



## Flat Rate Tuition - Observations and Analysis of Student Persistence and Performance

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### ABSTRACT

Facing reduction in public funding and increases in pressure to improve student performance and graduation rates, many public colleges and some state systems have implemented flat rate tuition policies. This study looks at the relationship between such a policy and undergraduate student *performance* (changes in GPA) and *persistence* (credits attempted vs. earned) at one public college during four consecutive academic terms. The study reveals a strong correlation between student *persistence* and *performance*. Students who persist in completing heavier credit loads are more likely to experience small and diminishing GPA gains; and students who do not persist are more likely to experience GPA losses of significantly lower magnitude. Students who attempt lower course loads are more likely to persist than those who attempt heavier course loads. These correlations are statistically significant so that they may be extrapolated to the whole student population in the college.

### KEY WORDS

Tuition; Undergraduate student; Student performance; Student persistence

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## INTRODUCTION

Flat rate (or block) tuition policies generally set a fixed tuition that allows students to take any number of credits at no additional charge. By contrast, credit rate or per-credit tuition policies require students to pay for the actual number of credits they attempt during any semester. Many colleges and universities charge flat rate tuition for their full-time students and credit rate tuition for their part-time students. Full time enrollment is generally defined as twelve or more credits in federal guidelines for typical 15 week academic terms.

During the most recent economic recession, political leaders and taxpayers alike began scrutinizing college tuition more closely than ever before. In response to demands from taxpayers who partially subsidize state education block grants and federal aid under Title IV of the Higher Education Authorization Act, the US Department of Education launched its College Affordability and Transparency Center in 2011. The web site lists institutions who charge the highest net tuition “price” and those who have raised tuition rates by the highest percentages each year. Upon filing a Free Application for Student Assistance (FAFSA), students and parents seeking Title IV financial aid receive a link to the Affordability site, encouraging them to compare tuition and student retention and completion.

For public colleges in particular, these disclosures have resulted in increased pressure to improve student degree completion rates and to keep tuition fees as low as practicable. Public 4-year colleges and universities report graduation rates of between 23.5% - 37% in four-years, while the private colleges and universities report these rates anywhere between 49% – 64% (DeAngelo et al, 2011). By linking completion rates to net tuition and student indebtedness, the federal government has increased the pressure on colleges to improve on both of these measures. At the same time, although private colleges and universities have depended on tuition and endowments as their main source of operating revenue for decades, their public counterparts have only recently seen such dramatic cuts in state funding that their own increasing dependence on tuition has resulted in significant tuition increases for this group of students who generally cannot afford to attend private colleges (Delta Project, 2012).

Spokespersons for the schools and associations in states where flat rate tuition has been implemented say that these policies are designed to motivate students to graduate on time (Sellingo, 2001; Waldman, 2004). As students who attempt only twelve credits per term for four years will complete only 96 credits i.e. 80% of the credits required to earn their degrees, many public colleges in particular have implemented flat rate tuition policies aimed at encouraging students to earn at least fifteen credits per term so that they may graduate within four years. However, students who attempt exactly 100% of the courses required within four years must succeed in both: passing every one of their required courses and completing **only** their required courses, limiting their flexibility to explore or change majors, to double major or even to earn a minor program of study. By contrast, the students who attempt eighteen credits per term may either graduate early, or may have the flexibility during their four years of enrollment to earn a double major, to explore or change majors, or to earn a minor program of study as well. For these reasons, many public institutions have turned to flat rate regimen for its potential to attain both goals: timely completion and lower tuition overall.

Therefore, most institutions (and even some entire state systems) who implement flat rate tuition tend to set the “full time” threshold at the exact 100% line by which a student making satisfactory progress would graduate in four years, generally 15 credits per term. In a small number of cases, there is no agreement on that threshold between states (or even between institutions within the same state). As a result of these inconsistencies, some student groups have expressed outrage, such as in Ontario (Mayo and Bien, 2009) where some institutions have set full time prices at a range that varies between 60%-100% of the credits students would need to earn per year to graduate on time. In other words, if 15 credits per term equals 100% progress towards a four-year completion, some institutions have set the flat rate at 9 credits, or 60% of the progress rate needed to complete a degree in four years, while others have set it at 12 credits or 80%. This variation casts doubt on the rationale for flat rate tuition as a tool for raising graduation rates. Flat rate tuition strategies that aim below the 100% full time threshold are designed to incent students to attempt heavier credit loads to attain maximum value for tuition paid.

To date, no published studies have described whether flat rate policies have contributed toward improving graduation rates. To conduct such a study, an institution would have to compare graduation rates for several years using the per-credit tuition cohorts against graduation rates for several years using the flat rate tuition cohorts. To compare six-year graduation rates, for example, a researcher would need twelve years’ worth of data: six with per-credit rates and six with flat rates. At an institution where flat rate tuition has only been in effect for two years, such a study will only be possible at some time in the future. However, an initial analysis of student *persistence*, based on the number of credits they attempt, and *performance*, based on changes to the GPA, may provide an early look at how a flat rate tuition policy is related to these aspects at one institution.

This study examines the impact of a recently-implemented flat rate tuition policy on student *persistence* (defined as credits attempted vs. credits earned), and *performance* (measured as change in GPA). The study uses student data for four consecutive academic terms at a public college where the flat rate threshold has been set at 100% of the credits students need to graduate in four years. At this college, that threshold is 16 credits per semester (on a 4-credit per course base system where 128 is the typical four-year requirement for most degrees granted). At this school, flat rate also applies to students who opt to take only 12 credits (which would place them on a five-year completion or 80% schedule). Students restricted to 12 credits by policy, e.g. remedial or probationary students would pay the per-credit price. Similarly, those students who decide to take 20 credits per term (120% schedule) also pay the same flat rate, creating a fiscal incentive for students to increase credits attempted.

A literature review on the research of flat rate tuition is given in Section 2. Section 3 provides an introduction to the tuition policy change in Stockton College and data collection for this study. In Section 4, we investigate how a student’s



persistence and performance are related to flat rate tuition. The analyses in Section 5 show statistical significances of the correlations revealed by our data.

## LITERATURE REVIEW

Given both, an increasing dependence on tuition and a strong sense of their mission to remain accessible to as many students as possible, it is not surprising that public institutions have adopted a variety of approaches to establish tuition policies aimed at offsetting what students must pay to earn their degrees. For example, some public colleges have implemented differential tuition policies. Differential tuition imposes higher rates for students entering potentially high-demand, lucrative careers such as engineering, while those students entering potentially lower-demand, less lucrative careers like liberal arts pay lower tuition rates. Studies of differential tuition policies (Yanikoski and Wilson, 1984) have focused on examining the types and rationales for adjusting tuition to achieve maximum tuition revenue in minimally regressive ways. The authors explain that the rationale for most institutions to charge higher tuition for graduate work compared to undergraduate programs has been largely unquestioned for centuries: graduate students stand to earn more upon completing their degrees, their class sizes are generally smaller and their programs require specialized, more expensive faculty, facilities and the equipment costs more than for most undergraduate programs. Yanikoski and Wilson extend this last rationale in a discussion about applying similarly differentiated tuition prices among various undergraduate programs.

Their study considers differential prices by student level (lower division vs. upper division), by institutional level (community vs. regional vs. research focus), academic program (engineering vs. literature, for example), and/or by student demand (nursing and engineering vs. philosophy) and finally, by student load or status (part time vs. full time). Although this section of their article touches on what can be referred to as flat or block rate tuition for full time students, the authors focus only on those load differentials that are coupled with one or more of the other approaches, namely program or demand (p. 742). The emphasis of this study is on the need for institutions to experiment with the approaches to charge differential tuition that best fit their own balance between enrollment management and student access. While an important scholarly foray into the variations of tuition pricing, this article does not examine the impact of these policies on student success in those programs or at those levels where the tuition has been adjusted.

Similarly, a few scholarly articles have appeared concerning institutions that have adjusted differences between their in-state vs. out-of-state tuition rates. These changes have been the focus of a study that examined out-of-state tuition as a deterrent to interstate migration (Morgan, 1983) and more recently, as the focus of a study that examined these rates as yet another battleground for states and undocumented residents (Dougherty, Nienhusser and Vega, 2010).

For example, in studying tuition policies as a means for deterring interstate migration, Morgan (1983) examined the impact of non-resident tuition in a supply-demand model. Morgan found that states likely to attract out-of-state students generally had favorable economic and environmental conditions. Although higher tuition for non-resident students was found to reduce migration in general, Morgan conversely found that economically attractive states seemed most likely to raise out-of-state tuition in response to strong demand and did not observe an immediate reduction in migration. Morgan concluded his analysis with the observation that students who choose to migrate to a state for higher education with the intent of remaining in that state to enjoy favorable economic conditions seem to calculate the value of paying higher non-resident tuition. Also, small declines in enrollment resulting from higher non-resident tuition may not deter these institutions from raising tuition. However, the author argues that these same states might reconsider their decisions and set lower tuitions for students who intend to remain in the state, framing their attraction to the state as an investment in economic development and workforce readiness for their state's future. As with the other two scholarly studies of tuition policy from this period of time, Morgan does not focus any aspect of his examination on the success or performance of students based on the non-resident differential tuition policy.

More recently, several articles have taken up the topic of tuition policies with respect to undocumented immigrants (Dougherty, Nienhusser and Vega, 2010; McLendon and Mokher, 2011). In both articles, the emphasis is on the current use of non-resident differential tuition policies to discourage undocumented students who graduate from US high schools from attending college. According to both studies, nine states currently allow undocumented students to pay in-state rates, while four states impose the non-resident rates. Dougherty et al situate their analyses of these contrasting approaches between two border states (Texas and Arizona) within an advocacy coalition framework and a policy entrepreneurship theory of policymaking. Neither study, however, takes up the question of how well students succeed based on different tuition policies.

As noted in the introduction, recent attention to college tuition has been due to the decline of public support, forcing many formerly affordable colleges to pass on increasingly higher shares of their costs directly to students via higher tuition and fees. Studying the impact of the "tax revolt" from the late 1970s and early 1980s, Archibald and Feldman (2006) find that state policies set in response to this political movement have remained in a constant mode of decreasing public support ever since, although institutions vary widely in how they respond with tuition policies. For example, in a scholarly review of tuition policies for his study of linear tuition modeling, Troutt (1983) found that few institutions, let alone states, used consistent approaches to setting tuition, much less to raising it. Troutt argues that linear mathematical models allow an institution to apply its own differential tuition rules (such as graduate tuition greater than undergraduate) along with its goals (that all increases will be equal as a percentage or will not exceed x% per hour, etc.) and yield ranges for the best possible increases to impose. The Troutt study looks closely at an actual case where the model was applied, and the Board at that institution opted to charge a per-credit increase that was very close to the amount that the linear model yielded.



By contrast, Cheslock and Hughes (2011) found that although states varied significantly from one another on their approaches to setting tuition rates according to institutional type, control, enrollment, need or grant recipient status, most states seem to share one trend in common over the past two decades: differences between the states fell over time as most states steadily withdrew public support from higher education during the two decades studied. Cheslock and Hughes also found that the population shift away from the high-tuition northeastern region towards the low-tuition southern region of the US also had an impact on the loss of public support and resulting increases in tuition. The relationships between enrollment behaviors and tuition policies have also been the focus of many studies reviewed by Curs and Singell (2010). Like many researchers whose work preceded theirs, Curs and Singell found that students were surprisingly unresponsive to changes in tuition policy, although their model demonstrates less responsiveness among high ability, low need students than their low ability, high need counterparts. Shin and Milton (2006) also acknowledge conflicting results on student sensitivity to tuition increases. Shin and Milton argue that economic cycles and external forces account for these conflicts in students' sensitivity to tuition increases. As with many of the studies reviewed above, however, these studies considered only the revenue and enrollment management impacts of tuition prices, not the impact on student success.

## A FLAT RATE STUDY AT STOCKTON COLLEGE AND DATA COLLECTION

Several decades of tuition policy studies have focused largely on economic aspects of tuition policy. The primary focus of this study is toward observing the relationship between students' *persistence* and *performance* in the semesters immediately following the adoption of flat rate tuition at Stockton, a public college. The following sections will describe the tuition policy change, the sample selection for the study, demographic observations, and an analysis of student *persistence* and *performance*. Therefore, this study will begin to fill this gap in the literature.

### Institutional Context and Tuition Policy Change

This study uses the data from The Richard Stockton College of New Jersey, one of nine state colleges in New Jersey. One of the two youngest senior public colleges in New Jersey, Stockton was founded in 1969 and opened its doors to approximately 1,000 students near Atlantic City in 1971. Since that time the College has grown to enroll more than 8,000 students, approximately 800 of whom are graduate students. Masters programs began at the College in 1999. Over its forty year history, the College has also grown from a handful of academic "divisions" to seven academic schools, identified in this article by institutional acronyms: Arts and Humanities (ARHU); Business Studies (BUSN); Education (EDUC); General Studies (GENS); Health Sciences (HLTH); Natural Sciences and Mathematics (NAMS); and Social and Behavioral Sciences (SOBL).

Consistent with the most common differential tuition policies, Stockton has traditionally charged higher tuition rates for graduate programs. Long after its founding, however, Stockton transitioned from a per-credit tuition pricing policy to a flat or block rate tuition policy in Fall 2009. This study looks at full time students during the period Fall 2009 through Spring 2011 to provide an initial analysis of student *persistence* and *performance* since the start of flat rate tuition.

### Sample Selection

Our initial sample included all undergraduate students during each Fall and Spring semester from Fall 2009 through Spring 2011. Summer records were excluded from the sample because flat rate tuition is not offered during summer terms. Students receiving any transfer credits during a semester were excluded from the sample as *persistence* effects could not be isolated. Similarly, to maintain consistent *performance* measure of GPA before and after each semester in the study, students who were not retained (because they graduated, dropped or stopped out between two consecutive semesters of study) were also excluded. Therefore, the following statistical analyses and discussion sections refer to sample sizes that are smaller than the total enrolled undergraduate population at Stockton for any period of this four-year study. Students in the graduate program were excluded from the study as the Flat Rate tuition policy does not apply to them.

During Fall 2009 through Spring 2011 a total of 18,851 student records were compiled. A total of 1,237 student records were dropped from the sample due to reasons discussed above (graduated, stopped or dropped out during the study period). To avoid bias due to the wide variability in the numbers between schools, all Grade Point Averages (GPA's) are weighted by the number of students in the category being studied.

## FLAT RATE – STUDENT PERSISTENCE AND PERFORMANCE

We define *persistence* as the situation where a student completes as many credit hours as they enrolled in during a semester. If a student started with, say 80 credits, enrolled in 16 credits and ended the semester with 96 credits – the student *persisted*.

While there are many ways to measure academic performance, for the purpose of this study, we define *performance* as the difference between GPA at the end of a semester and GPA at the beginning of a semester. If the GPA goes up, it is interpreted as an improvement in *performance* and vice versa.

In this section, we look at how, and how much, flat rate tuition is related to a student's *persistence* and *performance*.

### Flat Rate and Student Persistence



Table 1 summarizes the data to show the course loads, 12-15 credits (Low), 16-19 credits (Medium), and 20 + credits (High) by student gender and their respective GPA's. We find that the proportion of male and female students in the Low load group was 41% and 59% respectively compared to 43% and 57% in our overall sample. This indicates that female students take the Low load at a higher rate than their male counterparts. The proportions in the Medium load for male and female students were 45% and 55%; 2% higher for male students than their overall percentage of 43%, while female students were 2% lower than their overall percentage of 57%. In the High load group the reverse was the case where female students were at 59%, 2% higher than their proportion in the sample while male students were at 41%, 2% lower than their proportion in the sample. Thus, the female students are over represented by 2% in the 12-15 credit and 20+ credit group while a higher proportion of male students; again by 2% take the 16-19 credit load.

**Table 1. Sample by Credits Attempted**

	Total 4 Semesters								
	Male			Female			Total		
	Number	%	GPA	Number	%	GPA	Number	%	GPA
12-15 Low	1,879	41%	2.89	2,750	59%	3.12	4,629	25%	3.03
16-19 Med	5,221	45%	3.03	6,430	55%	3.24	11,651	62%	3.14
20+ High	1,043	41%	3.04	1,528	59%	3.21	2,571	14%	3.14
Total [Average]	8,143	[43%]	[3.00]	10,708	[57%]	[3.20]	18,851	[100%]	[3.11]

It was interesting to note that there seems to be a self-selection process, where students with higher GPA's are generally taking heavier loads, the only exception being females in the Medium load having a .03 higher GPA than in the High load group. For the total sample the GPA's were 3.03, 3.14, and 3.14 respectively for the Low, Medium and High loads. Table 2 also shows that the overall GPA of female students is .20 higher than for their male counterparts. Section 5 presents results of some statistical correlation analyses.

### Flat Rate and Student Performance

*Performance* refers to the changes in GPA during the semester. Leaving aside EDUC (because it is an upper-division, post-baccalaureate-level program) Table 1 illustrates that the highest beginning GPA was observed for HLTH at 3.28, followed by ARHU at 3.18, NAMS and SOBL at 3.12, BUSN at 3.01 and GENS at 3.00. Because the distribution of GPA's for different schools is not necessarily revealing regarding any underlying factors related to Flat Rate Tuition. All of the discussion that follows has been aggregated for the whole college.



**Table 2. Sample by School**

School	Total 4 Semesters								
	Male			Female			Total		
	Number	%	GPA	Number	%	GPA	Number	%	GPA
ARHU	1,085	13%	3.07	1,721	16%	3.24	2,806	15%	3.18
BUSN	2,190	27%	2.94	1,373	13%	3.12	3,563	19%	3.01
EDUC	103	1%	3.55	168	2%	3.57	271	1%	3.56
GENS	763	9%	2.87	1,065	10%	3.09	1,828	10%	3.00
HLTH	138	2%	3.00	1,212	11%	3.31	1,350	7%	3.28
NAMS	2,058	25%	3.04	2,242	21%	3.19	4,300	23%	3.12
SOBL	1,806	22%	3.00	2,927	27%	3.19	4,733	25%	3.12
Total [Avg]	8,143	[100%]	[3.00]	10,708	[100%]	[3.20]	18,851	[100%]	[3.11]

To examine the effect of course loads -- Low, Medium or High -- and beginning GPA on the performance of students, we initially defined *performance* as measured by changes in GPA. At first, we looked at the beginning GPA's and ending GPA's for *all students as a group*. We found that there was increase in GPA's for all groups and that the increase was substantial: students attempting and persisting in a High load increased by .16, Medium increased by .13, and Low increased by .20. As an aggregated data set, these increases were very surprising.

We then decided to look more closely at the GPA's, not for the whole group but instead to track beginning and ending GPA's for each student, sorted by their degree of *persistence*. In this way, we found that the GPAs for students who *persisted* went up at rates that differed, depending upon the number of courses that were dropped. Our analysis of student *persistence* and *performance* on the following tables 3, 4 and 5 thus follows a weighted GPA to account for the relative strength of each individual's GPA on the overall average in each load bracket.

**Table 3. Persistence Rate, Beginning and Ending GPA's of 100% Persistent Students (no courses dropped)**

	Total					
	Starting #	Ending #	Success %	Starting GPA	Ending GPA	Change
12-15 Credits	4,373	3,291	75%	3.12	3.17	0.05
16-19 Credits	10,674	8,149	76%	3.23	3.26	0.04
20+ Credits	2,567	1,675	65%	3.26	3.29	0.03
Total [Avg]	17,614	13,115	[74%]	[3.20]	[3.24]	[0.04]



Table 4. Students who dropped 1 course (4 credits or less)

	Total					
	Starting #	Dropped ≤ 4 credits	Dropped %	Starting GPA	Ending GPA	Change
12-15 Credits	4,373	733	17%	2.76	2.64	-0.12
16-19 Credits	10,674	1,918	18%	2.89	2.87	-0.02
20+ Credits	2,567	614	24%	2.97	2.99	0.01
Total [Avg]	17,614	3,265	[19%]	[2.87]	[2.84]	[-0.03]

Table 5. Students who dropped more than 1 course (5 credits or more)

	Total					
	Starting #	Dropped ≥ 5 credits	Dropped %	Starting GPA	Ending GPA	Change
12-15 Credits	4,373	349	8%	2.57	2.26	-0.31
16-19 Credits	10,674	607	6%	2.67	2.36	-0.32
20+ Credits	2,567	278	11%	2.71	2.59	-0.12
Total [Avg]	17,614	1,234	[7%]	[2.65]	[2.38]	[-0.27]

## IMPLICATIONS

Table 3 shows that 4,373 students attempted 12-15 credits during the four semesters studied. By paying the 16-credit tuition rate, these students experienced no financial benefit from the flat rate policy. However, 3,291 (75%) of them completed all 12-15 credits they attempted, demonstrating a strong *persistence* rate among this group. Additionally, the GPA for those 75% who persisted went up by .05 on average, demonstrating a modest *performance* gain. However, 733 (17%) dropped one course and their GPA went down by 0.12, demonstrating declines in both measures: *persistence* and *performance* (Table 4). Finally, a very small number, 349 (8%) dropped more than one course and their GPA went down by 0.31, demonstrating an even larger decline in *performance* among those with the lowest *persistence* rates (Table 5).

Table 3 also shows that 10,674 students attempted 16-19 credits; they derived a small financial benefit from the flat rate tuition. Of these attempters, 8,149 (a similar 76% to the per-credit rate cohort above) completed all 16-19 credits indicating a very strong *persistence* rate, and their GPA went up by a similarly modest *performance* gain of .04 on average. Likewise, of the 1,918 (18%) students who dropped one course for a lower *persistence* rate, the GPA *performance* also dropped slightly by .02 (Table 4). Additionally, 607 (6%) students dropped more than one course and their GPA decline was quite substantial at 0.32 (Table 5). As these students paid the full flat rate for 16 credits, most saw a neutral financial effect (or in the case of the 18-credit science students who typically carry lab credits) some recognized a modest financial benefit from the flat rate tuition.

Interestingly, of the 2,567 students who attempted 20+ credits (the flat rate financial beneficiaries) only 1,675 (65%) completed all 20+ credits, a lower *persistence* rate than their counterparts in both the low and medium credit load brackets. These students also demonstrated a very modest *performance* gain with a .03 higher GPA than what they started the semester with (Table 3). However, in contrast to the low and medium load groups above, the 614 (24%) of students who dropped one course from their high credit loads actually experienced an extremely slight *performance* gain when their GPA went up by 0.01 on average (Table 4). Finally, Table 5 shows that much like their low and medium load counterparts, those heavy load students with the lowest *persistence* rates, 278 (11%) who dropped more than one course also saw their GPA *performance* decrease, but only by 0.12 (where the Low load poor *persistence* students dropped .31 and the Medium load poor *persistence* students dropped .32 in the GPA).



The data suggest that successful students with higher GPAs seem to be self-selecting or voluntarily choosing to attempt heavier loads. In those cases, their chances for success in both measures, *persistence* and *performance*, are relatively high at 65% and +.03 respectively. Those with lower starting GPAs appear to be less likely to seek the financial advantage of the flat rate tuition policy, and far less likely to benefit from it when they attempt a High load.

The *persistence* rate among students in the Low and Medium load group was 75% and 76% respectively, and dropped to 65% for students in the High load group (Table 3). This difference also suggests that taking 20 or more credits leads students to drop one or more courses at a higher rate than their Low or Medium load counterparts. We also found that overall GPA went up by .04 for all students who *persisted*, with the highest increase for students who started with a Low load at 0.05; 0.04 for the Medium load group, and 0.03 for the High load group.

These gains in GPA contrast with the groups that did not *persist* (Tables 4 and 5) as the GPA decreased by 0.03 for students who dropped one course and by 0.27 for students who dropped two or more courses. Among students who dropped one or more courses, the ending GPA was lower for all groups except a very small increase (0.01) for the High load group who dropped one course. This may be an indication that students with a relatively high GPA (2.97 in our sample) may be taking 20+ credits with the idea of dropping one course, if needed, to maintain or improve their GPA.

The largest decline in GPA was for the Medium load at -0.32 with a close second at -0.31 for Low load group that dropped two or more courses. By contrast, the smallest *performance* decline was for the High load students who dropped two or more courses with a -0.12 decline.

## STATISTICAL CORRELATION ANALYSIS

We observed in the last section that female students and students with higher GPA's were generally taking heavier course loads, and students who took heavier loads generally had better *performance* in terms of GPA improvement. However, these results are *sample* statistics. The *population* in our study is composed of all students. The data we used, which covers four semesters excluding transfer students and summer semesters, is thus viewed as a sample of the population. We want to examine whether the statistics in the sample represent the population with statistical significance, and whether the results derived from the sample are statistically valid to be extrapolated to the student population. Statistical analyses in this section are carried out to study whether the differences shown in the sample reflect the true differences in the population.

### Flat Rate vs. GPA and Class Level

We compared the students who take advantage of flat rate tuition, i.e. they take more than 16 credit hours (FRT students), with all students in terms of GPA and college seniority as measured by cumulative credit hours earned as of the beginning of each semester in our sample. We use the confidence intervals to test whether the differences in averages between FRT students and all students are statistically significant. The results are in Table 6. For example, the average GPA for FRT students in Fall 2009 is 3.28 and the 99.7% confidence interval is 3.238-3.32. Since the average GPA for all students is 3.097, which is outside the confidence interval for FRT students, we conclude that the GPA of FRT students is higher than the population with 99.7% confidence.

**Table 6. Flat Rate Students vs. All Students**

	Semester	FRT Students		All Students	Is difference of averages between FRT and All students significant with 99.7% confidence?
		Average	3 $\sigma$ range (99.7%)	Average	
GPA	Fall 09	3.280	3.238~3.320	3.097	Yes
	Spring 10	3.271	3.229~3.313	3.086	Yes
	Fall 10	3.328	3.288~3.367	3.129	Yes
Cumulative credit hours earned	Fall 09	61.356	58.061~64.651	68.724	Yes
	Spring 10	63.779	60.775~64.781	66.167	Yes
	Fall 10	63.244	60.382~66.107	66.576	Yes

The results of statistical analyses in Table 6 shows:

1. Students who take advantage of FRT have higher GPA's than those who do not. That is, a student with higher GPA tends to take advantage of FRT as compared to those with lower GPAs. Three semesters' results are consistent and statistically significant with 99.7% confidence.
2. Students who take advantage of FRT have earned fewer cumulative credit hours than those who do not. Three semesters' results are consistent and statistically significant with 99.7% confidence. That is, a student who is at higher class level and has earned more credit hours tends not to take advantage of FRT, compared to students at lower class level and relatively new in college.





## Flat Rate vs. Gender

To test who are more likely, between male and female students, to take advantage of flat rate tuition policy, we use the simple regression method in which dependent variable  $Y$ =number of credit hours taken by a student in a semester, independent variable  $X$ =gender (1 for male and 2 for female). The results are shown in Table 7.

**Table 7. Gender vs. Number of Credit Hours Earned – Results of Regression**

	p-value	correlation sign	Significant?
Fall 09	0.000000687	+	Yes
Spring 10	0.000000056	+	Yes
Fall 10	0.00000014	+	Yes

A “+” correlation sign means that number of credit hours earned in a semester is positively correlated with gender. Since 1 represents male and 2 represents female in the data, the “+” correlation shows that female students tend to take more credit hours than male students.

The analysis results in Table 7 show that more female students tended to take advantage of FRT than male students. This correlation is consistent in the samples of three semesters and is statistically significant with 99.7% confidence.

## Students’ Course Load vs. Performance

We used the regression analysis method to study the correlation between the number of credit hours a student takes in a semester and his/her academic performance in that semester. As defined in section 4, a student’s academic performance, or simply *performance*, in a semester is represented by the improvement of his/her GPA in the semester, which is calculated by subtracting GPA at the beginning of the semester from GPA at the end of the semester.

In the regression analysis, dependent variable  $Y$  is defined as the difference between beginning GPA and ending GPA of a semester for a student, independent variable  $X$  is defined as the number of credit hours taken by a student in a semester. As students with GPA lower than 2.0 are put on scholastic probation and not allowed to take advantage of FRT, we only included students with GPA of 2.0 or higher in this analysis.

Regression analysis results using the data for Spring 2010 and Fall 2010 are presented in Table 8.

**Table 8. Credit Hours vs. Student Performance – Results of Regression**

	p-value	correlation sign	Significant?
Spring 10	$8.34 \times 10^{-23}$	+	Yes
Fall 10	$3.43 \times 10^{-36}$	+	Yes

A “+” correlation sign here means that number of credit hours taken by a student is positively correlated with his/her *performance* measured by difference of the GPAs at the beginning and end of a semester. Note that the p-value indicates the probability of making an error when extrapolating the sample results to the population. Extremely small p-values in the results indicate that the samples of two semesters are very representative for the population and the results from the samples are reliable, and may be confidently extrapolated to the population to draw inferences.

The regression results show phenomenally strong positive correlations between the number of credit hours a student attempts and his/her *performance*. That is, if a student takes more courses in a semester, his/her *performance* is likely to be better than other students; and on the other hand, if a student’s academic performance is improved then s/he usually has taken a heavier course load. Note that the results only show the strong correlation between academic performance and students’ course load. They do not indicate the causal relation between the two factors. That is, they do not show whether a student’s heavier course load causes his/her higher performance or a student’s higher performance explains the reason for him/her to take a heavier course load.

## CONCLUSION

This study has demonstrated a strong correlation between *persistence* and *performance* i.e. greater success in *persisting* also shows greater success in *performance*. The study also shows statistical correlations between the students who take advantage of flat rate tuition and their genders, GPAs, class levels, and performances. As noted in the preceding section on implications, these findings may prove useful to inform advising protocols, satisfactory academic progress guidelines and other related institutional policies designed to enhance student persistence and performance.

Further studies may include investigation of the reasons behind the correlations we have discovered. Statistical causal studies may reveal why correlations exist between the pairs of factors such as *persistence vs. performance* and course



load vs. *performance*, which will prove useful to institutions who are interested in examining the longitudinal impact on graduation rates.

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