

# New Perspectives on Gender

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## Contents

1. Introduction	1546
2. Gender Differences in Psychological Attributes	1548
2.1. Risk attitudes	1548
2.2. Attitudes towards competition	1551
2.3. Social preferences	1554
2.4. Attitudes towards negotiation	1556
2.5. Empirical implications for labor market outcomes	1558
2.6. Other personality traits	1562
2.7. Where do gender differences in preferences and personality traits come from?	1566
2.7.1. Nurture	1567
2.7.2. Nature	1570
3. Gender Identity	1572
3.1. Theoretical foundations	1572
3.2. Does gender identity influence women's labor market decisions?	1574
3.3. Empirical determinants of gender identity norms	1576
3.4. Does gender identity drive psychological attributes?	1578
4. Women's Well-being	1579
5. Conclusion	1582
References	1584

## Abstract

Psychological and socio-psychological factors are now more commonly discussed as possible explanations for gender differences in labor market outcomes. We first describe the (mainly) laboratory-based evidence regarding gender differences in risk preferences, in attitudes towards competition, in the strength of other-regarding preferences, and in attitudes towards negotiation. We then review the research that has tried to quantify the relevance of these factors in explaining gender differences in labor market outcomes outside of the laboratory setting. We also describe recent research on the relationship between social and gender identity norms and women's labor market choices and outcomes, as well as on the role of child-rearing practices in explaining gender identity norms. Finally, we report on some recent work documenting puzzling trends in women's well-being and discuss possible explanations for these trends, including identity considerations. We conclude with suggestions for future research.

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## 1. INTRODUCTION

At the time Altonji and Blank completed their influential Handbook chapter in 1999, the two main factors being discussed as sources of the gender gap in earnings were differences in human capital accumulation and discrimination (taste-based or statistical). Patterns of occupational segregation by gender (which have been shown to “explain” much of the gender gap in earnings) were essentially attributed either to discrimination being more pronounced in some occupations than others, or to differences in human capital accumulation pre labor market entry (such as differences in the type of education women receive) or post labor market entry (such as differences in accumulated experience).

While researchers have certainly not abandoned studying these two factors nor given up on their first order relevance, a major development over the last ten years has been the rising popularity of new classes of explanations for gender differences in labor market outcomes.<sup>1</sup> First and foremost is the possibility that there are important differences in psychological attributes and preferences between men and women that may make some occupations more attractive to women and others more attractive to men. While Altonji and Blank (1999) already discuss this possibility, they also point to the difficulty in pushing it further without better foundations for the source and nature of these gender differences. Thanks to advances in the psychology and experimental literatures, and a growing influence of these literatures on economics research, we now have a much more concrete sense of the psychological factors that appear to systematically differ between men and women. In particular, we review the evidence regarding gender differences in risk preferences (Section 2.1), in attitudes towards competition (Section 2.2), in the strength of other-regarding preferences (Section 2.3) and in attitudes towards negotiation (Section 2.4). While there is an abundance of laboratory studies regarding each of these psychological factors, there has been to date, as we discuss in Sections 2.5 and 2.6, only a very limited amount of research able to establish the relevance of these factors for labor market outcomes. In this regard, whether this body of psychological research will be more than just a decade-long fad and have a long-lasting impact on how labor economists think about gender differences will crucially depend on further demonstration of its economic significance in real markets. Assuming such economic significance can be established, policymakers will want to better understand the sources of

<sup>1</sup> See for example Black and Brainerd (2004) and Black and Strahan (2001) for studies of how globalization and deregulation trends may have reduced discrimination against women in various occupations. Recent research has also focused on how technological progress has affected women’s educational choices and labor market experience. See for example Goldin and Katz (2002) for how the availability of the pill increased women’s willingness to invest in long-duration professional degrees, or Greenwood et al. (2005) for how improvements in household technologies may have contributed to women’s greater attachment to the labor force. Finally, there has been more rigorous discussion of how the shift toward a service and skill-intensive economy has increased the proportion of jobs suitable for women; see for example Weinberg (2000) and Black and Juhn (2000). Blau and Kahn (2006) provide a careful discussion of the extent to which gender differences in human capital may account for the fast convergence of male and female wages in the 1980s and the slowing convergence in the 1990s.

these gender differences in psychological attributes and traits: are evolution and biology dictating that women are more risk averse than men? Or is the gender gap in risk aversion an outcome of child-rearing practices? The review we perform in Section 2.7 suggest at least some environmental influences on top of pure biological foundations, and hence the promise of a broader set of policy tools to try to undo some of the psychological influences that might be the most damaging to women's labor market success.

Another increasingly discussed explanation for why women and men experience different labor markets is the existence of social norms about what is appropriate for men to do and what is appropriate for women to do. Influential papers by Akerlof and Kranton (2000, 2002, 2005) have helped the import into economics of earlier insights from the social psychology literature regarding an individual's social identity and how it can influence behaviors and choices in markets. One of the richest applications of the social identity model has been to gender identity and its implications for not only occupational sorting, but also labor force participation and the allocation of work within the household. We review the (gender) identity model in Section 3.1. Unfortunately, it has been difficult to design a credible causal testing of the impact of gender identity norms for women's labor market choices; we review the evidence that has been produced so far in Section 3.2. Here again, we feel that much more validating empirical work will be needed in the near future for gender identity insights to have a long-lasting impact on how labor economists approach gender issues. The review we perform in Section 3.3 shows that socialization and child-rearing practices have been singled out (in the economics literature at least) as the key drivers of social norms regarding gender roles; in fact, as we discuss in Section 3.4, a nurture explanation for why men and women exhibit different attitudes with respect to risk (or competition, or negotiation, or altruism) might be that such gendered traits are components of one's gender identity (e.g. being a woman implies displaying more risk-aversion; being a man implies behaving more aggressively).

Section 4 continues on the theme of bringing a more psychological perspective into the labor economics of gender. In that section, we review some recent work on gender differences in well-being. We are particularly motivated by a recent paper by Stevenson and Wolfers (2009) who find that, despite decades of educational gains and an unambiguous enlargement of their set of labor market opportunities, women's self-reported levels of life satisfaction appear to have declined over time, both in absolute terms and relative to men's. We discuss various explanations for this finding. More generally, we stress in this section that additional measures of women's well-being exist beyond those typically used by labor economists (see for example Blau, 1998), and that a creative use of those measures could lead to a richer perspective on women's progress.

We conclude in Section 5 with additional suggestions for future research.

## 2. GENDER DIFFERENCES IN PSYCHOLOGICAL ATTRIBUTES

### 2.1. Risk attitudes

Bonin et al. (2007) empirically demonstrate that individuals that are less willing to take risk tend to sort into occupations with more stable earnings; these occupations, due to compensating wage differentials in environments with risk-averse agents, also tend to pay less on average.<sup>2</sup> Hence, risk preferences may be an important determinant of earnings, in addition to the more traditional factors typically included in a Mincerian wage equation.<sup>3</sup>

A large experimental literature has tested whether systematic differences in risk preferences exist between men and women. This literature has been recently reviewed in two articles: Croson and Gneezy (2009) and Eckel and Grossman (2008a).<sup>4</sup> Most of the experimental work reviewed in these articles consists in comparing how men and women value risky gambles or choose between gambles. Some of the experiments exclusively rely on hypothetical choices; others involve real (albeit most often small) stakes. In most cases, the subject pool consists of college students.

Both Croson and Gneezy (2009) and Eckel and Grossman (2008a) come to the conclusion that the published experimental findings are broadly consistent with women being more risk averse than men. Summaries of the most important papers are presented in Table 1 of Eckel and Grossman (2008a), as well Table 1 of Croson and Gneezy (2009). For example, Levin et al. (1988) ask college students whether or not they are willing to take each of 18 different gambles; they find significantly higher reported take-up rates among men than among women. Also, Hartog et al. (2002) elicit hypothetical certainty equivalents for a series of lotteries and use those to compute risk aversion parameters; they find those risk aversion parameters to be 10 to 30 percent larger for women than for men. Eckel and Grossman (2002) ask subjects to choose among five alternative gambles that differ in expected return and variance, and pay subjects according to the outcome of the gamble that they choose; they find that men choose on average riskier gambles with higher expected payoffs. Motivated by the work of Kahneman and Tversky (1979), Eckel and Grossman (2002) also show that women's higher average level of risk aversion hold both in the loss domain (where the gambles include negative payoff amounts) and in the gain domain (where all the possible payoff amounts are non-negative).<sup>5</sup> Holt and Laury (2002) ask a sample of about 200 college students to make choices between 10 paired

<sup>2</sup> See also Grund and Sliwka (2006).

<sup>3</sup> The predictive power of risk preferences to explain important economic and social choices has been demonstrated in many other domains. For example, Anderson and Mellor (2008) show that individual-level risk aversion is negatively associated with smoking, heavy drinking, being obese, and not using a seat belt, even after controlling for demographic and socio-economic characteristics.

<sup>4</sup> Croson and Gneezy (2009) extend their literature review to a broader set of gender differences in preferences, including attitudes towards competition and social preferences; Eckel and Grossman (2008a) focus exclusively on risk attitudes.

<sup>5</sup> The evidence regarding a gender gap in risk attitudes in the loss domain appears less robust. For example, in an abstract lottery choice experiment, Schubert et al. (1999) find women to be significantly more risk averse than men in the gain domain but find the opposite (e.g. men being more risk-averse than women) in the loss domain.

lotteries, with each pair featuring a lower risk lottery (e.g. a lottery where the potential payoffs differed only slightly) and a higher risk lottery (e.g. a lottery where the potential payoffs differed more widely); they infer a subject's level of risk aversion from the point in the 10-pair suite at which they switched from the low-risk to the high-risk lottery. They also vary the level of pay (e.g. subjects make choices for both low-payoff and high-payoff lottery treatments). They find a small but a significant gender gap in risk aversion in the low-payoff treatment, with women being more risk averse. However, this gender gap disappears in the high-payoff treatment.

While the subject pool in most existing lab studies is restricted to the college population, Dohmen et al. (forthcoming) show evidence of higher risk aversion among women in the general population. Their study relies both on a large representative survey of the German population and a complementary experiment carried on a representative subsample. In the survey data, a global assessment of individual risk aversion is obtained by asking individuals to self-assess their willingness to take risk ("How willing are you to take risks, in general?"), on a scale from 0 to 10. This contrasts with the more traditional lottery-type elicitation of risk attitudes, and the complementary experiment is then used to validate the individual self-assessment of risk attitudes as measured in the survey data. Specifically, an additional representative sample of 450 subjects is asked both to answer the subjective self-assessment question and also to make choices in real-stakes lotteries. The subjective survey question is deemed a reliable measure of risk attitude in that it predicts actual risk-taking behavior in the experiment, even after controlling for many observable characteristics. In their large representative sample of the German population, Dohmen et al. (forthcoming, 2010) find that gender (but also age, height and parental education) has a quantitatively significant effect on one's self-assessed willingness to take risk: the gender effect corresponds to about a quarter of a standard deviation reduction in the willingness to take risk.

Their larger research sample also allows Dohmen et al. (forthcoming, 2010) to study how the gender gap in risk-taking varies over the life cycle. While the willingness to take risk goes down steadily with age among men, Dohmen et al. (forthcoming, 2010) find a richer dynamic among women, with the most rapid decline from the late teens to age thirty, a flattening between age thirty and the mid-fifties, and a further decline after that.

Moving beyond the lab and survey evidence, a few field studies also point at systematic differences in risk aversion between genders, even though omitted variable concerns are typically quite pronounced in these studies. For example, studying the defined contribution pension allocation decision among employees of a large US firm, Bajtelsmit and VanDerhei (1997) find that women invest a relatively greater share in low-risk assets; however, this gender gap could reflect on systematic differences in socio-economic status, income, wealth, or financial knowledge between the genders, which the authors cannot control for. Using various years from the Survey of Consumer Finances, both Jianakoplos and Bernasek (1998) and Sunden and Surette (1998) find that single women typically

hold lower proportions of risky assets. While better socio-economic and wealth controls are available in those studies, there remains a concern that men and women cannot be perfectly matched on all the dimensions that are relevant for financial investment decisions. Illustrating the relevance of this concern, Dwyer et al. (2002) show that gender differences in risk taking among mutual fund investors are in part driven by systematic differences in financial knowledge between men and women. Specifically, using data from a 1995 national survey of close to 2000 mutual fund investors, they find that women exhibit less risk-taking than men in their most recent, largest, and riskiest investment decisions; however, controlling for knowledge of financial markets and investment (which is possible because the survey includes a series of questions in order to determine the respondents' understanding of basic financial concepts) greatly reduces, but does not eliminate, the estimated gender gap in risk-taking. While the lab and field evidence surveyed so far has mainly focused on decision making in the financial domain (a domain that is admittedly very relevant to labor market outcomes), researchers have also been interested in whether the observed gender differences in risk aversion hold across other tasks or domains of decision-making: are women also more risk-averse than men when it comes to, say, health-related choices? This is a relevant question because psychologists have argued that a given subject's risk preferences may vary quite a lot across domains (Slovic, 1972). Dohmen et al. (forthcoming, 2010) address this question by exploiting domain-specific risk attitudes questions in the German survey data. In particular, the survey includes five similarly worded questions as the general risk question, where subjects are asked to assess on a scale from 0 to 10 their willingness to take risk when it comes to: driving, financial matters, sports and leisure, health and career. They find a lower average willingness to take risk among women compared to men in each of these five domains; the gender gap in risk attitudes is greatest in the driving and financial matters domains, and smallest in the career domain.

A discussion of gender differences in risk attitudes is often accompanied by a discussion of gender differences in overconfidence. And indeed, a gender gap in overconfidence is often offered as an explanation for the gender gap in risk attitudes.<sup>6</sup> While both genders have been shown to display overconfidence, men appear particularly overconfident in their relative ability, especially when it comes to tasks that are perceived to be in the masculine domain (see Lundeberg et al., 1994; Beyer, 1990; Beyer and Bowden, 1997). This larger relative overconfidence may make men more likely to enter riskier situations. An interesting illustration of gender differences in overconfidence in the field can be found in Barber and Odean (2001). Barber and Odean (2001) start from the theoretical prediction that overconfident financial investors will trade stocks too much; they then show, using data from a large discount brokerage, that men trade 45 percent

<sup>6</sup> Other personality traits have been proposed as drivers of risk attitudes, and potential explanation for the gender gap in risk attitudes. See Section 2.7.

more than women and that this greater relative trading negatively impacts the relative return of their portfolio.<sup>7</sup>

## 2.2. Attitudes towards competition

Many high-profile, high-earning occupations often take place in highly competitive settings where winners and losers are singled out and winners are disproportionately rewarded. A few recent experimental papers have proposed a new explanation for why women may be relatively under-represented in those occupations. These papers suggest that women may systematically under-perform relative to men in competitive environments and that many women, even among the most able, may simply prefer to stay away from such environments.

Gneezy et al. (2003) bring students to the lab in groups of six: 3 women and 3 men. Each student is asked to solve mazes for a period of 15 minutes under one of two possible compensation schemes: a piece rate scheme, or a tournament scheme. Under the piece rate scheme, students are paid a fixed prize for each maze that they solve; under the tournament scheme, only the student in the group that solves the highest number of mazes receives some compensation. While there is no gender difference in performance under the piece rate scheme, men strongly increase their performance in the tournament setting but women do not. The gender gap in performance in the tournament setting is large, with men solving about 40 percent more mazes than women.

Because the tournament payment is more uncertain than the piece rate payment, it is possible that the gender difference in performance in the tournament setting is simply a reflection of the gender differences in risk aversion we already discussed in Section 2.1. Gneezy et al. (2003) rule out this possibility by implementing a third payment scheme under which the tournament “winner” is chosen at random; under this scheme, both men and women perform at their piece rate level, and there is no gender gap in performance.

A final important result in Gneezy et al. (2003) is that women do as well as men in the tournament setting if the groups are single-sex; hence, the authors attribute the gender gap in the tournament setting to women’s relative failure to perform at a high level when competing against men, but not when competing in general. In this regard, it is interesting that the female (and male) subjects in this experiment are all students at the most competitive technology university in Israel (Technion), and hence, compared to the general population, quite used to performing in a male-dominated environment.

Niederle and Vesterlund (2007) push this research agenda further by studying the compensation choices men and women make in a mixed-sex environment (groups of 2 men and 2 women). As in the previously discussed paper, the compensation schemes under consideration are a piece rate scheme and a tournament-like winner-take-all

<sup>7</sup> While this is consistent with men being relatively more overconfident than women, one cannot rule out as an alternative explanation the possibility that men simply derive more entertainment value from trading.

scheme. The task in this case consists in solving a series of additions. The experiment is designed not only to highlight gender differences in compensation choices, but also investigate the possible explanations for these gender differences. At the end of each round, the participants are informed about their own performance but provided no information about their relative performance. The first two rounds are used to assess gender differences in performance in this task under either a piece rate setting or a tournament scheme; in neither case do the authors observe gender differences in performance.<sup>8</sup> The third round is when participants get to choose which compensation scheme they would prefer for their performance in that round. Despite the lack of gender differences in performance in the first two rounds, Niederle and Vesterlund (2007) find that close to three quarters of men, but only one third of women, choose the tournament scheme; most strikingly, even the women that perform in the top performance quartile in the first rounds of the experiment are less likely to choose tournament compensation than the men that performed in the lowest quartile. From a payoff maximization perspective, there are too few (high ability) women and too many (low ability) men entering the tournament.

In the remaining sections of the paper, Niederle and Vesterlund (2007) provide a careful investigation of the potential explanations for why women are so much more likely to “shy away” from the winner-take-all environment. Consistent with prior work on overconfidence, Niederle and Vesterlund (2007) find that both men and women overestimate their performance rank in their group but that men overestimate it by a greater extent than women; this gender gap in overconfidence explains some but not all of the gender difference in compensation choice. However, further accounting for the gender differences in risk attitudes, as well as women’s greater aversion to negative feedback does little to further reduce the gender gap in the decision to compete.<sup>9</sup> The residual gender gap, Niederle and Vesterlund (2007) conclude, is best interpreted as women having less of a taste for competition.

In a complementary paper, Niederle and Vesterlund (2008) propose to re-examine the costs and benefits of affirmative action in light of an environment such as the one described above, where too few women but too many men enter competitive environments. In particular, they experimentally demonstrate a substantial increase in the share of women willing to participate in tournaments under a quota-like affirmative action policy that requires at least as many women as men to be tournament winners. The reason for this, they argue, is that the affirmative action policy essentially makes the competition more gender-specific, and that women’s taste for competing is higher when

<sup>8</sup> This second round result is in contrast with Gneezy et al. (2003).

<sup>9</sup> By entering the winner-take-all scheme, an individual will automatically learn whether or not he or she was the highest performer on the task. If, as argued by Roberts and Nolen-Hoeksema (1989), women respond more poorly to information about how well they did compared to others, they may decide against the winner-take-all scheme to avoid being exposed to this information.



the competition is more gender-specific. Because of this entry response to the affirmative action policy, which includes entry by high ability women, the cost of affirmative action (in terms of the average ability of the tournament winners) is not as high as one might have predicted absent the change in entry.

While Gneezy et al. (2003) and Niederle and Vesterlund (2007) offer a truly original explanation for the gender gap in labor market achievement, some questions remain open for future research regarding both the robustness and interpretation of the findings in these two influential papers. One remaining source of confusion is with regard to the importance of the gender composition of the group a given individual is made to compete against, e.g. same-sex versus mixed-gender groups. For example, Gneezy and Rustichini (2004) study how fourth-graders (75 boys and 65 girls) perform on a short distance race. They first let each child run by himself or herself to establish some individual speed benchmark and then get the children to compete in pairs, where the children in a pair have been matched on their speed, independently of their gender. While there is no gender gap in performance when the children run alone, boys outpaced girls in the competitive setting, with boys running faster and girls running slower. While this in itself is consistent with the lab findings described above, it appears that the gender gap in performance is more pronounced in the single-sex races: boys' speed increases in the competitive setting by about the same amount whether they are paired with boys or girls; but girls' speed only decreases when they are paired with other girls, and they in fact run a bit faster when paired with boys. This is unlike the maze task in Gneezy et al. (2003), where women did better when competing against other women than when compensated with the piece rate. Also raising questions about the importance of the gender composition of the environment for the gender competition effects is a paper by Gupta et al. (2005). While this paper is quite similar to Niederle and Vesterlund (2007), subjects in this case choose between a piece rate or tournament pay scheme after being told whether they are matched to a man or a woman. As in Niederle and Vesterlund (2007), men are much more likely than women to select the tournament pay scheme. However, women's decision of whether or not to compete seems unrelated to whether they are paired with a man or with a woman.

Future research in this area should also aim to confirm that the gender differences in performance in competitive setting and willingness to enter competitive settings are more than just a reflection of already identified gender differences, such as attitudes towards risk and overconfidence. Indeed, in contrast with Niederle and Vesterlund (2007), Gupta et al. (2005) find that risk aversion appears to matter substantially in explaining women's compensation choices. Dohmen and Falk (forthcoming) also perform a laboratory experiment where subjects are asked to perform a task and can choose how they want to get compensated for this task. The subjects in this case can choose between a fixed pay scheme (where subject receive a fixed fee just for showing up in the laboratory, independently on how well they perform on the task) and one of three different variable

pay schemes: piece rate, tournament and revenue sharing. Like Niederle and Vesterlund (2007), they find that women are relatively less likely to select into the variable pay schemes, even after controlling for gender differences in baseline productivity levels on the task. However, and in contrast with the findings in Niederle and Vesterlund (2007), they also show that the gender gap in selecting into the variable pay schemes (including the tournament pay scheme) becomes small and statistically weak after controlling for gender differences in risk attitudes.

Finally, future research in this area should investigate how robust the results are to higher stakes, as well as to repetition and learning. In a study combining field and laboratory evidence, Antonovics et al. (2009) illustrate the importance of increasing stakes. The field data comes from *The Weakest Link*, a television game show where groups of individuals compete for large sums of money. In contrast with Gneezy et al. (2003), they find no evidence that the gender of one's opponent matters for the performance of female participants in the game show. Yet, when replicating the game show in the laboratory with the kind of stakes that are typically used in the laboratory (around \$20 for the winner), they do replicate Gneezy et al. (2003). They further manage to replicate the game show behavior in the laboratory by raising the stakes (\$50 or higher) and establishing a better match between the age profile of the game show participants and that of the laboratory's subject pool. Specifically, when the stakes are low in the laboratory, women perform worse when they compete against men than when they compete against women; when the stakes are \$50 or more, women perform better when they face men than when they face women.<sup>10</sup> Vandegrift and Yavas (2009) assess the robustness of the gender gap in tournament entry in an environment that allows for learning about absolute and relative performance. Their results suggest that gender might not be such a strong predictor of tournament entry when, as is common in many real world applications, individuals repeatedly face the same task and compensation choices, and are able to learn about their actual relative ability.<sup>11</sup>

### 2.3. Social preferences

Another "psychological" perspective on why women are not performing as well as men in the labor market has been linked to possibly systematic differences between

<sup>10</sup> One should note though that even the basic (e.g. low stake) laboratory results here are not perfectly in line with Gneezy et al. (2003) in that both men and women under-perform in this case when competing against someone of the opposite sex.

<sup>11</sup> The task under consideration in Vandegrift and Yavas (2009) is a forecasting task, with participants being rewarded based on the quality of their forecast. Women are disproportionately weaker at this task than men. In early rounds, male entrants into the tournament show significantly lower forecast errors than female entrants; however, the difference disappears over time and in the final rounds, there is no significant difference between the forecast errors of male and female tournament entrants. Some of the convergence in the gender gap for tournament entrants is the result of reductions in performance by male tournament entrants, but most of the convergence is caused by a large improvement in the ability of the average female tournament entrant. Weaker forecasters tend to avoid the tournament and, after controlling for forecasting skill, gender does not predict tournament entry.

genders in their level of social preferences. In particular, it has been argued that women are more socially minded than men. One can easily see how stronger redistributive preferences might interfere with women's financial success in the labor market. Stronger redistributive preferences could also be in part responsible for women being less willing to compete (Section 2.2), or less willing to negotiate (Section 2.4). A large body of experimental research on gender differences in social preferences is summarized in Croson and Gneezy (2009) and Eckel and Grossman (2008b).

Three main types of experiments have been used to study gender differences in social preferences: public good experiments, ultimatum experiments and dictator experiments. Eckel and Grossman (2008b) point towards a difficulty in interpreting and comparing the results of many of the public good and ultimatum experiments. Indeed, some of these experiments include financial risk (for example, the selfless choice in a public game typically involves some risk of financial loss) while others do not; this is problematic in that, as has been discussed before, there are systematic gender differences in risk aversion between women and men. Also, some experimental designs expose the subjects and their decisions to the judgment of others, while others do not; yet, women and men may differentially care about how others judge their behavior. As an illustration of these difficulties, Eckel and Grossman (2008b) review 7 recent public good experiments (typically, these are *n*-person simultaneous move games where an individual's contribution to the public good generate positive externalities but where non-contributing is a dominant strategy), and confirm the lack of uniformity across these studies. Three of those studies (Brown-Kruse and Hummels, 1993; Sell and Wilson, 1991; Sell et al., 1993) find that women contribute less to the public good than men do; two (Nowell and Tinkler, 1994; Seguino et al., 1996) find higher contribution by women; and another two (Cadsby and Maynes, 1998; Sell, 1997) find mixed results. Eckel and Grossman (2008b) argue that the experimental evidence in favor of women being more socially oriented is much stronger if one restricts oneself to those experimental designs where the researchers have managed to abstract away from risk and have provided more anonymity to the subjects. In this regard, the evidence on dictator experiments typically is subject to less confounding factors. Overall, the dictator experiments (see for example, Bolton and Katok, 1995; Eckel and Grossman, 1998, or Andreoni and Vesterlund, 2001) find evidence that is broadly consistent with women giving away more than men.<sup>12</sup>

There is a quite a lot of field evidence consistent with higher level of altruism and stronger preferences for redistribution among women. Some of this evidence is indirect, coming from observed gender differences in political orientation. Some papers have

<sup>12</sup> To be precise, the findings in Andreoni and Vesterlund (2001) are a bit more nuanced. When altruism is expensive, women are found to be kinder; but the opposite holds when altruism is cheap. Andreoni and Vesterlund (2001) also find that while men are more likely to be extreme types in terms of giving (e.g. either perfectly selfish or perfectly selfless), women are more likely to share evenly.

demonstrated that women are today more left-leaning than men (see for example, Edlund and Pande, 2002; Edlund et al., 2005 or Box-Steffensmeier et al., 2004).<sup>13</sup> However, the fact that this political gender gap has been changing over time (women were consistently more conservative than men until the mid-1960s) and that this trend can be related to an increase in divorce risk and decline in marriage (Edlund and Pande, 2002; Edlund et al., 2005) suggests a more economic, rather than pure psychological, explanation for women being more left-leaning: women may prefer more redistributive policies because they are more likely to be the beneficiaries of those policies, due to their lower average earnings.

A few recent papers provide more direct evidence on the gender gap in policy preferences between men and women (rather than just the partisan gender gap). Funk and Gathmann (2009) use time-variation in the adoption of women's suffrage across Swiss cantons and study voting behavior on a broad range of policies that were subject to direct voting through referendums and initiatives. They find that female voting has a substantial impact on the composition of spending, but a negligible effect on the total size of government spending.<sup>14</sup> In particular, they find that female voting is associated with stronger support for redistributive policies and public health spending.<sup>15</sup> While there might again be an economic explanation for this finding, Funk and Gathmann (2009) further establish that the gender gap in policy preferences remains even after controlling for socio-economic characteristics. This suggests there might be true psychological differences between men and women in the strength of their social preferences. Similar patterns are found in subjective self-reports: for example, Alesina and Giuliano (2009) examine survey data for a variety of countries and conclude that, even after controlling for a large vector of individual socio-economic characteristics, women are more pro-redistribution than men; this appears to be true holding political ideology constant.

#### 2.4. Attitudes towards negotiation

Because a negotiation can be viewed as a competition over resource distribution, the research on gender differences in competition and gender differences in social preferences has been linked to an earlier literature on gender differences in negotiation. While earlier meta-analyses (Rubin and Brown, 1975) pointed towards a lack of consistent patterns, with many null and contradictory findings, more recent meta-analyses (Stuhlmacher and Walters, 1999; Walters et al., 1998) started highlighting the importance of situational or contextual factors for gender differences in negotiation. Building on this, a recurring

<sup>13</sup> Interestingly, Washington (2008) and Oswald and Powdthavee (2010) show that having a daughter (rather than a son) make fathers favor more liberal policies.

<sup>14</sup> The effect on total spending is in contrast with the results in Lott and Kenny (1999) who find increases in state-level spending after the adoption of women's suffrage in the US.

<sup>15</sup> Similarly, Miller (2008) finds that the suffrage rights for women in US states were associated with large increases in public health spending, and a subsequent decline in child mortality. Papers such as Thomas (1990, 1994), or Duflo (2003) also confirm that women place greater weights on the provision of public goods and child welfare.

theme in the more recent wave of research on gender differences in negotiation is that those differences are not static but highly dependent on the context, with gender effects occurring under some situational cues but disappearing (or sometimes even reversing) under other situational cues. In this regard, this work is quite different from the previously discussed research on risk attitudes, or preference for competition, or selflessness, which has been less concerned so far about the importance of situational factors.

Bowles et al. (2005) show that whether subjects are told that they are negotiating for themselves or negotiating for others matters for the resulting gender gap in negotiation outcomes. In particular, women's performance in negotiation improves significantly when negotiating for someone else as opposed to for themselves; whether men negotiate for themselves or for others has little effect on their negotiation performance. Bowles et al. (2005) relate this result to an entitlement literature that suggests that women may feel relatively less deserving (see Major, 1987). It is also possible that women expect (rightly or wrongly so) more of a backlash if they negotiate for themselves (Rudman, 1998; Rudman and Glick, 1999). Finally, women may feel more obligated towards others than men do or may care more about others (Section 2.3), which make them feel especially motivated to do well when responsible for the interests of others.

Bowles et al. (2005) also investigate the moderating role of what they call "situational ambiguity" in explaining gender difference in negotiation. In particular, Bowles and al. create a low ambiguity situation in a laboratory-based price negotiation experiment by providing buyers with specific information about what would be a good agreement price in the negotiation; in contrast, no such information was provided to buyers in the high ambiguity situation. They show that women's performance is especially low when information is poor.

Small et al. (2007) measure the gender gap in the likelihood to initiate negotiations. Subjects in their controlled laboratory experiment are paid what is presented to them as the lowest amount possible after playing a word game; the research's objective is then to analyze whether participants ask for higher payment from the experimenter. Women ask much less often than men. Offering stronger cues about the negotiability of payment does not reduce the gender gap; in contrast though, the gender gap disappears when the situation is framed as an opportunity to "ask," rather than an opportunity to "negotiate." Small et al. (2007) attribute this difference to women being more intimidated by the "negotiation" language than by the "asking" language. Building on work in politeness theory (Brown and Levinson, 1987), Small et al. (2007) suggest that the "negotiation" language might be viewed as inconsistent with the norms of politeness that socially less powerful individuals (e.g. women more than men) are more likely to abide by; in contrast, the "asking" language is more in line with what a low-power person would say (e.g., "may I borrow a dollar?" rather than "give me a dollar").

Bowles et al. (2007) also investigate gender differences in the propensity to initiate negotiations. They propose and test the view that a differential treatment of men

and women that attempt to negotiate is a key driver of the gender gap in initiating negotiation for higher compensation. As a first step in their study, they first investigate how subjects evaluate accounts of male and female candidates that did or did not negotiate for their compensation. Women that initiate negotiation receive systematically worse evaluation from male evaluators than men that initiate negotiations. In particular, in both written and video-based evaluations, male evaluators report being significantly more willing to work with women who accepted their compensation offers than with those who attempted to negotiate for higher compensation, even though they perceive both groups of women as equally able. Female evaluators did not display such systematic patterns across the written and video-based evaluations. This is reminiscent of studies such as Rudman (1998) and Rudman and Fairchild (2004), who show that women who self-promote in a stereotypically masculine way are perceived to be socially less competent.<sup>16</sup>

In a next step, when asked to take the candidates' perspective, female subjects are shown to be less inclined to negotiate in the presence of a male evaluator; but no such difference occurred in the presence of a female evaluator. Hence, the gender of the evaluator is a key driver of the gender gap in the propensity to initiate compensation negotiations. Bowles et al. (2007) also investigate possible mediators for these effects; they conclude that neither nervousness, nor the anticipation of backlash, nor the strength of the participants' gender identity can fully explain the gender differences in the propensity to initiate compensation negotiation in the presence of a male evaluator. Bowles et al. (2007) conclude that "...women's greater hesitation (as compared to men) about attempting to negotiate for higher compensation may be informed more by emotional intuition than a conscious cost-benefit calculus based upon the anticipated social consequences of initiating negotiations."

## 2.5. Empirical implications for labor market outcomes

Most of the studies described above take place in controlled experimental settings. While these studies often document economically large gender differences in risk attitudes, attitudes towards competition and negotiation, or willingness to share with others, the real test for these new psychological perspectives on gender is whether they have any bite in explaining actual gender differences in labor market (or labor-market relevant) outcomes. The existing research in this area, which we describe below, is clearly just in its infancy and far from conclusive, with many contradictory findings. Trying to better establish the relevance of the psychological research for real outcomes should be a first-order priority for future research.

Manning and Saidi (2010) study data from the 1998 and 2004 British Workplace Employees Relations Survey, which contains information on the use of performance

<sup>16</sup> Similar results have been found in the leadership literature. See for example Eagly et al. (1992).

(or variable) pay at the occupation-level within establishments. Based on both the experimental literature on gender differences in attitudes towards risk and preferences for competition, they predict that there should be fewer women in those occupations and establishments that use variable pay instead of fixed pay contracts. While this is indeed what they find, the difference is quantitatively small, especially in contrast with the large gap in attitudes towards risk and competition observed in the laboratory. They also find very modest effect of performance pay on hourly wages and no significant effect of the gender mix in a job on the responsiveness to performance pay.<sup>17</sup>

A few recent papers have looked for field evidence on the impact of competitive pressures on male and female performance. In search of settings that are closer to the winner-take-all environments used in the laboratory, these papers have focused on narrower subgroups of the population. Paserman (2007) study how male and female tennis players react to competitive pressures in Grand Slam tournaments. By the nature of the sport, there is no variation in gender composition here: female tennis players never play against male tennis players. Paserman (2007) can therefore only look for behavioral responses to competitive pressures in single-sex environments (which, as we discussed earlier, have not been consistently found in the lab). Using a point-by-point analysis, Paserman (2007) finds that women are much more likely than men to commit unforced errors at critical points in the game; there is also some evidence that women's first serves become more conservative at critical points in the game (e.g. women have a higher first serve percentage at critical points).

In a recent working paper, Lavy (2008b) finds a real world setting that is even closer to the controlled environment designed by Gneezy et al. (2003). Specifically, Lavy studies how high school teachers' performance is affected when they are forced to participate in an academic subject-specific rank-order tournament where they are rewarded according to the relative performance of their classes on a test compared to the performance of other teachers' classes at the same school. In contrast with the laboratory evidence, Lavy finds no statistical evidence that female teachers do worse under the tournament scheme. In addition, female teachers' performance in the tournament scheme does not appear to be statistically related to the gender mix of the comparison group (e.g. other teachers at the same school in the same academic subject). One should note though that a first-order difference between the teacher environment studied here and the laboratory setting is the time frame under which the task has to be performed (15 minutes of maze solving versus months of teaching). Another first-order difference is that teachers have clearly a lot of experience with the task at hand, unlike the maze-solving students. Other possible explanations for why the Lavy results differ from the experimental results might be that

<sup>17</sup> Note that the lack of strong differential response to performance pay by gender has been documented in multiple other papers. For example, Paarsch and Shearer (2007) show how productivity responds to piece-rate incentives among employees of a Canadian tree-planting firm. They find no evidence of differential response to incentives by gender and attribute the gender gap in productivity to gender differences in tree-planting ability.

the type of men that become teachers might be a very selected group, and the fact that it is the kids' performance, rather than the teacher's input in that performance, that is being directly measured.

In contrast, Örs et al. (2008) find results that are more consistent with the competition hypothesis. They study the performance of men and women in the very competitive entry exam to the Haute Ecole de Commerce (HEC) in France, where only a little more than 1 out of 10 applying students is admitted. They compare how men and women perform on the entry exam to their performance in the national high school exam (with is admittedly somewhat less competitive and less stressful), as well as, for the admitted students, to their performance in the first year of courses at HEC. They find that women perform more poorly than men on the stressful and competitive entry exam, with the performance distribution for men displaying much fatter tails. Yet, and consistent with the competition hypothesis, they find, when looking at the same set of students, that the performance of women first-order-stochastically dominates that of men in the two less competitive settings with similar academic content (national high school exam and first year at HEC).<sup>18,19</sup>

A few descriptive field studies have confirmed that women appear less likely to initiate negotiations. In a study of graduating professional school students, Babcock and Laschever (2003) find that only 7% of female students attempted to negotiate their initial compensation offers, as compared to 57% of men. In a survey of about 200 working adults, Babcock et al. (2006) find that men had initiated negotiations two to four times as frequently as women. Among MBA students, Babcock et al. (2006) find that more than half of the male students negotiated their job offer, compared to only about 10 percent of the female students. As in the laboratory setting, they find sharp contrasts between low-ambiguity industries, where compensation standards for starting salaries are relatively transparent and high-ambiguity industries, where compensation standards are less transparent. While there is no gender difference in negotiated starting salaries in low-ambiguity industries, there is about a \$10,000 gender gap in high-ambiguity industries after controlling for a long vector of salary predictors.

Other descriptive studies have tried to link gender differences in negotiation to the under-representation of women at senior levels. Greig (2008) surveys about 300

<sup>18</sup> Rothstein (2004) observes a related pattern in US data: after controlling for SAT scores, girls have higher GPAs than men in both high school and college.

<sup>19</sup> Niederle and Vesterlund (2010) argue that a similar logic might be used to explain why women under-perform in math tests. Specifically, they argue that the difference between test score performance and actual ability might be particularly large for women when it comes to taking math tests (where women under-perform compared to men) because the math tests might be perceived as particularly competitive and/or stressful for women. Relying on the stereotype threat literature (Steele, 1997), they posit that women may view the math test taking task as particularly anxiety-inducing. It is also possible that compared to, say, English tests, math tests are typically taken in environments where more males tend to be present (as more of them select into math-intensive majors) and women respond particularly poorly to competitive pressures when surrounded by males. As we discuss below (Section 2.7), this last point is in line with a growing body of work discussing the benefits of single-sex education for women.



investment bankers at a major US investment bank. She finds that female employees report a lower propensity to negotiate on behalf of themselves and further shows that a correlation exists between one's propensity to negotiate and one's rate of advancement and seniority at the bank. While correlated with gender, the propensity to negotiate is not correlated with performance, suggesting that the gender gap in negotiation may bias personnel decisions and lead to an inefficient allocation of leadership positions.

Blackaby et al. (2005) examine promotion and pay patterns by gender in the UK academic labor market for economists. They find a significant gender gap in promotions, as well as a significant gender gap in the number of outside offers, holding productivity constant. Moreover, there is a stronger correlation between number of outside offers and earnings for men, but not for women. One (of admittedly many) possible interpretation for these findings is gender difference in one's ability or willingness to bargain.

Säve-Söderbergh (2009) uses a unique survey data set on a population of recent social science graduates in Sweden. In the survey, participants are asked to report if they were asked to state an explicit wage bid to their prospective employer, and if yes, what that bid level was; they are also asked to report the wage they were offered. Controlling for individual- and job-level characteristics, Säve-Söderbergh (2009) finds that women submit lower wage bids than men and are also offered lower wages; women also receive lower counter-offers than men. Säve-Söderbergh (2009) also studies the extent of self-promoting strategies by gender, by looking at how much each applicant overbids a similar applicant. Women do not appear to use self-promoting strategies less than equally qualified men in similar jobs, but they typically overbid by less than men do. Employers reward (in terms of offered wages) both men and women for self-promoting, but the rewards are slightly larger for men.

Fortin (2008) investigates the role of greed and altruism in explaining the gender wage gap. She relies on longitudinal data which allows her to capture those psychological characteristics in a pre-market environment and therefore minimize ex-post rationalization concerns. Fortin (2008) finds individual attitudes towards greed and altruism, but also ambition and leadership, to have the expected effects on a set of labor-market related behaviors and outcomes: in particular, individuals that display more greed and less altruism earn more). Moreover, women tend to score higher on most of those factors that are predictive of financially less attractive labor market outcomes; for example, women hold more altruistic values than men and rank opportunities to "help others or be useful in society" higher in their career selection. Fortin also finds evidence of gender convergence across cohorts in many of those soft factors, with the gender gap in ambition and leadership having particularly shrank a lot among the younger cohorts in her data. The psychological factor that remains an important predictor of the gender gap in earnings in the later cohorts are expectations about future income, which are themselves tightly linked to greed.

Manning and Swaffield (2008) take a stab at quantifying the importance of the previously discussed psychological factors in explaining the gender gap in early-career wage growth in the UK. They consider a comprehensive set of psychological factors, including risk attitudes, attitudes towards competition, self-esteem and overconfidence, and the strength other regarding preferences. One advantage of their data, as in Fortin (2008)'s study, is that they can define proxies for these psychological attributes prior to labor market entry. They conclude that the whole set of psychological factors can explain at most 4.5 log points of the about 25 log points gap in earnings that has built up between men and women 10 years after labor market entry; in contrast, human capital factors account for about 11 of these 25 log points.

## 2.6. Other personality traits

A recent literature has been interested in studying how a broader set of personality traits and characteristics affect behaviors and labor market outcomes (see Bowles et al., 2001; Borghans et al., 2008a,b). Personality traits may affect labor market earnings through different channels.<sup>20</sup> The most obvious model is that personality traits are part of an individuals' set of productive traits (just like cognitive skills) and these traits are directly valued in the market. In this case, any systematic difference in personality traits between men and men will translate in earnings differences, maybe in part due to occupational segregation. Personality traits may also impact pay by affecting one's preferences, such as one's willingness to take risk, or one's taste for competition.

The most commonly used inventory of personality traits is the Big Five model (see Digman, 1989, 1990; McCrae et al., 1999 or McCrae and John, 1992). The Big Five personality traits are extroversion, agreeableness, conscientiousness, neuroticism and openness to experience.<sup>21</sup> Psychologists have documented over the years gender differences in these five personality traits. A review by Bouchard and Loehlin (2001) suggests that agreeableness and neuroticism are the two traits that are most consistently associated with gender differences: women are consistently found to be both more agreeable and more neurotic than men.

Mueller and Plug (2006) rely on the Big Five model for an early exploration of the effects of personality traits on earnings by gender in the Wisconsin Longitudinal Study.<sup>22</sup> Like the earlier psychology literature, they confirm in this data the presence

<sup>20</sup> A well-known demonstration of the importance of personality traits for labor market success has been demonstrated in early childhood intervention programs such as the Perry Preschool Program (Heckman et al., 2007): while originally designed to improve the cognitive skills of children, this program did little to raise IQ levels among treated adults; however it did raise personality skills as well as a variety of economic outcomes among treated adults.

<sup>21</sup> An active debate surrounds the personality literature. One key aspect of this debate centers on the question of whether personality traits are stable across situations or whether they are essentially situation-specific. Also, the Big Five model is often criticized for its lack of theoretical foundations.

<sup>22</sup> Related studies by organizational and industrial psychologists have examined how the Big Five personality dimensions relate to job performance, occupational attainment and career success. See for example Judge et al. (1999).

of some gender differences in the Big Five personality traits. They find that women score significantly higher than men along the agreeableness, neuroticism, extroversion and openness dimensions, with the gender gap in agreeableness and neuroticism being the largest. Their second main finding is that while personality traits matter significantly for labor market earnings, the correlations differ quite a lot by gender. While there are positive returns to being open to experience for both men and women, men earn a premium for being antagonistic (that is, not agreeable) while women earn a premium for being conscientious. Overall, only 3 to 4 percent of the gender gap in earnings is explained by gender differences in mean personality traits and gender differences in the returns to those personality traits. A Oaxaca-type decomposition indicates that antagonism is the key trait in driving this gender gap (with men scoring higher on this trait and experiencing higher returns when displaying this personality trait). Overall, they find in this data that personality traits account for about as much earnings heterogeneity as cognitive ability does, but matter much less than a factor such as education.

A few other papers have been interested in the contribution of more specific personality traits for the gender gap in labor market achievements. Niederle and Yestrumskas (2008) test for the possibility that women's under-representation in high profile occupations might be related to their lower desire to seek challenges. Their experimental design confirms that women avoid higher difficulty levels on a task, even though there are neither gender differences in ability on that task nor gender differences in beliefs about ability on that task. Further experimental probing however suggest that those gender differences in the willingness to select more difficult tasks can be fully explained by (previously documented) gender differences in risk aversion and confidence.

Borghans et al. (2005) focus on the importance of interpersonal skills, or "people" skills. Borghans et al. (2005) argue that technological and organizational changes have induced an increase in the demand for interpersonal (or "people") skills. One explanation for this pattern is that new technologies may have led to more emphasis being placed on those skills that cannot be easily automated, which would naturally include people skills. They show that the importance of people tasks increased particularly rapidly between the late 1970s and the early 1990s. This shift in demand, the authors argue, has been particularly beneficial to women: indeed, they show that occupations in which people tasks are more important employ relatively more women, suggesting that women are relatively more endowed in those increasingly valuable interpersonal skills.<sup>23</sup> The authors conclude that the large increase in the importance of people tasks at work from the late

<sup>23</sup> Borghans et al. (2008a,b) present empirical evidence in both UK and German data that one's sociability level in youth affects one's job allocation in adulthood. More caring individuals are assigned to jobs in which caring is more important (e.g. teaching or nursing careers).

1970s to the early 1990s has contributed to the decline in the gender wage gap over that time period.<sup>24,25</sup>

In a similar spirit, a few studies highlight how other personality differences between men and women may work in women's, not men's, advantage. The focus so far has been on education. Specifically, gender differences in behavioral problems have been brought forward to explain why women are now surpassing men in terms of educational achievement.<sup>26</sup> The medical literature has documented the much higher rate of attention deficit hyperactivity disorder (ADHD) among boys (see for example Szatmari et al., 1989). Goldin et al. (2006) also report on the higher incidence of arrest rates and school suspension among teenage boys compared to teenage girls in the NLSY data.

The sources of the gender differences in the incidence of behavioral problems between boys and girls remain unclear. One hypothesis (Bjorklund and Kipp, 1996) is that women are better than men at delaying gratification; a meta-analysis of the relevant empirical research by Silverman (2003) suggest that there is indeed a small female advantage in the ability to delay gratification. Another explanation for boys' higher incidence of behavioral problems in high school is related to their later puberty and later maturation. In a study of the Finnish education system, Pekkarinen (2008) shows how postponing when students have to choose between vocational and academic tracks (from age 10–11 to age 15–16) led to a relative increase of the share of girls choosing the (more challenging) academic track, as well as a relative increase in the share of girls continuing into tertiary education. This differential response, Pekkarinen (2008) argues, is related to the fact that while boys and girls are at about the same stage of cognitive and psychological development by age 10–11, most girls are beyond puberty by age 14, while boys are still going through important physical and psychological changes that have adverse effects on their behavior and aspirations. Yet another hypothesis (see Sax, 2007) is that the demands that are placed on children in kindergarten have increased a lot over time (in the US at least), moving away from experiential knowledge and towards didactic knowledge; this change might have been detrimental to boys given the slower speed of development of relevant areas of their brain (such as the language area). A consequence of all this, Sax (2007) would argue, has been the increase in ADHD diagnosis, especially among very young boys, and the increase usage of ADHD drugs, which have been linked to personality changes (laziness, motivation, violence) even after short period of usage. An empirical implication of this hypothesis would be that starting kindergarten at an early

<sup>24</sup> The paper also documents that the same increase in demand for people skills may have slowed down the black-white convergence as blacks are relatively under-represented in occupations where people tasks are important.

<sup>25</sup> There is also been a related discussion of how modern business practices have increased the relative demand for more participative type of leadership, and hence been relatively favorable to women (see Eagly and Carli, 2007).

<sup>26</sup> Another explanation that has received attention for the reversal of the gender gap in college attendance is that the returns to college might be higher for women than for men (Dougherty, 2005). There has also been some discussion of increasing reverse discrimination against boys (see for example Lavy, 2008a,b).

age would be especially detrimental to boys. There is not much evidence for this so far (see for example Elder and Lubotsky, 2009).

While the literature is still unclear about the source of this gender gap in behavioral problems, it has already been established that they matter for the (reverse) gender gap in college attendance. Using NELS data on a nationally representative cohort of eight graders in 1988, Jacob (2002) shows that boys have a much higher incidence of school disciplinary and behavior problems, and that they spend fewer hours doing homework. Controlling for these non-cognitive behavioral factors, as well as the higher college premium for women, can explain most of the female advantage in college enrollment; importantly, non-cognitive factors continue to matter even after controlling for high school achievement (Jacob, 2002). Hence, as Goldin et al. (2006) put it, one can view the reversal of the gender gap in college attendance as the outcome of a "... more level playing field allowed girls to blossom and take advantage of higher expected returns of attending college. At the same time, slower social development and greater behavioral problems of boys remained and allowed girls to leap frog them."

Finally, besides papers trying to directly relate, in a reduced form way, personality traits to educational and labor market outcomes, a few studies have been interested in how personality traits predict preference parameters, such as risk preferences. For example, Croson and Gneezy (2009) offer an interesting discussion of what might explain gender differences in risk aversion. They point at systematic gender differences in emotional or affective reaction to risk, which may affect the utility one gets from making riskier choices. Indeed, women appear to experience more stress, fear or dread in situations that involve the risk of a negative outcome. (Brody, 1993; Fujita et al., 1991). Also, Fehr-Duda et al. (2006) show that women's higher relative risk aversion can be linked to women underestimating large probabilities of gains more strongly than do men; this, they argue, could be viewed as consistent with Loewenstein et al. (2001)'s "risk as feelings hypothesis," with women's stronger emotional reaction at the time of making a risky decision manifesting itself as pessimism.<sup>27</sup> The same pessimism may also cause women to overestimate the probability of negative outcomes, as suggested by Silverman and Kumka (1987), Flynn et al. (1994), or Spigner et al. (1993).

Borghans et al. (2009) experimentally measure risk aversion (as well as ambiguity aversion) among a sample of Dutch high school students. They then link those individual-level risk attitudes to both cognitive and non-cognitive personality traits, including the Big Five (openness, conscientiousness, extraversion, agreeableness, neuroticism) and a measure of ambition. Like much of this literature, they also find women to be more risk averse. They then try to assess how much of this can be due to differences in cognitive and non-cognitive traits between the gender. They do find personality traits to be predictive of risk aversion: in particular, being less agreeable, more

<sup>27</sup> See also Loewenstein and Lerner (2003).

neurotic and more ambitious is associated with lower levels of risk aversion. However, controlling for these psychological traits explains little of the gender gap in risk aversion.

## 2.7. Where do gender differences in preferences and personality traits come from?

It is obvious that there are important biological differences between men and women that have direct implications for how each sex is faring in the labor market. For example, men have a comparative advantage when it comes to occupations that require physical strength.<sup>28</sup> Also, as suggested in Ichino and Moretti (2009), it is likely that the menstrual cycle puts women of child-bearing age at a relative disadvantage because of it may cause them to be regularly sick and absent from work.<sup>29</sup> More importantly, many of the disruptions associated with child birth mechanically hurt women's chances of labor market success. In this regard, a few papers have shown how various sources of medical progress, by minimizing the influence of these biological differences, have contributed to a reduction in the gender gap in education and labor force participation. Goldin and Katz (2002) argue, and empirically demonstrate, that the availability of oral contraceptives (the pill) increased the likelihood that college-educated women choose to further invest in long-duration professional education (such as by entering medical school or law school). Similarly, Bailey (2006) shows that legal access to the pill for young unmarried women significantly increased their labor force participation later in their life cycle, as well as their number of hours worked. Also, Albanesi and Olivetti (2009) discuss how medical improvements in maternal health and the introduction of infant formula increased the labor force participation of married women of child-bearing age.<sup>30</sup>

Besides these obvious biological differences between the sexes lies the question of whether more subtle gender differences, such as the gender differences in preferences and personality traits discussed in the prior sections, also have biological roots (a "nature" explanation) or whether, in contrast, they mainly are the outcomes of environmental influences (a "nurture" explanation). As we discuss earlier, some of the research summarized above already highlights the importance of situational cues for the measurement of gender gap in attitudes (see in particular the work on gender differences in negotiation in Section 2.4), strongly suggesting a non-trivial role for environmental

<sup>28</sup> Welch (2000) presents in a two-skill (brain and brawn) model that can explain both the reduction in the gender gap in earnings, and the increase in income inequality. The model assumes that women are relatively well endowed in brains, and that brains are less equally distributed than brawn. With these two assumptions, an increase in the price of brain (such as likely occurred in the 1970s and 1980s) can at the same time reduce the gender gap in earnings and increase wage inequality.

<sup>29</sup> While Ichino and Moretti (2009) find evidence of 28-day cycles in absence for women working in a large Italian bank, Rockoff and Herrmann (2009) fail to detect any such cycles among female teachers in the New York City public schools. They argue that the different explicit financial incentives surrounding sick days in the US and Italy, and different levels of intrinsic motivation, can account for the lack of consistent results.

<sup>30</sup> See also Buckles (2007), who examines how easier access to infertility treatments affects women's labor force participation and wages.

factors. In general though, either nurture or nature factors could explain why men and women differ in their attitudes towards risk, or competition, or their willingness to share with others.

Proponents of a nurture explanation emphasize that parents, teachers and peers tend to treat boys and girls differently from a very young age, maybe being more tolerant of more aggressive or competitive behavior for boys, or having higher expectations them. Proponents of a nature explanation have emphasized arguments from evolutionary biology and evolutionary psychology. For example, an evolutionary explanation for gender differences in attitudes towards competition relies on the view that competitiveness may be a positive factor in the reproductive success of men, but a negative factor for the reproductive success of women. Because men can have many more children than women, they have more to gain from a reproductive perspective from winning competition against other men (Daly and Wilson, 1988); in contrast, more competitive tendencies among women may be destructive as their death may also imply the death of their offspring (Campbell, 2002).

Sorting out the relative importance of nature versus nurture has important policy implications. Finding a large role of environmental factors in explaining why women are, for example, more risk averse than men (and hence under-represented in riskier higher-earnings jobs) would imply that well thought-out educational reforms might be effective in undoing at least some of the gender gap. In contrast, affirmative action policies to increase women's representation in competitive sectors, or a push for further medical and pharmaceutical advances, might be the only effective policy tools if differences between the genders in the willingness to operate in a competitive environment are biological rather than environmental. Of course, it is also possible that both nature and nurture are at play, with these two explanations complementing one another rather than competing with one another. This last possibility is broadly supported by the body of research we review below.

### **2.7.1. Nurture**

Gneezy et al. (2008) present a case study that appears to rule out a pure nature-based explanation for gender differences in attitudes towards competition. The idea behind this research consists in measuring gender differences in behavior across two distinct societies with as close as possible to opposite cultures when it comes to women's position in the society. Finding evidence that women behave differently across such two distinct societies would run against the view that the behavioral differences between the genders are purely determined by biology. The two societies selected by Gneezy et al. (2008) are the Maasai in Tanzania and the Khasi in Northeast India. The Maasai are a classic example of a patriarchal society where "women are said to be less important than cattle." The Khasi are matrilineal with inheritance and clan membership following a female lineage; Khasi women are the head of their household and make all important economic decisions. After these two societies have been identified, the study then consists in asking

participants to perform a simple task and ask them to choose, ahead of performing the task, how they want to get compensated for the task. The task in this case, chosen for its simplicity and gender neutrality, consists in tossing a small ball 10 times in a bucket. The participants are further informed that they will be paired with someone else performing the same task in another location in the village, and can choose between being compensated a fixed amount for each successful throw or three times that fixed amount per successful throw if they outperform the other participant (and nothing if they are outperformed). Gneezy et al. (2008) find that while the patriarchal society follows the same gender patterns as found in the West (with 50 percent of the Maasai men choosing to compete compared to only 26 percent of Maasai women), the exact opposite pattern holds in the matriarchal society (with 54 percent of Khasi women choosing to compete compared to only 39 percent of Khasi men). While this result runs against the view that gender differences in the willingness to compete are purely driven by biology, it remains possible that different socialization processes between these two societies resulted in a large evolutionary distance between them.

Two other recent papers also pointing towards a role of socialization and environmental factors in explaining gender differences in preferences (risk attitudes and attitudes towards competition) are Booth and Nolen (2009a,b). Booth and Nolen (2009a) show that gender differences in risk attitudes in a sample of English 15-year-olds depend on whether the girls have attended a single-sex school or mixed-gender school. Girls from single-sex schools display risk attitudes that are no different from the average boy; in contrast, girls from mixed-gender schools are significantly more risk averse. Clearly, an advantage of this study compared to Gneezy et al. (2008) is that one is less concerned about evolutionary distance between students in single-sex schools and those in mixed-gender schools. There is however a clear concern about differential selection into these two types of school, and in particular that the more able students attend the single-sex grammar schools.<sup>31</sup> Booth and Nolen (2009a) try as much as possible to address this concern by restricting their analysis to the top students in both types of schools, by showing the robustness of the results to propensity score matching of students, and by instrumenting for school type with relative distance between the child's residence and the closest mixed-gender or single-sex school.

Booth and Nolen (2009b) use another part of the same experiment to study how the educational environment might relate to the gender differences in the willingness to compete. Specifically, the boys and girls in the experiment are also asked to solve mazes first under a piece-rate scheme, then under a tournament scheme where their performance is compared to others in a group they were randomly assigned to. Finally, they are asked to choose whether they want their performance in a last round to get compensated under the piece rate scheme or under the tournament scheme. Consistent

<sup>31</sup> Prior research has established a negative correlation between cognitive skills and risk aversion, even after controlling for socio-economic background and educational attainment. See for example Dohmen et al. (forthcoming, 2010).



with the findings on risk attitudes in Booth and Nolen (2009a), they find that girls from single-sex schools behave more like boys in that they are 42 percentage points more likely to choose the tournament compensation compared to girls from the mixed-gender schools; in contrast, boys from mixed-gender schools are statistically as likely to enter the tournament as boys from single-sex schools. These findings are robust to controlling for ability on the task (as measured in the first rounds of play), as well as to performing the same set of robustness checks as in Booth and Nolen (2009a).<sup>32</sup>

While our focus has been on the role of environmental factors for the gender gap in non-cognitive skills, we also discuss for the sake of completeness recent work on how nurture may affect the gender gap in some key cognitive skills. Hoffman et al. (2010) focus on spatial abilities, a skill that has been shown to correlate with success in engineering courses as well as the decision to major in physical sciences (Humphreys et al., 1993), and a skill at which men significantly outperform women (Voyer et al., 1995). Hoffman et al. (2010) use a research approach similar to Gneezy et al. (2008) to assess the role of nurture in the gender gap in spatial reasoning, which they measure by the time needed to solve a puzzle. They show that women's relative disadvantage on this task disappears when they move from a patrilineal society (the Karbi) to a geographically and ethnically close matrilineal society in Northeast India (the Khasi).

Much of the remaining research on how environmental factors influence the gender gap in cognitive skills has put the emphasis on the possible role model effects associated with teacher gender. While a lot of the earlier research on this topic has delivered mixed results (most likely because of an inability to deal well with obvious omitted variable and selection issues), a few recent papers have come to more consistent evidence of non-trivial role model effects. In a sample of eighth graders in the US, Dee (2005, 2007) studies how within-children cross-subject assignment to a same-sex rather than opposite-sex gender teacher affects both the children's performance in the subject and the teacher's perception of the student's performance.

Assignment to a same-gender teacher improves performance for both girls and boys; it also improves the teacher's perceptions of the student's performance. Hoffmann and Oreopoulos (2009) exploit both within student and within instructor variation and find qualitatively similar effects among first-year college students, even though the economic magnitude of these effects is rather small (at most 5 percent of a standard deviation improvement in grade). Another study of college students (Carrell et al., 2009) focuses on how same-sex teachers in introductory university courses affect a student's majoring choices. The experimental design here is particularly appealing in that the focus is on an educational institution where students are randomly assigned to professors for those

<sup>32</sup> Note that there is also some evidence that girls that are randomly assigned by the experimenter to all-girls groups are less likely to shy from competition than girls assigned to mixed-gender or all-boys groups; however, this does not cancel out the direct effect of being female on one's willingness to compete. Similarly, Booth and Nolen (2009a) find that girls assigned to all-girls groups display a higher risk tolerance than girls assigned to mixed-gender or all-boys groups.

introductory courses. The results suggest that female students that are assigned to female professors for their introductory math and science classes not only perform better in those classes but are also much more likely to major in science, math, or engineering; professor gender does not appear to matter much for male students. This is qualitatively consistent with Bettinger and Long (2005) who use within course and student variation (e.g. no random assignment in this case) and find small but positive effects of same-sex instructors on course credits and major choices for female students.

A recent study by Fryer and Levitt (2010) fails to find such role model effects to mothers' influences on their daughter's math skills. Fryer and Levitt (2010) relies on ECLS-K, a data set that covers a sample of more than 20,000 children entering kindergarten in the fall of 1998 and interviews them in the spring of kindergarten, first grade, third grade, and fifth grade. They find that girls with highly-educated mothers, or mothers working in math-related occupations, lose as much ground in math compared to girls whose mothers are less educated or do not work in math-related occupations. The data further shows that parents report spending equal amounts of time with boys and girls doing math-related activities. More generally, a set of variables capturing parental behavior or parental expectations do little to explain the gender gap in math scores among these young children.

A few recent papers have debated whether socialization or environmental forces can account for some of the cross-country variation in the gender gap in math test scores. Guiso et al. (2008) focus on whether the degree of sexism in 40 countries relates to how well 15-year-old girls are doing in math and reading compared to 15-year-old boys. The proposed measure of sexism include the World Economic Forum's Gender Gap Index, as well an index of attitudes towards women built from the World Values Surveys. The findings suggest that the gender gap in math disappears in more gender-equal societies and the reading gender gap (which always favors women) becomes even larger in those societies. However, Fryer and Levitt (2010) show that this correlation between the gender gap in math and the gender equality indicators no longer holds when the list of countries is extended to include more middle-eastern countries (countries that generally score low on the gender equality indices but where girls do relatively well in math). Reminiscent of the work of Booth and Nolen (2009a,b), Fryer and Levitt (2010) note that one of the (many) distinctive features of these middle-eastern countries is their disproportionate reliance on single-sex schools.

### **2.7.2. Nature**

While the evidence discussed so far is suggestive of at least some environmental influences, there has also been quite a lot work suggesting biological influences. Scientists have argued that differences in male and female brain structures, and in the exposure to sex hormones influence gender specific skills (see for example Kimura, 1999). In particular, a lot of research has focused on establishing that testosterone levels, which of course differs on average between men and women but also differ within gender, are

predictive of important behavioral outcomes. Studies have related higher testosterone levels to more positive attitudes towards competition and dominance (Archer, 2006), lower fear levels (Hermans et al., 2006) and more gambling and alcohol consumption (Dabbs and Morris, 1990; Mazur, 1995; Blanco et al., 2001). Also, Baron-Cohen (2003) argues that lower prenatal exposure to testosterone is related to how social a child is, and his or her ability to empathize with others.

A few recent studies have tried to directly establish a link between testosterone levels and the willingness to take financial risk. Dreber and Hoffman (2007) study the correlation between risk preferences and prenatal exposure to testosterone in a sample of Swedish university students. To proxy for prenatal exposure to testosterone, they use the ratio of the length of their second finger (index) to the length of their fourth finger (ring finger), a measure also known as the “2D:4D” ratio. There is suggestive but not conclusive evidence that the 2D:4D ratio is a marker for the permanent effects of prenatal hormones on the organizational structure of the brain: the 2D:4D ratio has been shown to be negatively correlated with prenatal testosterone exposure and to be fixed very early in life (see Manning et al., 1998). Dreber and Hoffman (2007) find that, both across and within-gender, a higher 2D:4D ratio predicts more risk aversion. In men, a similar correlation has been observed between levels of circulating testosterone and their risk attitudes (Apicella et al., 2008). Also, women’s willingness to take financial risk has been shown to vary over the menstrual cycle (Broder and Hohmann, 2003).

A couple of recent papers show that testosterone levels are related to career choices and professional success. Maestriperi et al. (2009) focus on a sample of about 500 MBA students and first investigate how between- and across-gender variation in risk aversion in that sample relates to variation in both circulating testosterone (as measured in the saliva) and testosterone exposure in utero (proxied for with the 2D:4D ratio). Among female MBAs, those with higher circulating testosterone, and (but somewhat more weakly) higher levels of prenatal exposure testosterone, display lower levels of risk aversion; however, in contrast to Dreber and Hoffman (2007) and Apicella et al. (2008), testosterone levels (either prenatal or circulating) do not appear predictive of risk aversion among male MBAs. In the low testosterone range though (where most women are), there appears to be no gender differences in risk aversion between men and women. When it comes to occupational choices, Maestriperi et al. (2009) find that female MBAs are much less likely to enter a financial career than male MBAs; this gap becomes smaller and statically less precise in a regression that controls for both circulating and prenatal testosterone levels (with both testosterone level variables having the expected effect on career choices—e.g. higher testosterone levels increase the chance of pursuing a career in finance). Also, Coates et al. (2009) focus on prenatal exposure to testosterone among male financial traders in the City of London, also using the 2D:4D ratio as a proxy. They find a relationship between an individual trader’s 2D:4D ratio and his long-term profitability as a trader, as well as the number of years he remains active as a trader.

Studies such as these are certainly suggestive of a role for nature in explaining at least some of the underlying gender differences in both preferences and labor market outcomes. Yet, in the end, none of this evidence implies causality. This is clearly obvious when it comes to circulating testosterone levels, which could be strongly affected by environmental factors, or be an outcome, rather than a cause, of behavioral choices. This is also true, even though in a less obvious way, when it comes to prenatal exposure measures. Indeed, it remains unclear what drives the variation in the levels of testosterone in utero. One could imagine this variation to be related to mother's socio-economic characteristics or behaviors, and those could directly feed into different child-rearing practices.

### **3. GENDER IDENTITY**

Another explanation that has gained in popularity over the last decade for the persistence of a gender gap in labor market outcomes is that this gap is an outcome of prevailing social norms about what is appropriate for men to do and what is appropriate for women to do. Such social norms may induce differential sorting of men and women across occupations; they may also drive women's decisions to participate in the workforce. While Altonji and Blank (1999) already mention the potential role of social norms in their review article, new research has emerged since their article, both theoretical and empirical, that helped refine our understanding of what those social norms are and how they might matter for labor market outcomes. On the theoretical front, a key development has been the import into economics, from social psychology, of the concept of identity, and the recognition that one's identity, which includes but goes far beyond one's "gender identity," could be an important factor in driving economic decisions. A 2000 paper by Akerlof and Kranton has anchored much of this recent literature. We first review this paper, as well as a few related theoretical pieces. We then discuss the empirical research aiming to test the link between gender identity and women's labor market outcomes, as well as the empirical research that has been interested in explaining the origin of gender identity norms. Finally, in an attempt to close the loop between this and the prior section of this article, we review some research that has proposed to link gender differences in preferences to gender identity; indeed, under a nurture view of gendered preferences, one could argue that women display more risk aversion (or a stronger dislike for competitive situations, or more altruistic tendencies) because this is what is expected from them under the prevailing gender identity norms.

#### **3.1. Theoretical foundations**

Akerlof and Kranton (2000) define identity as one's sense of self, or one's sense of belonging to one or multiple social categories. One's identity encompasses a clear view

about how people that belong to that category should behave.<sup>33</sup> Akerlof and Kranton (2000) propose a model where one's identity directly enters the utility function: under this model, one's identity can influence economic outcomes because deviating from the behavior that is expected for one's social category is assumed to decrease utility. Hence, people's economic actions can in part be explained by a desire to conform with one's sense of self.

Most relevant to this review is the lengthy application Akerlof and Kranton (2000) propose of the identity model to the concept of gender identity. In this case, the two relevant social categories are those of "man" and "woman," and these two categories are associated with specific behavioral prescriptions which, if violated, will decrease utility. One obvious application is labor force participation: as long as there is a strong behavioral prescription indicating that "men work in the labor force and women work in the home", norms regarding gender identity could explain why women have been slow at increasing their labor force participation.

Another application Akerlof and Kranton (2000) consider is that of occupational segregation by gender. How could gender identity explain why such segregation has been slow to disappear? Akerlof and Kranton (2000) ask that we put ourselves in the shoes of a woman Marine. Because Marines are essentially all viewed as men, a woman in this occupation may feel discomfort as her decision to become a Marine is in conflict with the behavioral prescription for her gender category (only men, not women are Marines). This could explain why women have been slow at entering male professions, despite financial incentives to do so.

Moreover, male Marines may feel the need to tease or mistreat the woman Marine, as accepting her as a co-worker threatens their own gender identity, which reinforces women's reticence to enter this male profession. Note that in this last implication, the identity model can be regarded as a micro-foundation for reduced form discrimination models, such as Becker's, which assumes that people from one group have a dislike for working with people from another group (Becker, 1971). While such a dislike for being around people of the other group may capture quite well the feeling that many whites may still experience against non-whites, it does not fit so well when the groups are men and women. In contrast, the identity model provides a reasonable explanation for why men may be averse to being surrounded by women at work. This is related to Goldin (2002)'s pollution theory of discrimination, who also assumes that men derive utility from their work not just due to the wage they earn but also from how their image is affected by where they work and who they work with. Under Goldin (2002)'s model, men want to keep women away from certain jobs because broad female participation in those jobs would reduce the prestige men get from working in those jobs. The driver of the reduction in prestige in Goldin (2002)'s case is more about the signals that might

<sup>33</sup> See also Akerlof and Kranton (2002, 2005). Akerlof and Kranton's approach to identity is most directly related to social psychology research by Tajfel (1981) and Turner (1985). For a survey of recent research on identity, see Hill (2006).

be send to outsiders about the qualifications that are required to perform these jobs if too many women enter, as their productivity is not directly observable and verifiable by those outsiders whose opinion drives occupational prestige. In other words, Goldin's model is much closer to a statistical discrimination model while Akerlof and Kranton's is more directly reminiscent of the taste-based discrimination model. While Akerlof and Kranton's model can only explain big shifts in occupational segregation through changes in societal norms regarding gender, Goldin's model puts the focus on the credentialization process (such as the one induced by women entering professional schools in the late 60s and early 70s) as an important driver of the "declining significance of gender" and of occupational de-segregation.

Akerlof and Kranton (2000) also apply their gender identity model to the allocation of housework tasks between spouses. They discuss how gender identity considerations may explain why even those women that are employed full-time in the labor market still do a disproportionate share of the housework. If behavioral prescriptions dictate that "men work in the labor force and women work in the home", men's gender identity is threatened if their wives work in the labor market, and especially if they do well (better than their husband). One way to rebalance utility in the household would be for those "threatening" women to engage in a larger share of the housework tasks. The prediction of the gender identity model here clearly runs counter to the prediction of the bargaining model, which would call for a monotonic negative relationship between women's relative labor market earnings and their relative contribution to housework activities.

### **3.2. Does gender identity influence women's labor market decisions?**

A couple of recent papers can be regarded as direct attempts to test the relevance of the gender identity model to explain female labor market outcomes both across countries and within-country over time. Fortin (2005) uses data from the World Values Surveys to assess how women's sense of selves relate to their labor force participation and relative earnings in a sample of 25 OECD countries over a 10-year period. She shows that the social representation of women as homemakers and men as breadwinners (as captured by a statement such as "being a housewife is just as fulfilling as working for pay") appears quite stable across cohorts and over time and is very predictive of women's labor market outcomes. There is also evidence that holding less egalitarian attitudes (as captured by a statement such as "when jobs are scarce, men should have more right to a job than women") is another powerful predictor of female employment and earnings; agreement with this statement has been declining both across cohorts and over time, which Fortin (2005) views as consistent with a decline in traditional forms of discrimination. Finally, there is evidence that what Fortin referred to as "mother's guilt" (as captured by disagreeing with a statement such as "a working mother can establish just as warm and secure a relationship with her child as a mother who does not work") is also closely related to a woman's labor force participation.

Fortin (2009) re-examines a similar question in a single country (the US) over a much longer time period (1977 to 2006). A more central motivation to this particular paper is to provide an explanation for the slowdown in the closing of the gender gap since the mid-1990s, which has occurred despite women's continued progress in terms of educational attainment (Blau and Kahn, 2006). Fortin shows that the evolution of gender role attitudes over time appears to map very well with the evolution of female labor force participation over time. Indeed, while women's gender role attitudes steadily became less traditional (e.g. more and more women disagreeing with the notion that husbands should be the breadwinners and wives should be the homemakers) and more egalitarian (e.g. more and more women agreeing with the notion that they are as capable as men in the workforce) until the mid-1990s, these trends reversed in the mid-1990s. Fortin (2009) further argues that the HIV/AIDS crisis might have been one of the factors responsible for the shift towards more conservative gender role attitudes.<sup>34</sup>

Important to an identity interpretation of the findings in Fortin's 2005 and 2009 papers is that the evolution of women's own sense of self, not just men's views about what women should do, drive the observed variation in labor force participation. This fact has been recently put into question by a paper by Charles et al. (2009). Charles et al. (2009) construct a measure of male sexism across US states, which they define based on men's responses to the gender role questions similar to those used by Fortin. They find a strong relationship between men's views on these questions in a given labor market and how women fare relative to men in that market (measured in terms of the gender wage gap and relative employment gap). Moreover, after controlling for men's views regarding gender roles, they fail to find that women's own views are predictive of their labor market outcomes. Charles et al. (2009)'s analysis further shows that it is the attitudes of the median man, but not the attitudes of the men at the tails of the distribution, that matters for women's relative labor market outcomes in a state. This, they argue, is consistent with the prediction of Becker's taste-based discrimination model.<sup>35</sup>

Another indirect test of the gender identity model is provided by Booth and van Ours (2009), who investigate the relationship between part-time work and well-being for Australian couples. They use three measures of satisfaction: hours satisfaction, job satisfaction, and life satisfaction. Controlling for family income, they find that part-time women are more satisfied with working hours than full-time women, and that women's life satisfaction is increased if their partners work full-time but decreased if they themselves work full-time. Male partners' life satisfaction is unaffected by their partners' market hours but is greater if they themselves are working full-time. This difference in

<sup>34</sup> Fortin (2009) writes: "The effect of the AIDS scare on egalitarian gender role attitudes would operate through preoccupations about reducing risk; it would make the lifestyle of the single, but not celibate, "career woman" less attractive. With the Pill, some women could become as sexually promiscuous as some men without facing the gender specific consequences; with the AIDS epidemic this equality of "opportunities" was severely tested."

<sup>35</sup> See also Pan (2010) for an empirical analysis of the link between men's sexism in a state and the dynamics of occupational segregation in that state.

the impact of part-time or full-time work on male and female partners' hours and life satisfaction is suggestive of Australian households having traditional gender role divides. In addition, when they use time use data to explore the relationship between male shares of market work and housework, they find that patterns more consistent with Akerlof and Kranton (2000)'s gender identity hypothesis than with the more standard household specialization model.

### 3.3. Empirical determinants of gender identity norms

Assuming that the gender identity model is relevant to women's labor market outcomes, one is left with the question of what drives gender identity. Under an identity model, the changes in women's labor market outcomes over the last decades could only have occurred in conjunction with deep societal changes in the strength and meaning of the male and female social categories.

Innovations in contraception, and the introduction of the Pill in particular, may have contributed to altering women's identity in the 1960s and 1970s. As Goldin and Katz (2002) show, the introduction of the Pill led to both an increase in women's investment in schooling and an increase in the age at first marriage. This, Goldin (2006) argues, meant that women's adult identities were less influenced by traditional gender roles (as these identities were now more likely to be formed before marriage) and more influenced by career considerations.<sup>36</sup> Also, as we just discussed, Fortin (2009) singles out the AIDS crisis as an exogenous shock that may have undone some of the "liberating" effects of the Pill and contributed to a return to more conservative gender identity norms in the 1990s.

Other papers have discussed the influence of nurture in the formation of gender identities. Many believe that gender role attitudes are largely determined early in childhood, and several papers have documented something akin to an intergenerational transmission of gender identity norms. In an early paper, Vella (1994) establishes a relationship between a young female's attitudes towards working women and her background characteristics, including her religious affiliation, and the educational background and labor market behavior of her parents.<sup>37</sup>

Fernandez et al. (2004) provide a related explanation for why men may differ in how traditional their views are with respect to whether women belong at home or in the office. They argue that a significant factor in the steady increase in women's involvement in the labor force has been the growing number of men growing up in families with working mothers. These men may have developed less stereotypical gender role attitudes, with weaker association between their masculinity and them being the only or main breadwinner in their household. In particular, they show that men whose

<sup>36</sup> Goldin (2006) also discusses the possible influence of the rise in divorce rate in the 1960s. See Stevenson and Wolfers (2007) for a discussion of historical trends in marriage and divorce.

<sup>37</sup> Guiso et al. (2003) also show that religious people are less favorable of working women.



mothers worked are more likely to have working wives. The paper follows Acemoglu et al. (2004) and uses variation in the male draft across US states as an exogenous source of variation in mothers' labor force participation. This finding suggests a virtuous cycle: with more of these "new" men around, women should rationally invest more in labor market skills work and thereby expose their sons to this less traditional family structure.<sup>38</sup>

Farre and Vella (2007) directly test for the intergenerational transmission of gender role attitudes. Using the NLSY1979, they find that a woman's view regarding the role of females in the labor market and family affects her children's views towards working women. Farre and Vella (2007) also show the impact of those attitudes in labor market participation: mothers with less traditional views about the role of women are more likely to have working daughters and (reminiscent of Fernandez et al. (2004)) more likely to have working daughters-in-law.

A broader take on the importance of intergenerational transmission for gender role attitudes is to demonstrate the relevance of one's cultural background in shaping identities, attitudes and behavior. In a recent paper, Fernandez and Fogli (2009) study the labor force participation and fertility choices of second-generation American women.<sup>39</sup> They use past values of female labor force participation and fertility rate in these women's country of ancestry as cultural proxies. The underlying logic for isolating cultural effects this way is that while these women live in the economic and formal institutional environments of the US, conditions in the country of origin might have been transmitted to them by their parents. Controlling for individual and spousal socio-economic backgrounds, they find that American women whose ancestry is from higher labor force participation countries work more; similarly, American women whose ancestry is from higher fertility countries have more children. Interestingly, spousal culture appears to also matter in explaining these women's labor force participation.

The schooling environment, which was earlier singled out as a driver of gender differences in preferences, has also been linked to gender identity. Specifically, adolescent girls in a coed environment could see their traditional female identity reinforced as they are trying to be attractive to the surrounding boys and are competing with other girls to get boys' attention. Studies by Maccoby (1990, 1998) suggest that the pressure might be greater on girls to develop stereotypical gender identities when they are surrounded by boys, than they are on boys when they are surrounded by girls. Also, Lee and Marks (1990) discuss how girls that attend single-sex schools were less likely to hold stereotypical views of gender roles even after they no longer attended these schools.

Dasgupta and Asgari (2004) study gender stereotypes (as measured by performance on a gender-stereotype Implicit Association Test), among college-age women both before

<sup>38</sup> An alternative, non-identity based, interpretation for the findings in this paper is that men with working mothers were more exposed in childhood to household tasks and became relatively more productive at those tasks, hence making them better partners for working women.

<sup>39</sup> See also Fernandez and Fogli (2006). A few older papers linking culture to female labor supply include Reimers (1985) and Pencavel (1998).

and after their first year at either a coeducational or a women's college. While the two groups of women do not differ in their level of gender stereotyping at college entry, differences start emerging one year later: students in the women's college display no gender stereotyping, while the female students at the coeducational college show higher levels of gender stereotyping than in the previous year. Interestingly, Dasgupta and Asgari (2004) argue that their finding is mediated through female students' exposure to female professors: being exposed to more women in counter-stereotypical positions appears to undermine the automatic stereotypical associations women hold about themselves.<sup>40</sup>

### 3.4. Does gender identity drive psychological attributes?

A reasonable question one could ask in light of all the work we have reviewed so far is whether gender identity norms are responsible for gender differences in psychological attributes, such as attitudes towards risk, competition, and negotiation, or altruism. Psychologists have shown that people expect women to be docile and generous, while they expect men to be confident and self-assertive (see Eagly, 1987). Some have argued that a higher degree of risk aversion is viewed as the norm for females while part of the male identity is to be risk-takers: for example, Eckel and Grossman (2002) show that men expect women to be even more risk averse than they truly are. These expectations could be part of the socially constructed gender norms, rather than a reflection on innate differences; behaving according to these expectations may reflect a willingness to conform with what is expected from one's social category.

Earlier studies in psychology have investigated how gender triggers matter for performance in negotiation. For example, Kray et al. (2001, 2002) demonstrate that a subtle priming of gender identity in a negotiation task, which they achieve by telling the students engaged in the task that their performance will be regarded as highly predictive of their actual negotiation skills, makes women less effective in that task.

A couple of very recent studies have tried to establish even more directly a causal link between gender identity and preferences, with mixed results. Benjamin et al. (forthcoming) study in a laboratory setting how making salient a specific aspect of one's social identity (they consider gender but also racial identities) affects a subjects' likelihood to make riskier choices, or more patient choices. From a methodological perspective, the study consists in generating temporal exogenous variation in identity effects by temporarily making more salient ("priming") a certain social category and seeing how the subjects' choices are affected. The gender identity salience manipulation is done through a questionnaire included in the beginning of the experiment and where subjects are asked to identify their gender and whether they are living on a coed versus single-sex dormitory floor.<sup>41</sup> While the study uncovers some rich patterns with respect to racial

<sup>40</sup> See also Beaman et al. (2009) for a study of how exposure to women in leadership position affects gender stereotypes (in this case among men).

<sup>41</sup> In the control condition, the first section asked about living on or off campus.

identity (for example, priming a subject's Asian-American identity makes the subject more patient), making gender salient appears to have no significant effects on either men's or women's patience, or their level of risk aversion. Of course, it is possible that the priming performed in this experiment was too weak to temporarily affect preferences.

Another recent study aimed at assessing how preferences are affected by gender identity is by Boschini et al. (2009). The question under study here is whether gender identity priming affects subjects' level of altruism. The experiment consists in comparing behavior in a dictator game for subjects whose gender identity has been primed versus not. The results indicate that the priming does affect behavior (with women being more generous) but only when the subjects are assigned to mixed-gender groups. Moreover, the effect is driven by males: men are sensitive to priming and become less generous in a mixed-gender setting when primed with their male identity. Women do not appear to respond to the treatment.

#### **4. WOMEN'S WELL-BEING**

Probably the most striking labor market change over the last 30 to 40 years has been the enormous gains women have experienced along several objective outcome dimensions, including their educational achievement, their labor force participation, and their earnings. These revolutionary changes have been witnessed in the US but also in most other economically advanced countries. For example, Goldin et al. (2006) document how, starting in the 1970s, US girls started narrowing the gender gap in high school in terms of science and math courses; while men born in the late 1940s had about a 10 percentage point lead in terms of college graduation rates compared to women born in the late 1940s, that gap had been eliminated by 1980; women are now the majority among graduates of four-year colleges. Blau and Kahn (2008) document the rise in women's labor force participation (both absolutely and relative to men) and the decline in the male to female pay ratio between 1980 and 2000 across ten economically advanced countries.

In a recent paper, Stevenson and Wolfers (2009) ask the obvious complementary question, which is: how have those changes in objective outcomes mapped into changes in well-being for women? The core of their evidence for the US is based on data from the General Social Survey going back to the early 1970s and up to the present. The subjective well-being question available in this dataset is the one that has been most commonly used by happiness researchers: "Taken all together, how would you say things are these days, would you say that you are very happy, pretty happy, or not too happy?" Surprisingly, Stevenson and Wolfers (2009) find that women appear to have become somewhat less happy over time, both absolutely and relative to men. A similar pattern of relative decline in women's happiness exists across a variety of European countries (with West Germany being an interesting exception).

What explains these trends? One possibility Stevenson and Wolfers (2009) investigate is that the trends reflect on the changes in family structure over that time period, which

include a rising share of single mothers, especially among the less educated (see Elwood and Jencks, 2004). Stevenson and Wolfers (2009) however argue against this view, in that the trends are not concentrated among less educated women, or those that are single parents.

Another possibility, closely related to our previous discussion of the gender identity literature, is that the decline in women's well-being reflects on the difficulty women face in attempting to balance the multiple and competing expectations associated with being a woman: women may now, more than before, feel a need to both be a good wife, a good mother, and have a career in order to be fulfilled, and these multiple behavioral prescriptions are competing for the women's time and resources (Benabou and Tirole, 2007). In contrast with this possibility, Stevenson and Wolfers (2009) report similar well-being trends for women with and without children as well as for employed and non-employed mothers. However, more consistent with the view that today's women might be emotionally struggling in that they have to juggle more complicated lives and many more objectives in their life, they do find that young women are increasingly attaching importance to multiple domains of their life, beyond the domestic domain.

Lalive and Stutzer (2010) present more evidence consistent with the view that increasingly complicated gender identities explain the decline in women's well-being. They study how women are faring both in terms of labor market outcomes and subjective well-being across various communities in Switzerland that differed in how they voted in a national referendum on an equal rights amendment to the Constitution. They argue that the communities more people agreed with the proposition that "women and men shall have the right to equal pay for work of equal value" capture environments where traditional gender role models are being challenged. They find that the gender gap in pay is smaller in those communities where a larger fraction of people supported the equal rights amendment. But they also find that women report lower level of overall life satisfaction in those communities. Hence, women appear to be particularly unhappy when and where they are expected to (and succeeding at) break(ing) away from traditional gender identity norms.

Another possible explanation for the trends uncovered by Stevenson and Wolfers (2009) is that women, as they progressively close the gender gap in labor market achievements, are shifting who they use as a standard of reference when answering an otherwise unchanged subjective well-being question. In particular, one could imagine that women are now, more than in the past, deriving their well-being from how well they are doing compared to men, while they used to mainly compare themselves to other women in the past. If such an adaptation to improving circumstances is indeed explaining the central results in Stevenson and Wolfers (2009), it would have unclear implications for how women's true level of utility has been changing over time (see for example Kahneman et al., 2004). Indeed, such a change in reference group may indicate that women's preferences have adapted and that their utility is truly dependent on their

relative income or consumption compared to men, and not higher than in the past despite the material gains. Alternatively, it is possible that women are in fact experiencing higher utility today than in the past but that they now have higher standards for what their life should be like, with the lower self-reports on the well-being question just being a reflection of the higher aspirations women now have for themselves.

While this discussion highlights the difficulty in interpreting the observed trends in women's self-reported life satisfaction, alternative sources of data have been used to provide a complementary perspective on how women's life experiences have been changing over time. In particular, a more objective measure of women's relative gain or loss in well-being might be obtained by looking at time use data. As summarized in a book such as "the Second Shift" (Hochschild and Machung, 1989), some female activists would argue that the results in Stevenson and Wolfers are indicative of the fact that women have not been able to fully enjoy their improved position in the labor market because they have taken on this additional labor market work without a compensating break in their responsibilities in household production. So, while women are making objective gains in the labor market, the addition of labor market to home production work may have just have translated into too much work. Time trends in time use data, such as studied by Aguiar and Hurst (2007), offer a direct way to test the relevance of such a view. Aguiar and Hurst (2007) study how the allocation of time has changed for various demographic groups in the US between 1965 and 2003. Most relevant for us is a comparison of time trends in total work (which is defined as market work plus non-market work) between men and women over that period. The main finding is that both men and women have experienced a decline in total work over that period. While the decline is slightly larger for men than women, the difference is not large in light of the colossal changes in women's labor force attachment over the same time period (7.6 hours per week for men compared to 6.4 hours per week for women). Compositionally, though, and not surprisingly, the sources of the decline in total work are different for men and women. Over that period, men have decreased their market work by about 11.5 hours per week and increased their non-market work by nearly 3.9 hours; in contrast, women have seen their market work increase by about 6.2 hours per week but have experienced a very sharp decline in their non-market work (12.6 hours per week). So, while men may have taken up a huge share of home production tasks, it seems pretty clear that new home production technologies have protected working women from the reality of a "second shift."

Of course, translating these trends in time use into information about experienced well-being implies making important assumptions about how much men and women value their time at work, be it market work or non-market work, and how much they value their time out of work.<sup>42</sup> Krueger (2007) exactly performs such a translation by

<sup>42</sup> This is well illustrated in the exchange between Aguiar and Hurst (2007) and Ramey (2007).

combining Aguiar and Hurst's time use data with information on how individuals affectively experience various activities they engage in. This measurement of "experienced utility" is at the core of the Day Reconstruction Method (DRM) research agenda, as presented in Kahneman and Krueger (2006). Under this method, survey participants are asked to report what activities they engaged in during the prior day (very similar to the time diary surveys that are used for the collection of time use data); the survey participants are then further probed, typically for a random subset of the reported activities about the extent to which they experienced various feelings (such as happiness, stress or sadness) while engaged in each of these activities. Based on this data, it is possible to compute how pleasant or unpleasant various activities are on average. This can be done across all individuals, but this also can be by subgroups (e.g. percent of time men find taking care of children pleasant versus percent of time women find taking care of children pleasant).<sup>43</sup>

Combining DRM data with the trends in time allocation data uncovered in Aguiar and Hurst therefore allows one to build a more precise picture of how men and women experience their daily life and how that has changed over time.<sup>44</sup> Using this finer approach, Krueger (2007) finds that there has been among men a gradual decline in the proportion of time spent in unpleasant activities; among women, despite the colossal changes in time allocation, there has been no detectable trend in the proportion of time spent in unpleasant activities. While these differences and changes are small (men went from spending about 20.8 percent of their time in unpleasant activities in 1965 down to 19.8 percent in 2005; women spent about 19.4 percent of their time in unpleasant activities in 1965 and 2005), they do coincide with Stevenson and Wolfers (2009)' evidence of a relative decline in female well-being over time compared to men.

## 5. CONCLUSION

Compared to ten years ago, labor economists now have a much larger set of potential explanations to draw from when trying to explain gender differences in labor market outcomes. While education, experience and discrimination might have been the primary factors considered in the past to account for, say, the lack of women in investment banking, most labor economists would now also discuss why investment banking jobs might be particularly unattractive to women because of the cut-throat competition that exists between bankers, or because of the heavy reliance on incentive pay in this

<sup>43</sup> There have been various demonstrations that subjective well-being and hedonic experiences are clearly different concepts. For example, Krueger et al. (2007) study overall life satisfaction and recalled affective experience in random samples of women in France and the US. Based on the standard subjective well-being question, they find American women to report higher levels of satisfaction with their life than French women. Based on the DRM data, though, they find the opposite ranking: French women are on average in a more positive mood during the course of a day; moreover, they spend a higher share of their time in more pleasant activities.

<sup>44</sup> Note that one important additional assumption that needs to be made given that the lack of historical data is that how pleasant or unpleasant a given activity is has not changed over time.

profession, or because women do not view succeeding in their investment banking career as something as crucial to their sense of selves as men do. These new perspectives on gender reflect growing influences of psychology and social-psychology literatures on economics research; in many cases, they provide micro-foundations for why women may choose different educational paths than men, or why they may not be as committed to their career as men are.

While there is a wealth of laboratory evidence suggesting that women differ from men on some of these key, theoretically relevant, psychological attributes, there is to this date a striking lack of research establishing the empirical relevance of these factors for actual outcomes. While the laboratory evidence shows in many cases large gender differences (say, in attitudes towards risk, or attitudes towards competition), most of the existing attempts to measure the impact of these factors on actual outcomes fail to find large effects. This is undoubtedly the reflection of a rather new research agenda, as well as of the difficulty of finding databases that combines good measures of psychological attributes with real outcomes. More direct demonstrations of field relevance will be crucial for these new perspectives to have a lasting impact on how labor economists approach their study of gender gaps.

Future work will also need to tackle the question of how these psychological factors fit within the time series of women's improving educational and professional achievements. While we have discussed some historical factors that may have shocked women's social identities away from the traditional stereotypes, is it also the case that women's attitudes towards, say, risk or other-regarding preferences, have been converging over time towards men's? This would certainly fit with the view that the gender differences in preferences are not hard-wired but rather a reflection of environmental influences, and warrant more research on the specific changes in the home or schooling environments that might have triggered the convergence in attitudes. It is also possible to reconcile women's progress in the labor market with stable gender preferences. For example, some of the work we discussed above raises the possibility that institutional changes (such as more strictly enforced affirmative action or quota policies that reduce women's need to directly compete with men) or technological changes (such as an increase in the demand for those interpersonal skills in which women are relatively more endowed) may have reduced, and even maybe reversed, the disadvantage associated with women's psychological profile.

Building on this, we expect that much more research will be devoted over the next decade to understanding why women are now surpassing men in terms of educational attainment. It is interesting that the research that already exists on this topic centers on those behavioral and psychological factors that give girls an advantage over boys while at school. It is possible that the same factors that are giving women an edge at school may start giving them an edge at work as other forces that have previously constrained women slowly disappear.

We devoted the last section of this chapter to alternative approaches to measuring women's well-being. Researchers have not found that the dramatic gains that women have made in terms of labor force participation and earnings translated in more satisfying lives, whether measured globally or based on the detailed tracking of their daily activities and emotions. While acknowledging all the caveats associated with the interpretation of well-being data, future research may try to better understand how differentially women and men evaluate the quality of their life in relation to their objective achievements (both professional and family-related), as well as how those evaluations have changed over time, maybe as a reflection of shifting gender identities. A more detailed look at how men and women emotionally experience various activities in their daily life (such as time spent in labor market work versus time spent taking care of children, or time spent in routine labor market work versus time spent in more challenging labor market work) may offer some clues on the trade-offs men and women are making when opting for the career job, the "quiet" job, or opting out.

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