges finding no effect of resources on educational attainment (Stange, 2012). Aggregate data from California shows small improvements in retention and course success rates since the recession began, though this may be a result of the changing mix of community college students more than an reflection of the value of school resources (Bohn, Reyes, & Johnson, 2013).

With budget concerns in mind, California has taken steps to determine how community college courses should be allocated to students (Bahr, Gross, Slay, & Christensen, 2014). Community colleges are increasingly criticized for low completion rates, especially in remedial academic sequences (Bahr, 2012; Bailey et al., 2010; Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008), even though some of their traditional missions, including basic skills and adult education, do not necessarily lead to degree production. State-level commissions have pushed to change the process under which courses are allocated to students, citing both financial challenges and the key role that community colleges play in producing skilled workers for the future (California Community Colleges Student Success Task Force, 2012; Little Hoover Commission, 2012). A 2011 report found that California’s community colleges utilized a wide range of enrollment practices, and recommended a number of changes to existing policies. State Bill 1456 will require that students with high unit counts or lower academic performance to lose registration priority. It is unclear how this change will impact students as little work has focused specifically on how registration systems influence student behavior. A small number of studies have directly compared early and late registrants at community colleges and universities and found that students who register later in the semester have lower course performance (Ford, Stahl, Walker, & Ford, 2008; Hale & Bray, 2011; Safer, 2009; Smith, Street, & Olivarez, 2002). These observational studies do not examine differences in assigned (as opposed to observed) registration times, link registration times to course availability, examine the range of student registration behaviors, or focus on institutions undergoing large increases in demand for courses, all of which I attempt to do in this paper. One promising study that exploits randomization in the registration assignment process found that having a later registration time has no impact on time to Bachelor degree, but this occurred at the University of California at Davis, whose students and structures are difficult to compare directly to a community college (Kurlaender, Jackson, Howell, & Grodsky, 2012).

A second key recommendation asks colleges to assign higher priority for students who fully matriculate by completing assessment, orientation, and counseling services prior to registration (Taylor, 2011). This would be a large shift, as the most recent estimate indicated that only 17 of the 112 community colleges currently utilize this process (Bahr et al., 2014). In contrast to the

previous proposal, which impacts long-standing college students with weak academic performance, this approach would penalize prospective community college students who do not complete these activities over the summer, months prior to attending. Research has long documented the challenges in the transition from high school to college, particularly for ethnic minority and first-generation college-going students (Goldrick-Rab, 2010; McDonough, 1997; Perna, 2000; Rosenbaum et al., 2006). Weak links between high schools and broad-access institutions leave many students unaware of the requirements needed to enter a community college, and traditionally underrepresented students may have less ability to access this information in time to transition smoothly (Stanton-Salazar, 1997; Stanton-Salazar & Dornbusch, 1995; Venezia, Kirst, & Antonio, 2003). In addition, California cut categorical funding for matriculation by half in 2010, which has restricted the ability of colleges to provide sufficient matriculation services, including access to counselors (Taylor, 2010). These issues raise the question of whether erecting additional barriers to college entrance will impact less motivated students who are unlikely to earn a postsecondary degree, or will restrict access to capable students who lack the social or cultural capital to help them navigate the transition into college.

Data and Methods

Data for this project came from one of the largest California community colleges, and included student transcripts, a small number of demographic characteristics, and students' assigned registration times. I also used a detailed history of every registration attempt for each student, which has not previously been utilized in research on overcrowding. This paper focused on credit-bearing students in the Fall semester of the 2011-12 academic year, as assigned registration times were not available for the previous Fall. I took a relatively agnostic view of community college students and, as much as possible, did not restrict my analysis to a narrowly defined group for three reasons. First, there is little consistent or reliable information about students' educational goals within the community college setting, and I hesitated to restrict students based on their responses to a set of questions early in their academic career. Second, I found missing data for many new students who matriculated close to the beginning of the semester, and as these students constituted a primary area of interest I did not want to remove them from my analysis. Finally, due to the economic recession, many students with college degrees may have chosen to take community college courses in order to change professions, and to the extent that they are taking course availability away from new students they should remain in the analysis.

I constructed two main categories that measure the content of students' course loads. The first category contained units that met the A to G general education requirements for earning an Associate's degree. The second category contained units that meet Intersegmental General Education Transfer Curriculum (IGETC) requirements, which permits students to transfer from a community college to a California State University (CSU) or University of California (UC) campus without the need, after transfer, to take additional lower-division, general education

courses to satisfy campus requirements. Given that most awards earned at the community college are either Associate degrees or transfer certification, examining these areas provides, at a minimum, a good proxy for the level of overcrowding at the college. I did not examine overcrowding for each degree program, such as Nursing, as registration for specific disciplines was allocated in a process outside the centralized registration system, and unavailable in the data. In order to avoid double counting, history courses that met IGETC requirements for multiple areas were placed into a separate category, and a small number of other dual-listed courses were placed into the category deemed most appropriate (results are invariant to placement).

For simplicity, I consolidated students into seven distinct registration groups.¹ “Priority” students, such as military veterans and foster youth, were given the earliest registration times, a practice common to all California community colleges. The second, third, and fourth major groups were “Continuing”, “Second Semester” (students entering their second semester registered after all other Continuing students), and “Returning” (students who have returned after not been enrolled for two semesters or more). Continuing students were assigned registration times based on their “quality points” (QP), which equal total units attempted by cumulative GPA. For example, a student who took 10 units with a 4.0 GPA would have forty QP, as would a student who took 20 units with a 2.0 GPA. Students were placed into registration blocks in descending order, with the highest QP students receiving an earlier registration blocks. In later analyses, I focused only on Continuing students who registered on June 24th and 27th, who I label “On-track”. These are students who attempt, on average, the highest number of units among all Continuing students, and appear most realistically to be working towards graduation. For example, these students have attempted between 24 and 95 units and completed between 20 and 51 units by the end of the previous semester (using the 5th and 95th percentile of the respective distributions).

The last three groups contained new students, who fall into categories that I label “Matriculated”, “Non-matriculated”, and “Last”.² In order to be “Matriculated”, a new student must have applied for admission, taken a placement exam, attended an orientation (a 30 minute online version is available), and met with a counselor. “Non-matriculated” students completed some but not all of these steps, or were exempt if they have already earned a postsecondary degree or did not intend to ever enroll in more than 9 units at the college. I included exempt students in my analysis, but removing anyone who reported earning a degree prior to entering the college did not change any key findings. “Last” students were new students who did not enroll until after the semester had begun. Any student registered in the previous semester was automatically assigned a registration time, so I restricted all analyses to students who attempted, successfully or not, to register in at least one credit-bearing course.

Matriculation is a rolling process, so I only counted students as Matriculated if they completed all steps prior to August 1st, when Non-matriculated students began to register. One potential issue is that students could have been prevented from fully matriculating if they were unable to schedule a placement exam or counselor meeting. Although I did not have data on whether students attempted to register for these appointments, I note that over 75% of Non-

matriculated students eligible to register in early August had their registration time generated by the system on June 1st (the earliest possible date), meaning they had at least six weeks after the time they first applied to complete all the steps required to receive the earliest possible registration date for Matriculated students (July 18th). Attempts were made to utilize causal identification strategies to measure the impact of late registration under a number of situations, but these strategies consistently failed and are discussed in an appendix available on the author's website.

Table 1 provides characteristics of students in the registration groups. Continuing students were less likely than new students to be male, African-American, or Latino, in large part due to higher dropout rates for these groups. Continuing students also completed higher levels of English and math, though many were still working through the remedial sequence. More importantly, there was little information to be had about Non-matriculated and Last students, as few of them had taken math or English placement exams by the time the semester had begun. As community college students are not required to provide their prior academic, and Non-matriculated and Last students were highly likely to leave after one semester, the only means of comparing Matriculated and Non-matriculated students, which I do later in the paper, is by observed course performance in their first semester.

Results

Assessing Open Course Sections

Prior to 2008 about half of all available course sections closed at some point during the registration process, but rose to 80% by Fall 2010, despite the fact that the number of course sections offered in this college stayed relatively stable over time (Figure 1). In order to examine what this means for student enrollment, I identified the date each course section closed in the Fall 2011 semester, and directly assessed how many open sections were available for each successive registration group. Many closed courses did not stay full, as registered students later dropped, but this approach mimicked students' perception of course availability at the time they were first allowed to register. I focused on course availability at four specific time points, which corresponds to when Second Semester, Matriculated, Non-matriculated, and Last students first became eligible to register.

Figure 2 illustrates two curves that map out course section closures. Course sections that meet the Natural Sciences requirement for receiving an Associate degree remained relatively open during the enrollment period, with approximately 50% of all course sections open when Second Semester students were first eligible to register, and 35% and 25% open for Matriculated and Non-matriculated students, respectively. In contrast, course sections that met the IGETC Biological Sciences requirement closed extremely quickly and were almost completely exhausted for Matriculated students. Table 2 shows the percentage of open sections for all Associate degree and IGETC categories at these four time points. I found that most areas had significant available capacity, with general education requirements for earning an Associate

degree having from one-third to two-thirds of their sections open when Matriculated students began to register, and about one-fifth to one-half still open for Non-matriculated students. In contrast, a number of IGETC requirements were extremely impacted, as Critical Thinking-English Composition, Oral Communication, Mathematical Concepts and Reasoning, and Biological Sciences had few course sections open for Matriculated students. Most course sections eventually filled up, but this occurred much closer to the beginning of the semester.

These findings show that continuing students, even those in just their second semester, appeared to have access to a large number of key courses. Matriculated students had course availability in a number of areas that would allow them to make progress towards graduation, but had limited ability to register in math, English, and science, at least during the initial registration process. Non-matriculated students had fewer options than Matriculated students, but were still able to access many key courses provided that they registered on time. Based on these findings, it is not clear the extent to which changing registration priority will open up seats for new students. In order to assess this forthcoming policy change, I note three aspects of student behavior that help explain why so many courses sections remained open.

Registration Block Utilization

Most students did not register when their assigned time became available, which provides some explanation for why so many sections remain open late into the registration process. Only 29.1% of On-track students registered in the first hour of their registration block, and 45.8% registered within the first day. These results held for other groups, with 39.9%, 33.9%, and 57.9% of Second Semester, Matriculated, and Non-matriculated students first attempting to register the same day they were eligible. Table 3 provides results from a linear probability model that regressed student characteristics on the likelihood of registering in the first hour (regressions that used first day registration as the outcome produce similar results). For Matriculated and Non-matriculated students, registering on time was strongly correlated with stronger performance on the English placement exam but not the math placement exam, though Non-matriculated students rarely took either exam. There were few statistically significant racial differences, with the exception of African-American students, who were less likely to register within the first hour. Table 4 examines On-track and Second Semester students, but adds a number of variables that incorporate students' academic behaviors from their time enrolled in college. For these students, the strongest predictors were related to students' past registration behaviors and intensity of enrollment. On-track and Second Semester students who registered in the first hour in the previous semester were 24.3 and 15.0 percentage points more likely to register within the first hour than other students, respectively, highlighting the importance of individual-specific behaviors. Part-time students and students who were not enrolled the previous semester were significantly less likely to register in the first hour, as were students who had not yet taken either the English or math placement exams. I also found a number of smaller differences that indicate that students who are female, Asian, or have stronger academics, were more likely to register earlier.

Student Churn

Conceptualizing registration as a simple process of receiving a registration date, selecting courses, and taking those courses, would be a misunderstanding of what registration looks like in practice. Students enrolled and dropped courses over and over again, leading to significant churn through the registration cycle that continued long after the semester began (Hagedorn (2007) also explores this issue). This churn can be represented in any number of ways, of which I illustrate just a few. Students were constantly moving in and out of open courses, so that a section with a capacity of thirty students had, on average, almost 39 unique individuals successfully register before the section first became closed. Examining only those students who were successfully enrolled in a section when it first closed during the registration cycle, I found that only 68% were still enrolled in the course at the end of the semester. This value did not change significantly across key course areas, as students enrolled in a highly impacted IGETC course were just as likely to drop as any other student. Finally, math and English courses lost almost eight percent of their total capacity on the first day of the semester and 17% in the first week; for a thirty student class, this translates to about two and five students dropping, respectively. Math and English courses, for which I had available wait list data, had an easy time filling these slots, and I estimated that about 45% of the students on the wait list on the first day of the semester were enrolled in the respective course by the end of the semester. In informal conversations with students, they described showing up to a course and waiting for others students to drop (or to be dropped by the instructor for failing to show) as the most common method for enrolling in oversubscribed courses.

Course Options

Depending on the Associate degree or IGETC requirement, only one- to two-fifths of students locked out of a course attempted to register in an alternate course that satisfied the same general education requirement. I also found that course availability was unequally distributed, with the college having significantly more available sections clustered in the late afternoon. More information is needed as to how students and colleges construct optimal course schedules, as well as the factors (e.g., labor supply, available facilities, unanticipated changes in course demand) that might inhibit well-spaced course offerings. Nonetheless, I found that practically every section of key courses filled up, regardless of the time at which it is offered.

Changing Priority Registration

Beginning in Fall 2014, students with high unit counts or lower academic performance lose their registration priority and are placed at the end of the registration line. I made an estimate of the impact of this policy by using proposed language that students lose registration priority if they have earned more than 100 units (not including non-degree applicable basic skills, ESL, and special classes such as remedial math and English courses) or if they are on academic probation for two consecutive terms, defined as having a cumulative GPA below 2.0 (Ortiz-Mercado &

Dumont, 2012). This is an oversimplification of how the policy will impact registration, but serves as a good approximation for two reasons. High-unit students register early in the registration cycle, and students are not generally considered to be on academic probation until after they have completed 12 units. As a result, these students are likely to fill up courses early in the registration cycle, and any high-unit, low-academic students who fill up courses late in the cycle will have done so after other students have had an opportunity to register. After taking into account students who registered but later dropped the course, I found that high-unit, low-academic students occupied between four to six percent of the total capacity in the most impacted areas, such as Biological Sciences. To the extent that these students occupy more than this percentage of seats, it is due to other students waiting an excessively long time to begin their registration process, rather than their earlier assigned registration times. As new students constitute 14.8% of total registrants during the semester, and 23.4% of enrollees within the state³, this change can constitute only a partial solution to excess demand.

Early Matriculation and Academic Outcomes

In contrast to the previous policy, which penalizes long-term, low-performing students, colleges have also been encouraged to provide earlier registration to fully matriculated new students, many who might be unfamiliar with the processes needed to transition on-time. Given the lack of available background information for Matriculated and Non-matriculated students, I first investigated the average number of units taken by each group (Figure 3). Due to the heterogeneous composition of students across blocks we cannot interpret any causal relationship between the average number of units taken and students' registration times. Nonetheless, overcrowding might lead one to believe that students with later registration times would take fewer units than students with earlier registration times, but Matriculated students who were eligible to register on the earliest possible date averaged 8.6 units, which was higher than every other group except for Priority students. Non-matriculated and Last students averaged 4.8 and 3.9 units, respectively. The difference between Matriculated and Non-matriculated students occurred mostly at the lower end of the units attempted distribution, as 21.7% of Matriculated students took between zero and three units, compared to 53.8% of Non-matriculated students. These results suggest that if late matriculating students are impacted by overcrowding, they are more likely to take fewer courses than fill up their schedules with unnecessary units. I also examined only those new students who took at least one class in three consecutive semesters (Fall 2011 through Fall 2012), and found that Matriculated and Non-matriculated students completed, on average, 23.8 and 19.3 units, respectively, by the conclusion of their third semester. Thus, the potential impact of late matriculation occurred primarily in the first semester at the college, as students who stayed enrolled experienced few observable long-term effects.

Matriculated students attempted twice as many units as Non-matriculated students in all major areas required to satisfy Associate degree or IGETC general education requirements (Table 5). Surprisingly, Matriculated students had course loads that were only marginally different from On-track students who had been enrolled at the college for multiple semesters. In

comparison to On-track students, the IGETC areas in which Matriculated students took the fewest units were English Composition, Mathematical Concepts and Reasoning, and Biological Sciences. This matches closely with the previous findings, where math and Biological Sciences closed earliest in the registration cycle. Differences in English and math units held when examining only students who met the qualifications to take those specific courses. Biological Sciences were overcrowded in large part as students who already passed this requirement attempted significantly more units within this area than all other students. In contrast to English or math, which can only be taken once, some students might need to take Biology, Anatomy, and Microbiology to satisfy major or degree requirements, impacting the ability of new students to enroll in these courses.

Table 6 compares the academic performance of Matriculated and Non-matriculated students. All regressions used either course or course-section fixed effects to account for variation in the types of courses in which students enrolled, and all Physical Education courses were removed from the analysis. Results from columns 1 through 3 indicate that Matriculated students were four percentage points more likely to pass their courses than Non-matriculated students, and this difference increased to about nine percentage points after accounting for student characteristics (column 4). This change was driven by the inclusion of variables which describe students' registration behaviors, which are strong predictors of course performance. Columns 5 through 8 compare students' marks in each course, on a typical zero to four point scale. Sample sizes were smaller as a number of students either withdrew or took a course ungraded. Overall I found similar results, with matriculated students generally having stronger marks within the courses they took, though most estimates were on the margin of statistical significance. Finally, I examined whether Matriculated students had different retention rates than Non-matriculated students. Results show that Matriculated students were 25 percentage points more likely to return the following year, but estimates were sensitive to the inclusion of various fixed effects (tables available upon request). Controlling for levels of academic performance and enrollment intensity in their first semester reduced the difference in retention rates to eight percentage points.

Although Non-matriculated students had worse academic outcomes and retention rates than Matriculated students, these results could be viewed through the lens of both statistical and practical significance. Matriculated students passed IGETC and Associate degree required courses about 61% of the time, and their weighted GPA in these courses was 2.47. By these standards, Non-matriculated students were not much different, passing over half of their general education requirements with an overall GPA that was still above a "C" average. Community college students as a whole have poor academic performance, and restricting access to only students who matriculate early is unlikely to significantly change the low rates of completion and transfer that plague the higher education system. More work is needed to understand differences in retention rates for Matriculated and Non-matriculated students. If late matriculation is simply correlated with unobserved factors that impact college retention, such as student motivation, than providing later registration times may be an effective way to provide earlier registrants with access to more courses. If late registration times induced capable students with less college

knowledge to drop out, then this constitutes an undesirable barrier to student achievement. This might occur if, for example, a student takes and passes a high number of units but leaves due to frustration over an inability to enroll in their desired courses.

Discussion

This analysis of one community college provides a much more complex picture of student registration than is normally described by media or policy reports. The motivation for changing priority registration rests on the assumption that long-term, continuing students are preventing new students from enrolling in needed courses, but my findings indicate that these students constitute only a small portion of the population, and their removal will still leave many new students unable to enroll in overcrowded courses. I found that math and science courses were unavailable to most new students, yet some students were able to overcome institutional constraints through early completion of matriculation steps, utilizing their registration time effectively, and being persistent in the face of course closures. In addition, many of the roadblocks in the system may be temporary, as students have exponentially more access after only one semester within the system. The current structure favors those students who take the steps to navigate community college matriculation significantly in advance of the beginning of the semester, understand how and are willing to select less desirable courses to meet short term goals, are free to sit in multiple classes early in the semester in anticipation of late openings, and, in the worst case scenario, can afford to stay - or even waste - a semester or two to earn enough credit that would allow them to get into the courses they need. Students who have less familiarity with how the college system works, need to enroll part-time, have limited availability due to family or financial considerations, or are unsure of their postsecondary goals, may be further disadvantaged by proposed changes. History suggests that this second type of student may be much more common within the community college system (Goldrick-Rab, 2010; Rosenbaum et al., 2006; Scott-Clayton, 2011). Whereas much work over the past few decades has focused, quite successfully, on improving college access, changing matriculation procedures with no concurrent efforts toward improving the connection between K-12 and college partners may begin to reverse this trend.

Overcrowding in each college may vary, and is likely to depend on the characteristics of both the institution and the students. There are two possible reasons why overcrowding may be worse in other colleges. Most importantly, the college studied did not cut the total number of course sections offered between Fall 2007 and Fall 2011; of the twenty largest California community colleges, only two others managed the same result.⁴ The findings here then represent an institution reacting to increased demand, as opposed to other colleges which may have both supply and demand challenges. In addition, the registration system studied is in some sense more meritocratic than other community colleges. Whereas most colleges assign students registration times on their units attempted alone (Taylor, 2011), the community college in this study rewards stronger academic performance by incorporating GPA into registration assignment, which would likely minimize overcrowding by allowing high-performing students to move more quickly

through the system. Nonetheless, there are a few reasons for thinking that these findings will also extend to other colleges: student behaviors, such as registering late or dropping courses, may be independent of the institutional structure; the most impacted courses are in Biological Sciences and math, which are requirements for a number of professions, especially in the medical field, where there has been huge demand over the last decade; and the community college is located in an area that contains many other community colleges within reasonable driving distance, which may lead to equilibrium effects that smooth crowding across institutions. I also find two reasons that overcrowding may be less of a problem at other institutions. Matriculated students in this college wait almost a full month after continuing students begin to register, and this lengthy enrollment process should worsen their opportunities to enroll in high-demand courses. In addition, high school students from the local feeder district were eligible to receive early registration priority, and, to the extent that these new students compete for the same courses as other Matriculated students, I would find less opportunity for Matriculated students in this college.

Recent policies to restrict priority enrollment are shown to be unlikely to satisfy increased demand, but it may be that overcrowding changes through a number of other mechanisms. Increased attention to overcrowding may induce students to change their behaviors by registering on time or developing stronger educational plans. This would actually increase competition for high-demand courses, and it is unclear how the state would respond to this shifts. Overcrowding may incentivize some students – perhaps those less committed to or certain of the value of college – to postpone or abandon their college goals or enter the workforce brought about by an improving economy. One area of concern are the most impacted courses – math and Biological Sciences – which are needed by thousands of incoming students. One way to increase capacity would be to shift resources from relatively undersubscribed courses into these areas, which would require more sophisticated course management systems for colleges. Colleges must elucidate the constraints that prevent them from offering more sections in oversubscribed areas. For example, if the key constraint is teacher labor supply, California could provide something like an emergency credential to allow high school teachers with math or science skills to teach in community colleges without a Masters degree. For community colleges that lack facilities – informal conversations with school staff cited this as an ongoing technical challenge – localities should develop short-term contracts that make unused city-owned spaces available to colleges. More dialogue between community colleges, their localities, and the state, could help produce increased efficiencies in an era of diminished resources.

Notes

¹ For brevity this section omits some details regarding the registration system, which are left to the appendix.

² New students in this analysis do not come from the local feeder district, as these students were assigned registration priority during the Fall 2011 semester as part of a local initiative aimed at supporting youth transitions into college.

³ Author's calculations from California Community Colleges Chancellor's Office MIS Data Mart.

⁴ Author's calculations from California Community Colleges Chancellor's Office MIS Data Mart.

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Appendix. Assigning Continuing Students Registration Times

The community college assigns students registration times in the following order: Priority, Continuing (including Second Semester students), Returning, and New. Priority registration is given to military veterans, foster youth, and all those who require early registration to accommodate time-sensitive commitments, such as Educational Opportunity Program students or student athletes. Continuing students are sorted based on their “quality points”, which are calculated from GPA multiplied by units attempted. Units can be defined as either repeatable or non-repeatable. Non-repeatable courses, such as English 1A, can only be taken once, and rely on the most recent grade earned. Repeatable courses, such as Physical Education, can be taken multiple times for credit. Calculations include all courses attempted back through the 1950s, but the designation for which courses were repeatable only exist in the data since 1998. Courses with no letter grade (e.g., Pass, No Pass, Withdrawal, Incomplete) do not impact quality point calculations. QP calculations lag one year, so that students who are in their second semester register after all continuing students, even though not all took courses in the Spring. For example, students who register in the Spring semester, which starts in mid-January, are assigned registration times in November and December, which precludes the inclusion of quality points from Fall courses. Fall registration mimics this approach, though it may be theoretically possible for Spring courses, which end in mid-May, to count towards Fall registration, which starts in mid-June. Continuing students are assigned registration blocks that contain, in almost all cases, exactly 900 or 1,000 students. As a result, not all students with equal quality points can be accommodated within a single block. In this case, students are split into two adjoining registration blocks in descending order by the total number of units attempted, irrespective of whether the courses were taken for a letter grade. For example, imagine two students took a three unit course and received an A, but one student also took a one unit PE course for no letter grade. Both students have 12 quality points, but the student who took PE would have four units attempted and be assigned the earlier registration time. If another tiebreaker is needed, the student who matriculated into the community college in the earlier semester would be placed into the earlier registration block. It is not clear what the next tiebreaker would be, but this impacts very few students.

TABLE 1
Descriptive Characteristics by Registration Group

	Priority	Continuing	Second Semester	Returning	Matriculated	Non-Matriculated	Last
Age	30.4	30.7	28.3	32.3	22.0	26.3	28.3
Female	51.2%	55.1%	55.8%	56.6%	50.2%	55.1%	43.9%
Ethnicity							
African-American	10.5%	7.7%	9.7%	11.5%	11.7%	7.4%	11.0%
Asian ^a	32.7%	29.4%	20.7%	22.7%	9.2%	8.6%	17.9%
Filipino	6.3%	7.6%	5.5%	7.5%	8.9%	4.5%	6.0%
Latino	18.5%	19.7%	20.4%	20.8%	26.6%	15.9%	18.2%
White	19.3%	24.1%	29.8%	26.8%	24.2%	31.6%	21.6%
Other	6.2%	5.8%	4.5%	5.4%	3.0%	2.1%	3.4%
Missing	6.4%	5.7%	9.5%	5.2%	16.4%	29.9%	21.8%
Current Math Level							
Completed College Math	23.6%	16.4%	3.2%	9.9%	0.0%	0.0%	0.0%
College Math	17.0%	15.1%	9.3%	6.8%	11.0%	1.6%	4.1%
One Level Below	14.8%	15.1%	8.0%	7.1%	13.2%	1.7%	1.4%
Two Levels Below	13.5%	12.3%	11.3%	10.6%	15.5%	3.0%	3.4%
Three Levels Below	9.3%	6.2%	10.6%	9.6%	23.9%	2.7%	3.9%
No Math Information	21.8%	34.9%	57.6%	56.0%	36.4%	91.0%	87.1%
Current English Level							
Above College English	28.8%	20.3%	2.0%	12.5%	0.0%	0.0%	0.0%
College English	27.1%	26.8%	16.8%	17.3%	19.7%	7.0%	1.8%
One Level Below	3.9%	3.1%	5.0%	4.5%	14.9%	1.8%	0.5%
Two Levels Below	5.6%	4.1%	6.8%	5.0%	19.2%	2.4%	1.8%
Three Levels or More Below	16.5%	9.2%	15.4%	11.1%	32.8%	4.4%	5.7%
No English Information	18.1%	36.5%	54.0%	49.7%	13.6%	84.5%	90.1%
Cumulative GPA	2.44	2.73	1.62	1.95	--	--	--
Missing GPA ^b	14.0%	0.5%	37.0%	24.6%	100.0%	100.0%	100.0%
Took At Least One Course:							
In Current Semester (Fall 2011)	88.4%	85.1%	81.9%	74.9%	87.6%	70.1%	83.2%
Next Semester (Spring 2011)	71.7%	64.0%	54.9%	41.3%	64.4%	39.3%	33.3%
Next Fall (Fall 2012)	54.6%	47.5%	38.5%	29.7%	47.8%	22.9%	17.5%
N	7,428	18,183	4,259	1,951	1,535	3,574	435

Note . ^a Asian comprises Chinese, Japanese, and Korean students.

^b GPA may be missing due to incomplete transcripts, or for new students who matriculated but took no courses, only ungraded pass or no pass courses, or withdrew.

TABLE 2

Percent of Open Course Sections by Initial Registration Date of Registration Group

	Open Course Sections at Initial Registration Date of:			
	Second Semester	Matriculated	Non-Matriculated	Last
Associate Degree requirements				
Area A: Communication and Analytical Thinking (N=276)	59%	36%	22%	7%
Area B: Written Composition (N=58) ^a	52%	38%	29%	22%
Area C: Natural Sciences (N=116)	50%	35%	26%	12%
Area D: Social and Behavioral Sciences (N=269)	86%	66%	48%	12%
Area E: Humanities (N=307)	87%	70%	57%	26%
Area F: United States History and Government (N=14)	100%	93%	93%	36%
Area G: Health Knowledge and Physical Skills (N=81)	69%	42%	25%	1%
IGETC requirements				
Area 1A: English Composition (N=58) ^a	52%	38%	29%	22%
Area 1B: Critical Thinking-English Composition (N=11) ^b	0%	0%	0%	0%
Area 1C: Oral Communication (CSU Only) (N=26) ^b	38%	8%	4%	4%
Area 2: Mathematical Concepts and Quantitative Reasoning (N=80)	43%	18%	13%	5%
Area 3: Arts (N=55)	84%	69%	49%	9%
Area 3: Humanities (N=82)	63%	43%	30%	13%
Area 3 & 4: History courses meeting both area requirements (N=69)	97%	88%	80%	17%
Area 4: Social and Behavioral Sciences (N=207)	79%	55%	34%	9%
Area 5A: Physical Sciences (N=66)	59%	48%	38%	23%
Area 5B: Biological Sciences (N=60)	27%	10%	7%	2%
Area 6: Language Other Than English (N=42)	95%	90%	86%	57%
Area 7: U.S. History, Constitution, and American Ideals (CSU Only) (N=5)	100%	60%	20%	0%

Note. N equals the number of unique course sections offered.

^a Associate degree Area B and IGETC Area 1A are both equivalent to passing introductory level college English.

^b IGETC Area 1B and 1C consist of English and Speech courses above introductory college-level.

TABLE 3

Predictors of Registering in the First Hour of Assigned Registration Time for New Students

	Matriculated	Non-Matriculated	Last
Intercept	0.243*** (0.044)	0.433*** (0.073)	-0.038 (0.082)
Age	-0.001 (0.002)	-0.001 (0.001)	0.002** (0.001)
Female	0.030 (0.022)	0.029 (0.018)	0.005 (0.018)
Asian	0.076 (0.045)	0.000 (0.033)	-0.029 (0.030)
Latino	-0.015 (0.031)	-0.044 (0.027)	0.005 (0.029)
Black	-0.118** (0.042)	-0.161*** (0.036)	-0.017 (0.034)
Filipino	0.052 (0.043)	-0.054 (0.044)	0.035 (0.042)
Race Other	0.089 (0.065)	-0.077 (0.061)	0.151** (0.051)
Race Missing	-0.044 (0.035)	-0.057* (0.022)	-0.034 (0.028)
Placed One Level Below College Math	-0.013 (0.045)	0.151 (0.091)	0.020 (0.088)
Placed Two Levels Below College Math	-0.004 (0.044)	0.017 (0.082)	-0.001 (0.066)
Placed Three Levels Below College Math	-0.003 (0.043)	-0.120 (0.087)	-0.007 (0.065)
No Math Placement Exam	0.115** (0.039)	0.033 (0.070)	0.028 (0.055)
Placed One Level Below College English	-0.100** (0.037)	-0.231** (0.075)	0.053 (0.147)
Placed Two Levels Below College English	-0.094** (0.036)	-0.225*** (0.065)	0.053 (0.096)
Placed Three Levels Below College English	-0.110*** (0.033)	-0.127* (0.056)	0.046 (0.075)
No English Placement Exam	-0.208*** (0.050)	-0.114*** (0.034)	0.029 (0.071)
N	1,342	2,895	435

Note. Table omits Matriculated and Non-matriculated students who were not eligible to register on the earliest possible registration date for their respective group. Omitted categories include white ethnicity and placing college-level in math or English.

*** p<0.001, ** p<0.01, * p<0.05

TABLE 4

Predictors of Registering in the First Hour of Assigned Registration Time for Continuing Students

	On-Track	Second Semester
Intercept	0.193*** (0.034)	0.223*** (0.035)
Age	-0.002** (0.001)	0.000 (0.001)
Female	0.038** (0.012)	0.072*** (0.013)
Asian	0.053** (0.018)	0.076*** (0.019)
Latino	0.002 (0.019)	-0.017 (0.019)
Black	-0.054* (0.026)	-0.046 (0.024)
Filipino	0.049* (0.025)	0.014 (0.029)
Race Other	0.022 (0.028)	0.032 (0.032)
Race Missing	-0.002 (0.027)	-0.030 (0.024)
Current Math Level		
Completed College-Level Math	0.029 (0.021)	0.099* (0.041)
Qualified for Math One Level Below College	-0.044* (0.020)	-0.005 (0.031)
Qualified for Math Two Levels Below College	-0.088*** (0.023)	-0.005 (0.029)
Qualified for Math Three Levels Below College	-0.121*** (0.031)	-0.082** (0.031)
No Math Data	-0.116*** (0.021)	-0.084*** (0.025)
Current English Level		
Qualified for English 1B or higher	0.042* (0.017)	-0.069 (0.047)
Qualified for English One Level Below College	-0.057 (0.039)	-0.018 (0.032)
Qualified for English Two Levels Below College	-0.052 (0.039)	-0.048 (0.029)
Qualified for English Three Levels Below College	-0.030 (0.025)	-0.056* (0.024)
No English Data	-0.042* (0.017)	-0.051** (0.019)

TABLE 4. (Continued)

	On-Track	Second Semester
Cumulative GPA (0 to 4 point scale)	0.056*** (0.009)	0.027*** (0.006)
No GPA ^a	--	0.051* (0.024)
Enrollment Status Previous Semester		
No Units Attempted, Did Not Attempt To Register	-0.146*** (0.026)	-0.005 (0.031)
No Units Attempted, Did Attempt to Register	-0.139*** (0.024)	-0.073** (0.028)
Part-time Enrollment (Less Than 12 Units)	-0.081*** (0.014)	-0.063*** (0.018)
Registered In First Hour	0.243*** (0.016)	0.150*** (0.017)
Registered In First Day	0.060** (0.019)	0.035 (0.023)
N	5,073	4,259

Note. Omitted categories include white ethnicity, students qualified to take college-level math or English, and students whose first registration attempt in the previous semester occurred at least one day after their assigned registration time.

^aGPA is missing for students who took no classes their first semester, withdrew from their courses, or took only ungraded courses.

*** p<0.001, ** p<0.01, * p<0.05

TABLE 5

Average Units Attempted by Registration Group

	On-Track	Second Semester	Matriculated	Non-Matriculated	Last
Total Units Attempted	7.51	6.60	8.62	4.81	3.88
Associate Degree requirements	3.87	3.02	5.05	2.43	1.28
Area A: Communication and Analytic Thinking	1.08	0.71	1.10	0.35	0.43
Area B: Written Composition ^a	0.26	0.07	0.11	0.02	0.01
Area C: Natural Sciences	0.75	0.36	0.44	0.27	0.09
Area D: Social and Behavioral Sciences	0.78	0.93	1.92	0.82	0.39
Area E: Humanities	0.67	0.72	1.10	0.81	0.24
Area F: United States History and Government	0.03	0.04	0.14	0.05	0.03
Area G: Health Knowledge and Physical Skills	0.31	0.19	0.25	0.12	0.10
IGETC requirements	3.06	2.00	3.20	1.59	0.55
Area 1A: English Composition ^a	0.26	0.07	0.11	0.02	0.01
Area 1B: Critical Thinking-English Composition ^b	0.05	0.00	0.00	0.00	0.00
Area 1C: Oral Communication (CSU Only) ^b	0.11	0.03	0.02	0.01	0.01
Area 2: Mathematical Concepts and Quantitative Reasoning	0.44	0.24	0.20	0.10	0.04
Area 3: Arts	0.15	0.14	0.28	0.18	0.03
Area 3: Humanities	0.28	0.12	0.29	0.14	0.03
Area 3 & 4: History courses meeting both area requirements	0.18	0.23	0.68	0.30	0.07
Area 4: Social and Behavioral Sciences	0.71	0.76	1.16	0.55	0.23
Area 5A: Physical Sciences	0.36	0.18	0.27	0.15	0.05
Area 5B: Biological Sciences	0.41	0.14	0.12	0.09	0.05
Area 6: Language Other Than English	0.10	0.08	0.04	0.05	0.03
Area 7: History, Constitution, and American Ideals (CSU Only)	0.02	0.02	0.04	0.00	0.00
N	5,073	4,259	1,342	2,895	435

Note. Table omits Matriculated and Non-matriculated students who were not eligible to register on the earliest possible registration date for their respective group.

^a Associate degree Area B and IGETC Area 1A are both equivalent to passing introductory level college English.

^b IGETC Area 1B and 1C consist of English and Speech courses above introductory college-level.

TABLE 6

Academic Performance of Matriculated and Non-matriculated Students

	Passed Course:				Course Grade (0 to 4 point scale):			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Matriculated	0.035** (0.011)	0.038** (0.013)	0.040* (0.016)	0.086*** (0.016)	0.075 (0.039)	0.065 (0.043)	0.107 (0.055)	0.288*** (0.056)
Fixed-Effect	Course	Course- Section	Course- Section	Course- Section	Course	Course- Section	Course- Section	Course- Section
Restrictions	--	--	IGETC or Associate degree courses	IGETC or Associate degree courses	--	--	IGETC or Associate degree courses	IGETC or Associate degree courses
Student Characteristics ^a	N	N	N	Y	N	N	N	Y
N	9,765	9,765	5,152	5,084	7,347	7,347	4,085	4,037

Note. ^a Student characteristics include age, dummies for gender and race categories, and whether a student enrolled within the first hour or first day of their assigned registration time.

*** p<0.001, ** p<0.01, * p<0.05

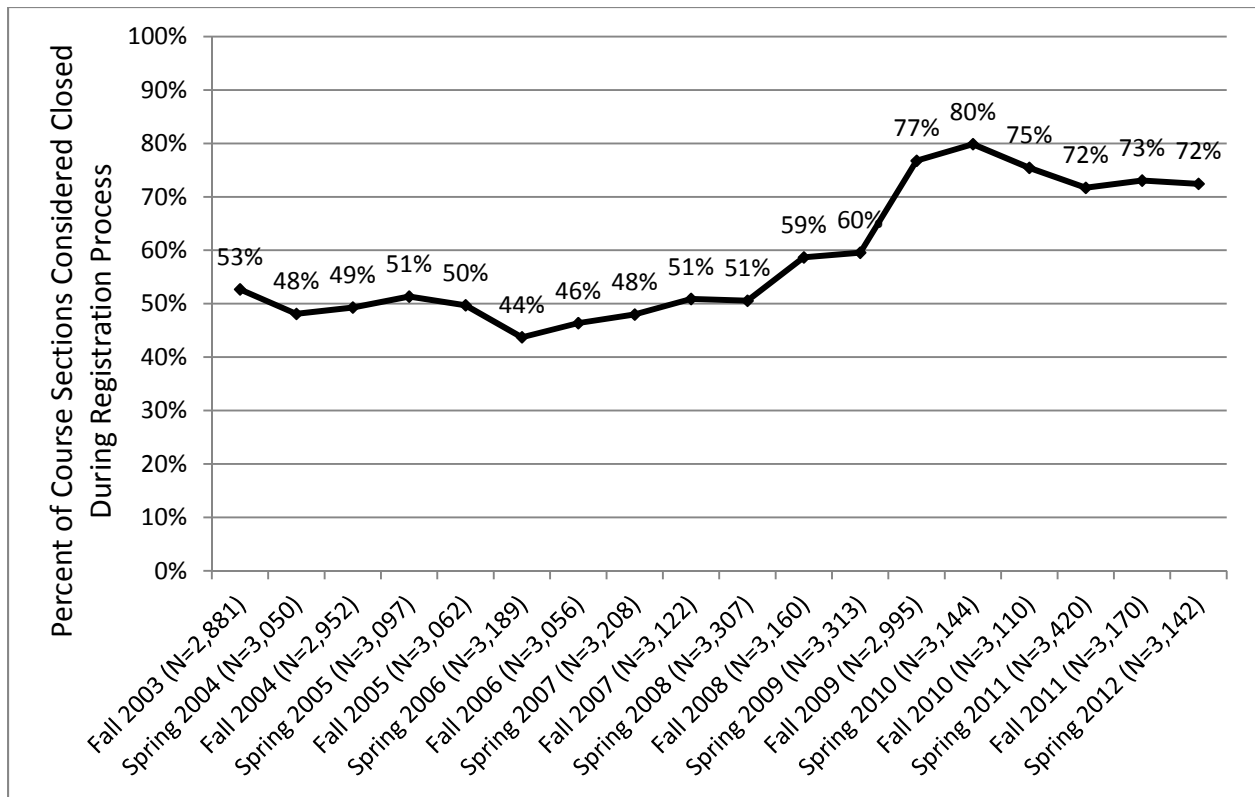


FIG. 1. Percentage of Closed Course Sections, 2004-2012 (N=number of course sections offered)

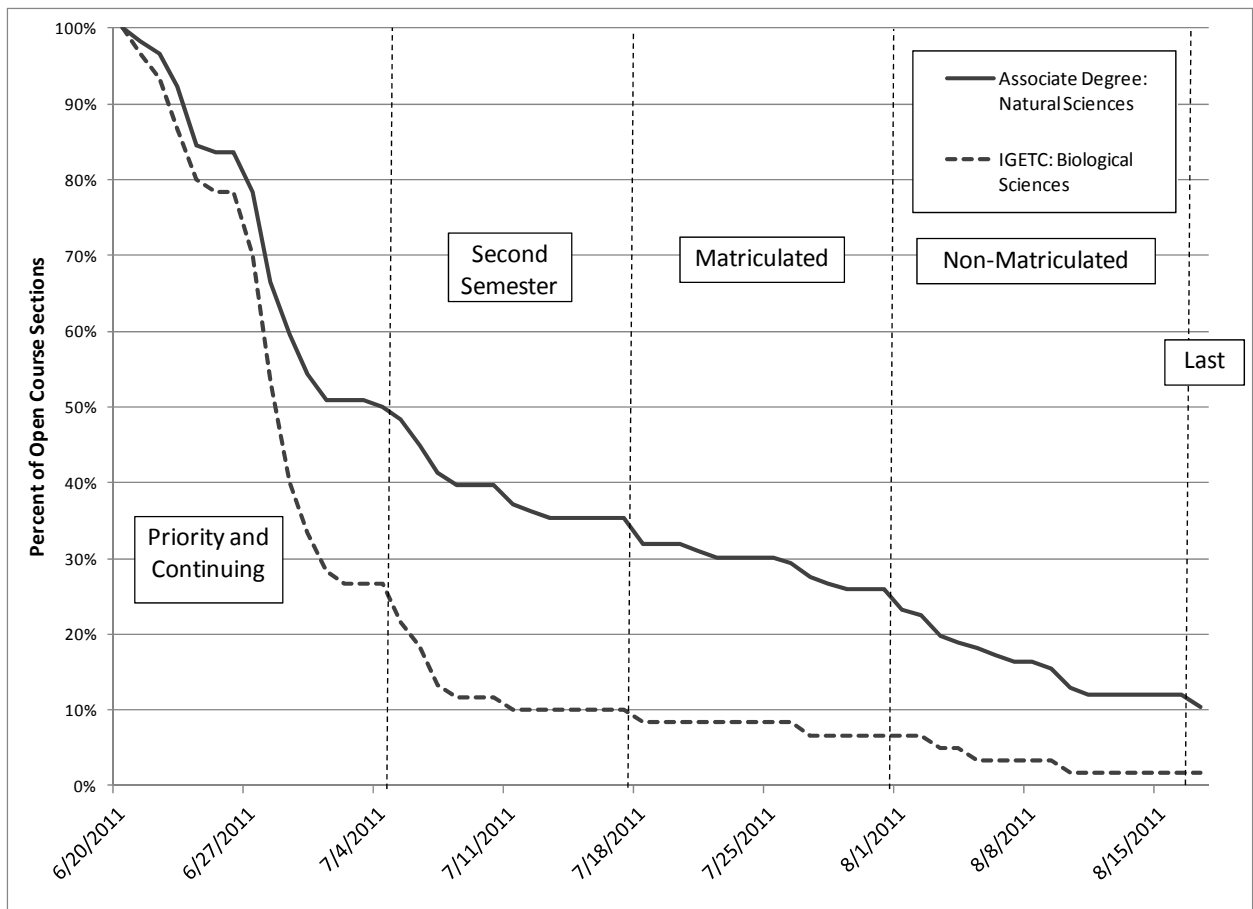
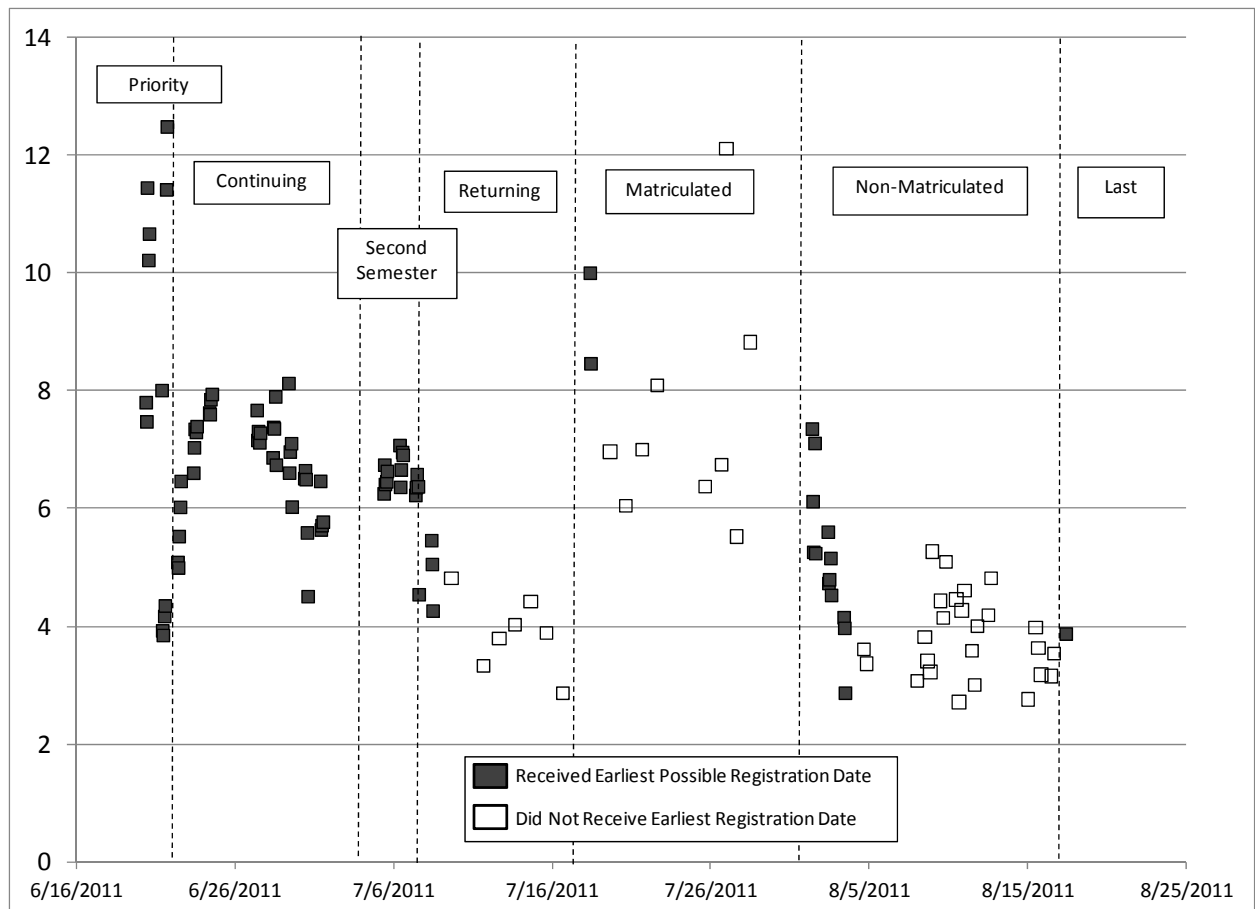


FIG. 2. Percentage of Open Course Sections During the Registration Cycle, Fall 2011



Note. Dark squares represent students who received the earliest possible registration date for their registration group. The figure only includes blocks if at least ten students matriculated on that date. Gaps between registration blocks in the first four registration groups are the result of weekends and the 4th of July.

FIG 3. Average Units Attempted by Registration Block, Fall 2011