December 2005

First Year Experience Programs and Student Performance:
A Statistical Evaluation*

David Fairris
Associate Dean, Student Academic Affairs
Professor of Economics

Jaehee Son
Doctoral Student in Economics

Abstract: This study offers a statistical evaluation of the CHASS Connect first year experience program at the University of California, Riverside. We analyze the program's impact on a variety of student performance measures by comparing performance measures across the CHASS Connect and nonCHASS Connect student populations controlling for a large number of student characteristics, including high-school grade point average, SAT score, socioeconomic status, first generation college student, and others. We find that the CHASS Connect program improved student retention, the likelihood of passing the entry-level writing requirement (given that the requirement had not been passed prior to matriculation), time to major declaration, and grade point average.

Introduction

In this paper we offer a statistical evaluation of the CHASS Connect freshman experience program in the College of Humanities, Arts, and Social Sciences at the University of California, Riverside. The results contribute to a growing empirical literature on the impact of freshman experience programs on student retention and performance (e.g., Cuseo 1991; Strumpf and Hunt 1993; Murtaugh, Burns, and Schuster 1999; Sidle and McReynolds 1999). In addition to more conventional measures of performance, we also explore the program's impact on time to major declaration and likelihood of passing the University entry-level writing requirement.

The CHASS Connect program has been in place at the University since the fall of 2002. It is composed of a variety of three-quarter long courses, with each three-quarter sequence exploring a particular theme from various disciplinary perspectives. Participants in CHASS Connect typically enroll in one of the sequences, and thus remain with roughly eighty fellow cohorts in one class all three quarters of freshman year. In addition to regular course work, these students are given training in study and note taking skills and in time management to enhance academic performance, and they attend cultural events together to build a sense of community.[1] The goals of the program are to increase student retention, enhance student performance, and foster more timely graduation by helping students to declare a major more quickly and to take a full set of courses over the academic year. The program has also focused on building specific skills – such as writing or mathematics – during different years of its existence. The program has historically served roughly ten percent of the freshman class.

---

[1] For more on specific features of the CHASS Connect program, see the website: "www.chassconnect.ucr.edu."

In the analysis below, we focus attention on the impact of CHASS Connect on retention, units completed, likelihood of passing the entry-level writing requirement, time to major declaration, and grade point average. We explore these impacts for both the 2002 and 2003 freshman classes.

The major findings are as follows:

- Retention (as measured by the number of academic quarters completed) is statistically significantly greater for CHASS Connect students than for the comparison group by between ten (2002) and six (2003) percent.

- CHASS Connect students are statistically significantly more likely to pass the entry-level writing requirement (having not passed prior to matriculation) than the comparison group by eleven percent (2002 and 2003).

- CHASS Connect students complete only marginally more academic units over a given time period than the comparison group by between three (2002) and zero (2003) percent.

- Among students who have not declared a major prior to matriculation, CHASS Connect students declare a major sooner (in terms of quarters since matriculation) than the comparison group by between eleven (2002) and four (2003) percent. The latter is not statistically significantly different from zero.

- CHASS Connect students have significantly higher grade point averages at UCR than the comparison group.

  This is true of the cumulative grade point average for all matriculating students – by between seven (2002) and nine (2003) percent – as well as for students who have been present on campus continuously since matriculation – by between three (2002) and four (2003) percent.

  It is also true of the second year grade point average for all students – by between twelve (2002) and fourteen (2003) percent. However, among students who have been present on campus continuously since matriculation, the impact of CHASS Connect on the second year grade point average is both quantitatively small – at two (2002) and three (2003) percent – and statistically insignificant.

Data

Our data come from a variety of sources. The student performance measures were supplied by the office of the Vice Chancellor for Student Affairs. The student characteristics measures which are used to control for heterogeneity across the CHASS Connect and nonCHASS Connect student

populations were also supplied by this office. Other control variables – for example, whether the student ever attended the Learning Center or whether the student lived in student housing during freshman year – were gathered independently, and were supplied by the directors of specific programs or offices.

We possess data on individual students in the 2002 and 2003 freshman classes. The data end in the fall of 2004. Thus, we have seven quarters of experience for the 2002 incoming class, four of which follow after students have experienced the program, and four years of experience for the 2003 incoming class, only one of which comes after students have experienced the program. The two cohorts are analyzed separately. Table 1 gives the definition of variables to be used in the analysis. Table 2 gives basic descriptive statistics on the CHASS Connect and nonCHASS Connect student populations for the 2002 and 2003 cohorts.

We compare outcome measures across the CHASS Connect and nonCHASS Connect populations. We begin with a simple comparison of means across the two populations, but then conduct a multiple regression analysis to control for a host of student characteristics in order to render the comparison groups as similar as possible. In addition to the reported results, we briefly discuss robustness checks and further specifications that test the consistency of the reported results and attempt to subject these results to more sophisticated empirical techniques. An example of the latter is an attempt to control for unobserved heterogeneity across the participant and nonparticipant groups.

Looking briefly at Table 2, it is clear that controlling for student characteristics in a comparison of outcome measures across the two populations is important. CHASS Connect students are more likely to be female, first generation college students (in 2002), and from lower quality high schools.[2] These differences could result in significant differences in student

---

[2] The "lived in dorms" variable is available only for the 2003 cohort. However, its absence in the 2002 analysis is probably of little consequence. In Appendix Tables 2 and 3 we compare the 2003 CHASS Connect results both with and without controlling for the "lived in dorms" variable, and find the results to be largely unchanged.

performance across the CHASS Connect and nonCHASS Connect student populations that are unrelated to the effect of the CHASS Connect program itself. Controlling for heterogeneity in student characteristics across the two populations gives us a more accurate measure of the program's impact.

Results

Tables 3 and 4 offer a comparison of outcome measures across the CHASS Connect and nonCHASS Connect student populations for the 2002 and 2003 cohorts, respectively. Columns one and two offer a simple comparison of means. In column three we give the difference between means and indicate whether this simple difference is statistically significantly different from zero (that is, whether the two means are statistically significantly different from one another). And finally, in column four we give the difference in means conditional on a host of controls for heterogeneity in student ability and background, and whether this difference is statistically significantly different from zero. The number of observations in the two populations is listed in the row below the results for each of the outcome measures. The impact of the control variables on outcome measures is given in Appendix Tables 1 and 2, where we present the full set of multiple regression results.

Looking, first, at the measure of retention in Table 3, we see that CHASS Connect students complete significantly more quarters than do nonCHASS Connect students. This is true in a comparison of simple means, but also when controlling for heterogeneous features of the two student populations. Later results will shed some light on why retention is better among CHASS Connect students. For now we can only say that, due either to a reduced probability of dismissal or a reduced probability of quitting, transferring, or temporarily withdrawing, CHASS Connect participants are less likely to leave the University.

An indication that this enhanced retention is the result, at least in part, of better academic performance, and thus is related to a reduced likelihood of dismissal, comes in the results on passing the entry-level writing requirement. For students who have not passed the writing requirement prior to matriculation (which is the population used in this analysis), failing to pass the requirement prior to the beginning of sophomore year is cause for dismissal. CHASS Connect students are statistically significantly more likely to pass this requirement than are similar students outside the program. In fact, even after controlling for background characteristics, CHASS Connect participants have a ten percent greater likelihood of passing the requirement, which, looking at the mean pass rate for the comparison group, is just enough to insure that virtually all CHASS Connect students are successful at meeting the entry level writing requirement.

Do CHASS Connect students complete more units per quarter in residence? In the third row of Table 3, we explore units completed among students who have completed all seven quarters of residence. There is only marginal evidence in support of a claim that CHASS Connect students progress more rapidly toward graduation by completing more units per quarter. In the final column of the table, controlling for a variety of individual characteristics, we see that there is a marginally greater number of units completed by CHASS Connect students, but the quantitative impact is not very large and the statistical significance level associated with the result is not terribly impressive.

Another way in which students might progress more rapidly toward graduation is timely declaration of a major. Students who declare a major late in their college career often find that they are unable to complete all of the major requirements in time to graduate in four years. Looking at the number of quarters prior to major declaration among "undeclared" students with seven quarters of residence (in row four of the table), we see that CHASS Connect students are somewhat quicker to major declaration than their counterparts outside the program. The sample size is small in this analysis, and the results are not resounding, but they offer at least suggestive evidence of a significant impact on this outcome measure for CHASS Connect students.

The last four rows of results offer evidence on the impact of CHASS Connect on grades. We look at both the cumulative GPA and the GPA in the second year, after the program has had its effect on skill enhancement. Arguably, it is the latter on which we should put greater emphasis; the former may reflect unrelated factors, including perhaps superior grades in the CHASS Connect courses themselves. We also look at both of these measures conditional on the student having been in residence all seven quarters. In this way, we are comparing across two populations with the same dismissal rate.

Regardless of the measure or sample analyzed, there is evidence of higher performance among CHASS Connect students. The only exception is the result for second year GPA among students that have neither quit nor been dismissed. However, it is possible that this particular result is biased **against** finding a positive CHASS Connect effect. If CHASS Connect rescues marginal students from dismissal – students who, absent the program, would have been dismissed – then comparing performance across the participant and nonparticipant populations may be an unfair comparison. In effect, the marginal students have been culled from the crop of nonparticipants, while the CHASS Connect group, precisely because the program is successful in enhancing student skills, is "saddled" with a larger contingent of otherwise marginal students in its ranks. (This kind of disproportionate selection can be handled by more sophisticated statistical techniques, but for now we leave this for future research.)

Turning to the results for the 2003 cohort in Table 4, we see very similar findings as in the analysis of the 2002 cohort. CHASS Connect students complete more quarters, are more likely to pass the writing requirement, and have higher GPAs, regardless of the measure or sample, compared to their counterparts outside the program. The one big difference between these results and those for the 2002 cohort is with regard to major declaration; here, we find no evidence of a CHASS Connect effect on the rapidity with which students declare a major. However, because the time frame is different for this cohort – we are looking at major declaration by the fall of

sophomore year (as opposed to junior year for the 2002 cohort) – the measured impact in this case and for this group may be less meaningful.

While our primary focus in this report is on the impact of CHASS Connect, it is instructive to pay just a bit of attention to the impact of the "control" variables on the various student performance measures. Appendix Tables 1 and 2 report these results. There is a great deal of interesting information here, but two results stand out: (1) High school quality matters for outcome measures, but, even holding this and all other factors constant, it is the high school GPA that appears to matter most in these regressions. (2) The population of low-income, first generation students is not as vulnerable as some conventional wisdom suggests. Indeed, with the exception of the GPA effect in the 2003 cohort, first generation is either neutral or positive in its impact on student performance, and low-income status is, generally speaking, not much of a factor at all.

Quantitative Impact

Thus far, most of our attention has been devoted to the issue of statistical significance. However, to assess the true benefits of the CHASS Connect program, the issue of quantitative significance is equally important. We measure quantitative significance by adding the estimated conditional impact of the program (in column four of Tables 3 and 4) to the mean outcome measure for the nonCHASS Connect population (in column two of Tables 3 and 4). The estimated quantitative impacts are shown in a comparison of levels in Figure 1 and in percentage differences in Figure 2.

While the impact of the CHASS Connect program on many of the student performance measures is statistically significantly different from zero, the quantitative magnitude of the impact is rarely greater than ten percent, and is never above fifteen percent. The largest and most robust quantitative impact is on the probability of passing the entry-level writing requirement. CHASS Connect boosts the probability of passing this requirement by roughly eleven percent in both years

of the program, which insures that virtually every participating student comes to possess basic

writing skills. The program's quantitative impact on retention (quarters completed) and time before

major declaration is also sizeable, especially for the 2002 cohort, where the percentage differences

with the nonCHASS Connect population are ten and eleven percent respectively. Focusing only on

students with a continuous enrollment over the entire study period, thereby discounting the

program's effects on retention, the less than five percent difference in student grade point average

for the participant population is unimpressive.

Robustness Checks and other Specifications

In this section, we report on several additional analyses run on these data to check for

robustness of the results reported above, and to correct for possible specification biases in the

findings. First, the above results are amazingly robust to the inclusion of additional control

variables. For example, including controls for ethnicity or the reported major does little to alter the

substantive findings on the impact of CHASS Connect. Since controlling for both of these reduces

greatly the degrees of freedom, especially in analyses with constrained sample sizes, and because

doing so left the results from a more simple specification unchanged, we chose to report the

simpler results in this report.

Second, not every student who entered the CHASS Connect program stayed with the program

for the entire three quarters. Indeed the exit rate (the percentage of entering students who failed to

complete all three quarters) was over 20% in 2002. When the analyses above are rerun on full-year

program participants only, the results are largely unchanged or even stronger, as we might expect.

We conducted the same analysis on part-year participants, curious about what we would find, and

thinking, initially, that one might treat these results as the impact on performance of a less

intensive, one- or two-quarter freshman experience program. By and large, the results for part-time

participants were much less consistent with earlier findings. Further reflection suggests that

treating these results as the likely impact of a one- or two-quarter freshman experience program would be a mistake, largely because those who "exit" the program are a nonrandom draw from the population of participants. We suspect, judging from the results, that leavers come from both the top and the bottom of the "ability/skill" hierarchy. But, regardless, putting much credence in these results for the likely impact of an alternative, less intensive CHASS Connect-style program would be a mistake in our view. Therefore, we chose not to report them.

Third, in controlling for student characteristics in the multiple regression framework above, our intention is to hold "all else" constant in the comparison of the two groups and thereby isolate the true impact of CHASS Connect on student performance. However, this method of comparing groups falls short of truly isolating similar individuals and then comparing outcomes across groups of similar individuals. The method of "propensity score matching" is superior in this regard. It is a semi-parametric method for program evaluation that searches for truly comparable individuals across two (affected and control) populations, and then compares average outcome measures across these two groups. When we re-estimated the model using this superior matching technique, the results were very similar to those reported above, and indeed in several instances were even stronger quantitatively and statistically.

Finally, there remains the rather thorny issue of whether, despite our best efforts at controlling for heterogeneity across the participant and nonparticipant populations, there remains unobserved heterogeneity – based, for example, on such difficult-to-capture features as "motivation" – that bias our results. Suppose, for example, that only truly "motivated" students enter the CHASS Connect program. Our results would then be biased because they reflect (uncaptured) student motivation rather than the effect of the CHASS Connect program.

Addressing bias due to uncaptured heterogeneity is difficult. One method is to employ an "instrumental variable" in which bias is removed statistically from the CHASS Connect effect by purging from this estimate any impact of correlation between the CHASS Connect variable and the

error term in the multiple regression analysis. Unfortunately, we experienced great difficulty in finding an identifying variable with which to instrument the CHASS Connect variable, finally landing on whether or not the student is a "pre-Business" major. The course load of Pre-business majors prevents them from enrolling in CHASS Connect, and so this variable was found to be a legitimate instrument, but unfortunately only in an analysis of the GPA and writing requirement effects. After instrumenting, the GPA effect seems less robust and strong, whereas the writing requirement effect remained largely unchanged.

Conclusion

This study offers findings on the impact of the CHASS Connect first year experience program at the University of California, Riverside, on student performance. We find strong evidence of a statistically significant effect of CHASS Connect on retention, passing the entry level writing requirement, the rapidity with which students declare a major, and grade point average. The quantitative impact varies in each case, but is rarely over ten percent and is never larger than fifteen percent above the average for students outside the program. CHASS Connect does not appear to significantly enhance the number of academic units completed per quarter.

Do these estimated quantitative effects warrant the annual investment the University makes in the program? Answering that question requires a comparison of the *value* of these effects to students, the University, and society with the *cost* of the program. Deciding whether CHASS Connect is the best freshman experience program the University could offer to entering students requires a comparison of the net benefits of this program with those of freshman experience programs at comparable institutions across the country or with those we may pilot in the future.

References

Cuseo, J.B. 1991. *The Freshman Orientation Seminar: A Research-Based Rationale for its Value, Delivery, and Content*. The National Resource Center for the Freshman Year Experience, Monograph No. 3. Columbia, South Carolina: The University of South Carolina.

Murtaugh, Paul A., Leslie D. Burns, and Jill Schuster. 1999. Predicting the Retention of University Students. *Research in Higher Education* 40(4): 355-371.

Sidle, Meg Wright and Janet McReynolds. 1999. The Freshman Year Experience: Student Retention and Student Success. *NASPA Journal* 36(4): 288-300.

Strumpf, G., and P. Hunt. 1993. The Effects of an Orientation Course on the Retention and Academic Standing of Entering Freshmen: Controlling for the Volunteer Effect. *Journal of the Freshman Year Experience* 5(1): 6-14.

Table 1

Variable Definitions

Quarters Completed — Number of quarters completed.

Passed writing requirement — =1 if passed Subject A writing requirement after matriculation; 0if failed to pass Subject A writing requirement.

Units Completed — Number of academic units completed.

Quarters before major declaration — Number of quarters before latest major was declared (unless "latest major" is undeclared, in which case = 9 (2002 cohort) or 6 (2003 cohort)).

Cumulative GPA — Cumulative GPA.

Second year GPA — Second year GPA.

CHASS Connect — =1 if in CHASS Connect; 0 otherwise.

Gender — =1 if female; 0 otherwise.

Low income family — =1 if family income < $30,000; 0 otherwise.

First generation — =1 if first in family to attend college; 0 otherwise.

High school GPA — High school GPA

High school quality — Index of high school quality.

SAT verbal — Score on verbal component of SAT.

SAT math — Score on math component of SAT.

Passed writing requirement before — =1 if passed the Subject A writing requirement before matriculation; 0 otherwise.

Visited Learning Center — Number of visits to the Learning Center.

Lived in dorms — =1 if lived in dormitories during freshman year; 0 otherwise.

Table 2
Student Descriptive Characteristics

Variable	2002 Cohort		2003 Cohort	
	CHASS Connect Mean *(Std. Error)*	*NonCHASS Connect* Mean *(Std. Error)*	*CHASS Connect* Mean *(Std. Error)*	*NonCHASS Connect* Mean *(Std. Error)*
Gender	0.79 (0.03)	0.62 (0.01)	0.74 (0.03)	0.60 (0.01)
Low income family	0.29 (0.04)	0.26 (0.01)	0.24 (0.03)	0.27 (0.01)
First generation	0.50 (0.04)	0.40 (0.01)	0.46 (0.04)	0.42 (0.01)
High school GPA	3.43 (0.03)	3.39 (0.01)	3.36 (0.03)	3.37 (0.01)
High school quality	5.64 (0.26)	6.32 (0.08)	6.04 (0.25)	6.61 (0.07)
SAT verbal	495.17 (6.87)	502.45 (2.09)	518.78 (7.25)	509.67 (1.91)
SAT math	512.54 (6.41)	538.38 (2.18)	509.05 (6.47)	546.24 (2.04)
Passed writing requirement before	0.58 (0.04)	0.51 (0.01)	0.48 (0.04)	0.44 (0.01)
Visited Learning Center	3.36 (0.54)	3.07 (0.21)	3.88 (0.61)	2.20 (0.13)
Lived in dorms	…	…	0.82 (0.03)	0.74 (0.01)
Number of Observations	173	1758	189	2013

Note: The number of observations for some variables will be less due to missing observations.

Table 3
The Impact of CHASS Connect
2002 Cohort

Variable	CHASS Connect Mean (Std. Error)	NonCHASS Connect Mean (Std. Error)	Difference in Means (Std. Error)	Conditional Difference (Std. Error)
Quarters completed	6.62 (0.07)	6.09 (0.04)	0.53** (0.13)	0.58*** (0.17)
N_{CC} / N_{NCC}	173 / 0	0 / 1758	173 / 1758	99 / 1026
Passed writing requirement [1]	0.99 (0.02)	0.88 (0.01)	0.11*** (0.04)	0.10*** (0.05)
N_{CC} / N_{NCC}	73 / 0	0 / 862	73 / 862	41 / 505
Units Completed [2]	108.41 (1.79)	106.86 (0.58)	1.56 (1.80)	3.51* (2.24)
N_{CC} / N_{NCC}	142 / 0	0 / 1268	142 / 1268	84 / 737
Quarters before major declaration [3]	4.88 (0.22)	5.18 (0.11)	-0.30 (0.25)	-0.58** (0.36)
N_{CC} / N_{NCC}	66 / 0	0 / 300	66 / 300	35 / 177
Cumulative GPA	2.86 (0.05)	2.68 (0.02)	0.18*** (0.06)	0.23*** (0.07)
N_{CC} / N_{NCC}	173 / 0	0 / 1758	173 / 1758	99 / 1026
Cumulative GPA [2]	2.93 (0.04)	2.88 (0.01)	0.05* (0.04)	0.10*** (0.05)
N_{CC} / N_{NCC}	142 / 0	0 / 1268	142 / 1268	84 / 737
Second year GPA	2.66 (0.79)	2.37 (0.03)	0.29*** (0.09)	0.35*** (0.12)
N_{CC} / N_{NCC}	173 / 0	0 / 1758	173 / 1758	99 / 1026
Second year GPA [2]	2.91 (0.05)	2.89 (0.02)	0.02 (0.05)	0.06 (0.06)
N_{CC} / N_{NCC}	142 / 0	0 / 1268	142 / 1268	84 / 737

Statistically significant at the 0.05(***), 0.10(**) and 0.20(*) levels respectively (two-tailed test). 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all seven quarters. 3: analyzed sample composed of students who completed all seven quarters and initially were "undeclared".

Table 4
The Impact of CHASS Connect
2003 Cohort

Variable	*CHASS Connect* Mean *(Std. Error)*	*NonCHASS Connect* Mean *(Std. Error)*	*Difference in Means (Std. Error)*	*Conditional Difference (Std. Error)*
Quarters completed	3.93 (0.02)	3.74 (0.01)	0.19*** (0.05)	0.21*** (0.06)
N_{CC} / N_{NCC}	189 / 0	0 / 2013	189 / 2013	115 / 1201
Passed writing requirement [1]	0.95 (0.02)	0.88 (0.009)	0.07*** (0.03)	0.10*** (0.04)
N_{CC} / N_{NCC}	99 / 0	0 / 1122	99 / 1122	62 / 678
Units Completed [2]	62.72 (1.08)	62.48 (0.38)	0.24 (1.23)	0.14 (1.42)
N_{CC} / N_{NCC}	177 / 0	0 / 1678	177 / 1678	109 / 999
Quarters before major declaration [3]	4.43 (0.11)	4.32 (0.05)	0.12 (0.14)	-0.16 (0.18)
N_{CC} / N_{NCC}	67 / 0	0 / 494	67 / 494	43 / 308
Cumulative GPA	2.85 (0.04)	2.62 (0.02)	0.24*** (0.06)	0.28*** (0.07)
N_{CC} / N_{NCC}	189 / 0	0 / 2013	189 / 2013	115 / 1201
Cumulative GPA [2]	2.87 (0.04)	2.81 (0.01)	0.06* (0.04)	0.12*** (0.05)
N_{CC} / N_{NCC}	177 / 0	0 / 1678	177 / 1678	109 / 999
Second year GPA	2.64 (0.07)	2.32 (0.03)	0.32*** (0.09)	0.38*** (0.12)
N_{CC} / N_{NCC}	189 / 0	0 / 2013	189 / 2013	115 / 1201
Second year GPA [2]	2.82 (0.06)	2.78 (0.02)	0.04 (0.06)	0.08 (0.07)
N_{CC} / N_{NCC}	177 / 0	0 / 1678	177 / 1678	109 / 999

Statistically significant at the 0.05(***), 0.10(**) and 0.20(*) levels respectively (two-tailed test). 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all four quarters. 3: analyzed sample composed of students who completed all four quarters <u>and</u> initially were "undeclared".

Appendix Table 1
Full Regression Results
2002 Cohort

Variable	Quarters completed	Passed writing requirement [1]	Units completed [2]	Quarter of major declaration [3]	Cumulative GPA [2]	Second Year GPA [2]
CHASS Connect	0.58*** (0.17)	0.10*** (0.05)	3.51* (2.24)	-0.58** (0.36)	0.10*** (0.05)	0.06 (0.06)
Gender	-0.02 (0.11)	0.04* (0.03)	3.47*** (1.52)	-0.48** (0.28)	0.08*** (0.03)	0.06** (0.04)
Low income family	-0.15 (0.12)	-0.09*** (0.03)	-0.98 (1.70)	-0.03 (0.34)	0.04 (0.04)	0.03 (0.04)
First generation	-0.12 (0.11)	-0.02 (0.03)	1.54 (1.55)	-0.23 (0.31)	0.06** (0.03)	0.09*** (0.04)
High school GPA	0.40*** (0.12)	0.03 (0.04)	11.24*** (1.71)	-0.47* (0.32)	0.44*** (0.04)	0.46*** (0.05)
High school quality	0.04** (0.02)	-0.004 (0.006)	0.48** (0.29)	-0.05 (0.06)	0.03*** (0.006)	0.02*** (0.008)
SAT Verbal	-0.00004 (0.0007)	0.0005*** (0.0002)	0.03*** (0.01)	-0.007*** (0.002)	0.001*** (0.0002)	0.001*** (0.0003)
SAT Math	-0.0008 (0.0007)	0.00001 (0.0002)	0.05*** (0.01)	-0.0009 (0.002)	0.0003** (0.0002)	0.0005*** (0.0002)
Passed writing requirement before	0.17** (0.11)	…	5.65*** (1.49)	-0.05 (0.29)	0.12*** (0.03)	0.09*** (0.04)
Visited Learning Center	0.01*** (0.01)	0.003*** (0.001)	0.04 (0.08)	-0.03*** (0.02)	0.001 (0.002)	0.0007 (0.002)
Constant	4.94*** (0.59)	0.58*** (0.18)	21.81*** (8.25)	11.45*** (1.73)	0.26* (0.18)	0.27 (0.22)
Adjusted R^2	0.02	0.03	0.15	0.07	0.25	0.17
N_{CC} / N_{NCC}	99 / 1026	41 / 505	84 / 737	35 / 177	84 / 737	84 / 737

Statistically significant at the 0.05(***), 0.10(**) and 0.20(*) levels respectively (two-tailed test). 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all seven quarters. 3: analyzed sample composed of students who completed all seven quarters <u>and</u> initially were "undeclared".

Appendix Table 2
Full Regression Results
2003 Cohort

Variable	Quarters completed	Passed writing requirement [1]	Units completed [2]	Quarter of major declaration [3]	Cumulative GPA [2]	Second Year GPA [2]
CHASS Connect	0.21*** (0.06)	0.10*** (0.04)	0.14 (1.42)	-0.16 (0.18)	0.12*** (0.05)	0.08 (0.07)
Gender	0.03 (0.04)	0.02 (0.03)	2.81*** (0.92)	-0.26*** (0.13)	0.05** (0.03)	0.02 (0.05)
Low income family	-0.03 (0.04)	-0.06*** (0.03)	1.13 (0.99)	0.23** (0.14)	0.01 (0.03)	0.03 (0.05)
First generation	0.08** (0.04)	-0.003 (0.03)	-0.16 (0.96)	-0.25** (0.13)	-0.05** (0.03)	-0.08** (0.05)
High school GPA	0.12*** (0.05)	0.09*** (0.03)	10.71*** (1.15)	-0.52*** (0.15)	0.49*** (0.04)	0.57*** (0.06)
High school quality	0.004 (0.01)	0.007* (0.005)	0.31** (0.18)	-0.03* (0.03)	0.02*** (0.01)	0.02*** (0.01)
SAT Verbal	-0.0002 (0.0003)	0.0006*** (0.0002)	0.04*** (0.006)	-0.001 (0.0008)	0.001*** (0.0002)	0.001*** (0.0003)
SAT Math	0.0005*** (0.0003)	0.0001 (0.0002)	0.02*** (0.006)	-0.001** (0.0008)	0.0004*** (0.0002)	0.0004 (0.0003)
Passed writing requirement before	0.07** (0.04)	…	5.59*** (0.94)	-0.05 (0.13)	0.13*** (0.03)	0.06 (0.05)
Visited Learning Center	0.006** (0.003)	-0.001 (0.002)	0.20*** (0.07)	0.001 (0.01)	0.003 (0.002)	0.0005 (0.004)
Lived in dorms	0.19*** (0.04)	0.05*** (0.03)	1.36* (1.02)	-0.04 (0.14)	0.02 (0.03)	0.13*** (0.05)
Constant	2.88*** (0.23)	0.17 (0.16)	-11.10*** (5.40)	7.84*** (0.77)	0.10 (0.17)	-0.25 (0.28)
Adjusted R^2	0.03	0.06	0.21	0.05	0.26	0.13
N_{CC} / N_{NCC}	115 / 1201	62 / 678	109 / 999	43 / 308	109 / 999	109 / 999

Statistically significant at the 0.05(***), 0.10(**) and 0.20(*) levels respectively (two-tailed test). 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all four quarters. 3: analyzed sample composed of students who completed all four quarters <u>and</u> initially were "undeclared".

Appendix Table 3
Full Regression Results (without "lived in dorms" variable)
2003 Cohort

Variable	Quarters completed	Passed writing requirement [1]	Units completed [2]	Quarter of major declaration [3]	Cumulative GPA [2]	Second Year GPA [2]
CHASS Connect	0.22*** (0.06)	0.10*** (0.04)	0.23 (1.42)	-0.16 (0.18)	0.12*** (0.05)	0.09 (0.07)
Gender	0.03 (0.04)	0.02 (0.03)	2.81*** (0.92)	-0.26*** (0.13)	0.05** (0.03)	0.02 (0.05)
Low income family	-0.02 (0.04)	-0.05*** (0.03)	1.24 (0.99)	0.23** (0.14)	0.01 (0.03)	0.05 (0.05)
First generation	0.07** (0.04)	-0.01 (0.03)	-0.23 (0.96)	-0.25** (0.13)	-0.06** (0.03)	-0.09** (0.05)
High school GPA	0.10*** (0.05)	0.09*** (0.03)	10.52*** (1.14)	-0.52*** (0.15)	0.49*** (0.04)	0.55*** (0.06)
High school quality	0.01 (0.01)	0.01** (0.005)	0.34*** (0.18)	-0.03* (0.02)	0.02*** (0.006)	0.03*** (0.01)
SAT Verbal	-0.0002 (0.0003)	0.0006*** (0.0002)	0.04*** (0.01)	-0.001 (0.001)	0.001*** (0.0002)	0.001*** (0.0003)
SAT Math	0.0006*** (0.0003)	0.0001 (0.0002)	0.02*** (0.01)	-0.001** (0.001)	0.0004*** (0.0002)	0.0004* (0.0003)
Passed writing requirement before	0.06* (0.04)	…	5.54*** (0.94)	-0.05 (0.13)	0.13*** (0.03)	0.05 (0.05)
Visited Learning Center	0.006*** (0.003)	-0.001 (0.002)	0.20*** (0.07)	0.001 (0.01)	0.003 (0.002)	0.0007 (0.004)
Constant	3.05*** (0.23)	0.22* (0.16)	-9.88** (5.32)	7.80*** (0.76)	0.12 (0.17)	-0.13 (0.27)
Adjusted R^2	0.02	0.05	0.21	0.06	0.25	0.12
N_{CC} / N_{NCC}	115 / 1201	62 / 678	109 / 999	43 / 308	109 / 999	109 / 999

Statistically significant at the 0.05(***), 0.10(**) and 0.20(*) levels respectively (two-tailed test). 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all four quarters. 3: analyzed sample composed of students who completed all four quarters <u>and</u> initially were "undeclared".
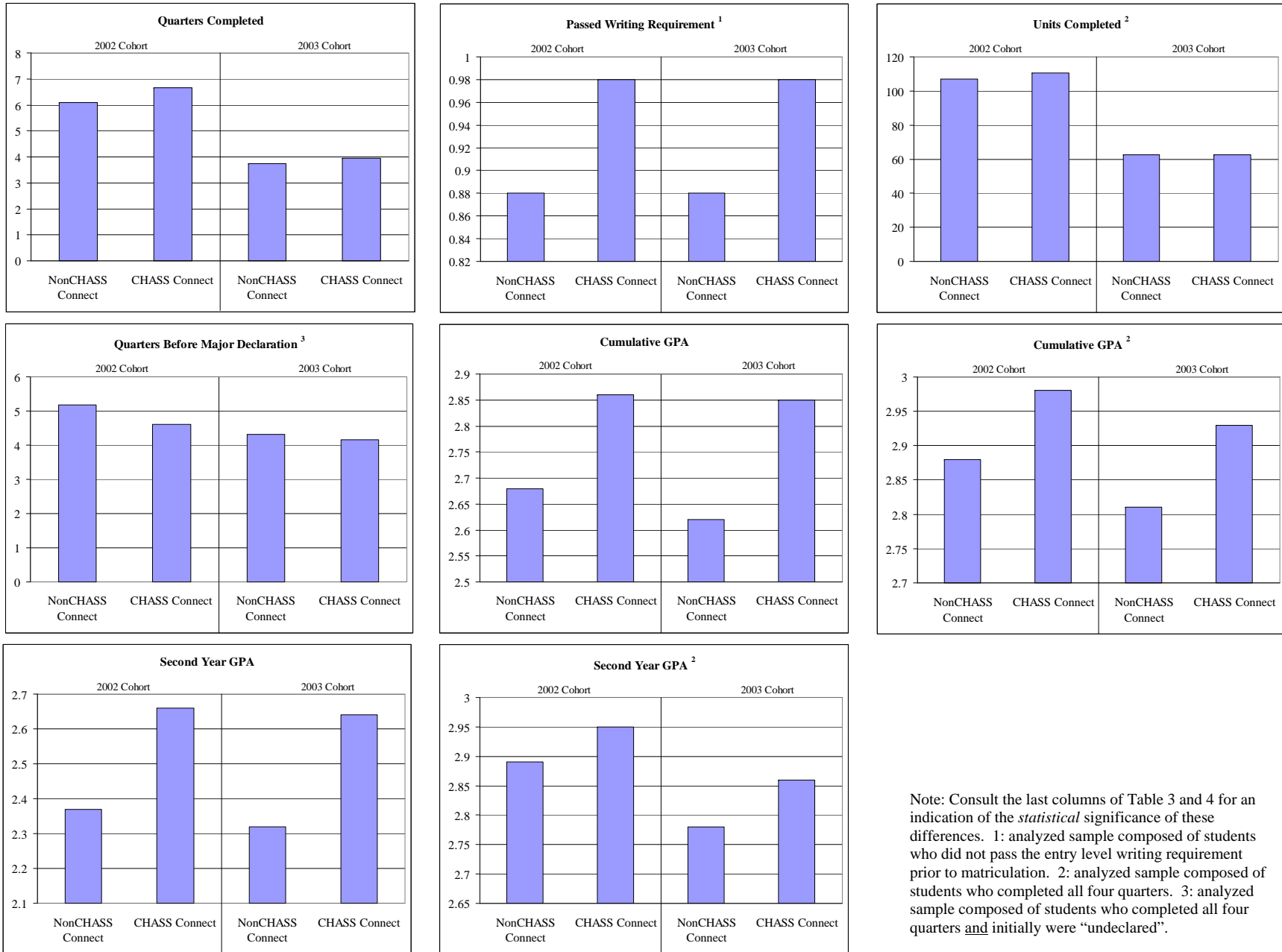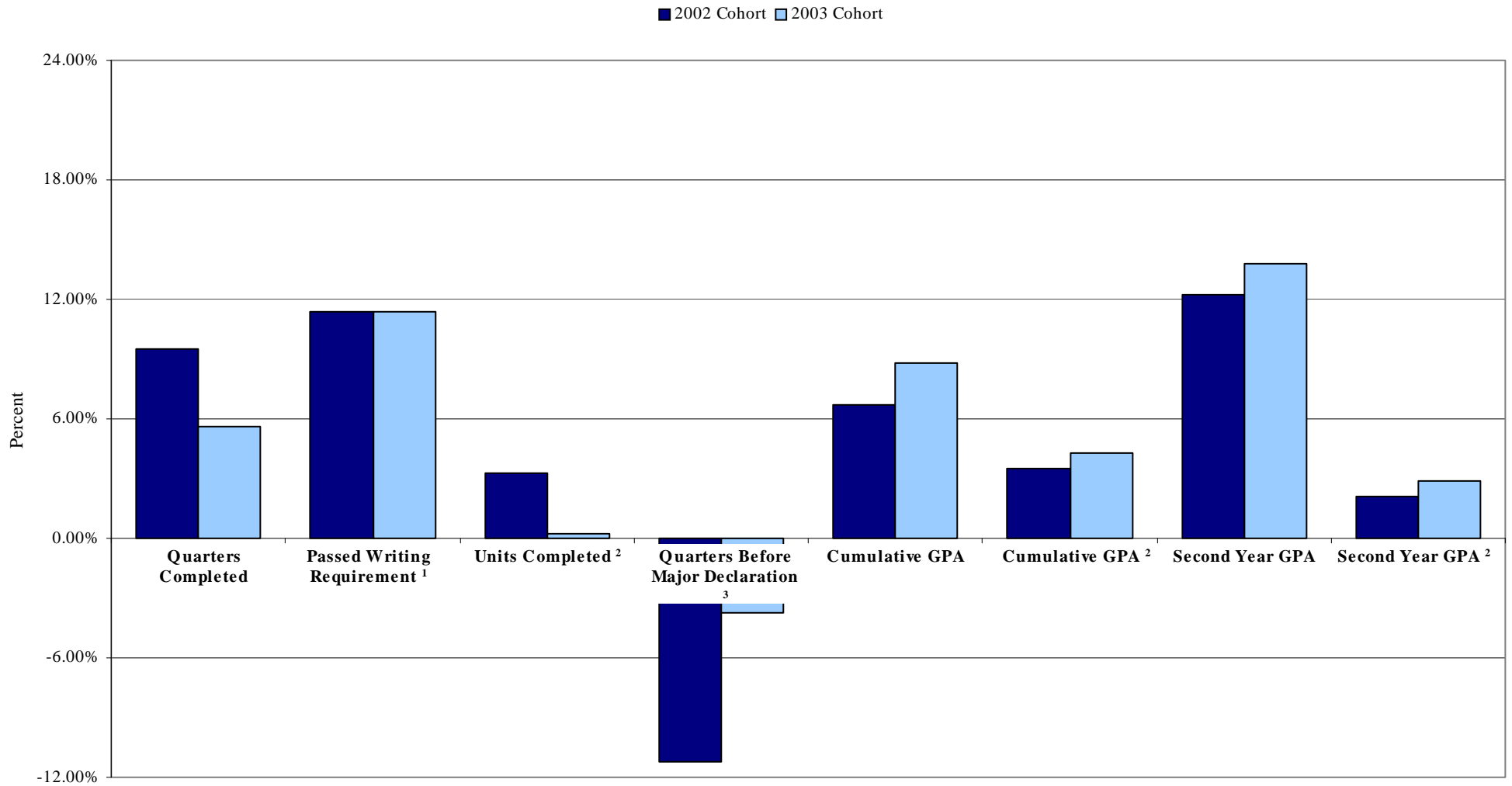
Figure 1
Quantitative Impact of CHASS Connect

Note: Consult the last columns of Table 3 and 4 for an indication of the *statistical* significance of these differences. 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all four quarters. 3: analyzed sample composed of students who completed all four quarters and initially were "undeclared".

Figure 2

Percentage Difference Due to CHASS Connect

■ 2002 Cohort □ 2003 Cohort

Note: Consult the last columns of Table 3 and 4 for an indication of the *statistical* significance of these differences. 1: analyzed sample composed of students who did not pass the entry level writing requirement prior to matriculation. 2: analyzed sample composed of students who completed all four quarters. 3: analyzed sample composed of students who completed all four quarters and initially were "undeclared".