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# The Gender Gap in Undergraduate Economics: A Scoping Review on Contributing Factors

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**Abstract.** The "women in economics" problem has become well-known within and beyond the economics profession in recent years. A greater representation of women and diversity in economics is necessary and beneficial at various levels. To explore the question of the underrepresentation of women in economics majors, this review identifies and evaluates literature exploring the factors contributing to the proportion of women majoring in economics at US colleges and universities. The contribution of this paper is to organize and clarify the existing knowledge exploring why women are underrepresented in economics at the undergraduate level. At the end of the paper, recommendations for future literature and research are made.

**Keywords:** Undergraduate Women; Economics; Gender Gap; Economic Courses.

## 1. Introduction

In the United States, at the undergraduate level, women in economics are disproportionately represented relative both to the general population and to the proportion of undergraduate students. Proceeding to the Ph.D. and professional levels, women's representation in economics remains low or steadily decreases along the "ladder." Between 1998 and 2019, roughly 30% to 35% of undergraduate economics degrees in the United States were granted to women (Lundberg and Stearns 2019). In contrast, for roughly four decades, women have consistently made up more than half of all undergraduate students (Digest of Education Statistics 2017). In 2021, female students made up 58 percent of undergraduate enrollment. (Condition of Education 2023). In 2017, women comprised 32 percent of students entering economics Ph.D. (Boustan and Langan 2019). In addition, compared to other STEM fields, women's progress in economics has seen less growth, remaining stagnant, if not slowed, over the past two decades (Meade, Starr, and Bansak 2021).

The "women in economics" problem has become well-known within and beyond the economics profession in recent years. A greater representation of women and diversity in economics is necessary and beneficial at various levels. Obtaining a more diverse group of economists has promoted the development of economics as a field, but the lack of diversity has limited the research. Further, studies have found that women economists pay attention to different topics than male economists. For example, compared to the focus of male economists, women economists concentrate more on subjects such as health and education economics. (May, Kucera, and McGarvey 2018). Gaining more women economists leads to more well-rounded, diverse decision-making that benefits society as a whole.

A growing body of literature has examined the various determinants of the persisting gender gap in economics. Beginning at the undergraduate level, students' decisions to major in economics are an essential early step toward becoming an economist and directly impact women's representation in the economic field and profession. Thus, this scoping review focuses on women's representation in undergraduate economics. Gaining a holistic understanding of these factors can contribute to seeking an explanation and potential solutions to the larger question surrounding women's representation in economics.

To explore the question of the underrepresentation of women in economics majors, this review identifies and evaluates literature exploring the factors contributing to the proportion of women majoring in economics at US colleges and universities. The contribution of this paper is to organize and clarify the existing knowledge exploring why women are underrepresented in economics at the

undergraduate level. At the end of the paper, recommendations for future literature and research are made.

Following methods denoted in a scoping review guide by Arksey and O'Malley (2015), a scoping study methodology (CITE) is used to do this work. The research is organized into three tiers: pre-course, during-course, and post-course factors. For each of the three categories, I reviewed and analyzed existing studies regarding why female undergraduate economics majors are underrepresented. In the following sections of the review, each of these factors will be addressed in turn.

## 2. Pre-course Factors

Pre-course factors are explanations that explore gender differences before students ever enter college. Examples would be differences in math preparation and students' predispositions about economics. These factors help understand the profile of students before they enter an introductory economics class and how that may affect their path of continuation and their future of majoring in economics. Also, examining pre-course factors helps gain an understanding of why fewer women choose to enter introductory economics courses.

### 2.1. Math Aptitude and Background

Many studies explore, to begin with, math aptitude as a potential deterrent for undergraduate female economics students. Studies find that women enter introductory economics with lower math aptitudes (commonly proxied by math SAT scores).

In a pioneering, widely-cited study conducted at Harvard College, researchers examined the underrepresentation of women in economics at the undergraduate level conducted at Harvard (Dynan and Rouse 1997). Researchers utilized data from students enrolled in the introductory economics course (approximately half of the student population enrolled in this course at some point) from the Harvard registrar. Students were sampled in April 1991 and 1992—shortly after they declared their majors. The study used self-reported SAT math scores affirmed by Harvard's registrar and self-assessed comfort levels to proxy students' mathematical abilities. For example, one survey question asked students to rate their comfort with graphs. Researchers found a positive relationship between higher SAT scores, higher

self-confidence, and the likelihood of taking economics courses. On average, men's SAT math scores were 26 points higher than women. Women's responses to the survey indicated less confidence than men, as students are more likely to major in a subject they believe they will do well in. However, despite finding high correlations between math ability and course choice, researchers found that math aptitude and confidence levels only accounted for a small part of women's decisions to major in economics after an introductory course, despite its influence.

Other studies found similar results— correlating a higher SAT math score to a higher likelihood of taking an introductory economics course, pursuing an intermediate economics course, and majoring in economics (Rask and Tiefenthaler 2008; Jensen and Owen 2001). Rask and Tiefenthaler (2008) utilized data—official transcripts, school records, and admissions records—from Colgate University, a private liberal arts college. The study found that students with higher SAT math scores were more likely to proceed to a higher level of economics courses; conversely, students with higher SAT verbal scores were less likely to do so—bolstering the "comparative advantage argument stating that female students may choose to major in the humanities because of their comparative advantages in the humanities. In agreement, a 2012 study on women's choices to pursue economics found that women and minorities with higher aptitudes (measured through a higher SAT/ACT score) are more likely to enroll in an introductory economics course (TLN Emerson, McGoldrick, and Mumford 2012).

Jensen and Owen's (2001) study utilized data from students taking th eir first introductory economics class across 34 liberal arts institutions in the United States to examine how instructors and

pedagogy influence students' decision to study economics beyond the first semester. The study focused not only on students' decisions to take their first economics course but also their decisions to pursue economics at higher levels. Jensen and Owen found that math background and aptitude, proxied by math SAT score, highest level of math attained, ease in interpreting tables and graphs, and absolute grades in introductory economics, explained only about 15 percent of the gender gap in undergraduate economics, which was not considered particularly influential and just accounted for a small portion of women's representation.

Contrary to Dynan and Rouse's (1997) conclusion that aptitude exerts limited impact beyond introductory economics, beyond enrollment in an introductory economics course, research has also found that lower math aptitudes may deter students from proceeding to intermediate economics. For example, Ahlstrom and Asarta (2019), in their study, found that math SAT scores have a strong positive effect on female and male students' enrollment in intermediate economics courses. Another study found that higher SAT math scores indicated that students were more likely to declare majors in economics (Bailey and Rask, 2002).

However, examining the big picture, findings have denied the influence of math aptitude as an important factor. While aptitude and math background influence students' decisions to a certain degree, it explains, at best, a small part of underrepresentation (Bayer and Rouse 2016). This conclusion agrees with the general findings of prior studies. Their conclusion agrees with that of other studies. Studies, in general, quantitatively explore and find women's worse math aptitudes as a factor and conclude that it is not an important or incredibly influential factor for the gender gap.

## 2.2. Interests and Predispositions

For pre-course factors, apart from students' math backgrounds, research has shown that students' perceived interests and predispositions are critical factors in determining future major choices for undergraduate students (Calkins and Welki 2006). Studies have found that women express less interest in and hold preconceptions about economics upon entering college. It is important to examine these predispositions as a piece of the puzzle to women's relatively lower enrollment rates in introductory economics. It is also conducive to understanding how women's impressions of the study deter them from enrolling in an introductory economics class and finding ways to encourage women to do so.

In the same study conducted at Harvard University, researchers found that women in their junior and senior years of college were twice as likely as men to report that they hadn't taken a first-year economics course because they didn't find economics interesting—indicating less interest, to begin with (Dynan and Rouse 1997). Seeking to measure students' dispositions, researchers surveyed whether students considered majoring in economics at the beginning of the school year. 69.2 percent of women responded with yes, while 77.8 percent of men did, indicating men were more likely to consider majoring in economics. Women were also morelikely to take introductory economics to satisfy a curricular requirement and less likely to be taking the course out of interest (61. 1 percent vs. 68.4 percent). These responses demonstrate that perceived interests—or ways students view economics as a subject before entering college—account for part of women's underrepresentation in economics majors.

Similar to Dynan and Rouse's study, Jensen and Owen's (2001) study also found that women entered the introductory economics course with less interest. However, Jensen and Owen also explored students' predispositions from another angle—examining the differences between students' dispositions and majors. Researchers found that 21 percent of students who intended to study economics at the beginning of the year changed their minds. Female students who entered the course with lower confidence and math ability were more likely to become discouraged during the course. On the other hand, men were more likely to become encouraged.

Studies have found a positive correlation between early exposure to economics and students' decisions to major in economics. In this case, students who took economics in high school are much

more likely to major in economics in college (Malgwi, Howe, and Burnaby 2005). Men, on average, take their first economics course significantly earlier than women. A study that drew data from an extensive database of institutions found that men were significantly more likely to have declared majors by the time of taking introductory economics (Emerson, McGoldrick, and Mumford 2012). Earlier exposure to economics for part of the gender gap.

In a study conducted at the University of Kentucky, researchers found that interest influences the gender disparity in economics (Bollinger, Hoyt, and McGoldrick 2009). Researchers distributed pre-course and post-course surveys that measure interest through two scores: economic knowledge and attitude. Through 807 surveyed students' responses, responses indicated that male students, on average, received more and earlier exposure to economics than female students. Men scored higher in both categories, positive attitude (interest) towards economics and knowledge, before taking the course, indicating women entered the course disadvantaged. However, notably, after the course, women's literacy scores, though still lower than men's by only a small margin, improved by a more significant percentage than men. However, on average, women's attitude scores decreased by a far more considerable margin after completing the course. Women's attitude scores decreased from 1.34 points lower than men's to 1.75 points lower than men's, while men's attitude scores increased. These statistics indicate that though predisposition and prior knowledge are essential, factors during the within-course stage significantly lowered women's attitude scores and prevented more women from proceeding to higher levels.

## 3. Within-Course Factors

Within-course factors include curricula, the classroom environment, gender composition, and pedagogy. These are important for understanding how the decisions are made to major in economics. It also contributes to an understanding of what, specifically in introductory economics courses, might deter students from advancing from an introductory economics course to intermediate economics, a key state of the "leaking pipeline" for women in economics.

### 3.1. Curricula and Pedagogy

Students' course experiences consist of various factors and determinants. Curricula and pedagogy are components that are crucial and can be especially influential for students' within-course experiences. Multiple studies indicate that many female students are "discouraged" by their introductory economics course experience, marked by a significant drop from enrollment in introductory economics to the next level.

While few studies have examined economics classrooms' common curricula and course material, it is found that economics curricula are often very discouraging and "unfriendly" to underrepresented and minority students—female and URM students. Studies have pointed to certain characteristics of economics courses, such as employing a heavy usage of tables and graphs in textbooks and classes, as unappealing to female students. Further, research has shown that typical economics curricula and subject matter include little representation of women, rarely mention women in the economy, and often ignore topics of interest to women—such as women's rise in the labor force (Ferber 1995).

In Ahlstrom and Asarta's study examining undergraduate women's course persistence in economics, utilizing two years of institutional records from a public land-grant university, researchers found evidence that increasing female representation in curricula can increase female students' confidence in economics. Doing so also increases their participation in economics courses (Ahlstrom and Asarta 2019). Some economists argue that regarding course material and content, including more topics related to and of interest to women and reducing the number of graphs employed in economics courses may help attract women and increase representation in economics courses (Feigenbaum 2013). However, other studies have found no relationship between covering more feminist topics in economics and its impact on female or male students (Jensen and Owen 2001).

The same sense of fit and students' belonging to a major was also emphasized by Kugler, Tinsley, and Ukhaneva (2021), who examined gendered differences between major choices. The concepts of "fit" and "belonging" for female students in economics classrooms have been echoed by another recent study at Swarthmore College. Researchers at Swarthmore College specifically inspected the classroom environment and students' experiments for female and URM students in Introduction to Economics (Bayer et al. 2020). Researchers specifically examined students' in-course experiences. The study is especially valuable for understanding students' within-course experiences. Diving into students' course experiences in Introductory Economics, researchers characterized and analyzed female and URM students' course experiences in three key categories: Relatability, Belonging, and Growth Mindset. Each of these three factors instrumentally impacted students' course experiences and, thus, their chances of continuing economics. Researchers found that curricula and course material often score low RBG values from female and URM students, especially in relatability and belonging. Researchers found that economics textbooks made students less comfortable and feel less "fit." Students' feedback illustrated that, for within-course performance, the textbooks, course material, and teaching style of the individual professor mattered significantly—the statement regarding the content the professor employed evoked a greater response than the statement in the textbook. Thus, pedagogy and teaching style should be a focus of future studies.

Within the current literature, research has closely examined the way economics courses are taught and how pedagogy influences female students and their continuation in economics. A report surveying economics courses has found that economics courses rely principally and heavily on lecturing (Watts and Schaur 2011). Further, in agreement with economics curricula, within economics lectures, subjects such as race and gender are rarely mentioned. In contrast to lecturing, approaches such as active learning have been shown to be more appealing and effective.

While literature examining pedagogy is limited, the relationship between teaching style and female enrolment is an interesting relationship to explore. Regarding teaching style, a widely-cited study exploring the relationship between professor gender and the gender gap in STEM fields found that the gender of the professor does not necessarily correlate with their teaching methods/styles (Carrell, Page, and West 2010). The study found that some male faculty members were more effective at teaching female students than male students, while some female faculty were more effective at teaching male students. Regarding the gender gap in economics, it would be helpful to examine ways or styles of teaching that attract and encourage more female students to take economics courses.

### 3.2. Classroom Climate

Classroom climate is a factor that is very influential on students' in-course experiences. The classroom climate of a course is its environment, social climate, and emotional aspects of the classroom. Importantly, the climate of the course can influence many important factors, from students' comfort to their sense of belonging to their self-perception.

In Dynan and Rouse's 1997 study at Harvard College, researchers found that female students were more likely to feel uncomfortable in their Introduction to Economics course. When the researchers surveyed students' comfort regarding asking questions in class, female students, on average, felt more uncomfortable doing so. However, researchers also concluded that data on comfort with asking questions were not statistically relevant to students' decisions to major in economics. Dynan and Rouse found that controlling for this variable did little to explain the gender gap.

At Swarthmore College, regarding classroom climate, researchers found that female and URM students felt a significantly lower level of belonging in introductory economics. For example, in responding to the statement, "I felt the professor cared about whether I was learning the material," 43. 1% of male students agreed, while 28. 1% of female and URM students agreed. Further, women and URM students were also significantly more likely to report feeling different from "typical economics students' (Bayer et al. 2020). Responding to "People like me can become economists," 41% of non-female and non-URM students agreed, while only 20.7% of female and URM students agreed.

The difference in response to this statement demonstrates female and URM students' lack of sense of "fit" and "belonging."

Much of the existing literature has yet to explore classroom climate as a significant factor. Notably, little to none of the studies have examined the classroom environment in a way that explores why many women (as shown through surveys and statistics in studies) feel much less comfortable asking questions or feeling like they can become an economist after taking their first economics class. This is a gap in the current literature.

### 3.3. Gender Composition

Another determinant of students' course experience is the gender composition of economics classrooms. Studies have reached conflicting conclusions regarding the impact of gender composition in undergraduate economics courses.

At Colgate University, researchers utilized 15 years of data covering 10,622 students derived from the university to examine the gender disparity in undergraduate economics. Interestingly, regarding the gendered effect of the classroom composition, researchers found that both female and male students were more likely to continue economics at higher levels, with a greater percentage of men in the class (Rask and Tiefenthaler 2008).

In accordance with the conclusions of Rask and Tiefenthaler's study, Emerson, McGoldrick, and Mumford, using data drawn from an expansive network of institutions, found that a 1% increase in the percentage of the male population in the class resulted in a 10% increase in female enrollment for Economics Theory—an intermediate level class that follows introductory economics (TLN Emerson, McGoldrick, and Mumford 2012). However, the study also found that a 1% increase in the male population in theory class (intermediate economics) decreased a female student's likelihood of majoring in economics by 59%. Thus, for different levels of economics, the study finds opposite forces of influence.

The gender ratio in the classroom can contribute to a student's perception of their "fit" for their major. Research has found that students feel less confident when they are less represented in a class (Kugler, Tinsley, and Ukhaneve 2021). However, in the big picture, this factor has been focused on or closely examined in most studies. More research is required to better understand the role of gender composition in the classroom environment in influencing women's decisions to major in economics.

### 3.4. Interventions

A recent study looked into a popular Harvard big data course that has been one of the sole courses in the economics department that successfully achieved a 50/50 gender ratio. (Bayer et al. 2020) Building on a report authored at Swarthmore College regarding women and URM students in economics, researchers who participated in the study (who were also professors teaching the course) focused on increasing factors of RBG (relatability, belonging, and growth mindset) for women and URM students by including more examples relevant to students' lives. Furthermore, the course and professors emphasized giving students space to ask questions—over 20% of the total class time was dedicated to responding to questions from students. The case study identified five key elements—personal connection, real-world exposure, scientific inquiry, career value, and social relevance—important to attracting diverse students.

Diversifying and adapting teaching styles and curricula may also benefit and attract more female students. Emerson, McGoldrick, and Mumford (2012) examined women's decisions to pursue undergraduate economics and found that different course and grading structures impacted female and male students differently. For example, including a warm-up activity boosted women's grades, and including a higher weighting for an end-of-year exam decreased women's grades—a significant indicator for students' continuation in economics—while men's grades remained the same. Thus, course structure and teaching style can be adapted to be better suited to women to encourage their course performance and their continuation in economics courses.

### 3.5. Role Models

The role modeling effect informs that seeing more women in economics as role models will encourage young women to do the same and pursue economics. Dynan and Rouse (1997), collecting their data from Harvard, found no role modeling effect—through its impact on the amount of women economics majors—effect through having female section leaders. Researchers examined whether having a female section leader raised students' likelihood of declaring a major in economics—a relatively straightforward way to approach effect. Though researchers noted positive effects, they were not enough to be statistically relevant to students' decisions to declare majors.

Jensen and Owen (2001), from their large multi-school sample, also found relatively weak evidence of the role-modeling effect. Female students who had a female instructor were more likely to take another economics course. However, it didn't impact female students' likelihood of declaring majors in economics. In a study utilizing data from a large public university in Ontario (Robb and Robb 1999), researchers sought to measure the effects of role modeling by observing female students' grades—an improvement in students' grades would indicate a present effect. The study found no evidence pointing towards a role modeling effect impacted by the gender of the instructor.

Bailey and Rask's 2002 study specifically investigating whether faculty in economics can be role models, their findings differed significantly from other studies. Bailey and Rask found that the role modeling effect is present in all directions. Namely, minorities and women instructors were likely to influence students; yet, role models that bore the most influence were the white male faculty. Although female and minority faculty had a relative impact on students, their impact was weak and inelastic compared to the role modeling effect of a white male faculty member.

Another widely-cited study investigates role-modeling and mentoring impacts for women economics PhDs (Neumark and Gardecki 1998). The study found no relationship between having a female dissertation chair or a higher composition of female faculty and positive impacts—measured through students' initial job placements—on female students. However, researchers discovered that a higher percentage of female faculty correlated with a shorter degree completion time for female students—indicating a positive influence.

### 3.6. Unconventional Forms of Role Modeling

A widely cited study at Southern Methodist University, a private liberal arts institution in Dallas, Texas, researchers aimed to determine the effects of role modeling in a form other than professor or advisor (Porter and Serra 2020). Researchers invited three female role models with careers not conventionally associated with the economics major to speak to undergraduate students about their careers. The talks were gender-neutral, with no specific mention of women in economics. Yet, at SMU, groups that experienced this intervention significantly improved women's participation rates in intermediate economics classes. This role modeling intervention increased women's enrollment in intermediate economics classes by 13% and increased the probability that women expressed an intention to major in economics by 7.9 percentage points—roughly doubling both measures. This study provides a valuable perspective on effective interventions involving role models and suggests that role models who dispel previous stereotypical conceptions about economics may be particularly successful.

## 4. Post-Course Factors

Post-course factors include research surrounding female students' performance in economics courses and students' responses to grades and their impact on women's continuation in economics courses.

Ahlstrom and Asarta's (2019) study drew data from a large public land grant university's institutional records from 2007 to 2015. The study found that students' grades in Introduction to Economics significantly impacted their persistence to higher levels of economics. Importantly, female and male students reacted differently to absolute and relative grades. Relative grades were a strong predictor

for women's persistence in economics—women were more likely to do well in other courses and feel more negatively toward economics grades. A study that drew data from a comprehensive set of 12 public institutions also found that female students in introductory economics courses, on average, performed worse than their male counterparts (Emerson, McGoldrick, and Mumford 2012). Researchers found that female and male students both performed worse in economics than their average GPAs; female students, on average, performed worse than their male counterparts.

Other Researchers also found that depending on a student's course performance in comparison to other course performances, it may either attract or repel students. For example, Sabot and Wakeman-Linn (1991), studying students at Williams College, found that as students' ranking in introductory economics increased relative to their grade-point-average ranks, their chances of enrolling in another economics course increased. Harvard economist Claudia Goldin (2015) also concludes, through a study conducted at private liberal arts Adams College, that an important reason why fewer women end up majoring in economics—beginning when women do not take the intermediate-level economics course is due to the fact that women do not perform well in the introductory course.

A recent study at Wellesley College used ten years of data collected at the all-women private liberal arts institution to measure how grading impacts women's decisions of majoring in economics (McEwan, Rogers, and Weerapana 2021). The findings of this study affirmed that women are grade-sensitive: negative grades hurt their pursuit of economics. However, researchers didn't find a relationship between students' grade sensitivity and having male instructors versus female instructors. Researchers also found a strong correlation between math ability and interest in the subject before entering college and performing well in the introduction of the economics course.

Some studies have experimented with course performance and grade sensitivity, seeking to increase women's continuation in economics. For example, one recent study examined possible interventions to the "leaky pipeline" by targeting the problem of women's negative response to grades by giving students positive feedback (Bedard, Dodd, and Lundberg 2021). Researchers emailed women who earned a B+ or higher in the introductory economics course—commending the student's strong performance. The intervention was designed based on the premise that women are more sensitive to feedback and sought to measure the impacts of positive feedback as an intervention. However, researchers found that this intervention did little to increase women's participation and diversity in the population in intermediate economics classes.

## 5. Suggestions

In order to increase the proportion of women in economics, this article proposes some suggestions based on previous research. First, studies should examine, more closely, students' preconceptions over economics before entering college. Looking at students' preconceptions and predispositions more closely may help future work to dispel negative preconceptions and encourage more to enroll in introductory economics. Second, it is also important to increase students' enrollment in economics courses during high school. Third, future research can delve deeper into general economics textbooks, course materials, and courses to increase women's interest in economics. Forth, Grading and course performance factors are incredibly influential for students; therefore, grading patterns should be examined in detail in future studies. Finally, studies should continue to explore various interventions. While no intervention can single-handedly solve the "women in economics" problems, interventions at pre-course, within-course, and post-course levels concerning various factors can make a significant change.

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