Undergraduate Women in Economics

Change Starts with UWE:

Gender and the Undergraduate Economics Major

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I am grateful to the Alfred P. Sloan Foundation for funding the Undergraduate Women in Economics Challenge through grant no. G-2014-14504 and to Danny Goroff of the Sloan Foundation for encouraging me to undertake this important task. I thank Tanya Avilova, the UWE project manager, who has been instrumental in this intervention. More information on UWE and the RCT can be found at: http://scholar.harvard.edu/goldin/UWE

Background of UWE

The following are notes on gender and the undergraduate economics major that I first compiled in August 2013 and revised in April 2015. These observations sparked me to think about how we could get more women to major in economics. Various people encouraged me to submit a proposal to the Alfred P. Sloan Foundation to support an RCT (randomized controlled trial) that is now called *Undergraduate Women in Economics* (UWE), or *The Challenge*. The project was funded by Sloan in Summer 2014 and Tanya Avilova was hired as the project manager. An advisory group (now called the Board of Experts) met in November 2014 to discuss strategy.[1] Tanya and I implemented the many ideas gleaned from this meeting.

In January 2015 e-mails were sent to all departmental chairs and/or undergraduate heads of colleges and universities (separate campuses) that granted an economics BA to at least 15 students per year. There are only about 325 of these in the U.S. Each e-mail recipient was asked whether the person agreed, in principle, to implement a set of treatments to increase the number of female majors. They were told that their institution would receive $12,500 (in increments after meeting stated goals) for their efforts and that the funds could be used in any way that would further the stated objective.

We received enthusiastic replies from a large number of the 325 e-mails, demonstrating the strong latent demand for action. About 160 schools agreed to take part in the treatment. Due to the large number of positive responses, Tanya and I increased the cutoff number of BAs in economics to 25 and imposed other requirements. A good reason for limiting the sample in this way is to increase the power of the experiment. We narrowed the group to 88 schools, stratified the schools into four selectivity groups and then randomly picked 5 schools from each group of 22. All 20 randomly picked "treatment" schools agreed to take part in the trial; about 35 of the non-treatment schools agreed to be "controls." Both treatments and controls had to agree to submit data through our on-line tool.

The idea behind the RCT is that the program would incentive schools to initiate treatments that would relatively increase the number of female majors, possibly without decreasing the number of male economics majors. The idea is to "treat" the group of incoming freshmen who would likely graduate four years later. But some students do not graduate in four years and some sophomores may be treated along with the freshmen. We have asked the schools to report outcomes on the basis of the treatment group. Where possible we have asked them to follow actual students. We understand that this may not be possible in all cases. We will, as well, follow cohorts as they go through the program to see if relative enrollments of males and females in the higher level classes change.

[1] Information on the Board of Experts can be found at: http://scholar.harvard.edu/goldin/board-experts

Our 20 treatment schools are a highly varied group in various ways. Some are large state universities, a few are flagship institutions; some are small liberal arts colleges and several are Ivy League institutions. Some have large business schools with undergraduate majors (good business programs syphon females from economics more than males). Several allow double or even triple majors. In terms of the variables of interest, they range widely in terms of the fraction female among their recent group of BA economics majors and in terms of the fraction of their undergraduates who major in economics.

In May 2015 Tanya and I met in Cambridge MA with all treatment schools in two groups of ten to discuss the issues each school faced and the treatments each thought they wanted to employ. We acknowledged early on that one-treatment or one limited set of treatments would not fit the problems faced at all schools. Instead, Tanya and I assembled a list of potential treatments (see Table 1) and required that our treatment schools use several of them. Each treatment school submitted a plan of action by the start of the Fall 2015 semester. We also required that they submit data on various measures of enrollment and graduation going back several years. We are, just now, collecting this information from all treatment and control schools. (Note that we can also use the IPEDS for the number of majors but only after the treatment and control classes graduate.)

Because we are in the middle of the first treatment year we do not have anything definitive to report. We have heard from several treatment schools that their interventions have increased the number of females in the principles course and among those expressing interest in the major. Most of all, it is clear that the UWE program has been instrumental in giving women in these 20 schools more of a voice and giving all potential majors better information about economics as a discipline.

Notes on the Undergraduate Economics Major at a Highly Selective Liberal Arts College

I have written these notes to explore why women are not majoring in economics to the same degree as are their male BA counterparts across a wide variety of colleges and universities. I focus here on data from a liberal arts college called Adams. Adams is similar in selectivity to institutions such as Amherst, Brown, Chicago, Columbia, Cornell, Dartmouth, Harvard, Pennsylvania, Princeton, Stanford, Swarthmore, Williams and Yale.

Differences in the male and female rates of majoring in economics are large and do not appear to be narrowing (Fig. 1). It should be said at the outset that economics continues to be a highly popular major in most universities and colleges. (For additional information on the gender imbalance among the top 100 universities and top 100 liberal arts colleges see Appendix Tables 1 and 2, which contain data from the IPEDS.)

Around 10 to 20 percent of all male undergraduates major in economics among the top-ranked 100 universities and top 100 liberal arts colleges without an undergraduate business major. At Adams almost one in five male students majors in the field. The emphasis in this note is on the *relative* popularity of economics among female undergraduates.

The reason for my interest in female economics majors is because I would like all students to have accurate information regarding the usefulness of a major. Many college seniors, both male and female, realize too late in their studies that knowledge of statistics, econometrics, and economic modeling are helpful tools in a large number of areas. Too often students think that economics is only for those who want to work in the financial and the corporate sectors. Many do not realize that economics is also for those who have broad intellectual interests. And that it is also for those with far-reaching goals that may include reducing crime, obesity, inequality, terrorism, poverty and infectious disease, to mention a few of the areas in which economists have advanced knowledge.

Economics Majors Nationwide and at Adams

For every female economics major today there are almost 2.9 male majors nationwide, relative to their numbers as BAs. I term that statistic the "conversion rate." (At many institutions where women greatly outnumber men it is important to scale by the number of BAs.) The rate is nearly 2.5 among the 100 top-ranked universities and about 2.6 for the 100 top-ranked liberal arts colleges.[2]

The conversion rate varies considerably across schools. It is higher in schools that have a business major, as women tend to exit economics to major in business fields such as accounting, human resource management and marketing. In addition, many business schools have undergraduate majors that require a minimum GPA for admission and female students tend to do better than their male peers. In the aggregate the conversion rate to economics has been fairly constant for the past two decades (see Fig. 1).

The record at Adams is similar to that of most of its peer institutions (averaged across 2009 to 2011) using data from the IPEDS. The relative rates at which male versus female BAs become economics majors for that period are as follows: Dartmouth (2.32), Princeton (2.09), Yale (1.94), Columbia (1.86), Chicago (1.85), Harvard (1.83), Stanford (1.78), Cornell (1.74), Pennsylvania (1.69), and Brown (1.64). There are some outliers that have more women: Berkeley (1.47), UCLA (1.18) and MIT (0.74). The explanation for MIT is that engineering schools tend to have a far higher fraction female in non-engineering subjects. Part of the reason why Berkeley and UCLA have relatively more women than the other institutions listed will be discussed at the end.

[2] Data are from U.S. Department of Education, IPEDS and are weighted by the number of BAs. Schools are included only if they grant a BA in economics. Top group of 100 is from *US News & World Report*.

The fraction female among economics majors at Adams decreased somewhat during the past eight years but rose recently and women were about 0.33 of the 2013 graduating class. The conversion rate (given as the green line in Fig. 2) rose a bit to 2006, then decreased to 2009 and then rose to 2013. Almost all of the movement in the conversion rate at Adams has been due to changes in the rate for males not that for females, which has remained fairly constant at 10 percent for graduating classes from 2005 to 2013 (see red line in Fig. 2). Including applied math majors who do the economics track increases the fraction of majors for both males and females, but the male share does not change by a significant amount.[3]

I turn now to an analysis of Adams College administrative data. Each observation in the data has been arranged by the student's graduating class. To ensure consistency across classes I use only individuals who appear in the data as freshmen or sophomores.

When and Why Do Females, Relative to Males, Fall Out of Economics?

The fraction female among economics majors at Adams is around 34 percent in the graduating classes from 2005 to 2013. About 14.7 percent of all students major in economics (10 percent of female and 19.5 percent of male students). Economics is a popular major at Adams but far less so for females than for males.

Economics is also a popular secondary major.[4] The current fraction of students (2013 graduating class) for whom economics is their secondary field is 14 percent, among those who pick any secondary field. The division between males and females echoes that for majors: 17.6 percent of males who pick a secondary choose economics compared with 10.2 percent of the women.

Given the low fraction of female relative to male economics majors, the question is whether women drop the idea of the major after taking the introductory economics courses or disproportionately do not express interest in the major from the outset. The answer is some combination of the two.

Only about 10 percent of women list economics as their primary major upon acceptance whereas almost 20 percent of men do.[5] It would appear, therefore, that the die is cast even before students enter the campus grounds. But there is considerable flux in this declaration.

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[3] The number of applied math majors who do the economics track is estimated by assuming that all applied math majors who take the intermediate sequence do the economics track.

[4] Secondary majors have existed ever since the graduating class of 2007. The requirement for the secondary in economics is both semesters of principles, one semester of the intermediate course and three other upper level economics courses.

[5] By "acceptance" is meant when the student accepts the offer from Adams.

For women there are three almost equally sized groups among those who eventually major in economics and/or listed it as their first choice: those who major in economics and had stated they would (0.33), those who major in economics but did not list it as their first choice (0.36), and those who listed it as their first choice but did not major in it (0.31).[6] Because most of the students who listed economics as their first choice but did not major in it took the principles course in the Fall, a large group leaves the major after that point although another equally sized group enters.[7] (I will term taking the principles course in a semester as "Principles-Fall/Spring.") The women who leave are disproportionately those who did not get an A or A-.

Therefore, the drop-off for women relative to men occurs at several points in their progression from new entrant to sophomore. There is a relative drop-off of women from freshman entrant to Principles-Fall and also from Principles to the Intermediate sequence (see Fig. 3). A somewhat greater fraction of females relative to males exits after taking Principles-Fall (when Principles-Fall could be taken separately from Principles-Spring).

One obvious reason why women disproportionately do not take Principles and eventually do not major in economics is because they enter Adams with less desire to major in economics than do their male counterparts.

Incoming freshmen at Adams are asked to provide each of their three most likely majors. Because high school students have probably not been exposed to many of the 54 subject selections on the form, their answers are expected to have considerable error. Interestingly, the fraction of both males and females who state that economics is their most likely major is approximately equal to the fraction who eventually majors in the subject. But there is considerable flux.

At the time of their acceptance 9.4 percent of females and 19 percent of males in the graduating classes of 2005 to 2013 stated an intention to major in economics. The fractions that actually majored in economics in these classes are 10 and 19.5 percent. But half of the women who initially intended to major in economics eventually did not whereas 44 percent of the men did not (see Table 2).

The intention to major in economics at the time of acceptance is a strong determinant of whether a student takes Principles or places out of one or both semesters upon entry. Almost 80 percent of students (either male or female) who gave economics as their top choice upon acceptance took Principles-Fall and an additional 10 percentage points placed out of it. Among females who did not give economics as their first choice 33 percent took Principles-Fall and

[6] For males the division is: 0.39 major in economics and say they will; 0.31 major in economics but do not say they will; and 0.30 listed economics as their top major but do not eventually pick it.
[7] Principles Fall is "micro" and Principles Spring is "macro." Until 2005 students who took Principles Fall had to take Principles Spring to get credit. But after 2005 the courses were separated.

among males 43 percent did. The Principles course is clearly very popular but especially so among those who enter Adams College with an interest in economics as a major.

Considering the top three majors each student declared about 24 percent of females listed economics as one of them and a whopping 43 percent of the males did. About 80 percent of the males and 74 percent of the females who eventually majored in economics had given economics as one of their top three choices upon acceptance. The remaining group was drawn from among those who did not list economics as one of their top three choices. They were widely dispersed regarding their initial top choices although the most numerous were government (for males and females), engineering (for males) and psychology (for females).

Taking, and Placing Out of, Principles of Economics: The Portals to Economics

As just noted, Principles is highly popular at Adams and 44 percent of Adams College students take at least the first semester (50 percent of males and 37 percent of females in the graduating classes considered here). Until 2005 students had to take both semesters of Principles to get a grade but after 2005 students could take Principles-Fall without taking Principles-Spring. Because the student data are grouped here by graduating class and because most students take these courses in their freshman or sophomore years, the class of 2007 was the first affected by the change. As can be seen in Fig. 4, the fraction of both males and females taking Principles-Fall (but not Spring) greatly increased with the ability to split the semesters but differences in enrollment by semester then narrowed.

In the most recent graduating class about 32 percent of female and 47 percent of male undergraduates took both semesters of Principles (or placed out of the Fall semester and took Principles in the Spring). The fraction female among Principles students in 2013 was around 40 percent and reached a local peak of 44 percent with the graduating class of 2009 (see Fig. 5).

Males receive considerably higher grades in Principles-Fall than do females (Fig. 6, panel A). They garner more A's and A-'s (44 percent) than do females (38 percent). Grades in Principles are extremely important in determining whether females major in economics. But that is far less the case for males.

The probability of majoring in economics by the grade in Principles is given in Fig. 6, panel B and demonstrates that males major in economics almost without regard to their grade in the elementary course.[8] Women, on the other hand, major in economics primarily if they did well in Principles. Whereas 42 percent of the females with A's in Principles major in economics and 40 percent of the males with A's do so, just 27 percent of the females with a B+ major in economics but 41 percent of the males do. That is, a nearly identical fraction of males with an A

[8] The conclusions from this analysis would not change if Principles-Fall were used instead.

major in economics as with a B+, but for females those with a B+ are two-thirds as likely to major in the field as are those with an A.

The relative fall off of women from Principles to intermediate microeconomics (Ec200 and Ec300) is primarily due to the fact that females do not continue with economics unless they do fairly well in Principles.[9] Although they receive a lower fraction of the A's and A-'s, that factor is a minor part of the difference. Far more important is the gradient of their continuing in economics with regard to their grade in Principles. Note that continuation to intermediate microeconomics from Principles is almost equivalent to who majors in economics or has a secondary in the subject.

One possibility is that males with low grades in economics major in the field because they also have low grades in other subjects as well but females have higher grades in other subjects and gravitate to them. The data currently made available do not allow a complete understanding of that possibility but one can look at the entire GPA.

Female economics majors have higher GPAs than male majors (see Fig. 7). In addition, they have even higher GPAs relative to non-economics majors whereas males economics majors have lower GPAs than other majors. Even among students with an A or A- in Principles-Fall, females have higher GPAs than do males. That is, female economics majors are positively selected on their GPA whereas male economics majors are negatively selected on their GPA. One disconcerting factor is that non-economics majors who receive an A or A- in Principles-Fall have higher overall GPAs than do economics majors and this holds for males and females.[10]

Intermediate Theory: The Entry Points for Majors

Economics majors at Adams are required to take the Micro and Macro Intermediate sequence. These courses are called Ec201, Ec301 for Micro and Ec202, Ec302 for Macro. The higher number means that the level of mathematical proficiency needed is greater. Ec201, Ec202 use less math and Ec301, Ec302 use more. In addition, one or both of the semesters are taken by other majors. It, too, is a popular (although demanding) course at Adams.

Among all Adams students 26.7 percent take Ec201 or 301, Micro-Intermediate (18 percent of female and 36 percent of male students).[11] Thus about 34 percent of the students in Micro-Intermediate are female and that is also the case for the entire intermediate sequence. The full year of intermediate theory attracts 20.4 percent of all Adams College students (13.7 percent

[9] Note that the difference in the gradient with regard to the grade in Principles for males versus females exists within groups. For example, it exists for certain groups like Asian-Americans and international students who have relatively high rates of majoring in economics and it also exists for those who intended to major in economics and for those who did not intend to do so.
[10] This finding is unaffected by excluding majors in the humanities.
[11] The Intermediate sequence data includes students who placed out of both semesters of Principles.

of female and 27.2 percent of all male students). Fewer take the Spring (Ec202 or Ec302 Macro-Intermediate) course than the Fall (Micro-Intermediate) but an equal fraction of males and females exit. The fraction female in intermediate theory increased somewhat after the 2007 graduating class but it has recently decreased to 32 percent (Fig. 8).

As just noted, the intermediate sequence has two tracks. One (Ec200) is the less mathematical and another (Ec300) is more mathematical. More than 70 percent of Adams students who enroll in the Intermediate course take the Ec200 track, but most who continue with economics in graduate school have taken the Ec300 sequence. The fraction female is around 7 percentage points less in Ec200 than in Ec300.

The aggregate falloff from Micro-Intermediate to the major is about 70 percent and does not differ by sex (as was apparent from Fig. 3). In addition, females who took the Micro-Intermediate course are somewhat more likely than are males to pick economics as a secondary major beginning with the class of 2007 (10 versus 14 percent).

Women do better than men in Ec200 (less mathematical version) but worse in Ec300 (more mathematical). The mean grade for women in Ec201 is 3.33 but is 3.24 for men. The tables are turned in Ec202 where men have a mean of 3.40 and women 3.30. Interestingly, the means for Ec301 are about the same by sex (3.30) although men do better in Ec302 than do women (3.42 vs. 3.35). The full distributions for the four courses by sex are given in Fig. 9.

Students who take Micro-Intermediate but who do not major in economics tend to major in applied math, social issues, and government (for males). The data in Fig. 10 are expressed as an odds ratio where a value exceeding one means that the major is greater than average for those who took Micro-Intermediate and a value under one means that the major is less than average for those who took Micro-Intermediate.

Race, Ethnicity and Gender

I have, thus far, not discussed demographic differences across students other than gender. Yet these distinctions have important implications for gender differences. I had earlier noted that the conversion rate in economics at Berkeley was 1.47 for 2009 to 2011 and was 1.18 at UCLA. The reason, it appears, is in part that Asian-American students have a higher fraction of females majoring in economics than do other ethnic and racial groups, in particular than do U.S. born whites. In fact, about the same fraction of Asian-American women major in as do U.S.-born white men economics at Adams.

Among Asian-American students at Adams the conversion rate is 1.22 but among U.S. whites it is 2.83 (see Fig. 11). International students also have relatively more female economics majors and a conversion rate of 1.39. Asian-Americans are 16 percent of Adams College

students, international students are 11 percent, and U.S.-born whites are 46 percent (although there is a substantial group with no listed race/ethnicity).

Summary of the Findings

There are about two males for every one female majoring in economics in the graduating classes at Adams from 2005 to 2013. Women disproportionately do not major in economics at Adams. But Adams is not alone in this circumstance. The same is true of Adams's peer institutions.

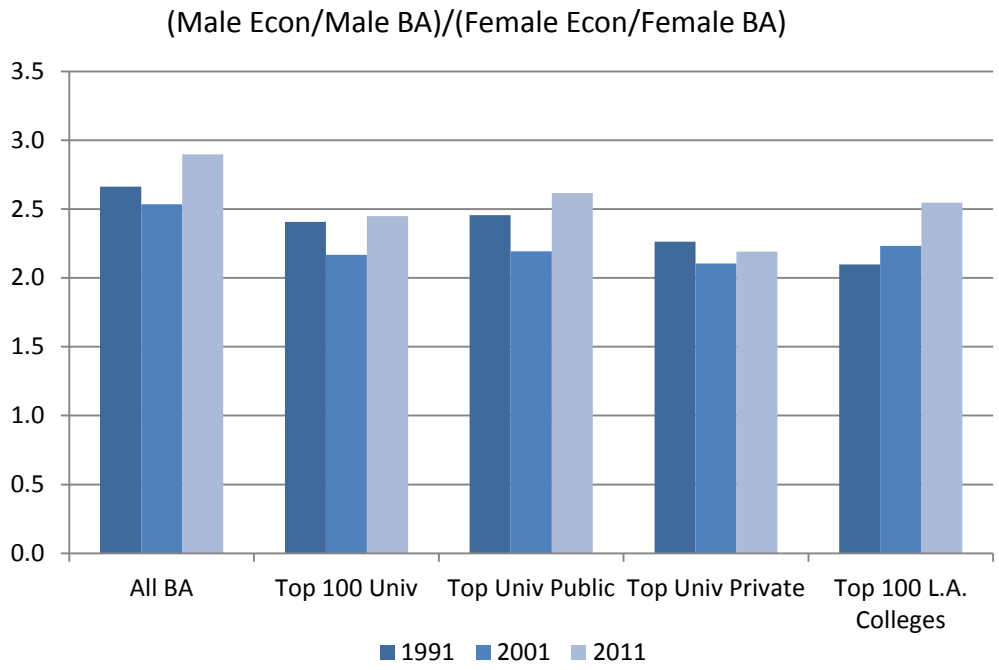
Males come to Adams with a far greater intention to study economics than do females. At the time of acceptance two males for every one female state that economics is their number one major choice, the same ratio for actual majors. Males whose top choice is economics are less dissuaded than are females from majoring in economics when they do poorly in the introductory principles course. But, for the most part, much regarding the economics major decision is determined before any course is taken. More than 50 percent of those who gave economics as their top choice eventually majored in the field. And 80 percent of male majors and 74 percent of female majors had listed economics as one of their three top choices at the time of acceptance.

Does math-ability have much to do with these differences? The raw difference between males and females in declaring economics as one of the three top choices upon acceptance is 0.187. Including the pre-admission scores on the SAT math and the Adams math placement test reduces the difference by just 1 percentage points to 0.177. Math-ability does not have much to do with the initial decision to major in economics and with the eventual major.

What about taking economics prior to admission? Males disproportionately take AP economics, but that does not explain the large differences in major choice discussed here. Among male undergraduates 15.8 percent take the macro AP and 11.4 percent of females do; 12 percent of males but 9.2 percent of females take the micro AP. Differences with regard to the major are much larger. Including whether or not a student took the economics AP decreases the difference between males and females in the declaration of economics as the intended major by less than 1 percentage point. Similar results hold for the eventual major.

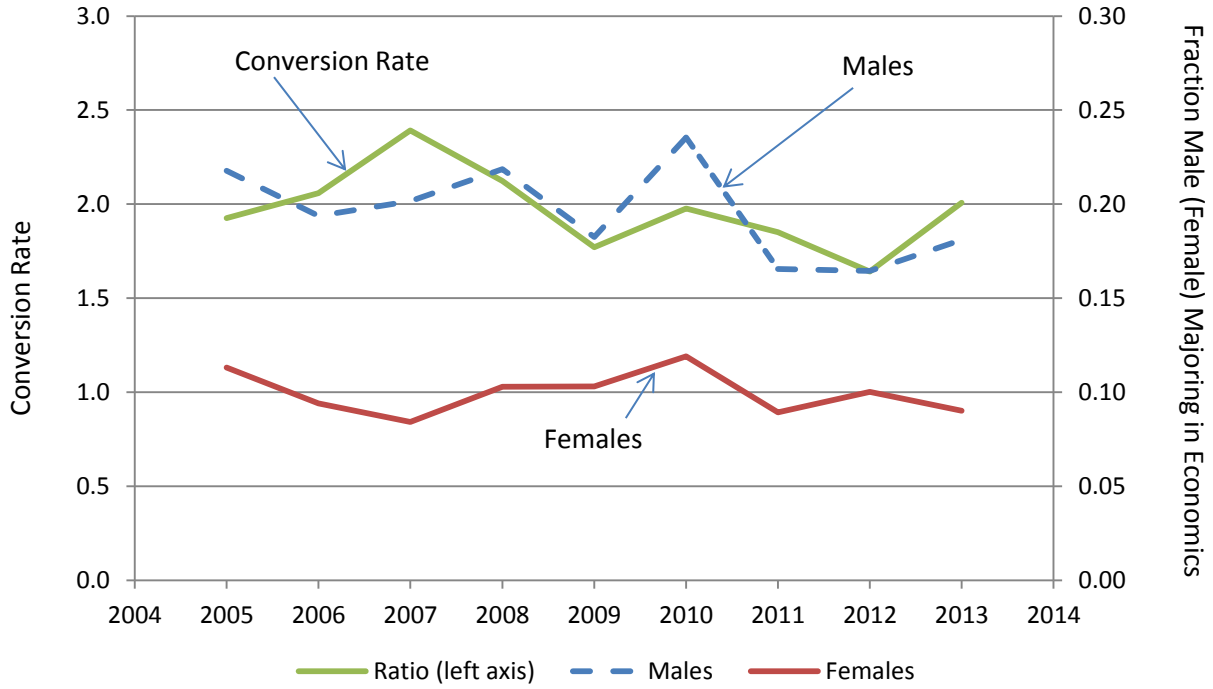
Exactly why males decide to major in economics far more so than females, even prior to beginning their freshmen year, remains somewhat of a mystery. It is likely that males have a stronger desire to work in the financial and corporate sectors and see economics as their ticket to success in those realms. It is important to impress upon the recent entrants that economics can be a ticket to success in a large number of realms, not just in the financial and corporate sectors.

Figure 1: Economics Majors as a Fraction of BAs by Sex and Institution Type: 1991, 2001, 2011



Source: IPEDS data on-line.

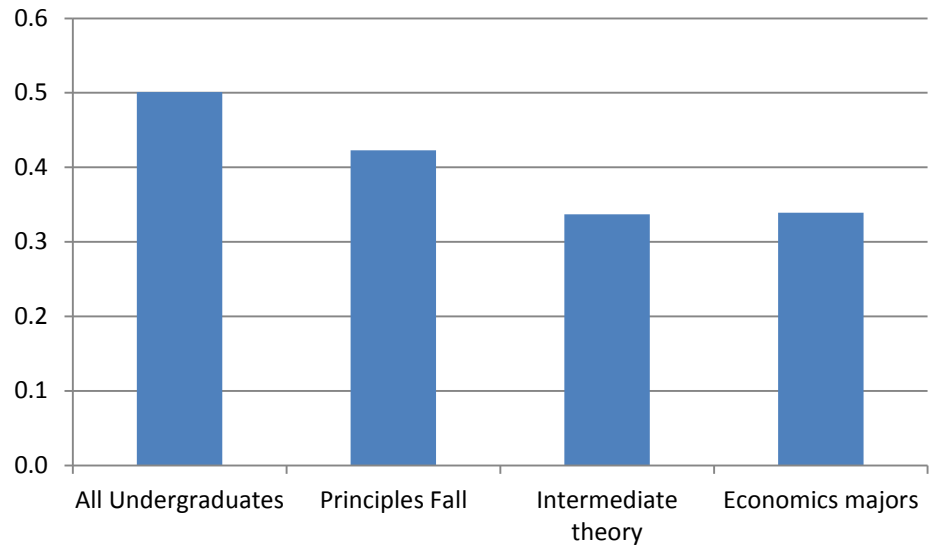
Figure 2: Male versus Female Economics Majors as a Fraction of BAs and the Conversion Rate: Adams, 2005 to 2013 Graduating Classes



Source: Adams College administrative data.

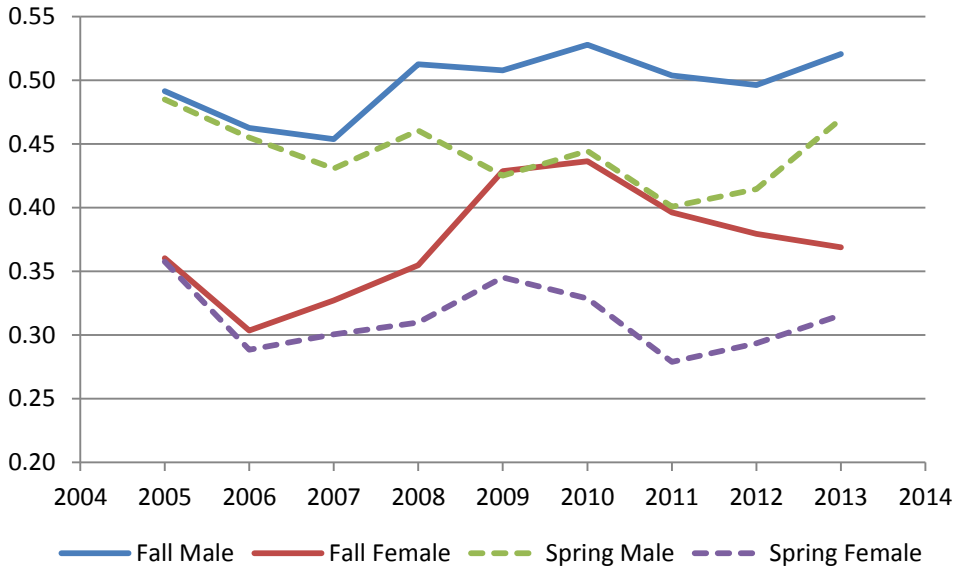
Notes: Conversion rate is graphed onto the left axis and Male and Female fractions are graphed onto the right axis. The conversation rate is (male economics majors/male BAs)/(female economics majors/female BAs) = (Fraction Males Majoring in Economics)/(Fraction Female Majoring in Economics).

Figure 3: Fraction Female by Stages to Economics Major: 2005 to 2013 Graduating Classes



Source: Adams College administrative data.

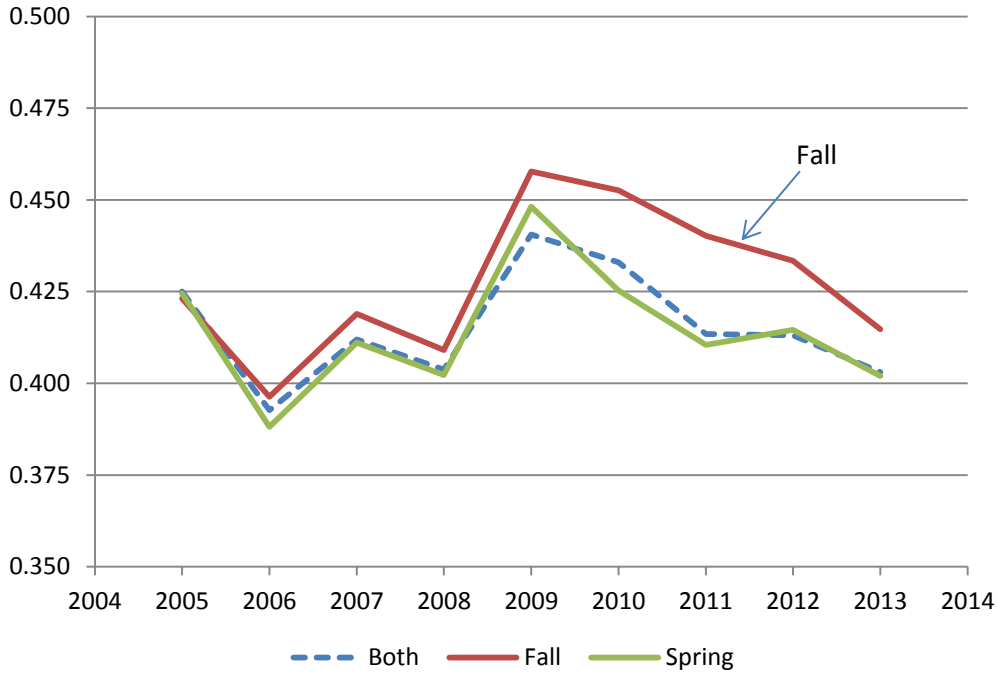
Figure 4: Principles Students as a Fraction of 2005 to 2013 Graduating Classes by Sex



Source: Adams College administrative data.

Notes: Male Fall, Female Fall: took Principles-Fall, does not include those who placed out of micro-economics. Male Spring, Female Spring: took Principles-Spring, does not include those who placed out of macro-economics. Principles could have been taken in any year and is not restricted to freshman and sophomore years. Students who place out of any semester are included only if they actually took the course in that semester.

Figure 5: Fraction Female among Principles Students: 2005 to 2013 Graduating Classes

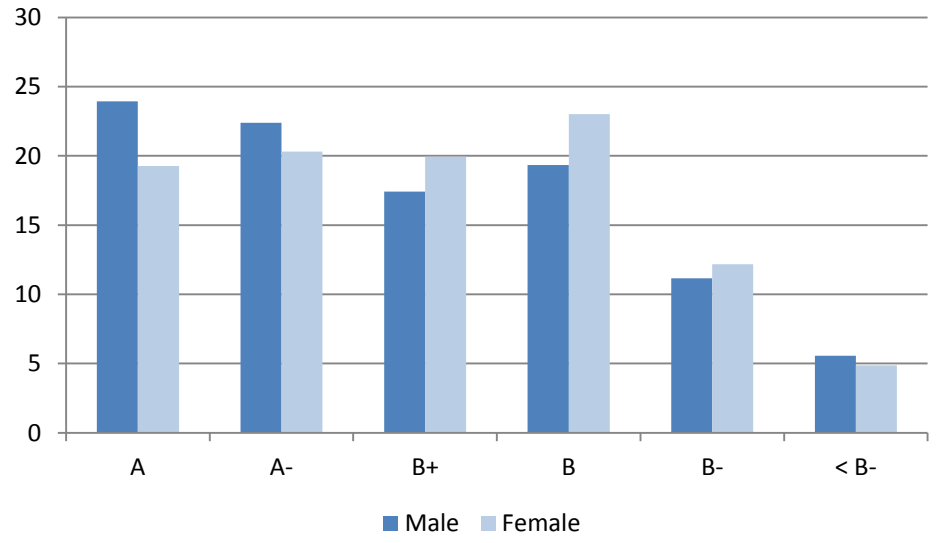


Source: Adams College administrative data.

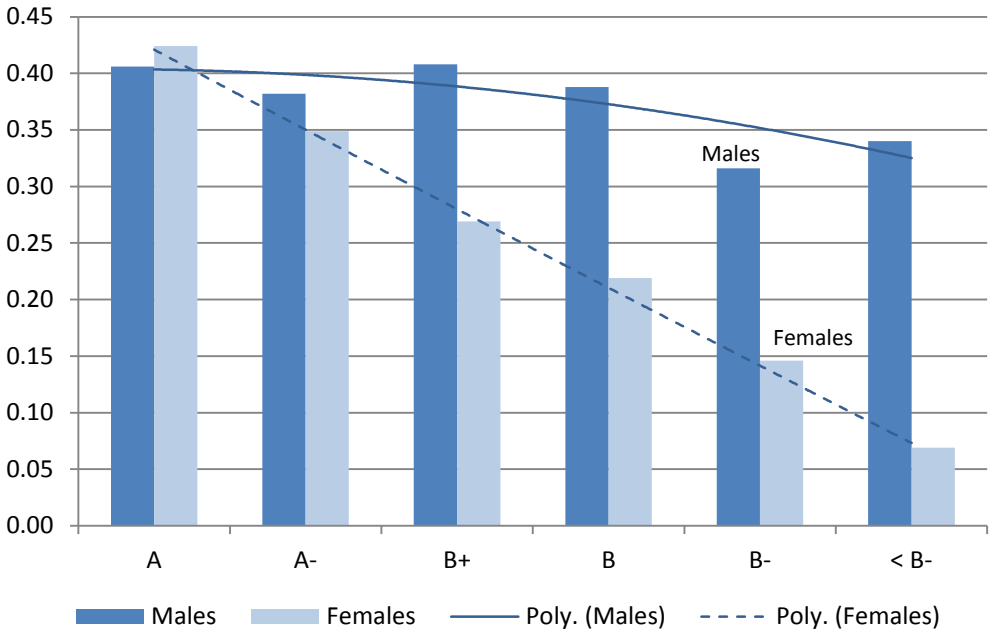
Notes: Both Semesters: took both Fall and Spring of Principles or placed out of one or the other semester. Fall, Spring: took Principles in that semester. Fraction female is expressed as a "conversion rate," meaning that it is scaled by the number of BAs of each sex.

Figure 6: Grade Distribution in Principles and the Fraction Majoring in Economics by Grade in Principles by Sex: 2005 to 2013 Graduating Classes

A. Distribution of Grades in Principles-Spring (or Fall if placed out)



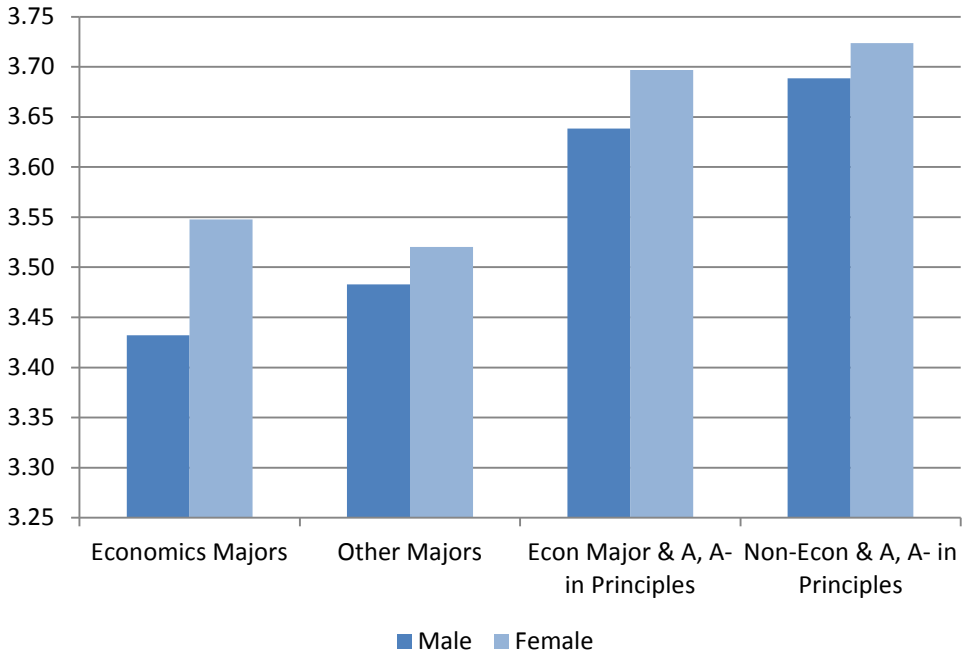
B. Fraction Majoring in Economics by Grade in Principles-Spring (or Fall if placed out)



Source: Adams College administrative data.

Notes: Grade is for Principles-Spring or -Fall if student placed out of Principles-Spring. Results do not change if Principles-Fall is used. Trendlines are second degree polynomials.

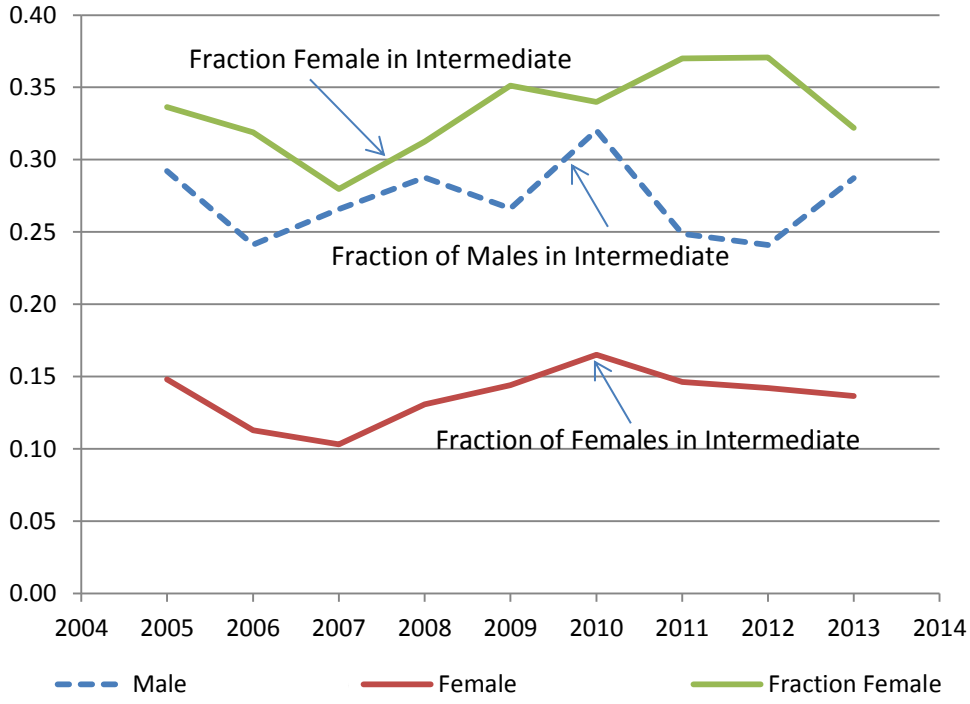
Figure 7: GPA at Graduation by Major and Grade in Principles



Source: Adams College administrative data.

Notes: Grade is for Principles-Fall but results do not change if Principles-Spring is used.

Figure 8: Fraction Female and Male Undergraduates Taking Intermediate Theory and Fraction Female among Intermediate Students: 2005 to 2013 Graduating Classes

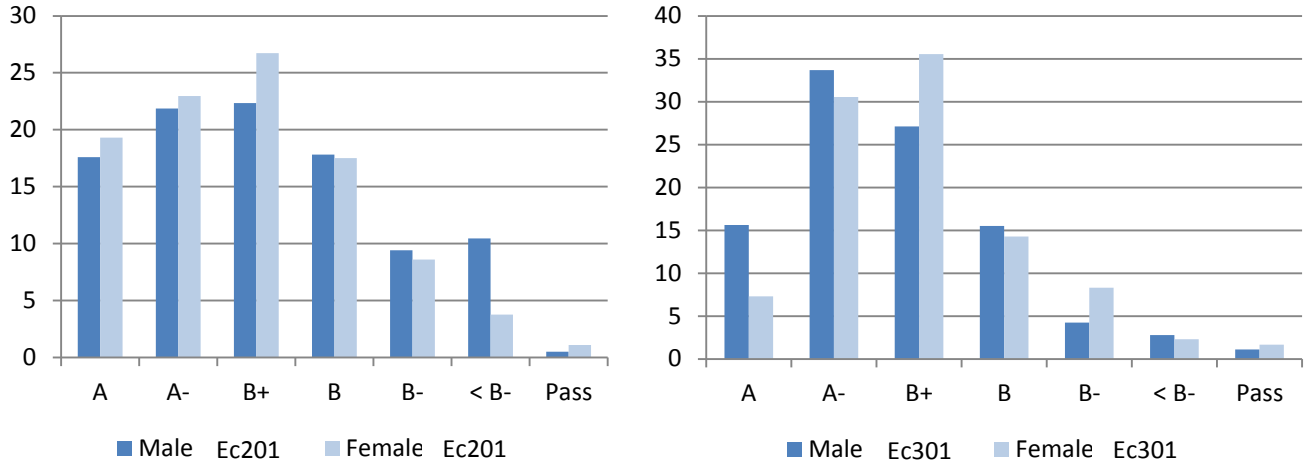


Source: Adams University administrative data.

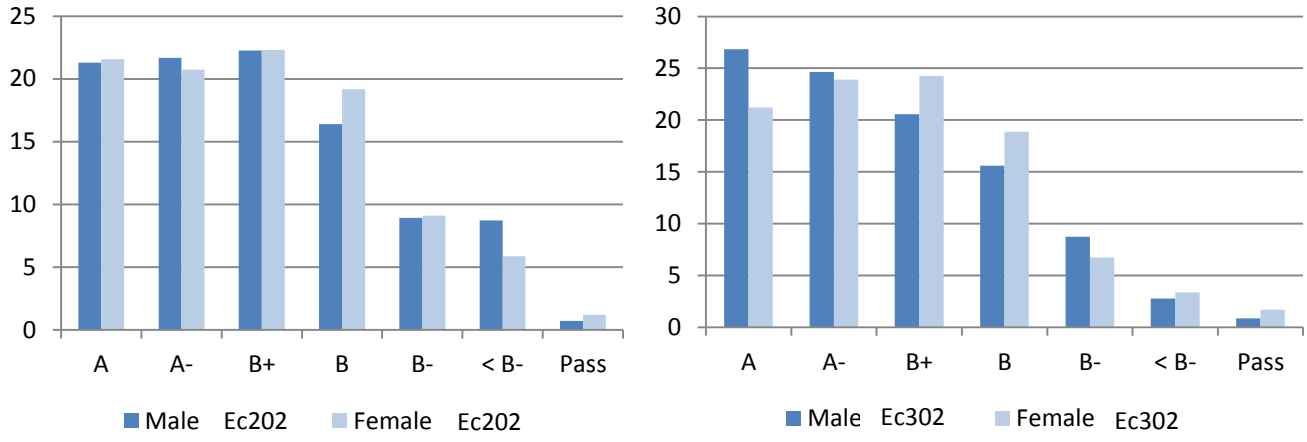
Notes: Gives students who took both Micro and Macro semesters of intermediate economics at either the Ec200 or Ec300 level. Fraction female is expressed as a "conversion" rate, meaning that it is scaled by the number of BAs of each sex.

Fig. 9: Grade Distributions in Micro and Macro Intermediate: 2005 to 2013 Graduating Classes

A. Micro Intermediate Theory (Ec201, 301)



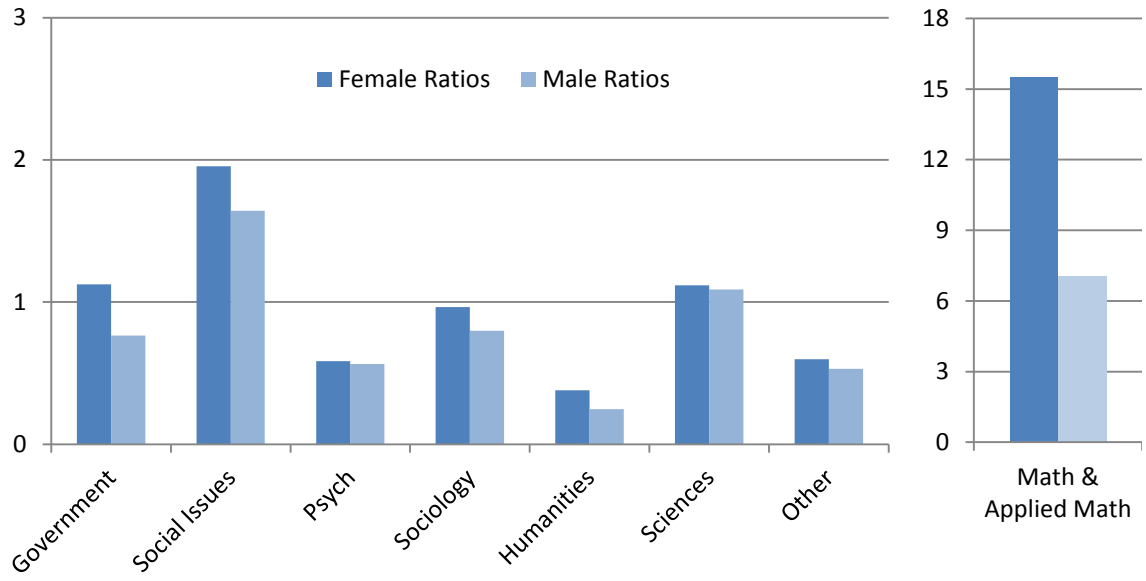
B. Macro Intermediate Theory (Ec202, 302)



Source: Adams College administrative data.

Notes: Ec201 is Micro-Intermediate Theory, less mathematical; Ec202 is Micro-Intermediate Theory, more mathematical. Ec301 is Macro-Intermediate Theory, less mathematical; Ec302 is Macro-Intermediate Theory, more mathematical.

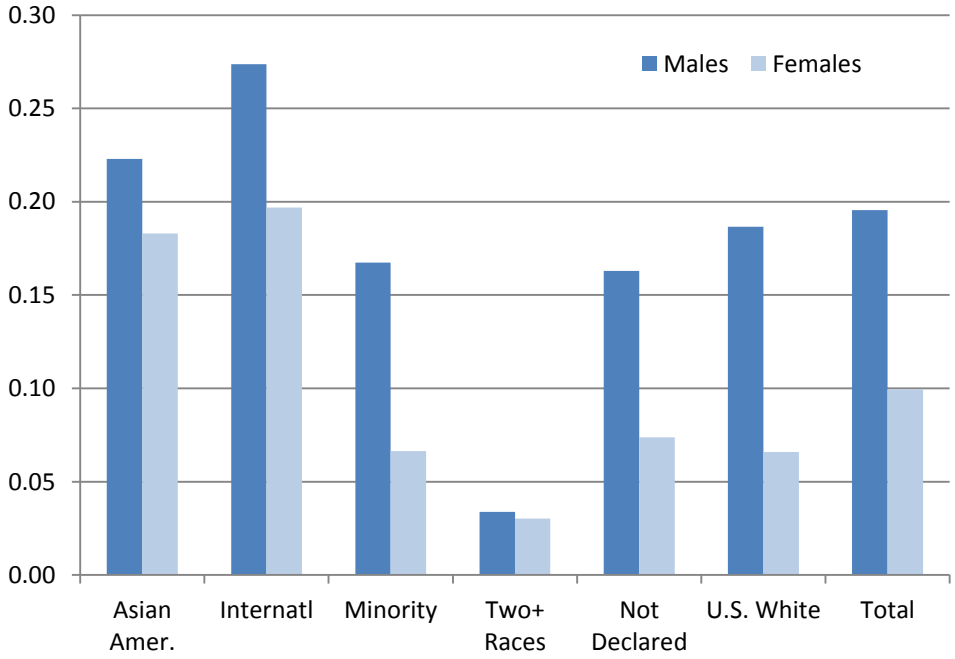
Figure 10: Majors (Other than Economics) of Students Taking Micro Intermediate Relative to All Other Adams Undergraduates



Source: Adams College administrative data.

Notes: Intermediate Theory includes both Fall semester (Micro) courses, Ec201 and Ec301. The data are the ratio of the fraction majoring in the subject conditional on taking the Ec201/Ec301 course to the fraction majoring in the subject who did not take the Ec201/Ec301 course. The Math and Applied Math group is given separately because it is considerably larger than the others.

Figure 11: Fraction Economics Majors by Race, Ethnicity, and Nativity



Source: Adams College administrative data.

Note: "Minority" is the term used by the Adams College administration and includes any underrepresented minority group. International means that the student is not a resident of the United States at the time of admission.

Table 1: Proposed Interventions for UWE Treatment Schools

Better Information	Mentoring and Role Models	Content and Presentation Style
Without accurate information about the broader application of economics (e.g., beyond finance and consulting), women are more likely to major in less rigorous fields often within the social sciences or humanities.	Women are more sensitive to their introductory course grades when choosing their major than are men. Networks among students and support for their decision to major in economics have been effective in recruiting underrepresented minorities.	On average, female undergraduates are less confident about their quantitative skills even if they are equally able and prepared. Their lack of confidence may diminish their belief that economics fits their personal strengths and abilities.
Use the *UWE-AEA Video* freshman orientation week to highlight key points about the major, including: • The many applications of economics; • The diversity of practitioners; • The range of potential careers. • Also use the video at the start of the introductory course, post it on the course website and on the department's website. Augment the material provided on your department's website or in printed pamphlets to highlight information such as: • Subfields and upper-level courses. • Various career options and course requirements for the different career tracks. • How economics relates to other fields and majors, and the high return to an economics degree. Guest speakers in lecture and other times: • Invite alumni working in diverse fields to talk about their jobs and interests. • Have talks during campus open days, e.g., freshman parents' weekend. • Guest speakers in lecture classes should include diverse faculty (gender, race and field). • Recruit faculty, from non-business/non-finance fields, who are inspirational and approachable.	Mentoring: • Increase the number of female TAs/grad students/older undergrad mentors for students in intro and intermediate courses. • Make a video of your alumni talking about their work involving economics, even if "economist" is not in their job title. • Facilitate opportunities for research and collaboration with the faculty • Help students find summer jobs that value economics, are dynamic, and include human contact. Creating student learning communities: • Encourage coffee/study breaks in the economics department lounge. • Organize student groups to create talks and conferences on diverse topics. Connect with students through social media. Faculty lunches: • Have informal lunches with professors and TAs. • Pick faculty who specialize in diverse areas of economic research (e.g., health, labor, education, environmental, econ history, behavioral, corporate finance). Student counseling: • Offer faculty counseling at midterms and other grade times (research papers, presentations, etc.). Convey that making mistakes is often part of learning economics.	Add modules and case studies to introductory and intermediate courses. Use evidence-based teaching material. • Present information through real-world examples that cover diverse subfields in economics and related disciplines. • Include study results and facts about the researchers and how they became interested in the subject. Invite the researchers to give a lecture. • Help faculty communicate more clearly and encourage more evidence-based theory courses. Support independent/group projects in sub-fields (e.g., health, education, poverty, crime, inequality, sports). • Have students interview community residents about issues in recent economics news (e.g., pay-day loans; Affordable Care Act; student debt) and how they have been affected. • Coordinate community service opportunities that apply economic concepts and tie into course material. Make sections more conducive to learning for students with different skill levels, styles of learning, and interests. • Separate sections based on students' quantitative experience, not by ability. • If sections are heavily skewed by gender, deliberately change the gender mix and collect data on grades and drop-off rates.

Table 2: Economics is Top Choice at Time of Acceptance to Adams College: 2005 to 2013 Graduating Classes

	Males	Females
(1) Total giving economics as top choice upon acceptance	1,413	686
(2) Placed out of Principles-Fall & did not take, given (1)	169	82
Placed out of Principles-Spring & did not take, given (1)	182	93
(3) Took Principles-Fall, given (1)	1,115	539
(4) Took Principles-Spring, given (1)	1,068	509
(5) Economics major, given (1)	795	348
(6) Applied math/economics track major, given (1)[a]	72	19

[a] Applied math/economics track is estimated as all applied math majors who have taken both semesters of Ec200 or Ec300.

Appendix Table 1: (Male Economics Majors/Male BAs)/(Female Economics Majors/Female BAs) for Top-100 Universities with Economics Majors, 2009 to 2011 (in descending order)

Institution	State	Control (public = 1)	Male/Female Economics Majors Relative to BAs	Male Econs /Male BAs	Fraction Business Majors
University of Connecticut	CT	1	6.879	0.088	0.136
Brigham Young University	UT	0	6.866	0.042	0.141
Michigan State University	MI	1	6.515	0.043	0.181
Florida State University	FL	1	5.884	0.046	0.217
Pepperdine University	CA	0	5.759	0.062	0.307
Indiana Univ., Bloomington	IN	1	5.303	0.034	0.200
Southern Methodist University	TX	0	5.076	0.187	0.255
University of MO-Columbia	MO	1	4.604	0.010	0.190
Johns Hopkins University	MD	0	4.589	0.076	0.018
Yeshiva University	NY	0	4.516	0.063	0.294
University of Iowa	IA	1	4.448	0.033	0.190
Miami University, Oxford	OH	1	4.420	0.018	0.252
Texas A & M University	TX	1	4.044	0.029	0.185
University of MA Amherst	MA	1	4.034	0.055	0.177
University of NC, Chapel Hill	NC	1	4.020	0.094	0.093
University of Georgia	GA	1	3.942	0.014	0.231
Ohio State University, Main	OH	1	3.871	0.036	0.169
University of WI, Madison	WI	1	3.869	0.086	0.113
Vanderbilt University	TN	0	3.661	0.176	0.000
Texas Christian University	TX	0	3.622	0.036	0.241
Clemson University	SC	1	3.533	0.036	0.208
Stony Brook University	NY	1	3.521	0.062	0.086
University of Rochester	NY	0	3.442	0.141	0.000
University of IL, Urbana	IL	1	3.314	0.054	0.130
Clark University	MA	0	3.292	0.082	0.067
University of TX, Austin	TX	1	3.287	0.064	0.121
University of CO, Boulder	CO	1	3.284	0.062	0.137
University of San Diego	CA	0	3.261	0.021	0.409
University of Pittsburgh	PA	1	3.250	0.047	0.149
Univ. of CA, Santa Barbara	CA	1	3.129	0.015	0.120
University of MD, College Park	MD	1	3.112	0.090	0.150
University of Florida	FL	1	3.055	0.035	0.137
University of Miami	FL	0	2.880	0.021	0.226
University of CA, Davis	CA	1	2.862	0.092	0.000
Boston University	MA	0	2.853	0.066	0.191
Pennsylvania State University	PA	1	2.797	0.030	0.177
University of MN, Twin Cities	MN	1	2.756	0.051	0.092
College of William and Mary	VA	1	2.729	0.080	0.147

VPI	VA	1	2.707	0.021	0.218
Brandeis University	MA	0	2.668	0.213	0.000
University of Delaware	DE	1	2.631	0.031	0.208
Washington Univ. St. Louis	MO	0	2.601	0.076	0.163
University of MI, Ann Arbor	MI	1	2.539	0.085	0.060
Emory University	GA	0	2.534	0.135	0.177
Rutgers Univ., New Brunswick	NJ	1	2.518	0.100	0.076
University of Notre Dame	IN	0	2.514	0.049	0.262
Case Western Reserve Univ.	OH	0	2.502	0.044	0.105
Syracuse University	NY	0	2.494	0.037	0.206
Wake Forest University	NC	0	2.481	0.161	0.204
Boston College	MA	0	2.444	0.119	0.242
Georgetown University	DC	0	2.440	0.072	0.240
University of CA, Irvine	CA	1	2.435	0.088	0.073
SUNY Binghamton	NY	1	2.418	0.102	0.137
Northwestern University	IL	0	2.318	0.164	0.009
Dartmouth College	NH	0	2.315	0.192	0.000
Purdue University, Main	IN	1	2.295	0.018	0.152
University of Tulsa	OK	0	2.250	0.020	0.206
Marquette University	WI	0	2.218	0.013	0.241
University of Southern CA	CA	0	2.216	0.044	0.261
Duke University	NC	0	2.129	0.155	0.000
University of Virginia	VA	1	2.113	0.090	0.092
Princeton University	NJ	0	2.072	0.129	0.000
University of Vermont	VT	1	2.059	0.047	0.103
University of WA, Seattle	WA	1	2.055	0.074	0.111
Northeastern University	MA	0	2.050	0.024	0.256
Fordham University	NY	0	1.993	0.073	0.279
Tufts University	MA	0	1.957	0.102	0.000
Yale University	CT	0	1.942	0.139	0.000
Tulane University of LA	LA	0	1.927	0.023	0.254
University of CA, San Diego	CA	1	1.890	0.105	0.052
University of CA, Santa Cruz	CA	1	1.860	0.045	0.095
Columbia University	NY	0	1.859	0.143	0.000
University of Chicago	IL	0	1.846	0.261	0.000
Harvard University	MA	0	1.833	0.180	0.000
American University	DC	0	1.809	0.040	0.156
New York University	NY	0	1.808	0.091	0.160
Cornell University	NY	0	1.781	0.064	0.135
Stanford University	CA	0	1.740	0.103	0.000
University of Pennsylvania	PA	0	1.690	0.079	0.244
Brown University	RI	0	1.643	0.129	0.048
Carnegie Mellon University	PA	0	1.504	0.043	0.101
University of CA, Berkeley	CA	1	1.469	0.078	0.046

Rice University	TX	0	1.360	0.106	0.010
University of CA, Los Angeles	CA	1	1.179	0.096	0.030
MIT	MA	0	0.742	0.033	0.062
Colorado School of Mines	CO	1	0.562	0.024	0.000

Sources: IPEDS institutional data on completions. Top-100 universities from *US News & World Report* (86 met the criteria for economics majors).

Notes: Data are averages of the underlying numbers for 2009, 2010, and 2011. Institutions with less than 0.005 of the male BAs in economics in any one year were excluded.

Appendix Table 2: (Male Econ Majors/Male BAs)/(Female Econ Majors/Female BAs) for Top- 100 (Coeducational) Liberal Arts Colleges with Economics Majors, 2009 to 2011 (in descending order)

Institution	State	Control (public = 1)	Male/Female Economics Majors Relative to BAs	Male Econs /Male BAs	Fraction Business Majors
Southwestern University	TX	0	7.157	0.081	0.126
Gustavus Adolphus College	MN	0	6.852	0.081	0.131
Washington & Jefferson Coll.	PA	0	6.279	0.068	0.269
Wofford College	SC	0	5.577	0.057	0.232
Augustana College	IL	0	5.538	0.016	0.232
Virginia Military Institute	VA	1	4.973	0.133	0.000
Kenyon College	OH	0	4.853	0.161	0.000
Washington College	MD	0	4.708	0.125	0.168
Colby College	ME	0	4.650	0.204	0.001
Skidmore College	NY	0	4.565	0.064	0.129
Earlham College	IN	0	4.565	0.056	0.059
St. Lawrence University	NY	0	4.210	0.157	0.000
Hobart & William Smith Coll.	NY	0	4.141	0.188	0.000
US Military Academy	NY	1	4.021	0.061	0.073
Wheaton College	MA	0	3.905	0.185	0.000
Kalamazoo College	MI	0	3.804	0.216	0.000
St. Mary's College of MD	MD	1	3.782	0.160	0.000
Allegheny College	PA	0	3.772	0.179	0.000
Muhlenberg College	PA	0	3.760	0.034	0.274
Union College	NY	0	3.753	0.177	0.000
St. Olaf College	MN	0	3.744	0.127	0.000
Hendrix College	AR	0	3.668	0.114	0.017
Willamette University	OR	0	3.652	0.173	0.000
Knox College	IL	0	3.475	0.128	0.000
Centre College	KY	0	3.380	0.205	0.000
Ursinus College	PA	0	3.240	0.236	0.055
Wesleyan University	CT	0	3.235	0.118	0.000
Lawrence University	WI	0	3.206	0.067	0.000
Hamilton College	NY	0	3.196	0.212	0.000
Colgate University	NY	0	3.172	0.173	0.000
Gettysburg College	PA	0	3.146	0.105	0.128
Lewis & Clark College	OR	0	3.134	0.099	0.000
Bowdoin College	ME	0	3.121	0.212	0.000
Wheaton College	IL	0	3.114	0.041	0.095
University of Richmond	VA	0	3.107	0.065	0.348
Denison University	OH	0	3.038	0.236	0.000
US Air Force Academy	CO	1	3.008	0.085	0.116
College of the Holy Cross	MA	0	2.989	0.288	0.000

Austin College	TX	0	2.950	0.104	0.142
Sewanee, Univ. of the South	TN	0	2.892	0.180	0.000
Macalester College	MN	0	2.890	0.167	0.000
College of Wooster	OH	0	2.877	0.084	0.000
Grinnell College	IA	0	2.867	0.120	0.000
Carleton College	MN	0	2.854	0.132	0.000
Dickinson College	PA	0	2.841	0.105	0.122
Franklin & Marshall College	PA	0	2.832	0.078	0.146
Furman University	SC	0	2.804	0.044	0.142
Connecticut College	CT	0	2.747	0.195	0.000
Middlebury College	VT	0	2.737	0.179	0.000
Williams College	MA	0	2.736	0.181	0.000
Illinois Wesleyan University	IL	0	2.728	0.043	0.240
Beloit College	WI	0	2.695	0.108	0.020
St. Michael's College	VT	0	2.629	0.036	0.257
DePauw University	IN	0	2.626	0.166	0.000
Trinity College	CT	0	2.601	0.222	0.000
Claremont McKenna College	CA	0	2.598	0.337	0.072
Haverford College	PA	0	2.586	0.143	0.000
Amherst College	MA	0	2.582	0.221	0.000
Bates College	ME	0	2.574	0.151	0.000
Colorado College	CO	0	2.548	0.215	0.000
Cornell College	IA	0	2.463	0.131	0.001
US Naval Academy	MD	1	2.462	0.151	0.000
Occidental College	CA	0	2.454	0.172	0.000
Vassar College	NY	0	2.394	0.116	0.000
University of Puget Sound	WA	0	2.359	0.094	0.140
Pitzer College	CA	0	2.323	0.070	0.045
Oberlin College	OH	0	2.272	0.050	0.000
Washington & Lee University	VA	0	2.271	0.114	0.263
Pomona College	CA	0	2.223	0.155	0.000
Davidson College	NC	0	2.191	0.124	0.000
Reed College	OR	0	1.989	0.058	0.000
Whitman College	WA	0	1.890	0.110	0.000
Swarthmore College	PA	0	1.777	0.172	0.000
Millsaps College	MS	0	1.745	0.025	0.262
Bucknell University	PA	0	1.744	0.154	0.143
Lafayette College	PA	0	1.669	0.232	0.000
Rhodes College	TN	0	1.568	0.107	0.102

Sources: IPEDS institutional data on completions. Top-100 liberal arts colleges from *US News & World Report* (77 met the criteria for economics majors).
Notes: Data are averages of the underlying numbers for 2009, 2010, and 2011. Institutions with less than 0.005 of the male BAs in economics in any one year were excluded.