COSME

Committee on the situation of women in economics

Newsletter 2018: Report

Women across Subfields in Economics: Relative Performance and Beliefs

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Introduction

Women are underrepresented in economics. According to the Census Bureau's American Community Survey, women made up 35 percent of economics majors in 2016, a figure about the same as in the early 1980s (Justin Wolfers, 2018). Using data from the National Center of Education Statistics in the US, Amanda Bayer and Cecilia Rouse (2016) calculate the percentage of women with a bachelor's degree in economics in 2014 at 28.4, even lower than in STEM (science, technology, engineering and math) fields. In the UK, the Universities and Colleges Admissions Service (UCAS) cites percentages below 30 percent for female undergraduate students of economics in 2013, after a decade of decline. Not surprisingly, economists registered with the RePEc Author Service picture an average worldwide female representation in economics academia lower than 20 percent.

Why are there so few women in economics? Various reasons have been pointed out: (i) math requirements inhibit women's entry into economics; (ii) women are less interested in economics than men before attending university; (iii) women refrain from entering economics because they see it as a male-dominated field, more prone to discriminate against them, even if it corresponds to unconscious bias reflected in day-to-day interactions[1].

In a recent paper (Pilar Beneito, José E. Boscá, Javier Ferri and Manu García, 2018) we explore another explanation. We hypothesize that there may be different gender preferences for different subjects/subfields in economics, along with incomplete information and mistaken beliefs, which bias the view of economics precisely against the topics in which female students show more interest and perform better than men. Thus, the economic areas in which women

[1] In a recent study that has received great attention, Heather Sarsons (2017) documents such a bias reflected in the higher penalty for coauthoring suffered by women economists, particularly if they coauthor with men. Erin Hengel (2018) presents evidence that women's writing is held to higher standards in academic peer review publishing. The students themselves may be affected by the male stereotype. Lillian MacNell, Adam Driscoll and Andrea Hunt (2015) provide evidence that students rate online teachers higher when those teachers use a male name, regardless of their actual gender.

relatively stand out and have a comparative advantage could be the less well known to students.

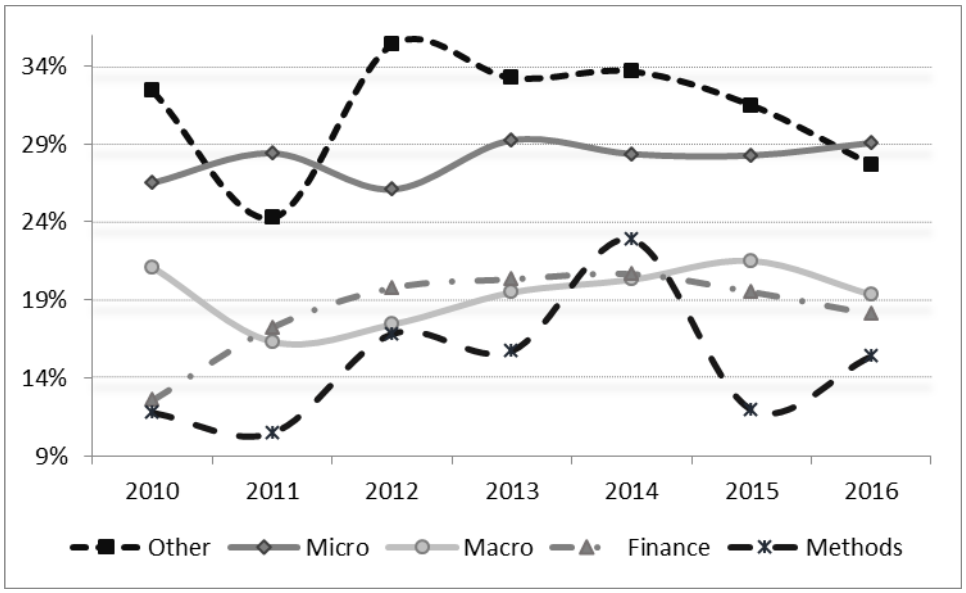
To support our hypothesis we identify the areas that are more congenial to women, both at the academic and at the undergraduate level. We provide evidence that women inclination for different subfields of the discipline is independent of general or mathematical ability. Then we explore student's beliefs about the profession and their opinions on different subjects. We conclude that women display relatively better performance and higher self-selection into microeconomics-related subjects from undergraduate level up, but that students (women and men) hold a macro-biased view of the profession.

A gender bias in the choices of research areas

To shed light on the representation of academic women across different subfields in economics, we look at the scientific programs of the annual meetings of the American Economic Association (AEA) in recent years. Our observational unit here is typically an author-paper-field-year match (hereafter, author). In order to find the author gender we use three different databases constructed on three sources: (a) the US Social Security card applications; (b) Facebook first names and self-reported gender (in Cong Tang, Ross Keith, Saxena Nitesh Saxena and Ruichuan Chen, 2011); (c) Spanish Statistical Office (INE), on the popularity of male and female first names (in Manuel Bagues and Pamela Campa, 2018). We register 22,609 authors over the whole period, of which 5,611 (24.82 percent) are female.

Figure 1, obtained by classifying paper JEL codes into five broad categories, shows a fairly stable evolution of the share of women. Additionally, we uncover a clear gap between two broad categories: one related with macro, finance and methods, which has a very low participation of female economists; and another more gender-balanced category made up of micro related topics and other fields difficult to classify. Actually, the share of women in the AEA program displays a virtually constant difference of about 10 percentage points between these two categories, which constitutes a considerable distance if we take into account the fact that the average female participation in the AEA meetings is less than 25 percent.

Figure 1: Share of women: research subfields (2010-2016)



The JEL approach might not be sufficiently fine-grained to capture the actual research topics covered in the meetings. To overcome this limitation, we dig into the paper abstracts and extract information using a machine learning algorithm. In this way, we identify a set of 21 topics (or themes) and construct a word cloud for each theme, averaging the years 2014 to 2016 for which we have information. Topics related to gender, education and health appear as the most attractive to women, with shares ranging from 48 to 32 percent of total authors (Figure 2). Conversely, at the bottom of the distribution of choices, we find themes linked with theoretical econometrics, finance and macroeconomics, where women represent less than 16 percent of the authors. These results reinforce and complement our findings with the JEL codes. In both cases, they are also fairly closely aligned with those obtained by Anusha Chari and Paul Goldsmith-Pinkham (2017) or Juan José Dolado, Florentino Felgueroso and Miguel Almunia (2012), using different methodologies and datasets.

Figure 2. Clouds of words from AEA papers' abstract (averages 2014-2016)

Our results also indicate that topics conventionally aligned with macroeconomics and finance are actually a reduced share of the total research papers presented at the AEA Meeting. This suggests that a fairly ample range of topics is covered by microeconomics oriented research, in contrast with the apparently prevalent idea among outsiders that economists essentially deal with macroeconomic and finance issues. However, the fact that microeconomic topics are

highly varied and correspond to a wide set of words complicates the task of conveying in a simple and straightforward way to those outside the academia that these topics are an essential part of economics.

A gender bias in grades at the undergraduate level

We have just showed that there is considerable gender bias in the choices of research areas, which leads to an uneven gender composition across different economic subfields. Next we provide evidence that this gender gap in tendency towards specific subfields appears earlier at the undergraduate level. To this end we use University of Valencia (UV) administrative records for economics major, from 2010-2014, in order to estimate the relative academic performance of male and female students across subfields. In our data sample, each observation refers to one student in a given course and a degree year. We have a total of 51,932 observations. All the courses are classified into the same broad categories that we used to classify research papers: macroeconomics, microeconomics, finance, methods and other.

For each subfield category we estimate a quantile regression (QR) for grades to allow the results to differ along the grades distribution. We pay especial attention to the gender effect. Among the control variables that refer to the student we include the score in the university entrance exam (the AU-score), which is a proxy for the initial or innate academic ability of the student. We also include course-effects to control for subject idiosyncratic factors, such as differences in the gender composition of teachers across courses. We undertake separate estimations for compulsory and optional subjects. In optional courses, students are more likely to self-select according to their preferences. Thus, for optional subjects we obtain QR results also controlling for selection using semi-parametric methods.

The analysis of students' performance displays the following results: (a) girls perform better than boys in micro-oriented subjects, while they perform relatively worse in macro-related subjects; (b) the correction for selection has two effects: the magnitude of the estimated coefficient for the women dummy is larger in both the micro and the macro equations, and the significance of the estimates increases; (c) in microeconomics-oriented courses, women outperform men in all three quantiles, while the differences are somewhat greater in the upper quantile, near 0.4 points; (d) in macroeconomics-oriented courses, women obtain average grades that are more than 0.5 points below the grades obtained by men in the upper quantiles, however, the estimates in the 0.25 and 0.50 quantiles, are not statistically significant, although still negative.

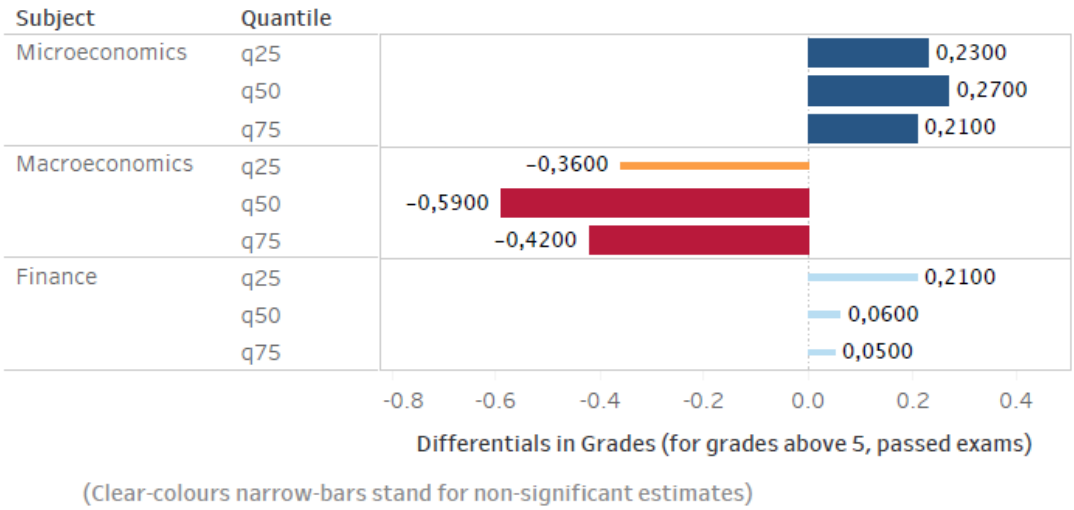
The fact that the differences are more pronounced in the upper part of the grades distribution makes the results even more relevant. The upper tail of the distribution of grades is where the level of competitiveness between students is expected to be the highest, and thus, where the natural differences, in terms of ability and preferences between men and women, if they exist, will show up more clearly. Hence, the observation that in the academia there are more men in macro-related occupations and more women in micro-related ones could well be related, at least in part, with these results.

Now, the question that naturally arises is what might be behind these differences. Is it a matter of preferences? Or, alternatively, is it a matter of ability (say, technical or analytical

ability) that is not totally captured by the AU-score? To answer these questions we repeat our estimations partialling out the effect of the student's average grade in the instrumental courses like mathematics and econometrics. Figure 3 shows the results for optional subjects after discounting such an effect. We conclude that sample differences among men and women in analytical ability, if they exist, are not able to account for the estimated gender differences in grades in macro and micro subjects.

Figure 3. Girls grades differentials vs. boys

Optional subjects, controlling for general and analytical ability



Students' self-statements, relative interests and performance

Ruled out gender differences in ability as a satisfactory explanation of the observed differences across subfields, we finally proceed to explore what students' self-statements about macro- and micro-related subjects reveal regarding their preferences and interests in these two subfields. For this purpose, a not announced anonymous questionnaire was given to students during class time with the collaboration of the teachers of the compulsory subjects of the first, second and third year of the economics degree (N=307). They were asked questions about themselves and their parents' education and jobs, following the categories in the administrative data. We also asked if economics was their first best option among all the university degrees (a variable that we call *initial vocation*).

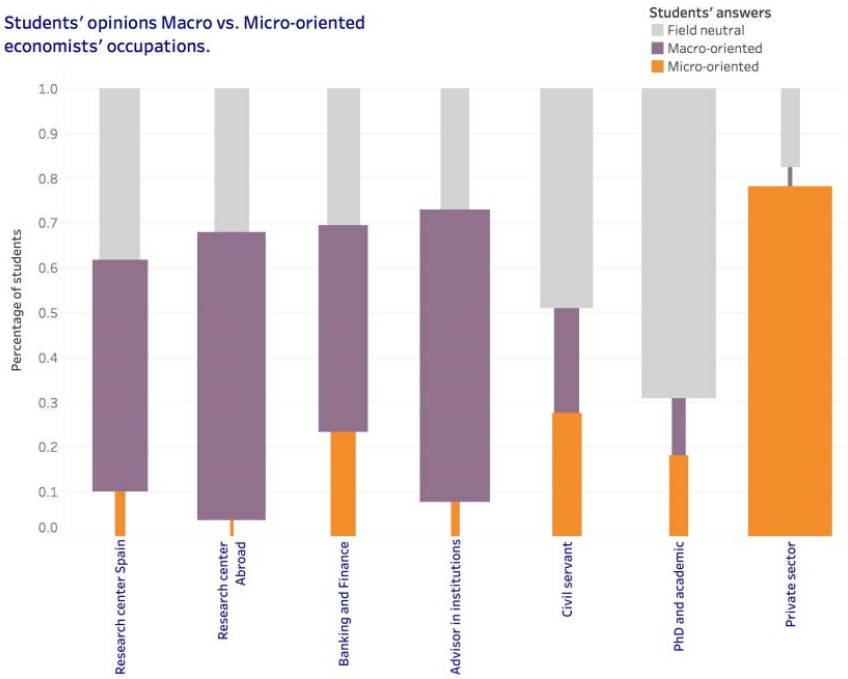
With respect to their opinions about macroeconomics and microeconomics we asked them to declare which of these two subfields they find to be more intuitive, more aligned with social problems, technically more complex, and more difficult to pass. Two additional questions in this group were of particular interest to us: first, whether students find either macro or micro a more interesting subfield than the other; and second, in which subfield they obtained better grades. They could also take a neutral position and answer 'both equally'.

As regards the students' opinion about macro vs. microeconomics, we find that: (a) women significantly find macroeconomics more technically complex and more difficult to pass than men; (b) women are more likely than men to answer that micro is more intuitive than

macroeconomics; (c) both female and male students find macroeconomics significantly more closely aligned with important problems in society, and women do not differ from men in this statement; (c) regarding which subfield is found to be more interesting, women exhibit a differential positive answer in micro and negative in macro with respect to men; (d) women also reported a worse performance in macro and better in microeconomics relative to men; (e) all the previous results are robust to controlling for students' ability and the rest of the controls.

To assess the students' beliefs about the economics profession, we presented them with a list of seven possible occupations of an economist. For each one, we asked students to report their opinion concerning two aspects: first, whether they personally associate more clearly each of these occupations either with macroeconomics or with microeconomics (or both equally); and second, whether each of these occupations is perceived as a male or a female job (or, alternatively, no gender bias). Figure 4 shows the answers for the macro vs micro oriented occupations. In general, no significant differences between girls and boys emerge here.

Figure 4. Students' opinions: macro vs. micro-oriented economists' occupations

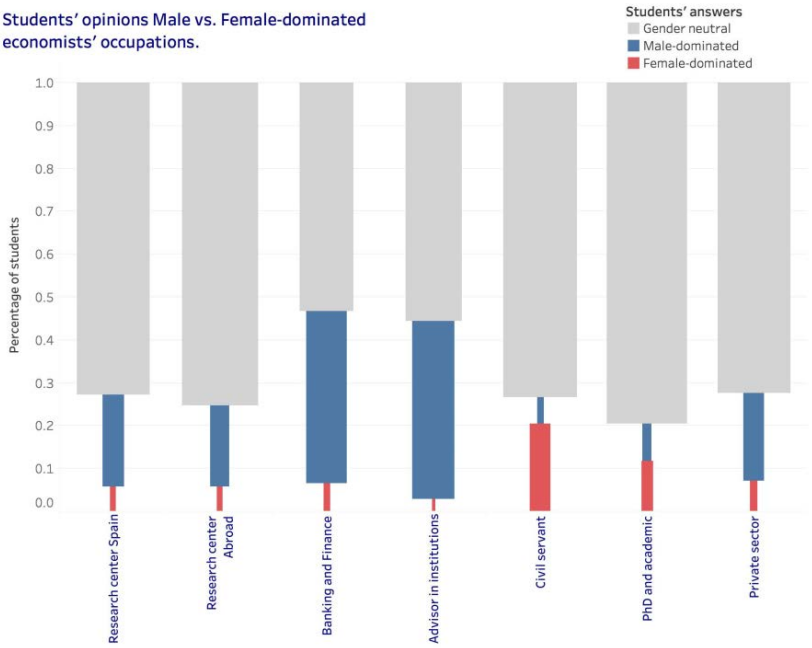


At least three concerns arise from this information. First, the economics profession is viewed as dominated by macroeconomics in most of economists' more natural occupations. Undergraduate students are not aware about the many interesting fields where microeconomists work. Second, this imperfect information is predictably much more pronounced among young students before their choice of major. Those not particularly attracted by macroeconomics (mainly girls) are very unlikely to feel attracted by economics, in part due to the lack of appropriate information as regards the many topics that microeconomics deals with. And, third, if microeconomics is particularly associated with only the private sector then it follows that business majors offer a natural alternative for those who think they will enjoy microeconomics more.

In Figure 5 we observe the students' beliefs about the gender bias of the different types of occupations. We find interesting that the two occupations less clearly associated with macro are precisely the two ones more closely associated with women. Thus, for many of our students, their overall perception of the profession seems to be one that offers greater opportunities for macroeconomists, particularly if they are men. It is difficult to see how such an environment could be attractive to women. Not only they do not belong to the dominant gender in some of the most visible occupations of the profession, but nor do they have a relative preference or a comparative advantage for the dominant subfield, macroeconomics.

The most disturbing fact, however, is that some of these established stereotypes respond to mistaken beliefs about the profession. It seems, for example, that the important role of microeconomics in providing advice to policymakers in the areas of education, health, energy, industry or labor is not clearly understood by our students. Policy advice in these areas is viewed as a task carried out by macroeconomists. The data also reveal a considerable misunderstanding of the job opportunities offered by the profession, as well as how the subfields they study in the degree translate into specific occupations in the labor market.

Figure 5. Students' opinions: male vs. female-dominated economists' occupations



We also explore how interests and grades in macro and microeconomic subjects correlate with the students' statements regarding themselves, as well as their beliefs about the profession. Regarding the interest for the subject, we find that: (a) vocational students (those choosing economics as the very first option) tend to find macroeconomics more interesting than micro; (b) women with higher AU-scores tend to show a greater preference for microeconomics than men do; and (c) the perception that microeconomics deals with important social problems matters exclusively for women.

As for the effect on grades, and after controlling for the interest in the specific subfield we obtain the following results: (a) unlike men, the higher women's AU-score is, the much less likely they are to claim a relatively better performance in macroeconomics. This result adds

further support to one of our findings using the administrative data, which reveals that the largest differences between men and women correspond to the upper tail of the grades distribution; (b) the result that women tend to outperform their male coursemates in microeconomics is basically explained by a higher interest of girls in microeconomics; and (c) the belief that the profession is male and macro-dominated has a significant and appreciable impact on the probability of a girl declaring that she obtains worse grades in macro than in micro, while it does not influence in any way the statements offered by boys.

Conclusions

The three pieces of evidence provided in this report convey the idea that there is a gender imbalance across subfields in the economics profession that is not only evident in research interests, but that begins at the undergraduate level. Different abilities do not seem to be the driving force, while gendered differences in interests and perceptions about the economist profession and the different subfields of our discipline might play an explanatory role.

We have not fully entered on the reasons why these preferences across subfields in economics differ by gender. However, our analysis suggests that the gender imbalance in economics may be connected with the imbalance across subfields: there are areas where women seem to feel relatively more comfortable, and these coincide with those that seem to be less known to our students. Our paper suggests that many microeconomics-related topics are not being effectively conveyed to young students - nor perhaps to the general public - and that correcting this misinformation (by adopting and extending projects such as CORE, for example) might be one way to make economics a more appealing discipline for women.

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