Laboratoire
de Recherche
en Gestion
& Economie

Working Paper

2020-07

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Nicolas Eber & Abel François & Laurent Weill

December 2020

Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex
http://large.em-strasbourg.eu/

IFS
Institut de Finance de Strasbourg

Gender, Age, and Attitude toward Competition[1]

Nicolas Eber[*]
EM Strasbourg Business School, University of Strasbourg

Abel François[+]
University of Lille, LEM (UMR 9221) and LIEPP Sciences Po

Laurent Weill[#]
EM Strasbourg Business School, University of Strasbourg

Abstract

A large body of literature has shown the existence of a gender gap in competitiveness and a handful of experimental works investigating the impact of age on this gap lead to inconclusive results. We propose an empirical investigation on that, which is based on survey data and complementary to experimentation. Using individual data from very large survey (European Value Study on 48 countries from 1990 to 2008), we examine how age influences the gender gap in attitude toward competition. After confirming the existence of a strongly significant gender gap, we find evidence of a gendered effect of age on attitude toward competition. Attitude toward competition has a U-shaped relation with age for men with a least-negative view around 53 years but becomes more and more positive over age for women. We therefore observe a U-shaped pattern of the gender gap with age with a minimum around 60 years. Finally, we show that the gender gap and its evolution with age are sensitive to both individual and national gender stereotypes, suggesting influences of cultural factors.

JEL Codes: J16.

Keywords: gender; competitiveness; attitude toward competition; age; gender gap.

[1] We thank the participants of seminars in LEM (University of Lille) and LaRGE (University of Strasbourg).
[*] University of Strasbourg, LaRGE, nicolas.eber@unistra.fr.
[+] University of Lille, LEM (UMR 9221), abel.francois@univ-lille.fr.
[#] University of Strasbourg, LaRGE, laurent.weill@unistra.fr.

1. Introduction

One needs explanations for the highly persistent differences in labor market outcomes of men and women, including long-lasting, though narrowing, wage gap (see Blau and Kahn, 2017, for a recent review) but also low representation of women among top positions in firms (Bertrand and Hallock, 2001). In addition to discrimination by recruiters and preferences differences for child rearing, gender differences in the attitudes toward competition have been frequently mentioned as one possible explanation for these lower labor market outcomes of women.

An important turning point was the publication of the influential book '*Women Don't Ask*' by Babcock and Laschever (2003). According to these authors, a key explanation for the persistent gender differences in labor market outcomes resides in the specific behavior of women in the workplace, especially in the bargaining of wages. More specifically, women do not ask in the sense that they negotiate less often, less toughly and finally less successfully than men.[2]

Since then, a large body of literature in experimental economics has grown on the gender gap in competitiveness (Niederle and Vesterlund, 2011, Niederle, 2016). Basically, this literature shows with laboratory experiments that men have more inclination towards competition than women, a result further confirmed by field studies (Ors et al., 2013; Flory et al., 2015). The causes of these attitude differences are of course an important, and still largely open, question; in particular, further experimental investigations have tried to disentangle the roles of biology and culture in the explanations of this gap.

While the gender gap in competitiveness is now a well-established result, a key question is the effect of age on this gap. It is a very important issue since the vast majority of experimental studies have been done on young adults while, in the workplace, a lot of competitive situations (e.g., competitions for promotions in firms' top positions) involve more mature adults. Endocrinological changes across the life span can affect competitiveness, in line with evidence that competitive behavior is affected by hormones (Apicella et al., 2011; Buser, 2012; Wozniak et al., 2014). Therefore, hormonal changes differing for men and women during life, the gender gap in competitiveness could vary with age.

[2] For example, Babcock et al. (2003) asked graduates from Carnegie-Mellon University whether they negotiate their starting salary: only 8% of women answered that they do, while 57% of men do so. Such gender differences in negotiations have been further confirmed by field data (Hernandez-Arenaz and Iriberri, 2018) and experimental research (Leibbrandt and List, 2015; Exley et al., 2020).

Surprisingly, only two studies, both using field experimental approach, have examined the effect of age on the gender gap in competitiveness. Mayr et al. (2012) find no influence of age on the gender gap while Flory et al. (2018) conclude to the disappearance of the gender gap at age 50. Therefore, literature about the age effect on the gender gap in competitiveness is inconclusive and the question deserves further investigation. As noted by Niederle (2016, p. 494), "the effects of age and work experience on competitiveness and its effect on the gender gap in competitiveness are clearly not completely resolved".

The purpose of this paper is to fill this loophole in the literature. To this end, we examine the effect of age on the gender gap in attitude toward competition (ATC thereafter) through a cross-country analysis on a broad and representative sample of individuals. We use data from the European Value Study (EVS thereafter) from 48 countries with men and women of all adult ages. Our investigation is based on the use of survey data, which distinguishes our work from many studies in the strand of literature on gender and competition. The use of survey data presents three key advantages for our research question. First, we investigate the question on a large cross-country sample, which is of major benefit as local or national culture can influence how individuals perceive competition. Second, we have respondents of all adult ages in large numbers, which is of major importance to examine finely the effect of age in terms of representativeness. Third, we have a great diversity in the characteristics of the respondents given the large number of periods and countries covered by the EVS. In a nutshell, working on large international surveys provides opportunities of refinement which is complementary to experiment settings.

The use of survey data implies that, unlike experimental studies, we do not consider behavioral competitiveness measures but rely on an ATC measure taken from the EVS. Respondents give their opinion on competition by answering the following 1-10 scale question: "How would you place your views on this scale? 1) competition is good. It stimulates people to work hard and develop new ideas; 10) competition is harmful, it brings out the worst in people". This measure captures the main aspects of the individual ATC. Recent works have shown that survey-based measures on competition preferences are highly correlated with laboratory measures of competitiveness (e.g., Bönte et al., 2017). Moreover, this measure has been commonly utilized in former works examining economic preferences (Guiso et al., 2003; Fisman and O'Neill, 2009; Pirinsky, 2013). In particular, Fortin (2005) used this measure "to capture potential gender differences in competitiveness" (p. 423) and find high positive correlations between the attitude toward competition provided by EVS and labor market outcomes (probability of being employed, probability of having a full-time job).

This supports our approach to consider the ATC measure provided by EVS as a relevant proxy for competitiveness.

Our empirical strategy is as follows. We first examine how gender and age affect ATC in our large cross-country sample. Through this analysis, we can check the presence of a gender gap in ATC, but also the nature of the relation between age and ATC. We then investigate the effect of age on the gender gap. To this end, we perform estimations of the impact of age on ATC by gender. We additionally investigate the gender gap in different cultural environments defined by gender stereotypes.

Our findings support the view that age affects the gender gap in ATC. First, we confirm the existence of a gender gap in ATC: men have a more positive view of competition than women. Second, we find a gendered effect of age on ATC. Age has a U-shaped impact for men with a minimum around 53 years, but its impact is continuously increasing for women. As a result, the gender gap in ATC has a U-shaped relation with age with a minimum around 60 years. It is however positive for all ages, meaning a more positive ATC for men whatever the considered age. Third, we show that the gendered effect of age on ATC depends on gender stereotypes, both defined at individual level and national level. According to the gender stereotype of the respondent and of the respondent's country, age impacts differently the ATC. So, the gender gap evolves differently with age depending on gender stereotypes. It suggests that a physiological determinant of competitiveness such as age can be influenced by cultural context.

Compared to the previous literature, our contribution is threefold. First, we confirm the existence of a strong gender gap in ATC. In other words, we establish that ATC is characterized by a gender gap that is similar to the gender gap highlighted in laboratory or field settings. Second, we obtain new results concerning the effect of age: while the experimental literature is inconclusive, we get a clear pattern of a U-shaped relationship between age and the gender gap in ATC thanks to a large dataset covering many countries. Besides, this result does not fit with the hypothesis or results obtained by previous studies. Third, we are able to detect a potential role for cultural factors (namely, gender stereotypes) on the gender gap in ATC.

The remainder of the paper is organized as follows. Section 2 presents the background of the research question. Section 3 develops data and methodology. Section 4 reports results for the determinants of the ATC. Section 5 presents evidence on the gendered effect of age on the ATC. Section 6 explores the influence of gender stereotypes on the gendered effect of age. Section 7 concludes.

2. Background

This section is devoted to the background for our research question. We first briefly review the main results about the gender gap in competitiveness, then we report the literature specifically devoted to the effect of age on this gender gap. We finally present the hypotheses on the gendered effect of age on attitude toward competition.

2.1. The gender gap in competitiveness

There is a fast-growing literature on the gender differences in competitiveness.[3] In a seminal paper, Gneezy et al. (2003) show that men, contrary to women, increase their effort level and their performances when the environment becomes more competitive, more precisely when the compensation system switches from a piece-rate payment scheme to a more competitive tournament payment scheme. When the level of competition increases, men improve their performances far more than women so that they finally perform better in the competitive environment while it was not the case in the non-competitive one.

Another aspect of the preference for competition by men has been shown by many experiments where subjects have to select the compensation scheme. In another seminal paper, Niederle and Vesterlund (2007) observe that men are more likely to self-select into competitive environments than women. When given the choice between the competitive tournament and the noncompetitive piece-rate compensation schemes, 73% of the male subjects choose the tournament while only 35% of the female subjects make the same choice. Moreover, this gap is not due to differences in the actual performances on the task or in risk aversion but rather to the overconfidence of men who tend to overestimate their relative abilities. According to the authors, their results show that "women shy away from competition and men embrace it". These results have been confirmed by numerous further experimental studies (e.g., Healy and Pate, 2011; Niederle et al., 2013).

Of course, these results have been obtained in the context of laboratory and the question of external validity arises. Some research tries to correlate the experimental measures of competitiveness and some real-world choices. In particular, some papers show that the

[3] For more thorough surveys, see Niederle and Vesterlund (2011) and Niederle (2016).

standard laboratory experimental measure of competitiveness from the Niederle-Vesterlund design, namely the choice by the subject to enter a tournament instead of a piece-rate payment, predicts quite well students' choice of highly competitive academic tracks (Buser et al., 2014, 2017).

Also, in order to get more external validity, some field experiments have tried to replicate the findings from the laboratory. Briefly sketched, the results obtained in the laboratory tend to be confirmed in the field. For example, Flory et al. (2015) propose a natural field experiment where 9,000 job-seekers are randomly assigned to different compensation schemes and find that, as in the laboratory, women tend to self-select into environments with lower competitive pressure. According to this field study, therefore, highly competitive 'real-world' workplaces tend actually to deter female workers. Some non-experimental studies have also been carried out to assess the robustness of the gender gap in competitiveness found by the experimental research. For example, Ors et al. (2013), who use real-world data on exams, confirm that female students perform worse in more competitive environments.

In a nutshell, the literature investigating the gender gap in competitiveness finds that men are more willing to compete than women. This well-established result mainly rests on laboratory and field experiments. An important, largely open, question deals with the reasons for these gender differences in attitudes toward competition. Two main explanations have been invoked: the biological one and the cultural one, in line with the long-lasting nature-nurture debate. Say differently, the question is to know whether women are less competitive than men from birth or become so through socialization.

The literature in evolutionary biology, whose precursor is Charles Darwin himself, argues that the differences in the cost of reproduction lead men to be more competitive than women. Indeed, whereas men, for whom the cost of reproduction is low, are inclined to compete with other men in order to mate with many partners, women incur a far larger cost that leads them to be more choosy (see, e.g., Knight, 2002).

Some experimental research seems to confirm that the differences in the attitudes toward competition are strongly rooted in the early life and could thus be for some part innate. For example, in a field study on children in Israel, Gneezy and Rustichini (2004) find that young girls are less efficient than boys in running during a sports session in school but only under competitive pressure. Further studies in other countries and/or on different tasks have not confirmed these results (e.g., Cárdenas et al., 2012; Khachatryan et al., 2015) but Sutter and Glätzle-Rützler (2015) find, with subjects from age 3 to 18, that gender differences in the willingness to compete emerge early in life and tend to persist over time.

Another strand of the literature investigates more specifically the influence of biological factors. For example, it is shown that testosterone, the main male hormone, is positively correlated with risk taking (Apicella et al., 2008; Sapienza et al., 2009) and that the progesterone, one of the main female hormones, has a negative impact on competitiveness (Buser, 2012). Furthermore, the level of competitiveness exhibited in the laboratory by the standard choice of selecting a more or less competitive environment is significantly impacted by the menstrual cycle and the intake of hormonal contraceptives (Buser, 2012; Wozniak et al., 2014). Apicella et al. (2011), however, find opposite results at least for men, since these authors find no correlation between the hormonal variables and the level of competitiveness from a sample of male subjects. Bönte et al. (2017) find that the digit ratio (2D:4D), considered as a biomarker of the prenatal exposure to testosterone and androgen, predicts quite well self-reported measures of competitiveness but not behavioral measures from laboratory experiments.

Another type of explanations for the differences in competitiveness between men and women resides in the sociocultural factors. The idea is that, for both men and women, the attitudes toward competition are shaped by culture. Some results seem to confirm the role of nurture in explaining the gender gap in competitiveness. The gap disappears for girls attending single-sex schools (Booth and Nolen, 2012) and is even reversed in matrilineal societies (Gneezy et al., 2009). Other studies try to confirm the effect of culture on the gender gap in competitiveness with mixed results: Cárdenas et al. (2012) do not observe clear differences among boys and girls in Colombia and Sweden, but both Booth et al. (2019) and Zhang (2019) find that the gap is narrower in China perhaps due to the communist culture.

2.2. The impact of age on the gender gap in competitiveness

The vast majority of research on the gender gap in competitiveness relies on lab or field experiments involving young adults (typically, undergraduate students). Yet, in the workplace, a lot of competitive situations involve more mature adults. For example, in their paper on the gender gap in achieving top positions in firms, Bertrand and Hallock (2001) report, in their sample of managers, an average age of 52.6 years for men and 47.5 years for women. Curiously, however, relatively few papers investigate the impact of age on the gender gap in competitiveness. Does the gap decrease or increase across the life span? The few research works devoted to this question lead to ambiguous results.

Mayr et al. (2012) use a field experimental approach on a sample of 543 US individuals. They find an inverted U relationship, both for men and women, with a peak around age 50. In other words, they conclude that the gender gap remains unchanged with age. They argue that their findings are striking because some theories on life-span changes in preferences suggest instead a gradual decline of competitiveness with age. They conjecture that their result of a mid-life peak both for men and women could come from the evolution across age of some personality traits, especially that of social dominance that seems to increase gradually from early adulthood to age 50 (Roberts et al., 2006).

Flory et al. (2018) adopt a field experiment based on the classical Nierdele-Vesterlund design on two distinct populations: 700 people from rural Malawi and 84 people from urban US population. They conclude that the gender gap in competitiveness disappears at age 50 because women over this age become as competitive as men. More precisely, the level of competitiveness does not significantly change with age for men but exhibits an increase at age 50 for women, making the gender gap completely disappear at age 50. The main explanation for this result deals with the argument of menopause occurring around this age of 50.

They refer to evolutionary and hormonally arguments to explain why women may tend to become less competition averse after the childbearing period, thus around the period of menopause. As explained above, the literature in evolutionary biology emphasizes the differences in the cost of reproduction as a main reason why men are more competitive than women. Then, a plausible conjecture is that this effect of a lower competitiveness of women coming from the reproductive costs tends to dissipate after menopause. The other argument, compatible with the evolutionary one, deals with hormones mechanisms. Some studies show that the gender gap in competitiveness appears at the age of puberty (Andersen et al., 2013). Yet, puberty and menopause are two periods of sharp hormonal changes. Hence, hormonal changes may be the major reasons for both the decline in competitiveness among women compared with men at adolescence and a "catching-up" at the age of menopause. Concerning the last effect, Flory et al. (2018) invoke the hormone cortisole whose levels tend to rise with menopause and appear to be positively correlated with women's competitiveness (Buser et al., 2017; Zhong et al., 2018).

To sum it up, the results of the literature about the age effect are mixed, even if it supports the view that age influences competitiveness and can thus affect the gender gap in competitiveness.

2.3. Extensions to the relationships between ATC, gender and age

Following the arguments and results of the literature, we can extract the four competing hypotheses for the gendered effect of age on ATC. Then, these hypotheses have to be deemed according to the cultural context.

As our purpose is to take benefit from large survey to investigate the relationship between age and competitiveness, we must shift our subject from competitiveness to ATC that is measured within such survey. The measure of competitiveness from the EVS is not a behavioral trait but it probably captures the main aspects of the individual attitude toward competition. Recent research shows that survey measures often correlate quite well with laboratory measures of competitiveness (e.g., Bönte et al., 2017). Furthermore, several works have similarly interpreted the answer to the EVS question about competition as a measure of competitiveness. This question has been commonly used in the literature to investigate economic attitudes. Guiso et al. (2003) used the same question as one of their measures of "attitudes toward the market" in their study of the influence of religion on economic attitudes. Fisman and O'Neill (2009) also used the same question as a measure of competitiveness in their study of the gender differences in beliefs on the returns to effort, as well as Pirinsky (2013) in his study of the link between confidence and economic attitudes, and Barrios (2015) examining the relation between happiness and attitude toward competition. In particular, and as mentioned above, Fortin (2005) used this measure "to capture potential gender differences in competitiveness" (p. 423) in her study based on the World Values Survey and the EVS. We interpret her findings of a good correlation between the EVS measure of ATC and labor market outcomes (probability of being employed, probability of having a full-time job) as an indicator that the measure in question can be relevantly used as a proxy for competition preferences.

Assuming that ATC measures competition preferences, we are able to sum up the literature through four main hypotheses about the relationship between age and ATC and the corresponding gender gap. We graphically present the four competing hypotheses in Figure 1.

FIGURE 1

The first hypothesis (H1), called the gradual decline hypothesis, states that the ATC should gradually become more and more negative with age both for men and women, leaving the gender gap unchanged. The theories of life-span changes in preferences suggest a gradual

decline with age of the willingness to compete. Indeed, there is some evidence that confidence, motivation and goals tend to decline with age, and this could be the main reason for a decline of the competitiveness across the life span.

The second hypothesis (H2), the mid-life peak hypothesis, establishes that competition is perceived more and more positively from early adulthood to age 50 and then is perceived gradually more and more negatively both for men and women, once again leaving the gender gap unchanged. This hypothesis is motivated by the observation that some personality traits (e.g., social dominance motivation) increase gradually from young adulthood to the fifties (Roberts et al., 2006). This mid-life peak assumption corresponds to the inverted U relationship (without impact of age on the gender gap) found by Mayr et al. (2012).

The third hypothesis (H3) is related to the menopause assumption and states that attitude toward competition for women should become suddenly more positive at the age of menopause, contributing to strongly reduce the gender gap around age 50. This is the assumption defended by Flory et al. (2018) with empirical evidence and arguments based on evolution and hormones mechanisms.

The fourth hypothesis (H4) is based on a hormonal assumption. It states that i) the ATC should be gradually more and more negative with age for men, and ii) women experience three periods: a slightly more favorable ATC with age under 35 years old, then a stronger improvement between 35 and 50 years old, and no more improvement with age after 50 years. The two gendered patterns contribute to reduce the gender gap with age. This hypothesis also deals with hormones but focuses on testosterone. It is motivated by the findings that testosterone promotes competitiveness (Eisenegger et al., 2017) while for women progesterone hampers competitiveness (Buser, 2012). Yet, biological research clearly shows a gradual decline with age of testosterone in men and a decline of progesterone in women with a very sharp drop (75% reduction) between age 35 and 50. Hence, the hypothesis is based on the positive relation for testosterone and the negative relation for progesterone with competitiveness.

Among these four assumptions, we do not have any prime hypothesis and our purpose is to know which one fits better with our measure of ATC. In other words, we organize a horse race between these hypotheses.

Beyond, all these assumptions focus on the biological explanations of the competitiveness level and the corresponding gender gap. Of course, it is possible that cultural effects may interfere with the biological factors. That is why it is important to check if the relationship between ATC and age is unchanged according to the cultural context of

individuals. If culture has no impact on the relation between competitiveness and age, it may suggest that the biological factors evoked above are actually the main candidates for explaining this relation. Hence, we additionally test the ancillary hypothesis (H5). It states that if culture matters, the effect of age on the ATC for men and women should be different according to the cultural context. We do not have precise expectations (direction or magnitude) about the influence of culture on the relationship. All we question is the existence and the stability of such a relationship.

3. Data and methodology

In this section, we present our empirical study in three stages. Firstly, we describe the measure of the attitude toward competition. Second, we present a first descriptive insight of the gender gap in ATC. Lastly, we present our empirical strategy to gauge the gender gap and the effect of age.

3.1. The measure of the attitude toward competition (ATC)

To scrutinize the gender gap in competitiveness, we study the ATC as measured by the European Value Study. To measure competition view, the survey uses a 1-10 scale question where the respondent has to give his opinion on the effects of competition. The question is worded as follows: "How would you place your views on this scale? 1) competition is good. It stimulates people to work hard and develop new ideas; 10) competition is harmful, it brings out the worst in people". We reverse the scale in order to facilitate the comments, so that a response of 10 indicates a more positive ATC while a response of 1 means a negative ATC.

The question has been asked in three waves of the survey[4] and once, two or three times in most European countries and very few other countries (including the US), which leads to a sample of 48 countries.[5] So our large set of countries limits the influence of local or country-specific cultural factors. Finally, 139,382 people are included into our sample given

[4] 1990-1993, 1998-2001, and 2008-2010.

[5] Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Netherlands, Northern Ireland, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and USA. The detailed description of observations per country and EVS wave is given in Section A1 of the Appendix.

the availability of various studied variables. As we decided to keep both the 'refuse' and 'do not know' responses as particular items of our categorical explanatory variables, the loss of observations is very limited.

3.2. Some descriptive insights of the gender gap in ATC

Out of our respondent sample, there are 64,599 men and 74,783 women and their respective perception of competition is divergent. The average of the competition rate is 7.32 for men and 7.02 for women over time and nations.[6] Put differently, men's rate is 4 percent more positive than women's rate, or the average gender gap in competitiveness, measured through opinion, is 4%. Like in lab experiment settings, we thus observe a significant gender gap in ATC using large international surveys and with competition preferences measured by a very simple question.

Figure 2 shows that the difference between men and women comes primarily from the highest rates. The proportion of women is dominant up to rate 7, while above this rate the proportion of men is higher. The largest differences stand at rate 6, where women are more numerous, and rate 10, where men are more numerous.

FIGURE 2

Over time, according to the EVS wave, we still observe a gender gap in competition rate (Figure 3). Even if the ATC becomes less and less positive over time,[7] the gender gap is stable. Or at least, it is not possible to underline a pattern in the gender gap. The difference in competition rate averages according to respondent's gender is 0.28 at the oldest wave, 0.33 at the intermediate and 0.26 at the most recent one.

FIGURE 3

Over countries, we logically observe more differences. The general ATC varies over the nations scrutinized (Figure 4). Azerbaijan is the nation with the most negative opinion of competition, and Romania with the most positive. Beyond these average differences of level, we observe a difference between men and women in all countries studied. In almost every

[6] The men's mean is significantly different from the women's mean at 0.00001%.
[7] This observation pleads to include a time effect into the regressions.

country, the rate given by men is higher than that given by women. Sometimes, the gender gap is small, like in Azerbaijan or in France, sometimes it is large, like in Sweden or Norway. In a first look, we do not remark any clear relationship between general characteristics of nations and the magnitude of the gender gap. It is either small or large in countries with established free-market economy or in countries formerly with a communist regime. It is either small or large in nations with gender egalitarianism tradition or in nations with catholic tradition, etc.

FIGURE 4

So, even if we observe at a first glance a general gender gap in each wave and country studied, this gender gap may vary. Yet, we have to be sure that the gender gap holds in multivariate analysis and to investigate the gendered relationship between age and competition perception in accordance with the hypotheses highlighted previously.

3.3. Estimation strategy and method

Our econometric strategy is threefold. First, we assess the presence of the gender gap in ATC –measured by the question presented above– by running the model on the full sample, i.e. men and women together. The gender gap is thus estimated by the coefficient associated to the dummy gender variable *Female*. This first stage tests the existence of a gender gap in ATC as observed in competitiveness by the experimental literature. It also informs us about the influence of age on ATC, independently from gender.

In a second step, we apply our model on two gender-based subsamples: men versus women. The purpose is to know if age plays a similar role in ATC for men and women. More precisely, it enables us to test the various hypotheses (H1 to H4) detailed above and deduced from the literature survey.

As summed up previously, the literature-deduced hypotheses establish various possible relationships between competitiveness and age with potential differences between male and female. We consider the multiple potential relationships by testing three functional forms between competition rate and age: linear, log transformation of age and a quadratic transformation. We do it for each specification or sub-sample of respondents and present the results either in the main text or in the Appendix.

Beyond, a quadratic relationship needs more specific empirical tests to make us confident about its existence. To achieve it, we perform three usual tests each time we implement a quadratic relationship. First, the test proposed by Lind and Mehlum (2010) relies on two necessary conditions, namely that the second derivative has the right sign and that the extremum point is within the data range. Second, we use the Fieller's (1954) method to estimate the 95% confidence interval of the estimated extreme point –a maximum or a minimum according to the shape– of the relationship to be sure that it belongs to the range of the variable values. In a third test, we split the sample in two sets according to the extreme value of the relationship: the observations below the extreme value and those above. For each subsample, we estimate our linear model to check if the estimated coefficients have the same signs as those obtained in the overall sample. If the estimated relationship passes all the three tests, we are confident on the existence of a quadratic form.

In the third and last stage of our econometric strategy, we test our last hypothesis H5, questioning the impact of age on ATC in regards with respondent's gender and according to the cultural context. More precisely, we assess the relationship between age and ATC in two opposite contexts: one with low gender stereotypes and another with high gender stereotypes. To do it, we distinguish two sorts of gender stereotype: individual stereotype and collective one. First of all, we separate respondents according to their own gender stereotype and apply our empirical model by distinguishing men and women and estimating the impact of age. Secondly, we follow the same process, but we discriminate respondents according to the average level of gender stereotype in their country instead. Following this strategy, we are able to test differentiated impacts of age for men and women according to stereotypes. It provides first investigations about the effect of cultural context on ATC.

As estimation method, we use OLS with correction of the standard errors that are clustered by countries to reduce the influence on error terms of unobserved heterogeneity related to respondents' country. Even if the explained variable is an ordered categorical variable –but with a large scale from 1 to 10–, this choice of OLS estimates has huge advantages. OLS model is useful to gauge non-linear relationship since the estimated coefficients obtained through *logit* model and likelihood maximum method are not meaningful. We also estimate an ordered *logit* model as a robustness check; we comment it in the main text and display the detailed outcomes in the Appendix.

Finally, we include usual control variables: income, education, work status, religiosity, and family characteristics (to live with someone, and to have at least one child). All variables are described in Section A2 of the Appendix. Moreover, we add into our specification a fixed

effect by country and a fixed effect by EVS wave to capture invariant unobservable factors related to national effects and survey period. As a result, our empirical model explains ATC measured with the rate (from 1 to 10) given by each respondent '*i*' living in country '*j*' during the '*t*' EVS wave as follows:

$$Competition_{i,j,t} = \alpha Female_i + \beta Age_i + \lambda \boldsymbol{X}_{i,j,t} + \mu_j + \gamma_t + \varepsilon_{i,j,t},$$

where the *Competition* variable corresponds to the competition rate, α measures the gender gap in ATC –and we expect that $\hat{\alpha}<0$ because $Female_i$ takes the value of one for female respondents–, Age_i the age of the respondent,[8] $\boldsymbol{X}_{i,j,t}$ a vector of variables describing the respondent's characteristics, μ_j country fixed effects, γ_t EVS wave fixed effects and $\varepsilon_{i,j,t}$ the error term that is assumed identically and independently distributed. Beyond his gender and age, the respondent's characteristics are his income level in 4 categories, his work status in 9 categories, a binary variable indicating if he lives with someone and another if he has at least one child, and lastly his religiosity.[9]

4. First results on the gender gap in ATC and its U-shaped relationship with age

Our investigation starts with the analysis of the determinants of ATC. We want to explore the presence of a gender gap in ATC in our large cross-country sample. We also examine the nature of the relation between age and ATC.

In Table 1, we report the estimations of the three functional forms: the linear specification with *Age* alone, the logarithmic specification with *Log (Age)*, and the quadratic specification with *Age* and *Age²*. Two main conclusions emerge.

TABLE 1

The first key result is the gender gap in ATC: we observe that *Female* is significantly negative in all estimations. More precisely, men have a more positive ATC than women, in line with former literature. In terms of economic significance, women have an ATC which is lower by 0.26 point in all estimations, all other things being constant. For example, the

[8] For the quadratic relationship, our specification is $\beta_0 + \beta_1 Age + \beta_2 Age^2$.
[9] See Section A2 of the Appendix for the definition and presentation of the variables.

computation of the predicted ATC for each gender with the third specification yields a value of 7.30 for men to be compared with 7.04 for women. In other words, men rate competition 4% more positively than women.

We can question the persistence of this gender gap in ATC across time and space. To this end, we perform additional estimations. First, we redo the estimations by considering separately the three waves of EVS, so that we can analyze the evolution of the gender gap from the beginning of the 1990s to the end of the 2000s.[10] We find a significantly negative coefficient for *Female* in all three waves, with a coefficient ranging between -0.27 and -0.28. Therefore, we can conclude that gender differences in ATC are stable over time. Second, we perform the estimations by considering separately respondents of each country of the sample.[11] We observe that the gender gap is very stable over the countries since *Female* is negative in all but three countries (Georgia, Kosovo, Macedonia, where the coefficient is positive but not significant) and significant in the vast majority of them. More accurately, the coefficient is significant in two thirds of countries of our sample. This finding is of importance since the gender gap tends to be observed whatever the country with local variation in terms of significance and magnitude.

The second key result deals with age. We find no significant coefficient for *Age* in the first specification and for *Log (Age)* in the second specification. However, *Age* is significantly negative and *Age²* is significantly positive in the third specification. Hence, these results suggest a U-shaped relation between age and ATC. This finding is of prime importance for our study. We thus perform three additional tests to check the relevance of this conclusion. These tests are displayed in Table 2.

TABLE 2

First, the application of the test from Lind and Mehlum (2010) to our quadratic specification of age leads to estimate

$$Competition_{i,j,t} = \beta_0 + \beta_1 Age_i + \beta_2 Age^2{}_i + \lambda \boldsymbol{X}_{i,j,t} + \mu_j + \gamma_t + \varepsilon_{i,j,t}$$

So, showing that the slope $\beta_1 + 2\beta_2 Age_{min}$ is positive and the slope $\beta_1 + 2\beta_2 Age_{max}$ is negative, where Age_{min} and Age_{max} are respectively the minimum and the maximum values, is equivalent to test the joint hypotheses as follows

$$H_A : (\beta_1 + 2\beta_2 Age_{min} \leq 0) \cup (\beta_1 + 2\beta_2 Age_{max} \geq 0)$$

[10] The results are reported in Table A3.1 of the Appendix.
[11] The results are reported in Table A3.2 of the Appendix.

vs

$$H_B : (\beta_1 + 2\beta_2 Age_{min} > 0) \cap (\beta_1 + 2\beta_2 Age_{max} < 0)$$

We perform this test and obtain conclusive results confirming the U-shaped form of the relationship between age and ATC.

Second, we apply the Fieller's (1954) method to estimate the 95% interval of the estimated minimum to ensure ourselves that it belongs to the range of the variable values (from 15 to 108 years). The estimated point is 44.15 and the Fieller's interval is 35.15 and 50.64. So, even with a 95% confidence interval, the age for the minimum competition rate is still between the two bounds of the variable, meaning that the extreme point is actually comprised into our sample.

Third, we split our sample in two subsamples: the first contains all the observations for which the age is under the minimum, namely respondents younger than 44.1 years, and the second all the respondents older than 44.1 years. Our purpose is to check that coefficients for age have the right sign in each sub-part of the sample. For the first subsample, we expect a significant and negative sign, while for the second subsample we expect a significant and positive sign. The estimation shows that the two coefficients have expected signs and are strongly significant.

To summarize, the three tests confirm the U-shaped relation between age and ATC. We illustrate this relation in Figure 5 which depicts the nonlinear impact of age on predicted ATC from our model with quadratic functional form. We note that the minimum predicted competition rate is reached at 44.1 years.

FIGURE 5

In analyzing the other variables, we note that income and education are positively associated with ATC, in line with the intuition that economic success favors a positive attitude toward competition. Interestingly, the variables dealing with the personal situation are also significant: living with someone and having at least one child favor a positive ATC.

As a robustness check of our results, we run an ordered logit model as an alternative method. This model estimates the impact of explanatory variables on the probability of climbing the scale of competition rate.

We aim at checking whether our results for the influence of gender and age on the attitude toward competition stand with an alternative method of estimation. As detailed in Section A4.1 of the Appendix, for the three functional forms of the variable *Age*, we obtain

the same findings as in the main estimations with the OLS model, when we employ an ordered *logit* model instead. First, we observe again a gender gap in ATC with the significantly negative coefficient for *Female* in all estimations. Second, we obtain evidence for the U-shaped relation between age and ATC. While *Age* and *Log (Age)* are not significant in the two first specifications, *Age* is significantly negative and *Age²* is significantly positive in the third specification. Thus, our key findings about the determinants of attitude toward competition are confirmed with the use of the ordered logit model. There is a gender gap in ATC, women perceiving less positively competition than men, and there is a U-shaped relationship between ATC and respondent's age.

5. Is there a gendered effect of age on competitiveness?

In this section, we question the stability of the relationship between age and ATC in regard with the gender of the respondents.

5.1. A gendered effect of age on ATC

We investigate how age influences the gender gap in ATC. To compare the impact of age for each gender, we perform separate regressions for men and for women. We adopt separate regressions by gender rather than one unique regression with interactive variables for the full sample for three reasons. First of all, separate regressions enable us to analyze the evolution by gender of the ATC with age. Including an interaction term between gender and age in the estimations would only inform about how the gender gap evolves with age. Our empirical strategy enables us to analyze the evolution of the gender gap with age, but also to examine how ATC changes with age for each gender. Second, the other variables can also vary by gender, which means that a regression on the full sample would require interaction terms between the variable *Female* and all other variables than age. However, such an approach would make more difficult the readability of the interaction term between age and gender, because other interaction terms with gender would be correlated with it. Third, we have a very large number of observations allowing separate regressions.

Table 3 reports the estimations. We use again the three functional forms (linear, logarithmic, and quadratic) for age to check to what extent age influences ATC.

TABLE 3

The key finding is the gendered effect of age on ATC. We find evidence that age has a different influence for men and women. With the linear and the logarithmic functional forms, we observe that age has a significantly negative impact for men and a significantly positive impact for women. *Age* and *Log (Age)* are always significant; however, they are negative for men and positive for women. With the quadratic functional form, we again confirm the positive impact of age on ATC for women: we find no significant coefficient for *Age* but a significantly positive one for Age^2. However, we find support for a U-shaped relation between age and ATC for men: the coefficients are significantly negative for *Age* and significantly positive for Age^2. Our results thus show that age favors ATC for women, while it exerts a nonlinear effect on ATC for men with a U-shaped form.

We must however perform additional tests as before to confirm the U-shaped form for the relationship between age and ATC for men. These tests are reported in Table 4. First, the test from Lind and Mehlum (2010) confirms the U-shaped form of the relationship between age and ATC for men. Second, the Fieller's method shows an estimated minimum of 52.91 for men with a 95% Fieller interval between 47.16 and 59.57. Third, we split our sample in two subsamples: the first contains all the observations for which the age is under the minimum (52.9 years), and the second all the observations with an age older than this minimum. As expected, we find that the coefficient for *Age* is significantly negative for the first subsample and significantly positive for the second subsample. Consequently, the three tests confirm the U-shaped relation between age and ATC for men. By contrast, the tests provided for the subsample of women respondents conclude to the absence of a quadratic relationship.

TABLE 4

Therefore, ATC has a U-shaped form with age for men, but becomes more positive with age for women. This clear result shows a gendered effect of age on ATC, which has several implications. First, the U-shaped relation between age and ATC we found for the entire population (Table 1) is explained by the U-shaped relation observed for men only. Second, the analysis of the gender gap in ATC should not be done without taking age into account. Since age influences the gender gap in ATC, any finding on the gender gap in

competitiveness can be driven by the average age of respondents in the sample used for the study. Third and foremost, these findings lead to a U-shaped form for the gender gap with age.

5.2. A non-linear gender gap in ATC over age

The gender gap is reducing with age as long as ATC becomes less positive with age for men since in the meantime ATC becomes more positive for women. But once the ATC increases with age for men (over 53 years), the gender gap is first reducing slower and then is increasing once the increase of ATC for men becomes higher than the one for women.

We can represent the gender gap in ATC over age based on our findings. For women, our investigation has shown that the quadratic functional form is not the most relevant one, given the non-significant coefficient for *Age* and the tests detailed in Table 4. We adopt the linear functional form rather than the logarithmic one, since the coefficient of *Age* is more significant in the former. For men, we obviously adopt the U-shaped relationship and, hence, the quadratic functional form.

Figure 6 depicts the evolution of the predicted ATC with age. As expected, ATC increases with age for women, while it has a U-shaped form for men with a minimum around 53 years. So, the gender gap in ATC is a U-shaped curve with a minimal value around 60 years. Therefore, the gender gap in ATC is not constant over age and reaches a minimum for 60-year old people.

FIGURE 6

How to explain our findings? We can turn to the four hypotheses derived from the literature. Our results reject the gradual decline assumption (hypothesis H1) since we do not observe such decline with age of ATC. They are also at odds with the mid-life peak assumption (hypothesis H2) supported by Mayr et al. (2012) in the absence of an inverted U relation for both genders. We also reject the menopause assumption (hypothesis H3). While Flory et al. (2018) argue that ATC of women relative to men should be reduced after menopause, we do not observe a major change in ATC for women around age 50.

Our results loosely support the hormonal assumption (hypothesis H4), at least partly. For men, hormonal reasons rely on the influence of testosterone on competitiveness (Eisenegger et al., 2017). Since there is a gradual decline with age of testosterone after the age

of 25, we should then observe a gradual reduction of ATC with age. This prediction is however at odds with our finding of a U-shaped form with a minimal value at 53. In other words, hormonal reasons can rationalize part of the general pattern, but do not provide a complete explanation for our findings for men. They can explain the reduction of ATC with age until 53 but fail to elucidate the increase of ATC when men become older.

For women, biological explanations related to hormones are based on the negative relation between progesterone and competitiveness (Buser, 2012). The sharp reduction of progesterone between 35 and 50 hence suggests increased ATC during that period. We do observe this evolution; however, hormonal reasons cannot explain why the increase continues over age 50.

In a nutshell, our key finding of a U-shaped relation between age and the gender gap in ATC is not fully explained by any of the four hypotheses provided by the previous literature. Moreover, our findings do not confirm previous empirical results based on experiments. The contrast between our results and those from former works might come from the fact that our investigation is performed on a large cross-country sample which contains large quantity of respondents in terms of age. Obviously, further investigations, especially with experimental methods, are needed to assess the validity of our results.

5.3. Additional comments

While our analysis is focused on the gendered effect of age, it is noteworthy to check whether we observe gendered differences for the additional determinants of ATC. To this end, we comment the results for the other explaining variables in Table 3. We find mostly similar results for men and women. We notably observe the same positive association between income and ATC for both genders. Interestingly, we point out however two differences. First, education is only associated with higher ATC for women. It is not significantly related to ATC for men. Second, the variables dealing with the personal situation matter more for ATC of men than of women. Having at least one child is only significantly positive for men, and the statistical and economic significance of the positive coefficient for living with someone is higher for men.

For robustness sake, we perform estimations with an ordered logit model. We have adopted an OLS model even if our dependent variable is an ordered polynomial one. This specification was notably motivated by the interpretation of the non-linear relationship. We

can however question whether the choice of this model has an impact on our findings. That is why we run an ordered logit model as an alternative method.

The results are detailed in Section A4.2 of the Appendix. We observe that results are similar to our findings in the main estimations with the OLS model. We find again evidence of the gendered effect of age on ATC. The linear and logarithmic specifications show that age exerts significant effects which are respectively negative for men and positive for women. With the quadratic specification, there is again evidence of a U-shaped relation between age and ATC for men and confirmation of the positive relation for women. Namely *Age* is significantly negative for men but not significant for women, while Age^2 is significantly positive for both genders.

Hence, the main conclusion about estimations performed with the ordered logit model is that they corroborate the findings obtained with the OLS model and thus strengthen the robustness of our conclusions.

6. The influence of gender stereotypes

Our findings suggest that the gendered effect of age on ATC is at best only partly explained by biological factors. Complementarily, we then turn to cultural influence on the impact of age. We tackle the question whether culture may have an impact on the evolution of ATC of men and women over age.

One key cultural factor which affects the gender differences is the existence of gender stereotypes. Bordalo et al. (2019) have recently shown that gender stereotypes contribute to gender gaps by shaping the beliefs of individuals. That is why we investigate the influence of gender stereotypes rather than other values.

To do it, we propose two measures of stereotypes: one defined at the individual level, the second at the nation level. Indeed, the influence of stereotypes can occur at the individual level through personal values, beliefs, and opinions, but also at the country level through the values of the society and its norms. Then, we use these measures to distinguish four sub-samples (according to the respondent's gender and stereotype) on which we apply our empirical model explaining ATC.

6.1. Measurement of gender stereotypes

We measure gender stereotypes with a question asked in each EVS wave and dealing with the role of male and female into a household. The wording is "People talk about the changing roles of men and women today. For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly". Starting from this question and the answers given by respondents, we calculate two measurements of gender stereotypes.

This question, also used by Guiso et al. (2003) as a "measure of attitude toward women" (p. 240), is a good candidate to catch gender stereotype, because of at least four reasons. First, the wording is large enough to embrace potentially a lot of dimensions of sexism. Second, the question does not deal directly with gender fight, or other current revendications. Third, there is enough variation into the answers given by respondents, meaning that there is no consensus on this point. And lastly, the question is rather neutral and not marked as favorable to one side or the other.

The individual-level stereotype is a dummy variable which takes the value of one if the respondent answers any other item than "agree strongly" to the statement. Out of our sample of respondents, 64% have gender stereotype (Table 5). Unsurprisingly, women have less frequently gender stereotype than men.

The second variable is also a dummy variable indicating if the respondent lives in a country with high gender stereotypes. First, we calculate the mean of the answer to the question by nation and EVS wave.[12] Second, we compare the national-wave mean for each respondent with the overall mean in our sample, and we consider that the respondent lives in a country with high gender stereotypes when the national-wave mean exceeds the overall mean. Table 5 indicates that 47% of the respondents live in a country with high gender stereotypes. Logically, the proportion is very close between men and women.

TABLE 5

Our purpose is to use these two new variables to distinguish four sub-samples of respondents: people having gender stereotypes versus people not having gender stereotypes,

[12] The values attributed to the items are 1 for 'agree strongly', 2 for 'agree', 3 for 'disagree', and 4 for 'disagree strongly'. The average across the nations and waves of our sample is 1.84.

and people living in countries with low gender stereotypes versus high gender stereotypes. The idea is to check if stereotypes have a direct effect on ATC. So, we include into our baseline specifications the new variables of gender stereotypes. The detailed results are presented in Section A5 of the Appendix. In a first specification, we introduce simultaneously the two new variables, in the two others we introduce successively one of the variables. First of all, the gender gap measured by the coefficient associated to the variable *Female* does not change regardless of the specification,[13] and the impact of age as well. Then, only the individual-level gender stereotype is significant with a negative sign. It means that respondents with gender stereotypes have worst opinion on competition than people without such stereotypes.

Before testing the stability of the age-competitiveness relationship according to gender stereotypes, we also estimate the gender gap for all the four sub-samples in order to check its stability. We sum up the results in Table 6.[14]

TABLE 6

Beyond the high significance of the gender gap regardless of the subsample, some remarks arise. Focusing on the raw estimated coefficient (first row of Table 6), we observe a tiny difference between respondents according to their individual gender stereotype (-0.26 and -0.27) and larger difference according to the national stereotype (-0.24 and -0.29). Yet, we turn to the beta coefficient (row before the last one in Table 6) that considers the differences in variance across the subsamples, and more marked results emerge. Indeed, we see that the gender gap is larger when respondents have individual stereotypes or live in a country with high stereotypes. And the spread between subsamples is greater for national than for individual stereotypes. At a first glance, the gender gap thus appears to be impacted by cultural factors: it is larger with strong stereotypes, either individual or national. This result suggests that stereotypes could exacerbate the differences in competition preferences between men and women.

6.2. Influence of individual gender stereotypes on the age-competitiveness relationship

[13] According to the specification, the estimated coefficient is -0.27 or -0.26; see Table A5.1 in the Appendix.
[14] For the detailed results, see table A5.2 in the Appendix.

Now, we consider the relationship between age and ATC by gender according to the individual gender stereotypes. Table 7 reports the six estimations. For convenient reasons, we do not report all the estimated coefficients. In the first two columns, we perform estimations for the entire sample combining men and women, the other columns detailing the coefficients according to the respondent's gender and stereotype. We compare results by gender for individuals with and without individual gender stereotypes to assess how they influence the impact of age on ATC.[15]

TABLE 7

Without making a distinction between men and women, we observe that the quadratic form of the impact of age is significant for respondents with individual stereotypes. The relationship between age and ATC has a U-shaped form for this sub-set of respondents. For respondents without individual gender stereotypes, both coefficients of *Age* and *Age²* are not significant. Alternative functional forms detailed in Section A5 of the Appendix show that the best fit is obtained with a linear relationship. The ATC of respondents *without* gender stereotypes is more and more positive with age, without depletion of the marginal effect over age. The distinction in the shape of the age-competitiveness relationship among all the respondents is confirmed by the specific tests (see Table 8).

Once we distinguish men and women, the outcomes are more complex. We begin with men. We obtain the same results for the coefficients of *Age* and *Age²* for men with and without stereotypes. *Age* is significantly negative while *Age²* is significantly positive for them. However, we must perform specific tests to confirm the U-shaped form for the relationship between age and ATC. A difference emerges between men with and without stereotypes in the tests reported in Table 8. For men *with* stereotypes, the three tests confirm the U-shaped form of the relationship between age and ATC. But the finding of a U-shaped form is not supported by two of the three tests for men *without* stereotypes. While the test from Lind and Mehlum (2010) confirms the U-shaped form, we see that the 95% Fieller interval for the estimated minimum ranges from -0.52 to 72.27. Moreover, splitting the sample in two subsamples leads to non-significant coefficients for *Age* for the observations under the estimated minimum and for those over the estimated minimum. In addition, the estimations of

[15] We only present in Table 7 the functional form for the variable *Age* that is the most efficient for the entire sample of respondent (see Table 1): quadratic for the entire set of respondents, quadratic for men and linear for women. All the detailed results for the three functional forms are displayed in Section A5.2 of the Appendix.

alternative functional forms for men without individual stereotypes (see section A5.2 of the Appendix) show that neither linear nor log transformation of age are significant. Put differently, male respondents without individual gender stereotypes experience no impact of age on their ATC. And by contrast, male respondents with such stereotypes experience a U-shaped relation between age and their ATC.

The situation is simpler for women. Regardless of their individual gender stereotype, women have a positive relationship between age and ATC. Their attitude toward competition is more and more positive, independently from their gender stereotype. Furthermore, tests of U-shaped form (Table 8) and estimations on alternative functional forms (see Section A5.2 of the Appendix) confirm that the linear relation is the more accurate.

TABLE 8

We therefore conclude that individual gender stereotypes affect the relation between age and ATC for men but not for women. The U-shaped relation is only observed for men with stereotypes while no relation is found for men without stereotypes.[16] As a consequence, the U-shaped form of the gender gap in ATC is only observed for people with individual gender stereotypes, as illustrated in Figure 7. For respondents without stereotypes (panel at the top of Figure 7), the gender gap continuously decreases with age since ATC increases with age for women and does not change with age for men. The gender gap is however still observed for the oldest persons and thus does not disappear. For respondents with stereotypes (panel at the bottom of Figure 7), the gender gap has a U-shaped form with a minimum at 58 years. All these findings are represented in Figure 7.

FIGURE 7

6.3. Influence of collective gender stereotypes on the age-competitiveness relationship

We turn to the estimations with national-level gender stereotypes displayed in Table 9. The estimations in the first two columns on the entire sample show a distinction about the impact of age according to this stereotype, which is strictly similar to our conclusion made with the prior distinction based on individual stereotypes. Age has no impact on ATC for

[16] We obtain equivalent conclusions if we change the estimation method (see Section A5 of the Appendix).

people living in a country with low stereotypes[17] and has a U-shaped relationship with ATC for people living in a country with high stereotypes. The results are confirmed by the specific tests on the U-shaped form (see Table 10). So, regardless of the gender stereotype measurement, we obtain identical relationship between age and ATC.

TABLE 9

Once again, these first results hide a more nuanced situation once we distinguish men and women. The estimations for men and women are reported in the following columns of the table. On the one hand, we obtain the same findings for men living in countries with high and with low stereotypes. The coefficients of *Age* and Age^2 are respectively significantly negative and significantly positive. The U-shaped relation between age and ATC is confirmed in the three additional tests displayed in Table 10. On the other hand, a striking difference emerges for women: the coefficient of *Age* is significantly positive in countries with high stereotypes but not significant in countries with low stereotypes. In other words, the improvement of ATC with age for women is only observed in countries with high gender stereotypes.

TABLE 10

As a consequence, a similar effect of age on the gender gap in ATC is observed for both groups of countries and is thus not conditional to the level of country stereotypes.[18] However, the minimum age for the gender gap differs for both types of countries. In countries with low stereotypes, the not-significant impact of age for women leads to the fact that the curves representing ATC for men and for the gender gap have similar evolutions with age. The age minimizing the gender gap in ATC is then 54 years. In contrast, in countries with high stereotypes, the rising of ATC with age for women increases the minimum age of the gender gap around 65 years. These findings are represented in Figure 8, showing the contrasted evolution of the predicted rate of competition and gender gaps with age according to respondents' gender and the level of gender stereotypes in the country they live.

FIGURE 8

[17] Indeed, alternative functional forms, both linear and log transformation, of age variable have no significant coefficient (see Section A5.3 in the Appendix).
[18] We obtain equivalent conclusions if we change the estimation method (see Section A5 of the Appendix).

To sum up the conditioned effects by gender stereotypes, we find that such stereotypes alter the gendered effect of age on ATC. In the main estimations, we showed that the relation of age with ATC has a U-shaped form for men and is linearly positive for women. While these results are observed in the presence of high stereotypes, they change in the presence of low stereotypes: the relation is not significant for men with low individual stereotypes and for women with low collective stereotypes. These preliminary findings suggest that cultural factors may play a significant role on the gendered effect of age on competitiveness.

7. Conclusion

In this paper, we investigate the effect of age on the gender gap in attitude toward competition. We use survey data to perform a cross-country analysis on a broad and representative sample of individuals. Our key finding is the gendered effect of age on ATC. Indeed, we observe that ATC has a U-shaped relation with age for men with a minimum around 53 years, while it increases with age for women. Both these results generate a U-shaped pattern for the relation between age and the gender gap in ATC. The minimum gender gap is obtained at age 60, with men having a more positive ATC than women at all ages. Our findings are not in full accordance with any of the hypotheses considered in the literature, and also do not confirm the results from the experimental works, so that further investigations, especially based on experimental methods, are required to assess their validity.

In addition to these new results concerning the effect of age on competition preferences, we have two other contributions to the literature. First, we show that the gender gap in competitiveness highlighted by the experimental literature also appears in the attitudes toward competition across a large cross-country sample. Second, we are able to detect a potential role for cultural factors (namely, gender stereotypes) on the gender gap in attitudes toward competition.

Finally, the central message from our analysis is the importance of age in understanding the relation between gender and competitiveness. From a policy perspective, it underlines the importance of considering age to appraise the influence of gender preferences differences on labor market outcomes. From a research perspective, it stresses the importance to investigate the gender gap in competitiveness for various ages. Our research is an initial

step towards understanding the effects of age on the gender gap in competitiveness. Further work is needed to check the relevance of our results in experimental and survey-based studies.

References

Andersen, S., Ertac, S., Gneezy, U., List, A. and Maximiano S. (2013), "Gender, Competitiveness, and Socialization at a Young Age: Evidence from a Matrilineal and a Patriarchal Society", *Review of Economics and Statistics*, vol. 95, p. 1438-1443.

Apicella C., Dreber A., Campbell B., Gray P, Hoffman M. and Little A. (2008), "Testosterone and Financial Risk Preferences", *Evolution and Human Behavior*, vol. 29, p. 384-390.

Apicella C., Dreber A., Gray P., Hoffman M., Little A. and Campbell B. (2011), "Androgens and Competitiveness in Men", *Journal of Neuroscience, Psychology, and Economics*, vol. 4, p. 54-62.

Babcock L. and Laschever S. (2003), *Women Don't Ask: Negotiation and the Gender Divide*, Princeton University Press.

Babcock L., Laschever S., Gelfand M. and Small D (2003), "Nice Girls Don't Ask", *Harvard Business Review*, vol. 81, p. 14-16.

Barrios, J. (2015). "I Think Competition is Better than You Do: Does It Make Me Happier? Evidence from the World Value Surveys", *Journal of Happiness Studies*, vol. 16, p. 599-618.

Bertrand M. and Hallock K. (2001), "The Gender Gap in Top Corporate Jobs", *ILR Review*, vol. 55, p. 3-21.

Blau F. and Kahn L. (2017), "The Gender Wage Gap: Extent, Trends, and Explanations", *Journal of Economic Literature*, vol. 55, p. 789-865.

Bönte W., Procher V., Urbig D. and Voracek M. (2017), "Digit Ratio (2D:4D) Predicts Self-Reported Measures of General Competitiveness, but Not Behavior in Economic Experiments", *Frontiers in Behavioral Neurosciences*, vol. 11, article n° 238.

Booth A., Fan E., Meng X. and Zhang D. (2019), "Gender Differences in Willingness to Compete: The Role of Culture and Institutions", *Economic Journal*, vol. 129, p. 734-764.

Booth A. and Nolen P. (2012), "Choosing to Compete: How Different Are Girls and Boys?", *Journal of Economic Behavior & Organization*, vol. 81, p. 542-555.

Bordalo P., Coffman K., Gennaioli, N. and Shleifer A. (2019), "Beliefs about Gender", *American Economic Review*, vol. 109, p. 739-773.

Buser T. (2012), "The Impact of the Menstrual cycle and Hormonal Contraceptives on Competitiveness", *Journal of Economic Behavior & Organization*, vol. 83, p. 1-10.

Buser T., Dreber A. and Mollerstrom J. (2017), "The Impact of Stress on Tournament Entry", Experimental Economics, vol. 20, p. 506-530.

Buser T., Niederle M. and Oosterbeek H. (2014), "Gender, Competitiveness, and Career Choices", *Quarterly Journal of Economics*, vol. 129, p. 1409-1447.

Buser T., Peter N. and Wolter S. (2017), "Gender, Competitiveness, and Study Choices in High School: Evidence from Switzerland", *American Economic Review*, vol. 107, p. 125-130.

Cárdenas J.-C., Dreber A., von Essen E. and Ranehill E. (2012), "Gender Differences in Competitiveness and Risk Taking: Comparing Children in Colombia and Sweden", *Journal of Economic Behavior & Organization*, vol. 83, p. 11-23.

Eisenegger C., Kumsta R., Naef M., Gromoll J. and Heinrichs M. (2017), "Testosterone and Androgen Receptor Gene Polymorphism Are Associated with Confidence and Competitiveness in Men", *Hormones and Behavior*, vol. 92, p. 93-102.

Exley C., Niederle M. and Vesterlund L. (2020), "Knowing When to Ask: The Cost of Leaning-In", *Journal of Political Economy*, vol. 128, p. 816-854.

Fieller, E. (1954), "Some Problems in Interval Estimation", *Journal of the Royal Statistical Society, Series B*, vol. 16, p. 175-185.

Fisman R. and O'Neill M. (2009), "Gender Differences in Beliefs on the Returns to Effort: Evidence from the World Values Survey", *Journal of Human Resources*, vol. 44, p. 858-870.

Flory J., Gneezy U., Leonard K. and List J. (2018), "Gender, Age, and Competition: A Disappearing Gap?", *Journal of Economic Behavior & Organization*, vol. 150, p. 256-276.

Flory J., Leibbrandt A. and List J. (2015), "Do Competitive Workplaces Deter Female Workers? A Large-Scale Natural Field Experiment on Job Entry Decisions", *Review of Economic Studies*, vol. 82, p. 122-155.

Fortin N. (2005), "Gender Role Attitudes and the Labour-market Outcomes of Women across OECD Countries", *Oxford Review of Economic Policy*, vol. 21, p. 416-438.

Gneezy U., Leonard K. and List J. (2009), "Gender Differences in Competition: Evidence From a Matrilineal and a Patriarchal Society", Econometrica, vol. 77, p. 1637-1664.

Gneezy U., Niederle M. and Rustichini A. (2003), "Performance in Competitive Environments: Gender Differences", *Quarterly Journal of Economics*, vol. 118, p. 1049-1074.

Gneezy U. and Rustichini A. (2004), "Gender and Competition at a Young Age", *American Economic Review*, vol. 94, p. 377-381.

Guiso L., Sapienza P. and Zingales L. (2003), "People's Opium? Religion and Economic Attitudes", *Journal of Monetary Economics*, vol. 50, p. 225-282.

Healy A. and Pate J. (2011), "Can Teams Help to Close the Gender Competition Gap?", *Economic Journal*, vol. 121, p. 1192-1204.

Hernandez-Arenaz I. and Iriberri N. (2018), "Women Ask for Less (Only from Men): Evidence from Bargaining in the Field", *Journal of Economic Behavior & Organization*, vol. 152, p. 192-214.

Khachatryan K., Dreber A., von Essen E. and Ranehill E. (2015), "Gender and Preferences at a Young Age: Evidence from Armenia", *Journal of Economic Behavior & Organization*, vol. 118, p. 318-332.

Knight J. (2002), "Sexual Stereotypes", *Nature*, vol. 415, p. 254-256.

Leibbrandt A. and List J. (2015), "Do Women Avoid Salary Negotiations? Evidence from a Large-Scale Natural Field Experiment", *Management Science*, vol. 61, p. 2016-2024.

Lind, J. and Mehlum H. (2010), "With or Without U? The Appropriate Test for a U-Shaped Relationship", *Oxford Bulletin of Economics and Statistics*, vol. 72, p. 109-118.

Mayr U., Wozniak D., Davidson C., Kuhns D. and Harbaugh W. (2012), "Competitiveness across the Life Span: the Feisty Fifties", *Psychology and Aging*, vol. 27, p. 278-285.

Niederle M. (2016), "Gender", in J. Kagel and A. Roth (eds.), *Handbook of Experimental Economics, second edition*, Princeton University Press, p. 481-553.

Niederle M., Segal C. and Vesterlund L. (2013), "How Costly Is Diversity? Affirmative Action in Light of Gender Differences in Competitiveness", *Management Science*, vol. 59, p. 1-16.

Niederle M. and Vesterlund L. (2007), "Do Women Shy Away From Competition? Do Men Compete Too Much?", *Quarterly Journal of Economics*, vol. 122, p. 1067-1101.

Niederle M. and Vesterlund L. (2011), "Gender and Competition", *Annual Review of Economics*, vol. 3, p. 601-630.

Ors E., Palomino F. and Peyrache E. (2013), "Performance Gender Gap: Does Competition Matter?", *Journal of Labor Economics*, vol. 31, p. 443-499.

Pirinsky C. (2013), "Confidence and Economic Attitudes", *Journal of Economic Behavior & Organization*, vol. 91, p. 139-158.

Roberts B., Walton K. and Viechtbauer W. (2006), "Patterns of Mean-Level Change in Personality Traits Across the Life Course: A Meta-Analysis of Longitudinal Studies", *Psychological Bulletin*, vol. 132, p. 1-25.

Sapienza P., Zingales L. and Maestripieri D. (2009), "Gender Differences in Financial Risk Aversion and Career Choices Are Affected by Testosterone", *PNAS*, vol. 106, p. 15268-15273.

Sutter M. and Glätzle-Rützler D. (2015), "Gender Differences in the Willingness to Compete Emerge Early in Life and Persist", *Management Science*, vol. 61, p. 2339-2354.

Wozniak D., Harbaugh W. and Mayr U. (2014), "The Menstrual Cycle and Performance Feedback Alter Gender Differences in Competitive Choices", *Journal of Labor Economics*, vol. 32, p. 161-198.

Zhang Y.J. (2019), "Culture, Institutions and the Gender Gap in Competitive Inclination: Evidence from the Communist Experiment in China", *Economic Journal*, vol. 129, 617, p. 509-552.

Zhong S., Shalev I., Koh D., Ebstein R. and Chew S.H. (2018), "Competitiveness and Stress", *International Economic Review*, vol. 59, p. 1263-1281.

Table 1. Gender gap in ATC.

	Linear specification coef. (s.e.)	Log transformation coef. (s.e.)	Quadratic specification coef. (s.e.)
Female	-0.26*** (0.024)	-0.26*** (0.024)	-0.26*** (0.024)
Age	0.0010 (0.0012)		-0.016*** (0.0044)
Log Age		-0.00021 (0.049)	
Age²			0.00018*** (0.0001)
Income level (low as reference):			
medium	0.14*** (0.031)	0.14*** (0.031)	0.15*** (0.031)
high	0.35*** (0.043)	0.35*** (0.043)	0.35*** (0.043)
dk refuse	0.22*** (0.046)	0.21*** (0.046)	0.21*** (0.046)
age completed education (no education as reference):			
14 y and less	-0.027 (0.13)	-0.031 (0.13)	-0.0025 (0.12)
[15 - 16]	0.018 (0.12)	0.0090 (0.12)	0.051 (0.12)
[17 - 18]	0.082 (0.13)	0.071 (0.13)	0.11 (0.13)
[19 - 20]	0.24* (0.13)	0.23* (0.13)	0.27** (0.13)
21 y and more	0.33** (0.13)	0.32** (0.13)	0.36*** (0.13)
dk refuse	-0.023 (0.15)	-0.030 (0.14)	0.0044 (0.15)
work status (full time as reference):			
part time	-0.100** (0.044)	-0.100** (0.044)	-0.11** (0.043)
self employed	0.20*** (0.050)	0.20*** (0.050)	0.20*** (0.050)
retired	0.022 (0.035)	0.047 (0.037)	-0.037 (0.036)
housewife	-0.014 (0.047)	-0.011 (0.047)	-0.031 (0.046)
student	0.13*** (0.045)	0.12** (0.047)	0.070 (0.046)
unemployed	-0.18*** (0.059)	-0.19*** (0.059)	-0.19*** (0.058)
other	-0.16*** (0.057)	-0.16*** (0.057)	-0.17*** (0.057)
dk refuse	-0.20 (0.19)	-0.20 (0.19)	-0.22 (0.19)
Living with someone (1 if yes)	0.035* (0.018)	0.035* (0.018)	0.054*** (0.019)
Having child (1 if yes)	0.029 (0.023)	0.041* (0.022)	0.059*** (0.021)
religiosity (religious person as reference):			
not religious person	-0.0033 (0.035)	-0.0054 (0.035)	-0.0023 (0.035)
convinced atheist	-0.17*** (0.061)	-0.18*** (0.061)	-0.17*** (0.061)
dk refuse	-0.12*** (0.046)	-0.12*** (0.045)	-0.12*** (0.045)
Constant	7.64*** (0.17)	7.68*** (0.26)	7.94*** (0.18)
Country fixed effects	Yes	Yes	Yes
EVS wave fixed effects	Yes	Yes	Yes
Observations	139,382	139,382	139,382
Adjusted R-squared	0.073	0.073	0.074

Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". Method estimation is OLS. Standard errors in brackets are clustered by country. *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 2. Tests of the U-shaped form of the ATC-age relationship.

Observations	139,382
Estimated extreme point	44.15
95% Fieller interval	35.15 ; 50.64
Lind and Mehlum test:	
Lower bound	15
Upper bound	108
Slope at lower bound	-0.01
Slope at upper bound	+0.02
t-Value for slope at lower bound	-3.37***
t-Value for slope at upper bound	+4.31***
t-Value of overall test of a U shape	3.37***
Age coefficient for observations	
under the estimated extreme point	-0.0053**
Observations	72,041
Over the estimated extreme point	0.0054***
Observations	67,341

Note: *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 3. The effect of age on ATC by gender.

	Linear		Log transformation		Quadratic	
	Men coef (se)	Women coef (se)	Men coef (se)	Women coef (se)	Men coef (se)	Women coef (se)
Age	-0.0032** (0.0015)	0.0037*** (0.0013)			-0.027*** (0.0050)	-0.0073 (0.0051)
Log Age			-0.18*** (0.062)	0.12** (0.054)		
Age^2					0.00025*** (0.000048)	0.00012** (0.000051)
Income level (low as reference):						
medium	0.12*** (0.036)	0.16*** (0.036)	0.12*** (0.036)	0.16*** (0.036)	0.13*** (0.036)	0.16*** (0.036)
high	0.33*** (0.049)	0.36*** (0.048)	0.33*** (0.049)	0.35*** (0.048)	0.34*** (0.049)	0.36*** (0.048)
dk refuse	0.15*** (0.053)	0.27*** (0.047)	0.15*** (0.053)	0.27*** (0.047)	0.15*** (0.053)	0.27*** (0.047)
age completed education (no education as reference):						
14 y and less	-0.12 (0.16)	0.028 (0.16)	-0.12 (0.16)	0.021 (0.16)	-0.083 (0.17)	0.044 (0.16)
[15 - 16]	-0.14 (0.17)	0.13 (0.15)	-0.14 (0.17)	0.11 (0.15)	-0.091 (0.17)	0.15 (0.15)
[17 - 18]	-0.058 (0.17)	0.18 (0.17)	-0.061 (0.17)	0.16 (0.17)	-0.013 (0.17)	0.20 (0.17)
[19 - 20]	0.14 (0.17)	0.30* (0.16)	0.14 (0.17)	0.28* (0.16)	0.19 (0.17)	0.32** (0.15)
21 y and more	0.25 (0.18)	0.37** (0.16)	0.25 (0.18)	0.35** (0.16)	0.30 (0.18)	0.39** (0.16)
dk refuse	-0.096 (0.20)	0.011 (0.18)	-0.096 (0.20)	-0.00034 (0.18)	-0.055 (0.20)	0.028 (0.18)
work status (full time as reference):						
part time	-0.084 (0.067)	-0.088* (0.049)	-0.086 (0.067)	-0.087* (0.049)	-0.10 (0.068)	-0.090* (0.049)
self employed	0.23***	0.13	0.23***	0.13	0.23***	0.13

	(0.047)	(0.081)	(0.047)	(0.081)	(0.047)	(0.081)
retired	0.080*	-0.0056	0.090*	0.024	-0.013	-0.040
	(0.044)	(0.043)	(0.045)	(0.044)	(0.047)	(0.043)
house	-0.21	-0.012	-0.21	-0.0068	-0.22	-0.023
	(0.18)	(0.048)	(0.18)	(0.048)	(0.18)	(0.047)
student	0.11**	0.13**	0.076	0.14**	0.030	0.098*
	(0.054)	(0.053)	(0.056)	(0.054)	(0.056)	(0.053)
unemployed	-0.22***	-0.15**	-0.22***	-0.15**	-0.23***	-0.16**
	(0.074)	(0.060)	(0.074)	(0.060)	(0.074)	(0.060)
other situation	-0.091	-0.19***	-0.088	-0.19***	-0.096	-0.20***
	(0.094)	(0.058)	(0.094)	(0.058)	(0.094)	(0.058)
dk refuse	-0.075	-0.29	-0.077	-0.29	-0.10	-0.31
	(0.22)	(0.19)	(0.22)	(0.19)	(0.22)	(0.19)
Lives with someone (1 if yes)	0.056**	0.029	0.064***	0.024	0.082***	0.042*
	(0.023)	(0.025)	(0.024)	(0.024)	(0.025)	(0.025)
Has child (1 if yes)	0.10***	-0.034	0.12***	-0.032	0.14***	-0.013
	(0.030)	(0.029)	(0.030)	(0.029)	(0.029)	(0.028)
religiosity (religious person as reference):						
not religious person	-0.026	0.015	-0.027	0.013	-0.024	0.016
	(0.031)	(0.045)	(0.031)	(0.045)	(0.031)	(0.045)
convinced atheist	-0.21***	-0.13**	-0.21***	-0.13**	-0.21***	-0.13**
	(0.069)	(0.061)	(0.069)	(0.061)	(0.069)	(0.061)
dk refuse	-0.16***	-0.086	-0.16***	-0.087	-0.16***	-0.086
	(0.049)	(0.056)	(0.049)	(0.056)	(0.048)	(0.056)
Constant	7.79***	7.32***	8.31***	7.03***	8.20***	7.52***
	(0.21)	(0.19)	(0.31)	(0.29)	(0.24)	(0.20)
Country fixed effects	yes	Yes	yes	yes	yes	yes
EVS wave fixed effects	yes	Yes	yes	yes	yes	yes
Observations	64,599	74,783	64,599	74,783	64,599	74,783
Adjusted R-squared	0.074	0.068	0.074	0.068	0.074	0.068

Notes: Attitude toward competition (ATC) is measured through the question: “How would you place your views on this scale? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas”. Method estimation is OLS. Standard errors in brackets are clustered by country. *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 4. Tests of the U-shaped form of the ATC-age relationship according to gender.

Sub-samples	Men	Women
Observations	64,599	74,783
Estimated extreme point	52.91	31.11
95% Fieller interval	47.16 ; 59.57	-93.75 ; 42.79
Lind and Mehlum test:		
Lower bound	15	15
Upper bound	108	108
Slope at lower bound	-0.019	-0.004
Slope at upper bound	+0.028	+0.018
t-Value for slope at lower bound	-5.245***	-1.042
t-Value for slope at upper bound	+4.880***	+2.908***
t-Value of overall test of a U shape	4.88***	1.04
Age coefficient for observations		
under the estimated extreme point	-0.006***	0.003
Observations	43,019	19,564
Over the estimated extreme point	0.0096***	0.006***
Observations	21,580	55,219

Note: *, ** and *** mean respectively p<0.1, p<0.05 and p<0.01.

Table 5. Respondents' distribution according to variables measuring gender stereotypes.

Level of stereotype:		Men	Women	Overall
Respondent has gender stereotype?	Yes	40,411 67,17%	43,503 62,02%	83,914 64.40%
	No	19,748 32.83%	26,639 37,98%	46,387 35,60%
Respondent lives in a country with high gender stereotype?	Yes	29,891 47,83%	33,560 46,34%	63,451 47,03%
	No	32,603 52,17%	38,866 53,66%	71,469 52.97%

Notes: Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as an individual with gender stereotype a respondent who does not answer "agree strongly" to the question. Is considered as living in a country with a collective gender stereotype a respondent for whom the average national answer is lower than the average of the entire sample.

Table 6. Comparisons of the gender gap in ATC according to sub-samples defined by gender stereotypes.

	Overall	Respondents not having individual stereotype	Respondents having individual stereotype	Respondents living in country with low stereotype	Respondents living in country with high stereotype
Gender raw coefficient	-0.26***	-0.26***	-0.27***	-0.24***	-0.29***
(se)	(0.014)	(0.025)	(0.017)	(0.019)	(0.020)
95% CI	[-0.29,-0.23]	[-0.31,-0.21]	[-0.31,-0.24]	[-0.27,-0.20]	[-0.33,-0.25]
Gender beta coefficient	-0.053***	-0.050***	-0.058***	-0.047***	-0.059***
N	139,382	46,387	83,914	71,469	63,4515

Notes: Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as an individual with gender stereotype a respondent who does not answer "agree strongly" to the question. Is considered as living in a country with a collective gender stereotype a respondent for whom the average national answer is lower than the average of the entire sample. Coefficients are estimated with OLS method and the quadratic functional form for age. For details see Table A5.2 in the Appendix. *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 7. The influence of individual gender stereotypes on the ATC-age relationship.

	All respondents:		Respondents without stereotype		Respondents with stereotype	
	Without stereotype coef (se)	With stereotype coef (se)	Men coef (se)	Women coef (se)	Men coef (se)	Women coef (se)
Female	-0.26***	-0.27***				
	(0.028)	(0.029)				
Age	-0.0071	-0.021***	-0.017*	0.0055***	-0.032***	0.0023*
	(0.0069)	(0.0048)	(0.0084)	(0.0017)	(0.0053)	(0.0014)
Age^2	0.00011	0.00022***	0.00018**		0.00030***	
	(0.000073)	(0.000048)	(0.000085)		(0.000050)	
Control variables	yes	Yes	yes	yes	yes	yes
Country fixed effects	yes	Yes	yes	yes	yes	yes
EVS wave fixed effects	yes	Yes	yes	yes	yes	yes
Observations	46,387	83,914	19,748	26,639	40,411	43,503
Adjusted R-squared	0.072	0.079	0.072	0.069	0.081	0.070

Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as an individual with gender stereotype a respondent who does not answer "agree strongly" to the question. Method estimation is OLS. Standard errors in brackets are clustered by country. *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 8. Tests of the U-shaped form of the ATC-age relationship with and without individual stereotypes.

	Overall		Men		Women	
Sub-samples	Without stereotype	With stereotype	Without stereotype	With stereotype	Without stereotype	With stereotype
Observations	46,387	83,914	19,748	26,639	40,411	43,503
Estimated extreme point	31.47	47.48	46.48	53.44	7.55	38.76
95% Fieller interval	nd	40.70;53.68	-0.52;72.27	47.96;59.83	nd	-45.76;48.58
Lind and Mehlum test:						
Slope at lower bound	-0.04	-0.01	-0.01	-0.02	0.00	-0.01
Slope at upper bound	0.02	0.03	0.02	0.03	0.01	0.02
t-Value for slope at lower bound	-0.77	-4.09 ***	-1.92 **	-5.99 ***	nd	-1.53 *
t-Value for slope at upper bound	1.90 **	4.54 ***	2.13 **	5.42 ***	nd	2.57 ***
t-Value of overall test of a U shape	0.77	4.09 ***	1.92 **	5.42 ***	nd	1.53 *
Age coefficient for observations						
under the estimated extreme point	0.006	-0.007 ***	-0.003	-0.008 ***	nd	-0.003
Observations	12,739	48,174	10,855	26,992	nd	17,293
Over the estimated extreme point	0.006 **	0.005 **	0.005	0.011 ***	nd	0.006 **
Observations	33,648	35,740	8,893	13,419	nd	26,210

Notes: *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$; nd means a trivial failure to reject the hypothesis of a monotone shape of the relationship.

Table 9. The influence of collective gender stereotypes on the ATC-age relationship.

	All respondents living in		Respondents living in countries with low stereotype		Respondents living in countries with high stereotype	
	countries with low stereotype	countries with high stereotype	Men	Women	Men	Women
	coef (se)	coef (se)	coef (se)	coef (se)	coef (se)	coef (se)
Female	-0.24***	-0.29***				
	(0.026)	(0.040)				
Age	-0.011	-0.025***	-0.025***	0.00077	-0.032***	0.0058***
	(0.0066)	(0.0063)	(0.0066)	(0.0016)	(0.0083)	(0.0015)
Age^2	0.00011	0.00029***	0.00023***		0.00031***	
	(0.000067)	(0.000056)	(0.000064)		(0.000078)	
Control variables	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
EVS wave fixed effects	yes	yes	yes	yes	yes	yes
Observations	71,469	63,451	32,603	38,866	29,891	33,560
Adjusted R-squared	0.073	0.080	0.075	0.068	0.080	0.074

Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as living in a country with a collective gender stereotype a respondent for whom the average national answer is lower than the average of the entire sample. Method estimation is OLS. Standard errors in brackets are clustered by country. *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$.

Table 10. Tests of the U-shaped form of the ATC-age relationship with and without collective stereotypes.

Sub-samples	Overall		Men		Women	
	living in country with low stereotype	living in country with high stereotype	living in country with low stereotype	living in country with high stereotype	living in country with low stereotype	living in country with high stereotype
Observations	71,469	67,913	32,603	38,866	31,996	35,917
Estimated extreme point	50.77	41.73	53.93	51.87	25.98	33.66
95% Fieller interval	nd	30.56;47.14	44.70;67.40	43.76;59.76	nd	12.94;41.53
Lind and Mehlum test:						
Slope at lower bound	-0.008	-0.014	-0.018	-0.020	-0.000	-0.009
Slope at upper bound	0.012	0.035	0.025	0.031	0.003	0.035
t-Value for slope at lower bound	-1.65 *	-3.12 ***	-3.76 ***	-3.34 ***	-0.07	-1.94 **
t-Value for slope at upper bound	1.52 *	5.73 ***	3.24 ***	3.45 ***	0.32	5.44 ***
t-Value of overall test of a U shape	1.52 *	3.12 ***	3.24 ***	3.34 ***	0.07	1.94 **
Age coefficient for observations						
under the estimated extreme point	-0.004	-0.010 ***	-0.005*	-0.008**	0.015	-0.004
Observations	43,808	32,635	21,975	21,110	4,892	11,385
Over the estimated extreme point	0.001	0.010 ***	0.011 **	0.008 **	0.001	0.011 ***
Observations	27,661	35,278	10,628	10,886	32,590	24,532

Notes: *, ** and *** mean respectively $p<0.1$, $p<0.05$ and $p<0.01$; nd means a trivial failure to reject the hypothesis of a monotone shape of the relationship.

Figure 1. Gender gap in ATC according to the literature hypotheses.

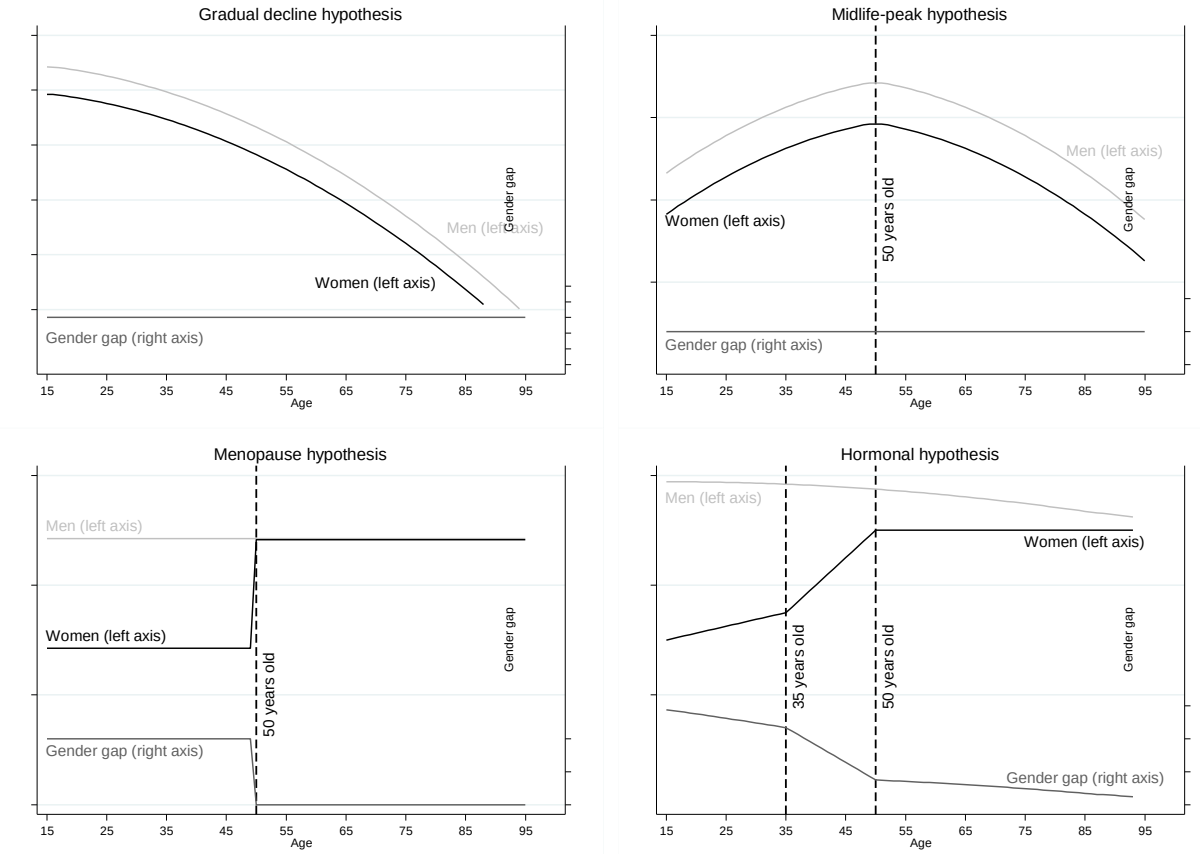
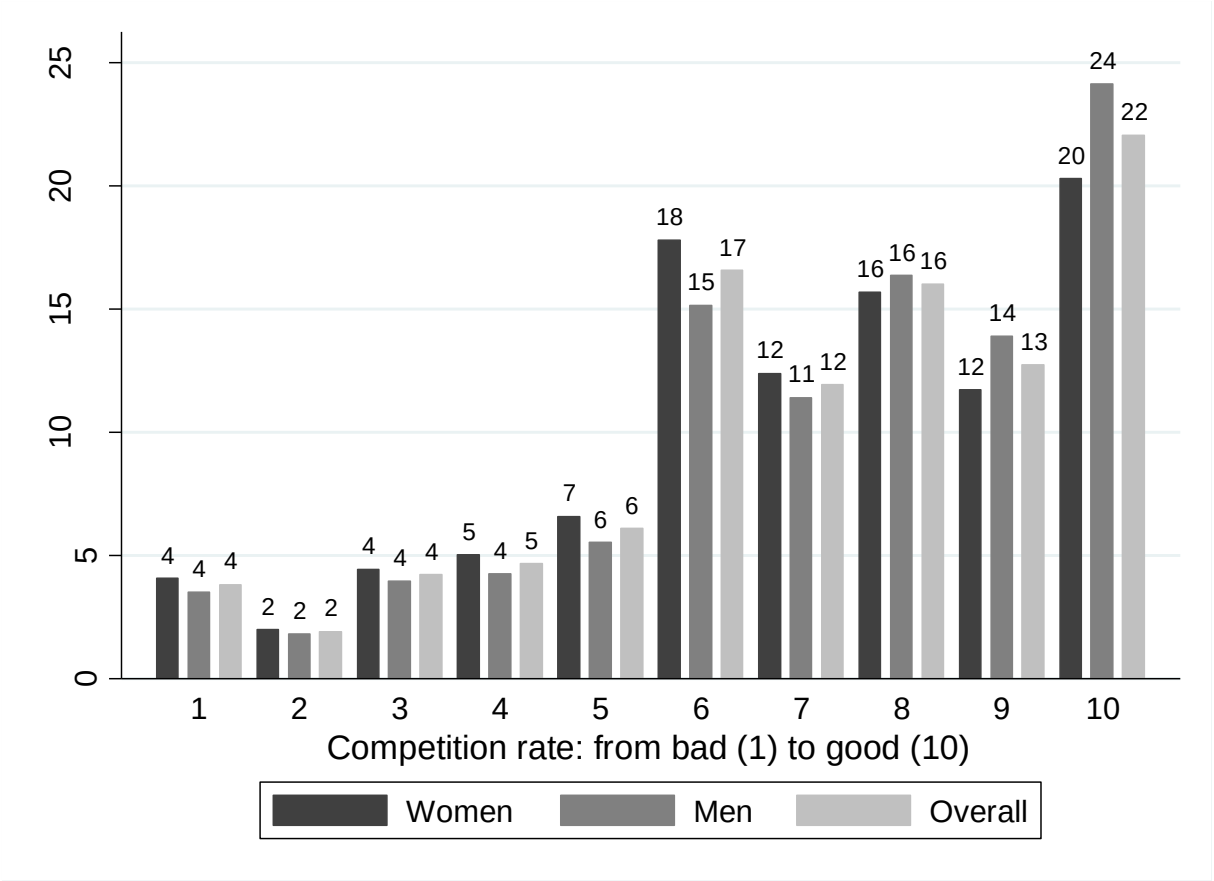
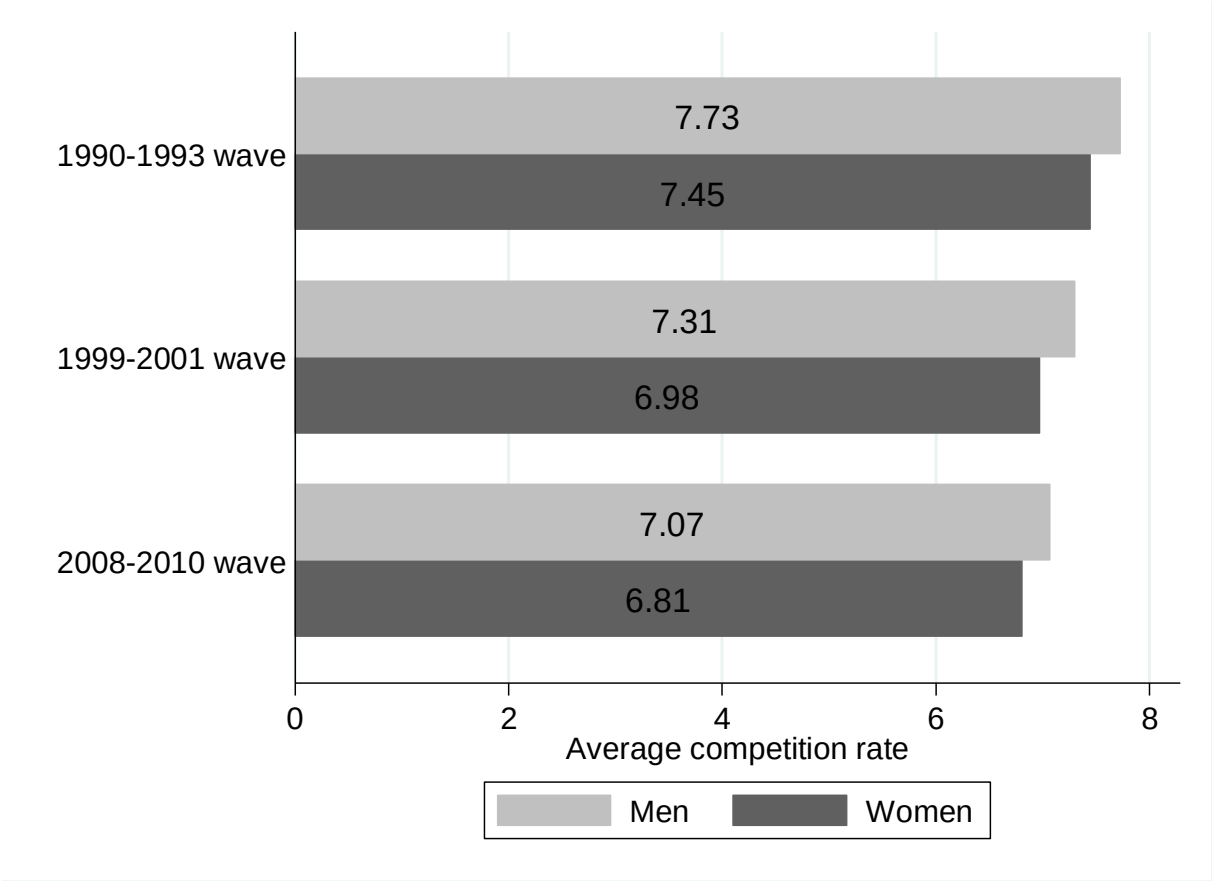


Figure 2. Respondents' distribution according to their competition rate.



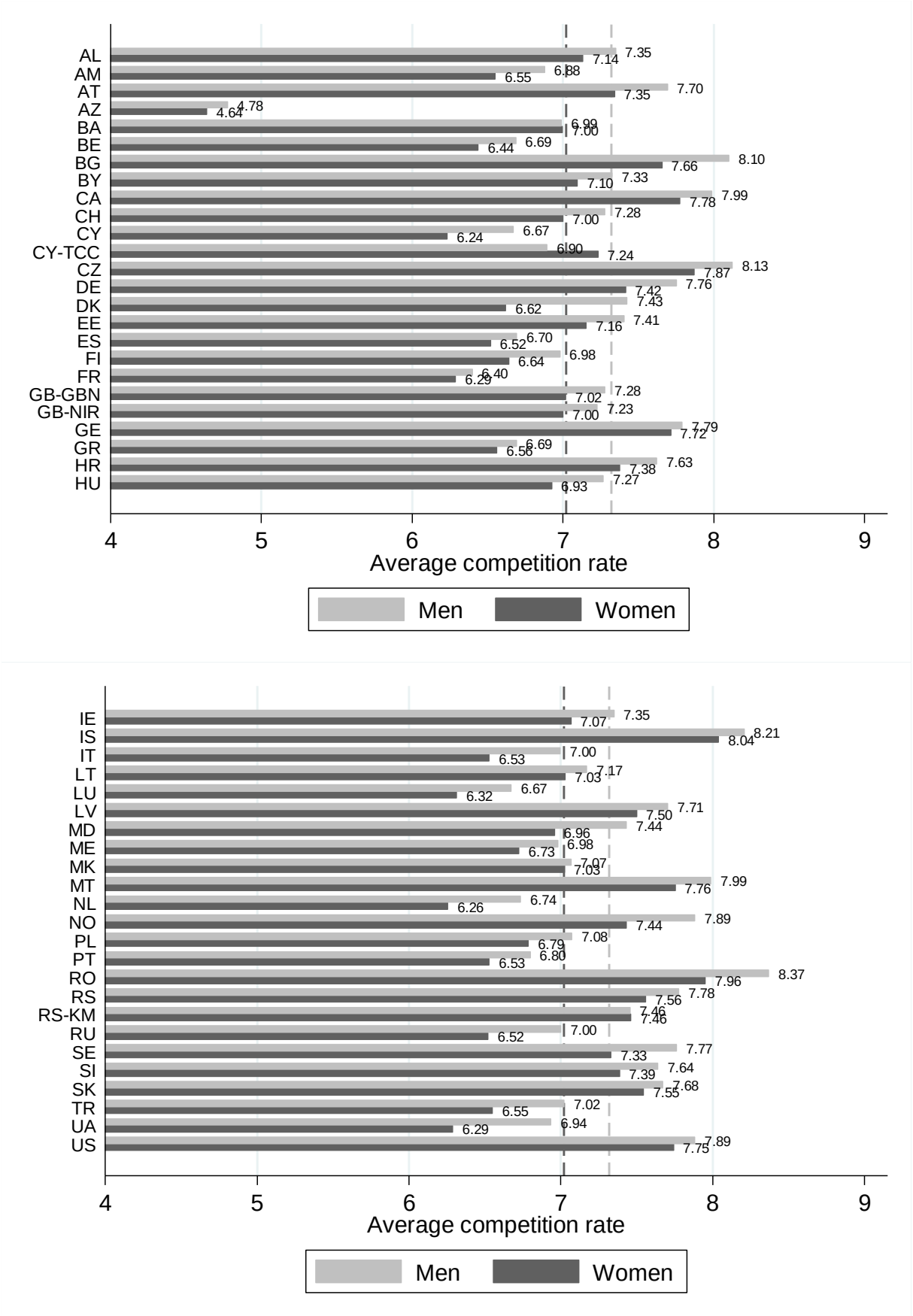
Note: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas".

Figure 3. Average competition rate according to the EVS wave.



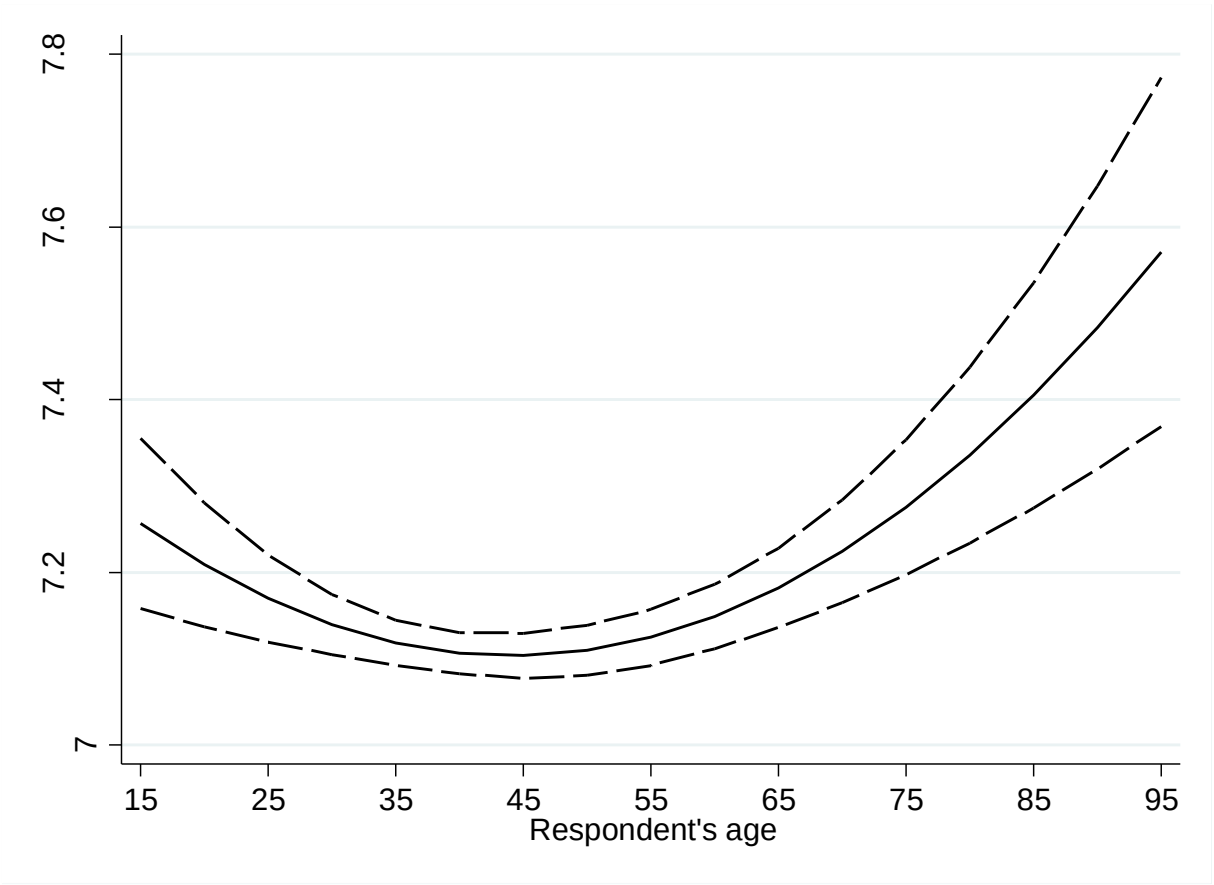
Note: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas".

Figure 4. Average competition rate according to respondents' country.



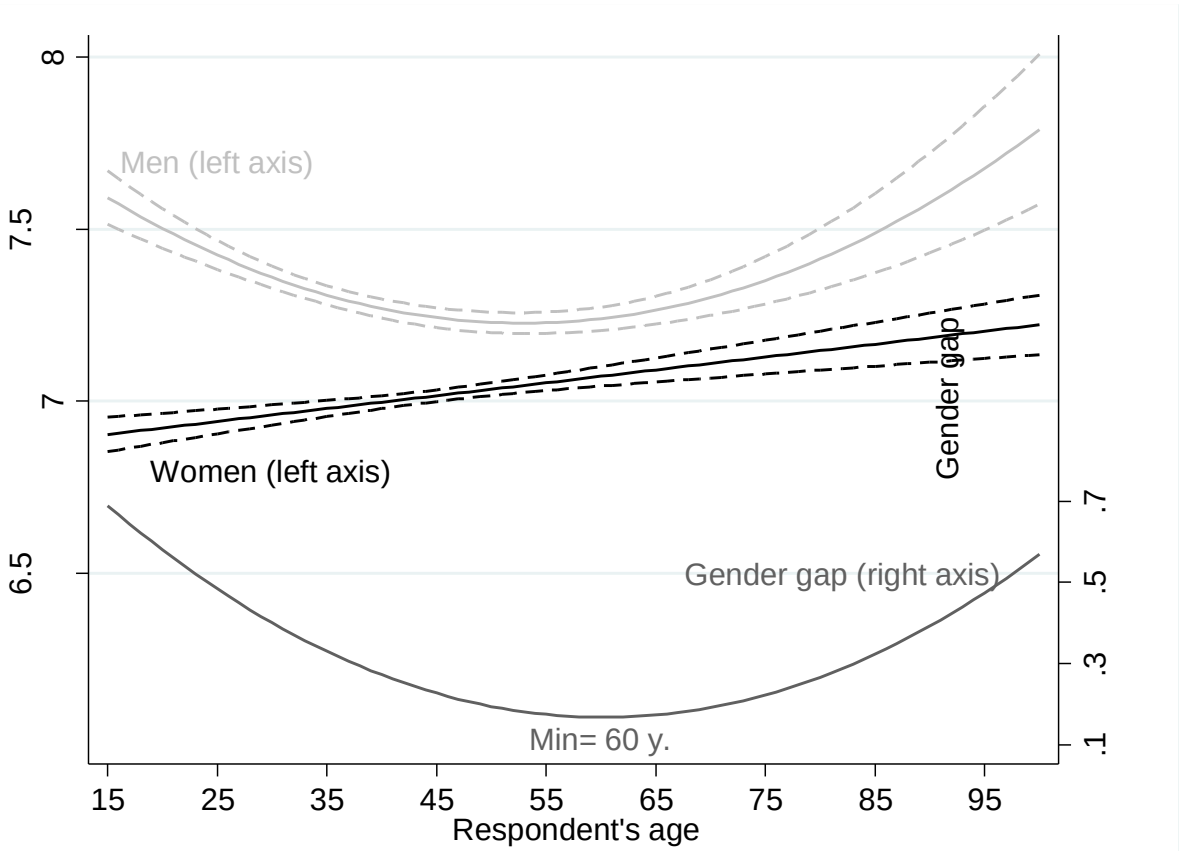
Notes: Attitude toward competition (ATC) is measured through the question: “How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas”. The dash lines represent the average answer for men (grey) and women (black).

Figure 5. Nonlinear impact of age on the competition rate.



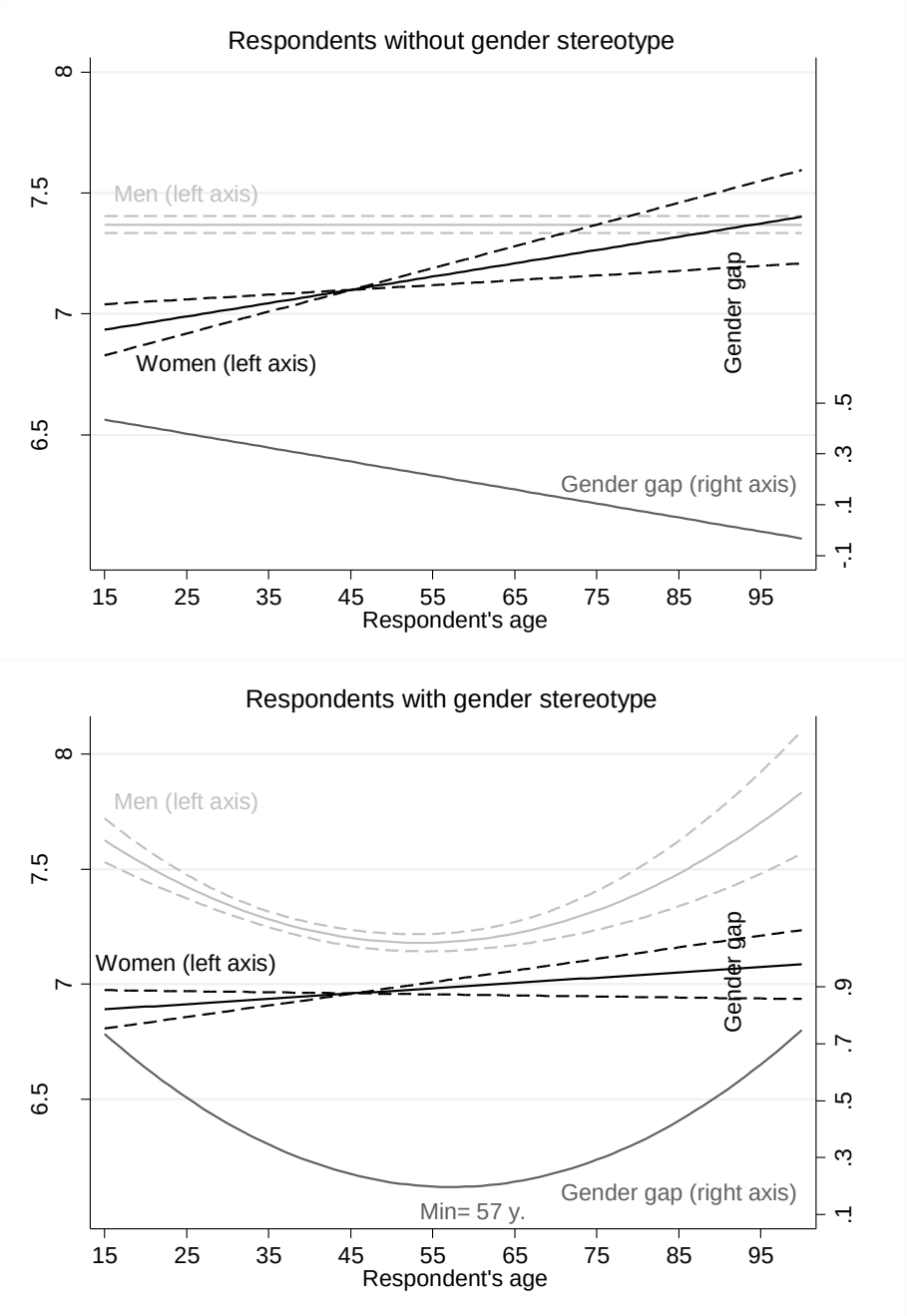
Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". The predicted rates come from quadratic model presented in Table 1, all other variables taking their average value. The solid line indicates the prediction and the dash ones the 95% confidence intervals.

Figure 6. Gendered impact of age on the competition rate and gender gap over age.



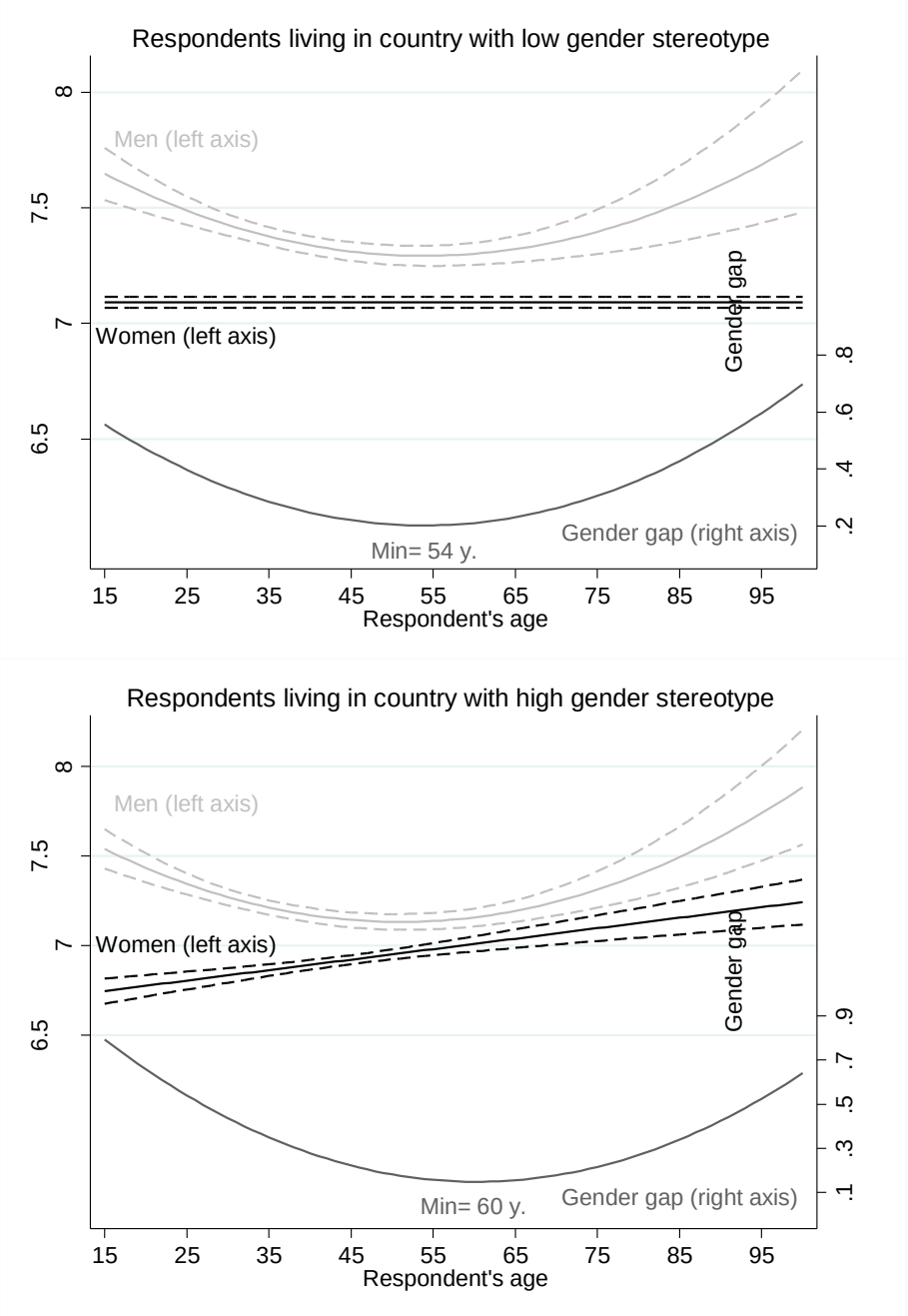
Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". The predicted rates come from two models presented in Table 5: the quadratic model for men and the linear one for women, all other variables taking their average value. The solid line indicates the prediction and the dash ones the 95% confidence intervals. The gender gap is the spread between men and women for each age.

Figure 7. Gendered impact of age on the competition rate and gender gap over age according to individual gender stereotypes.



Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as an individual with gender stereotype a respondent who does not answer "agree strongly" to the question. The predicted rates come from four models presented in Table 8: the quadratic model for men if it is significant and the linear one for women, all other variables taking their average value. The solid line indicates the prediction and the dash ones the 95% confidence intervals. The gender gap is the spread between men and women for each age.

Figure 8. Gendered impact of age on the competition rate and gender gap over age according to collective gender stereotypes.



Notes: Attitude toward competition (ATC) is measured through the question: "How would you place your views on this scale (from 1 to 10)? 1) competition is harmful, it brings out the worst in people; 10) competition is good. It stimulates people to work hard and develop new ideas". Gender stereotype is measured through the question: "For the statement 'Both the husband and wife should contribute to household income', can you tell me how much you agree?", with four items of answer: "agree strongly", "agree", "disagree" and "disagree strongly"". Is considered as living in a country with a collective gender stereotype a respondent for whom the average national answer is lower than the average of the entire sample.The predicted rates come from four models presented in Table 9: the quadratic model for men if it is significant and the linear one for women if it is significant, all other variables taking their average value. The solid line indicates the prediction and the dash ones the 95% confidence intervals. The gender gap is the spread between men and women for each age.

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Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex

http://large.em-strasbourg.eu/