Identity, Overconfidence and Investment Decisions

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Abstract

Why are men more risk tolerant than women? Why do they invest more often and more aggresively than women? I test whether social identity contributes to explain this heterogeneity. Identity prescribes normative behaviors to individuals. I manipulate male and female identity in a controlled environment. In a set of four experiments, men whose identity is primed or threatened become more risk tolerant, and they invest more often and more money than non-primed men and women. The effect of identity manipulations is largest for money-burning investment opportunities. I relate male identity to overconfidence, which is induced into subjects by priming their sense of power over other individuals. Men induced with overconfidence also become more risk tolerant and invest more often and more money than others. In a fifth experiment, I find that priming identity and overconfidence positively affects men's subjective beliefs of experiencing good investment outcomes.

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1 Introduction

Men are less risk averse than women (Croson and Gneezy, 2009). They are more competitive (Niederle and Vesterlund, 2007) and they trade stocks more often and more aggressively than women (Barber and Odean, 2001). At the same time, systematic heterogeneity in the risk aversion of investors has major consequences for asset prices (Garleanu and Panageas, 2012). Investigating the determinants of heterogeneous attitudes towards risk across genders may therefore help us understand stock prices and individual investment decisions.

Research so far has mainly focused on biological factors to explain the different attitude towards financial risk across genders.[1] In this paper, I test for the effect of social identity on risk attitudes and investment behavior. Identity prescribes opposite normative behaviors to men and women (Akerlof and Kranton, 2000): Table 1 enlists the most frequent stereotypical behaviors associated with a male, powerful, successful and female individual by 200 survey respondents on an online platform.[2]

In a set of five experiments, I address the following questions: i) Does identity have a causal effect on men and/or women attitudes towards risk and on their investment decisions? ii) Does the identity channel act through preferences or through beliefs? iii) How does the identity channel relate to overconfidence?

In the field, quasi-random manipulations of gender identity and overconfidence are hard to detect.[3] In this paper, identification is obtained by randomly manipulating gender identity and overconfidence in a controlled environment. Following a large body of

[1]For instance, genetic characteristics (Kuhnen and Chiao (2009) and Cesarini et al. (2010)), neurological responses to positive emotional states (Kuhnen and Knutson, 2011) and basal testosterone (Mastripieri et al., 2009)

[2]The identity channel is not necessarily uncorrelated with biological or genetic characteristics of individuals. Willer et al. (2013) find that men with higher level of basal testosterone are more responsive to gender identity threats in the lab than men with lower levels of basal testosterone. They do not find any effect of these manipulations on subjects' testosterone level. In this paper I test for a causal effect of identity manipulations on the risk tolerance and investment behavior of subjects. I am agnostic on a possible mediation or moderation of the identity effect of biological, genetic or neurological characteristics of subjects.

[3]Direct measures of overconfidence are also hard to detect. Grinblatt and Keloharju (2009) measure overconfidence at the individual level from mandatory psychological tests administered to a large male population. They show that more overconfident men trade more often than other men.

research in social psychology, gender identity is manipulated by priming or threatening male and female identity stereotypes.[4] Overconfidence in the form of *illusion of control* is induced by randomly asking subjects to recall and describe a situation when they had power over another individual (Fast et al., 2012).[5]

In Experiment 1 subjects' gender identity is primed or threatened. Risk preferences are elicited using lottery choices à la Holt and Laury (2002) before *and* after the manipulation. Results in social psychology suggest that male identity priming and threatening both increase risk-taking in men due to salience and overcompensation, respectively. I do find that men are more likely to choose lotteries after the manipulations than before. No effect is detected on non-primed men or women.[6]

In Experiment 2 I test if induced overconfidence affects risk tolerance. I find that men primed with power choose risky lotteries more often after the prime than before. To disentangle the effect of overconfidence from that of inducing elation states as in Kuhnen and Knutson (2011), I run a placebo test. Subjects recall and describe a situation when they felt successful. Recalling successful experiences plausibly induces excitement. But as Table 1 shows, stereotypes associated to a successful individual are a mix of those associated with male and female individuals; to the contrary, powerful individuals are perceived as similar to men. Men primed with success do not behave differently than others, hence the results are hardly driven by inducing a state of elation into subjects.

In the third and fourth experiments, subjects perform investment tasks. They receive a virtual monetary endowment, and they are proposed an investment opportunity whose probability of success is known (Gneezy and Potters, 1997). They are asked if they want

[4]See Shih et al. (1999) and Willer et al. (2013). Choi et al. (2010) are the first who use priming techniques to test for the effect of social identity on economic preferences in the laboratory.

[5]In all experiments, subjects in the control condition recall and describe a situation when they felt relaxed. To ensure that effects are not driven by a response to the control condition, all subjects describe a situation when they felt relaxed before experimental manipulations in Experiments 3 and 4.

[6]The non-effect of priming gender identities on female subjects is consistent with results on gender identity priming, such as Meier-Pesti and Penz (2008) and Boschini et al. (2012). Non-results for the female subsamples are shown in Appendix B.

to invest any money (extensive margin) and if yes, how much money they want to invest (intensive margin).

In Experiment 3, subjects face three investment opportunities whose expected value is higher than the invested amount. This experiment can be interpreted as a causal test of Barber and Odean (2001), insofar as gender identity and overconfidence are induced into treated subjects.[7] Men primed with male identity are 12% more likely to invest, and those primed with overconfidence 17% more likely to invest than non-primed men. At the same time, men primed in both conditions invest about $20 more than non-primed men out of an endowment of $100.[8]

In Experiment 4, decisions are framed as delegated investments: subjects manage a principal's money, and they are paid a performance-based fee. They are presented with two investment opportunities: one has an expected value higher than the invested amount, the other one lower. A risk neutral agent would invest her whole endowment in the former opportunity (sound investment), and nothing in the latter (money-burning investment). This setup can be interpreted as a causal test of Malmendier and Tate (2005), Malmendier and Tate (2008) and Gervais et al. (2011). Men primed with male identity are 11% more like to invest than control men, and they invest on average $25 more in each opportunity, out of an endowment of $100. The difference in the amounts invested is larger for the money-burning opportunity, where primed men invest on average $35 more than others.

Overall, the evidence is consistent with a positive causal effect of social identity and overconfidence on men's willingness to take on financial risks. By construction, the analysis isolates reduced-form effects. Moreover, claims about external validity are subject to the caveat that the pool of recruited subjects is not necessarily representative

[7]However, the channels tested here are the illusion of control and better-than-average beliefs, instead of the overprecision of signals proposed by Gervais and Odean (2001).

[8]Subjects are given a virtual endowment in US dollars, and they are told that the compensation will be a fraction of the virtual money they own at the end of the experiment.

of the average individual investor, the average personal investment consultant or the average CEO. Yet, results may suggest welfare implications of identity and overconfidence for investors and corporate executives. Both traits make men less conservative when facing financial risks. This may have a positive effect on their welfare (and on the welfare of firms which hire them) if they are faced with sound investment opportunities, consistent with the model of Gervais et al. (2011), and with the evidence of Hirshleifer et al. (2012). In comparison, welfare effects are negative for male investors and executives who face money burning opportunities, and who have no need to raise external funds to invest, consistent with the evidence of Malmendier and Tate (2005) and Malmendier and Tate (2008).

Finally, I investigate whether identity and overconfidence affect investment decisions through preferences (shock to risk aversion) or through beliefs (shock to subjective probabilities of experiencing good investment outcomes). Subjects know objective probabilities of all future states in lotteries and investments: there is no uncertainty. But their subjective probabilities of experiencing good outcomes may differ from the objective ones, thus altering their subjective expected value of investing. This fact is established in a fifth experiment. Subjects report how many times they expect to succeed if investing ten times in an opportunity which succeeds on average five out of ten times. Men believe that they will succeed significantly more than five times, while women do not. Subjects are then asked how often they expect that individuals in their neighborhood, on average, would succeed if investing ten times in the same opportunity. I interpret the difference between the expected success rates of the self and of neighbors as a direct measure of *better-than-average* beliefs. This measure is significantly positive for men primed with identity and overconfidence, while it is statistically not different from zero for non-primed men. This evidence does not exclude a direct effect of identity and overconfidence on preferences. Yet, it suggests that the beliefs channel contributes substantially to explain all the findings in this paper.

2 Related Literature

This paper builds on the literature on gender, preferences and economic outcomes. Several studies find that men are less risk averse than women, and they tend to invest more often and higher amounts than women in risky projects. Recent surveys of this literature include Croson and Gneezy (2009) and Charness and Gneezy (2011).

Niederle and Vesterlund (2007) find that women are less willing to compete than men, even if their performance on a real experimental task is not worse than the performance of men. They find that men are overconfident about their expected performance in a competitive environment, while women have lower preferences for competition. This is confirmed using field data on a large population by Buser et al. (2012).

Researchers in economics and finance have mainly investigated whether the heterogeneity in risk preferences across genders are due to biological factors, such as genetic characteristics of individuals (Kuhnen and Chiao (2009), Cesarini et al. (2010)), neurological responses to positive emotional states (Kuhnen and Knutson, 2011) and basal testosterone (Mastripieri et al., 2009). Few exceptions include Borghans et al. (2009), who show that gender differences in risk aversion are partly explained by individual-level psychological measures.

At the same time, Akerlof and Kranton (2000) discuss the role of identity and prescribed behaviors on the economic behavior of individuals. Gneezy et al. (2009) document an effect of societal norms on individual preferences for competition across genders: women compete less than men in a patriarchal society, but more than them in a matriarchal society. The effect of social norms on individual preferences is also discussed by Fehr and Hoff (2011). An effect of social and group identity is not confined to preferences for competition and risk: Chen and Li (2009) induce group identity in the laboratory, and show that charity concerns towards ingroup subjects who fall behind are higher, and envy towards ingroup subjects who obtain higher payoffs is lower compared to outgroup subjects. Bertrand et al. (2013) find that measures of gender identity, e.g. the aversion to higher incomes of wives compared to husbands, affect several within-household market and non-market outcomes, such as divorce rates, marriage satisfaction, and wives' income and participation in the labor force.

Building on these results, I propose an experimental test for a causal effect of social norms, identity and stereotypical behaviors attached to the two genders on individual risk aversion and investment decision-making.

Methodologically, this paper builds on a strand of literature in social psychology initiated by Shih et al. (1999), who first investigated the effects of identity on behavior by priming identity stereotypes in the laboratory. Identity is composite, since every individual belongs to several social groups. After priming one identity trait, individuals tend to conform to the behavior prescribed by the primed identity. Choi et al. (2010) are the first who use priming techniques in the laboratory to study the causal effect of social identity on economic preferences. They find that Asians and non-immigrant blacks primed with their ethnic roots make more patient choices than non-primed subjects. To the contrary, they detect no effect of priming gender identity on the risk preferences of men or women. My results may appear at odds with theirs, but they are not: the procedure in this paper departs from theirs in two ways. First, the risk tolerance of subjects is elicited before *and* after the manipulations. This allows to reduce the cross-subject variation in risk preferences within each experimental cell, i.e. to control for the risk preferences each subject is endowed with before starting the experiment.[9] Second, the priming procedure in this paper is more aggressive than the procedure in Choi et al. (2010): subjects read a short text reporting several stereotypes related to male or female identity, and they recall and describe in detail a situation when they behaved in line with those stereotypes.[10]

To provide a full view of the effects of gender identity on individual risk preferences, I also follow Maas et al. (2003) and Willer et al. (2013), who provide a test for the overcompensation hypothesis: men whose identity is threatened react by behaving more in line with their threatened identity. In those papers, identity threats consist of random

[9]Conditioning the manipulation effects on the risk preferences of subjects before the manipulations reduces the variation in the estimated coefficients dramatically. If I only use the risk aversion elicitations after the experimental manipulations all my results become insignificant or barely significant, in line with Choi et al. (2010).

[10]My procedure is more similar to Meier-Pesti and Penz (2008), although it differs on the crucial issue of asking for detailed descrptions of own subjects' experiences instead of descriptions of the the daily life of a stereotypical person (see below).

feedback on a gender identity survey suggesting that subjects are masculine or feminine. This implies a deception on the part of the experimenter. I alternatively produce identity threats by priming the opposite gender identities on male and female subjects.[11]

In this paper, subjects perform tasks to elicit their risk aversion and investment behavior. Risk aversion elicitation tasks follow Holt and Laury (2002): subjects choose between lotteries with different expected values, as well as ranges between the highest and the lowest possible payoffs. Investment tasks are similar to Gneezy and Potters (1997). They give subjects an endowment and confront them with a set of risky investment opportunities, whose probabilities of success are known. Subjects decide if they want to invest any money, and if yes how much they want to invest.

This paper is also close to Meier-Pesti and Penz (2008), who study the effect of masculinity and femininity stereotypes on individual measures of risk taking. I differ from them in four respects. First, I aim to investigate the economic mechanisms that explain the identity effect: on the one hand, I relate the identity effect to overconfidence, which I induce into subjects by priming their sense of power over other invididuals; on the other hand, I propose and implement a test for whether the identity effect acts through preference or through beliefs. Hence, this paper could be interpreted as a causal test of Barber and Odean (2001), Gervais et al. (2011) and Malmendier and Tate (2005). Second, the priming of masculine and feminine stereotypes is connected to the subject's own experiences, which they describe in detail after being exposed to the manipulation. This allows testing for the overcompensation hypothesis, since priming female (male) identity on men (women) is a form of identity threat.[12] Third, the answers in this paper are elicited with incentive-compatible procedures. Fourth, the subjects in this paper are recruited from a varied population in terms of age, education levels, and local

[11] Since the threat procedure I propose has not been tested previously, and it is less aggresive than the one in Willer et al. (2013), I assign less subjects to the threat condition than to the identity prime and control conditions in Experiment 1.

[12] Instead, Meier-Pesti and Penz (2008) ask subjects to describe pictures of a business man, a mother with her baby, and a group of individuals. Hence, there is no identity threat in their procedure. Consistently, they find no differential risk taking between male subjects in the control group and subjects in the female identity prime group.

communities, as opposed to students of similar age, same education, and living on the same campus. Selection of subjects in these relevant dimensions may explain why in Meier-Pesti and Penz (2008) male and female subjects are indistinguishable in terms of self-reported masculine attributes.

The rest of the paper is organized as follows: Section 3 describes the controlled environment where experiments are run. Section 4 outlines the experimental hypotheses tested in the paper. Sections 5 through 8 describe procedures and discuss results of each experiment. Section 9 analyzes the channels which drive the effects of identity and overconfidence investment decision-making, while Section 10 concludes.

3 The Laboratory Environment

A. Amazon Mechanical Turk (mTurk)

All experiments are run on an online platform: Amazon Mechanical Turk (mTurk). On mTurk, registered *Requesters* post a task to be executed for pay, which is offered to a large pool of *Workers*, who may accept to perform the task. Requesters are usually private companies, tasks are short surveys to test marketing campaigns effectiveness, and Workers are registered internet users. Users provide their fiscal address and a social security number (if US-based) for tax purposes. Task completion usually takes less than 30 minutes, and the average offered salary is low ($1.39 per hour). Workers based in the US, who are exclusively recruited in all experiments in this paper, complete tasks on mTurk mainly to spend their spare time in a constructive way (Paolacci et al., 2010). This explains why, despite low payments, satisfactory task completion rates are not lower than in human subjects laboratories (see Section 3.B).
Recently, mTurk has gained interest among researchers in psychology, marketing and political science as a way to cheaply recruit subjects for artefactual field experiments.[13]

[13] An exhaustive description of Amazon Mechanical Turk, workers characteristics and motivations, and the academic research based on it goes beyond the scope of this paper. Please refer to Mason and Suri (2011) and Paolacci et al. (2010) for detailed comments. Berinsky et al. (2011) replicate many experimental results in political science using the mTurk platform.

In economics, Kuziemko et al. (2013) use mTurk to run survey-based experiments on preferences for redistribution across the US. A major concern with mTurk is that Workers might not take the time needed to properly complete a task. I address this concern in four ways: first, the subject pool is restricted to Workers who have been rated positively by Requesters at least 95% of the times they have accepted a task in the past. Second, experiments are designed on a software, *Qualtrics*, which tracks the time each Worker takes to complete a full task, as well as each individual questions. Third, I read all short essays written by subjects to verify that they produce sensible and coeherent statements in line with the instructions they receive. Finally, I add implausible options in multiple choice questions, and I verify that they are not picked.[14]

B. Advantages of mTurk over a human subject laboratory

For an experimental study on identity, mTurk has several advantages compared to university human subjects laboratories. In particular:

- Subjects can be easily recruited across the whole US, instead of among individuals living in a same college town. Panel A of Figure 1 plots IP addresses in longitude-latitude space for the subjects recruited in Experiment 2 and Experiment 3. This is a major advantage, especially when testing for effects of social stereotypes on individual behavior: if subjects were members of the same community, they would be exposed to a peculiar social environment which is most likely dissimilar from the one faced by average men and women in the US. Moreover, college students, MBA students and university employees are likely to sort into communities whose values, norms and customs they share.

- Age and education levels of subjects are varied,[15] while a sample of college students would be restricted to individuals between 18 and 22 years old, all completing a college degree. Panel B of Figure 1 plots the age distribution of subjects in

[14] For instance, when confronting subjects with certainty equivalet vs. lottery choices, I sometimes add the option of getting $0 for sure versus taking part in a lottery which pays $0 with 50% probabilty and a positive amount otherwise.

[15] Note that demographics of workers are not provided by mTurk. They have to be asked to workers directly: they are self-reported.

Experiments 1 through 4. Since mTurk is an online platform, younger individuals are oversampled compared to the elderly in the population. Yet, this is a major improvement compared to sampling individuals from the first bin only (15-22 years old). Unreported distributions of subjects' education levels are similarly varied. This heterogeneity allows to account for age and education effects in the analysis of experimental data, which are likely to be relevant in a social identity study.

- Accuracy of answers of mTurk Workers is on average high. The ratio of subjects making major mistakes is below 7% for experiments involving lottery choices, and about 5% for those involving investment decisions. As a comparison, Falk et al. (2012), who use similar lottery tasks as those used in this paper, face wrong task competion rates in between 5% and 16% of recruited subjects in a human subjects laboratory.

- As an online, double-blind platform, mTurk allows to run artefactual field experiments[16] where recruiting subjects is logistically simple.

- Anonimity guarantees that the priming procedure (recalling events and describing them) is most effective, since subjects can pick any event they have experienced and describe it without fear of being identified. This is not true in lab experiments, where subjects know that laboratory staff or instructors may retrace their identity. They may have reputational concerns for disclosing unconventional personal experiences which would be the most appropriate for the prime to be effective.

- Reputational concerns are high on mTurk: requesters decide whether to pay workers based on the accuracy of task completion.[17] The system keeps track of acceptances and rejections over time, and requesters can restrict the worker pool to those above certain percentiles of acceptances over total number of initiated tasks. Rejections affect future employability of workers.

[16] An artefactual field experiment is designed as a laboratory experiment. At the same time, subjects perform tasks in their own natural environment, such as at home or at work (see List (2011).)

[17] In this paper, subjects have always been paid unless they did not follow the instructions in event recalling tasks, for instance writing random characters instead of sensibles short essays. Subjects who made mistakes in risk aversion elicitation tasks, such as crossing certainty equivalent choices several times, have been regularly paid, although they are excluded from the analysis as explained below.

- Last but not least, mTurk guarantees cheap and quick replicability of results, since the same pool of subjects is accessed by anyone who registers to the platform. This allows for a more transparent comparison of results across studies. [18]

4 Experimental Hypotheses

Based on results in social psychology and correlational evidence in economics and finance, I develop a set of experimental hypotheses on the effects of gender identity and overconfidence on the willingness to take on financial risks and on investment decision-making by men and women.

Hypothesis 1: Priming men with male identity (salience) or female identity (threat) increases their willingness to take on financial risks. The primes have no effect on women.

Hypothesis 2: Inducing overconfidence increases the willingness to take on financial risks by men. It has no effect on women.

Maas et al. (2003) find that men whose identity is threatened in the laboratory are more likely to be willing to engage in risky behaviors than unthreatened men. Willer et al. (2013) find that men whose identity is threatened are more supportive of the Iraq war and are willing to pay more to buy SUVs than non-threatened men, while no effect is detected on women. Choi et al. (2010) do not find any effect of gender identity primes on the willingness to take on risks by men or women. My design differs from theirs in two respects. First, I elicit the risk tolerance of subjects via lottery choices both before and after the experimental conditions. This allows to reduce the cross-subject variation in risk preferences within each experimental cell, i.e. to control for the risk preferences each subject is endowed with before starting the experiment. Second, I use a more aggressive priming technique: I ask subjects to read a short text reporting several stereotypes

[18] In an open letter to social psychologists dated September 26 2012, Daniel Kahnemann emphasizes replication as a major issue with priming research, as demonstrated by recent scandals in top European universities. He suggests a protocol for improving credibility of priming research which would be easily implemented if using mTurk as a common laboratory field by experimental researchers.

related to male or female identity, and to recall and describe in detail an event when they behaved in line with those stereotypes.

Hypothesis 3: Men primed with identity or overconfidence invest more often and more money than control men when facing a sound investment opportunity.

This hypothesis builds on correlational evidence in Barber and Odean (2001), who find that male investors tend to invest more often and more money than female investors. Also, Grinblatt and Keloharju (2009) find that most overconfident men trade more often than others in the field.

Hypothesis 4: Men primed with identity or overconfidence invest more often and more money than control men when acting as agents of a principal. The effect is stronger for money-burning investment opportunities.

The first part of Hypothesis 4 builds on the model of Gervais et al. (2011), who show that overconfident CEOs are less conservative than others when faced with a sound investment opportunity. The second part builds on Malmendier and Tate (2005) and Malmendier and Tate (2008), who find that overconfident CEOs are more likely to invest in money burning opportunties than other CEOs when they have enough cheap funds available.

5 Experiment 1: Identity and Financial Risk Taking

In Experiment 1, I test whether gender identity has a causal effect on risk preferences of men and women, as elicited via lottery choices.

From Hypothesis 1, I conjecture that men whose identity is primed (male prime condition) or threatened (female prime condition) will make riskier choices compared to men in the control condition. Moreover, we should observe a *within-subject* increase in the willingness to take on financial risks after exposure to the treatment. We should detect no differences in choices made by female subjects across treatments.

A. Design and Procedure

340 subjects were recruited on Amazon Mechanical Turk (mTurk) in April 2012 (first session) and September 2012 (second session). Subjects were invited to work on a survey on creative writing[19] to earn $0.5, plus a chance to earn a bonus by picking lotteries. The subject pool was restricted to mTurk workers with a US tax identification number, and with a history of more than 95% of lifetime tasks approved by requesters. The experimental design was a 2 (male, female) by 3 (control, male prime, female prime) factorial design.

Table 2.A describes the experimental procedure. Upon accepting the task, subjects answered four background questions.[20] Then, they were confronted with two screens of lottery choices à la Holt and Laury (2002), as adjusted by Choi et al. (2010): each choice included a degenerate lottery paying a positive outcome for sure (certainty equivalent), and a lottery paying a positive outcome with probability 1/2, zero otherwise.[21] Subjects could not proceed from one screen to the other without completing each lottery task in full, although they were allowed to leave the experiment at any point in time (no one took advantage of this option). In the second stage experimental conditions were administered. Subjects read a short extract from a true internet blog, and they recalled and described in detail a situation when they had behaved in line with the description in the text.[22]

The short essays produced by subjects were used to verify that the manipulation was effective. Control subjects read a text on *ayurveda* principles for a healthy lifestyle, which enlisted a series of non-stressful and relaxing activities to be done during the day. Subjects in the male identity prime condition read a blog entry describing the masculine side of life,

[19] The information of the objective of the study was retained from subjects at the recruitment stage. This ensured that i) subjects were not primed with their identity after being told the study was about the effects of identity stereotypes; ii) subjects would not look up on the internet information about previous studies on identity priming and behavior; and iii) the results could be replicated in other sessions or by other researchers in the future without the risk that future subjects could know about the experimental aims from previous subjects (mTurk has a forum open to *Workers* to exchange information about different tasks.

[20] Questions included the country of residence, gender, age group (18-22, 23-35, 36-45, 46-60, 60+) and education level group (high school or lower, some college/no degree, college degree, postgraduate degree).

[21] In the second session, subjects were confronted with three sets of lottery choices. This was ensure that the results did not vary with the effort subjects had to put in performing the lottery choices.

[22] Subjects were encouraged to describe the event, their feelings and their behavior in a short essay of 5 to 10 sentences. Please find the original screenshots for each experimental condition in the Appendix.

i.e. a collection of stereotypes about how a masculine individual behaves.[23] Subjects in the female identity prime condition read an analogous blog entry describing the feminine side of life, i.e. a collection of stereotypes about how a feminine individual behaves. The third stage consisted of two screens of lottery choices similar to those performed before being exposed to experimental conditions.

To make lottery choices incentive-compatible, subjects were told that their bonus payment would have been calculated by picking one screen at random in the first group, one line at random within the screen, and assigning them a scaled amount of the certainty equivalent or of the lottery payoff, based on subject's choices. The same procedure applied to screens in the second group. The bonus was the highest scaled amount the subject had obtained from the first and the second set of screens.

Table 2 Panel B shows the distribution of subjects across experimental conditions. 20 subjects (5.8% of the full sample) were excluded because of inconsistencies in lottery choices, leading to a final sample of 320 subjects. Subjects were assigned in proportions of 2:2:1 to the control, male prime and female prime conditions, respectively. [24]

In Appendix B I report the means, standard deviations and number of subjects for the full sample and for the subsample of men. Following Simonsohn (2013) I propose a test for whether the observed standard deviations do not differ from those one would obtain in random samples drawn from normal distributions with the same means and the average of the standard deviations across conditions of the observed samples. This is important in light of the recent misconduct scandals in the social psychology literature detected by Simonsohn (2013) and commented by Kahneman (2012). For Experiment 1, the null that the observed distributions come from independently drawn random samples could only be rejected above the 99.99% significance level (99.98% in the male subsamples). Results

[23]Consistent with the characterization of male identity in Table 1, the discussed stereotypes include confidence. One might be concerned that this treatment directly induces overconfidence into subjects, hence making it essentially equivalent to the priming procedure in Experiment 2. This is why the chosen text for male identity explicitly states that *"the masculine side [...] includes [...] how to accurately weigh probabilities so that you know the most likely outcome to expect in situations you come accross."*, i.e. the text explicitly warns subjects to accurate estimate probabilities. Please find the full excerpt in the Appendix.

[24]The aim was to maximize the power for a test of male identity prime on men, since the identity threat I use is different from previous studies.

for the same tests in all other experiments are also reported in Appendix B.

B. Measuring Risk Tolerance and Non-parametric Analysis

I compute a measure of risk tolerance at the subject level. For each set of lottery pairs, [25] I compute the difference between the number of times a risk neutral agent would choose the certainty equivalent over the lottery, and the actual number of times a subject made this decision. For each subject, I average this difference for choices made in the first stage to obtain a *pre-treatment* risk tolerance measure at the subject level:

$$RiskTolerance_{pre,i} = \frac{1}{L} \times \sum_{l} RNchoices_{pre,l} - choices_{pre,l,i}$$

where $l \in (1, L)$ denotes a set of lottery pairs, $RNchoices_l$ is the number of times a risk neutral agent would choose the certainty equivalent over the lottery in each set of lottery pairs, and $choices_{l,i}$ is the number of times agent i chose the certainty equivalent over the lottery in each set of pairs. $RiskTolerance_{pre,i}$ is therefore positive whenever the subject, on average, chose the lottery over the certainty equivalent more often than a risk neutral agent would do, and negative otherwise. This measure summarizes risk preferences subjects are endowed with before entering the lab.

I compute the analogous measure of risk tolerance for choices made after the experimental conditions:

$$RiskTolerance_{post,i} = \frac{1}{L} \times \sum RNchoices_{post,l} - choices_{post,l,i}$$

Finally, I define the within-subject change in risk tolerance after the treatment compared to before the treatment as $\Delta RiskTolerance_i = RiskTolerance_{post,i} - RiskTolerance_{pre,i}$. Using the change across experimental conditions at the subject level reduces the variance of the estimator due to heterogenous risk preferences of subjects within each experimental cell. This is crucial to increase the power of the test for an effect of the manipulations on risk tolerance, as emphasized below.

I first provide non-parametric evidence on the estimated distributions of $RiskTolerance_{pre}$

[25] Please find an example of a set of lottery pairs in the Appendix.

and of $\Delta RiskTolerance$ across experimental conditions of Experiment 1 in Table 11.[26] Results are reported for the subsample of male subjects, which is the only one affected by the experimental manipulations, consistent with previous literature in social psychology and as described in the following sections. Panel A of Table 11 plots the estimated distributions of the level of risk tolerance of male subjects before they are exposed to the identity manipulations by treatment group. As expected, the vast majority of subjects are risk averse: the mean of all distributions and the largest part of their mass lie in the negative domain. Importantly, the distributions of pre-manipulation risk tolerance for men which will be exposed to the control and to the male prime (green dot-dash and blue solid lines, respectively) look very similar in terms of mean, standard deviation and higher moments. Moreover, note that the standard deviation of these distributions is high: this suggests that it is indeed important to control for the preferences subjects are endowed with when entering the lab for a powerful test of the effects of the manipulation on the subjects' risk tolerance. The distribution of the risk tolerance of men in the female prime group also spikes to a negative value and it lies on the negative domain, although the standard deviation seems lower than the one for the other experimental groups.

Panel B of Table 11 depicts the main results of Experiment 1. The plot reports the distribution of $\Delta RiskTolerance$ for the male subsample across experimental groups. The risk tolerance of control subjects (green, dot-dash line) does not change, on average, after being exposed to the control condition, since the distribution spikes at zero.[27] If the male prime and the female prime were increasing the risk tolerance of subjects, we would expect that the respective distributions of the change in risk tolerance were shifted to the right compared to the distribution for control subjects. Indeed, the change in the risk tolerance of the male prime group (blue, solid line) is on average positive, and the standard deviation of the distribution is similar to that of the control group. The male group also includes a fatter right tail, i.e. subjects on whom the manipulations have a large effect.

[26] Unreported results for the distributions of the level and the change in risk tolerance across groups in Experiment 2 are qualitatively similar to those in Table 11.

[27] This is also prima facie evidence that the control condition does not drive the results in the paper. I also address this issue in the designs of Experiment 3 and Experiment 4, where *all* subjects are asked to recall and describe a situation when they felt relaxed before being exposed to the manipulations. More broadly, this evidence suggest that the effects are not driven by the act of priming subjects and asking to recall situations per se. Similar evidence for the success prime in Experiment 2 also speaks to this point.

The distribution of the change in risk tolerance for the female prime group (dashed, red line) also peaks to a positive value. As it is the case with the level of risk tolerance before the manipulations, the standard deviation of this distribution seems slightly lower than the one for the other experimental groups.

C. OLS Analysis

To assess the statistical significance of the results, I run the analysis in a parametric setting by estimating the following OLS equation:

$$\Delta RiskTolerance_{iae} = \alpha + \gamma_1 \times MalePrime_{iae} + \gamma_2 \times FemalePrime_{iae} + \eta_a + \eta_e + \epsilon_{iae} \quad (1)$$

where $\Delta RiskTolerance$ is the measure of within-subject change in risk tolerance for subject i, in age group a and education group e, before and after being administered an experimental condition; $MalePrime$ and $FemalePrime$ are dummies which equal one if the subject is exposed to the male identity or female identity prime, respectively; η_a and η_e are fixed effects for subjects' age and education level brackets, respectively. The identification strategy is a difference-in-differences design: for each subject, I look at the decisions before and after exposure to the manipulations, and across subjects in the treatment and control groups. The first panel of Table 3 reports estimated coefficients of Equation 1. Men primed with male identity choose lotteries over certainty equivalents 0.53 times more (s.e. 0.25) than control men after the prime.[28] This effect is robust to averaging out age and education group effects in columns (2) and (3). Men primed with female identity (identity threat) also behave in line with Hypothesis 1: they choose lotteries over certainty equivalents 0.55 times more (s.e. 0.23) after than before the prime. This result is also robust to controlling for age group and education group fixed effects.

In the second Panel of Table 3, I use the whole sample (male and female subjects) to provide a triple-diff estimator for the effect of identity on risky choices. I estimate the

[28] Since individual level choices are collapsed into their average before and after the treatment, standard errors are corrected for White heteroskedasticity

following equation:

$$\Delta RiskTolerance_{iae} = \alpha + \beta Male_{iae} + \gamma_1 \times MalePrime_{iae} + \gamma_2 \times FemalePrime_{iae}$$

$$+ \gamma_3 \times (MalePrime \times Male)_{iae} + \gamma_4 \times (FemalePrime_{iae} \times Male)_{iae} + \eta_a + \eta_e + \epsilon \quad (2)$$

where $\Delta RiskTolerance$ is the same measure as in Equation 1, $Male$ equals one if a subject is a man, and $MalePrime \times Male$ and $FemalePrime \times Male$ are interactions of the treatment condition with the gender of subjects. The coefficients of interest are γ_3 and γ_4, which are predicted to be positive. Indeed, the change in risk tolerant choices of men in the male identity prime condition is significantly more positive (0.90, s.e. 0.37) than that of women and with respect to the control group. The effect is robust to including age group and education fixed effects to the estimated OLS equation. As for the female identity prime, men become more risk tolerant after the treatment, although the effect is only barely statistically significant (0.63, s.e. 0.34). In line with results in social psychology and with Hypothesis 1, the two treatments have no significant effect on the change in risk tolerant choices made by women.

OLS regression results provide an estimate of the average magnitude of the effect for male subjects. In Table 11, I provide evidence of the effect of identity primes on the full distributions of measured changes in risk tolerance at the subject level for male subjects. I plot the estimated probability distribution function of $\Delta RiskTolerance$ for male subjects in each experimental condition. The vertical dotted line indicated the null hypothesis of no effect of the experimental condition on the risk tolerance of the subjects ($\Delta RiskTolerance = 0$). As expected, the estimated PDF of the change in risk tolerance for men in the control condition (green, dash-dotted line) spikes at zero, and it is symmetric around zero. The density for men in the male identity prime condition (blue, solid line) spikes at about 0.5. Moreover, the standard deviation of the distribution is lower than that of the distribution for control subjects. This density has a right tail: there are subjects who pick lotteries over certainty equivalents as many as 5.5 times more after the male identity prime than before. Similarly, the density for men in the female identity prime condition (identity threat) spikes at a value greater than zero (0.45). The standard deviation of this distribution is also lower than that of the distribution for control subjects.

Hence, priming men with male identity or female identity (identity threat) increases their willingness to take on financial risks in an incentive-compatible risk aversion elicitation framework.

D. Effect of Identity by Age and Education

In Table 4 I exploit the cross-sectional variation in the distributions of age and education levels of subjects to investigate whether these dimensions mediate or moderate the effect of identity primes on the observed change in risk tolerance of men. As for age, researchers in several fields find that young men are more likely to engage in risky behaviors than older men.[29] The sign of the interaction of identity cues with age is a priori unclear. On the one hand, youngsters may not only take on more risk on average,[30] and they could be more responsive to identity cues than older men. On the other hand, the base level of risk taking by the youngsters might be high enough that the interventions have no scope for causing a large increase in risk taking. At the same time, age is correlated with the propensity to invest by individuals, since wealth tends to increase with age: if the effect I document was mainly driven by youngsters, its aggregate impact would be low and potentially irrelevant. I sort subjects based on their declared age group, and I place them into three bins: *Low* (age 22 or lower), $Medium$ (from 23 to 35 years old), and Top (older than 35). In columns (1) to (3) of Table 4, the omitted category is the control group, and the omitted interaction group is Top. The male prime does not affect youngsters more than others. If anything, the average change for the group of oldest men is higher than for other groups, although the interaction terms are not statistically significant. Similarly for

[29]Since Williams (1966) evolutionary biology has argued that the risky behavior of male subjects of various species, including Homo Sapiens, is fueled by competition to access more mating opportunities. This is particularly true for young individuals, who have no established reputations within communities. A large body of neurological evidence (e.g. surveyed by Casey et al. (2008)) finds that risk taking increases at puberty and it decreases with age. Steinberg (2008) connects these results to the remodeling of the dopaminergic system at the time of puberty. Somerville et al. (2011) investigate the peculiar ventral striatal representation of appetitive cues in adolescents. Psycologists also find that the gender gap in risk taking is larger around puberty and it decreases over time (e.g., see Byrnes et al. (1999)).

[30]Note that this effect is averaged out in my estimations since I control for the risk attitudes of subjects before the experimental manipulations using the measure $RiskTolerance_{pre,i}$.

the female prime, the average effect among younger subjects is lower than among other age groups, although I cannot reject the null that these differences are zero.

I then test whether the education level of subjects affects the magnitude of the effects of identity primes on elicited risk tolerance. Several studies find that the education level of individuals is positively correlated with their elicited risk tolerance.[31] Since more educated individuals invest more in the stock market, if the effect of education was mainly driven by the least educated, then its aggregate effects might be negligible. I sort subjects based on their declared education level, and I split them into three bins: *Low* (high school degree or lower), *Medium* (college dropout), and *Top* (college degree or higher). As it is the case with age, the sign of the interaction between the magnitude of the effect of identity primes on risk taking and education is a priori unclear. In column (4) of Table 4 I find that the effect of the male identity prime on men is indistinguishable from zero for subjects with a high school degree or lower level of education. The estimated effect is also lower for college dropouts that for those with higher education (omitted category), although this difference is statistically insignificant. Results are similar in column (6), where education level is interacted with the male and female prime at the same time. As for the female prime (identity threat), I do not find any statistically or economically significant differences in the estimated effects across education groups.

6 Experiment 2 - Overconfidence and Financial Risk Taking

In Experiment 2, I test Hypothesis 2, i.e. whether overconfidence has a causal effect on the willingness to take on financial risks by men and women. Overconfidence is induced asking subjects to recall a situation when they had power over another individual (Fast et al., 2012).

[31]At the same time, higher education is correlated with determinants of financial risk taking such as income, wealth and occupation, among others. Campbell (2006) provides evidence consistent with various dimensions correlated with education which may affect the decision of households to participate in the stock market. Cole et al. (2012) use an instrumental variables approach to test for a causal effect of education on financial risk taking, and they look at several channels whichmay mediate the effect of education. Grinblatt et al. (2011) find that higher IQ increases the likelihood that individuals invest in the stock market.

A. Design and Procedure

340 subjects were recruited on Amazon Mechanical Turk (mTurk) in May 2012 (first session) and October 2012 (second session). Subjects were invited to work on a survey on creative writing to earn \$0.5, plus a chance to earn a bonus by picking lotteries. The subject pool was restricted to mTurk workers residing in the US and with a history of more than 95% of lifetime tasks approved by requesters. The experimental design was a 2 (male, female) by 3 (control, power prime, success prime) factorial design. Table 5 panel A describes the experimental procedure: there are three stages. The first and last stages (lottery choices), as well as background questions, are the same as in Experiment 1. In the second stage, subjects in the control condition recall an event when they felt relaxed, and describe it in detail (5-10 sentences). Subjects in the power prime condition recall an event when they had power over another individual or group of individuals, and describe it in detail. Overconfidence is thus induced into subjects in the form of *illusion of control* (Fast et al., 2012). Subjects in the success prime condition recall an event when they felt very successful and decribe it in detail. This treatment should induce positive emotional states in subjects, but the stereotype of a successful individual is perceived as a mix of male and female identity (see Table 1).

Table 5 Panel B shows the distribution of subjects across experimental conditions. 17 subjects (5% of whole sample) were excluded because of inconsistencies in lottery choices, leading to a final sample of 323 subjects. Subjects were assigned in equal proportions to the three experimental conditions.

B. Results

Subjects tolerance to risk before and after the treatment, as well as its change, are measured as in Experiment 1. Table 6 reports estimated coefficient for the following OLS equation:

$$\Delta RiskTolerance_{iae} = \alpha + \gamma_1 \times PowerPrime_{iae} + \gamma_2 \times SuccessPrime_{iae} + \eta_a + \eta_e + \epsilon \quad (3)$$

The dependent variable and fixed effects are defined as in Equation 1. $PowerPrime$ and $SuccessPrime$ are dummies which equal one if a subject is exposed to the power or to the success priming, respectively. Panel 1 of Table 6 shows that men primed with power chose lotteries over certainty equivalents 0.52 (s.e. 0.26) times more after the prime than before, compared to control men. This effect is robust to adding age group and education fixed effects.[32] The size of the effect is also similar to the one of the male identity prime in Experiment 1, which is in line with the similar characterization of being man and being powerful in Table 1. Once we enlarge the sample to women, though, the effect of power priming on men decreases to 0.46, and it is statistically indistinguishable from zero (s.e. 0.42). The effect of both experimental conditions is negative for women, although no coefficient is distinguishable from zero.

The coefficient on the placebo treatment, $SuccessPrime$, is never different from zero for men. This placebo result suggests that inducing a positive emotional state on men hardly explains their increase in risk tolerance after an identity or overconfidence prime.

Overall, men become less risk averse when induced with overconfidence, although results are not statistically significant when considering both men and women.

7 Experiment 3 - Identity, Overconfidence, and Individual Investment Decisions

In Experiment 3, I test whether identity and overconfidence have a causal effect on individual investment decision-making. This could be interpreted as a causal test of Barber and Odean (2001), where overconfidence is induced in treated subjects to compare their investment behavior to that of plausible controls.

A. Design and Procedure

240 subjects were recruited on Amazon Mechanical Turk (mTurk) in September 2012. Subjects were invited to work on a survey on creative writing for \$0.5, plus a chance to earn a bonus by simulating investment decisions. The subject pool was restricted to

[32]Note that one subject did not declare his education level.

mTurk workers residing in the US and with a history of more than 95% of lifetime tasks approved by requesters. The experimental design was a 2 (male, female) by 3 (control, male prime, power prime) factorial design.

Panel A of Table 7 describes the experimental procedure. In the first stage, subject were asked 4 background questions as in Experiment 1. Then all subjects recalled a situation when they felt relaxed. This is to address the concern that results in Experiment 1 and Experiment 2 might be driven by a change in the behavior of control subjects instead of primed ones.[33] In the second stage, subjects were exposed to experimental conditions: control and male prime subjects were exposed to the same primes as in Experiment 1. Power prime subjects to the same prime as in Experiment 2. The third stage consisted of investment decisions. Following Gneezy and Potters (1997), each subject was assigned a virtual endowment of $100 at the beginning of each of three periods. Each period, they were presented with an investment opportunity, and they decided if and how much of their endowment they wanted to invest. All investments had a higher expected value than the endowment. The first opportunity succeeded with probability 1/2, and paid off 3 times the invested amount in case of success. The second and third opportunities succeeded with probability 1/6 and paid off 7 times the invested amount. The three opportunities were presented in random order to each subject. Each period, subjects could not invest more than their endowment. Also, they could not invest less than zero, i.e. pay to avoid making an investment choice. Each period, subjects were given feedback about the investment outcomes immediately after their choices, through a random number generator which assigned positive or negative invested outcome according to success probabilities of each investment opportunity. This was to verify if the positive effect of male identity and power primes on risk taking by men persists irrespective of investment outcomes, or if it is inhibited after men subjects experience negative outcomes, as it might happen during a trading session.

Panel B of Table 7 shows the distribution of subjects across experimental conditions. 6 subjects (3% of whole sample) were excluded because they did not write meaningful words or sentences in the priming task, leading to a final sample of 234 subjects. Subjects were

[33] The distributions plotted in Table 11 also help to address this concern.

assigned in equal proportions to the three experimental conditions.

B. Results

I estimate the following probit model to test for an effect of primes on the extensive margin of investment:

$$Pr(Invest = 1)_{iae} = \Phi(\alpha + \beta \times MalePrime + \gamma \times PowerPrime + \eta_a + \eta_e) \quad (4)$$

where $Invest$ is one if subject i in age group a and education level group e invested any positive amount, zero otherwise. $\Phi(.)$ is the normal cdf, and covariates are defined as in Equation 1. The left panel of Table 8 reports marginal effects derived from estimated coefficients. Standard errors for marginal effects are computed using the delta method, and clustered at the subject level, since I observe three investment choices per subject. Column (1) shows that men primed with male identity were 12 percentage points (s.e. 6.5 p.p.) more likely to invest than controls, who invested on average 65% of times. The effect is robust if we average out fixed age and education effects. Men primed with power invested 17 percentage points (s.e. 6.8 p.p.) more often than controls. This is robust to controlling for age and education fixed effects. Results are similar if I estimate the marginal effects in a linear probability model. Untabulated results for estimating Equation B. on the female subsample show no effect of the two primes on women's willingness to invest.

The right panel of Table 8 refers to the intensive margin of investment. Because the dependent variable (invested amount) is censored to the right ($100) and to the left ($0), I estimate a tobit specification. Covariates include those in Equation 1. Since estimated coefficients are within the censoring interval, their interpretation is similar to that of OLS coefficients. Standard errors are clustered at the subject level. Subjects primed with male identity invested on average $16 dollars more in each opportunity than control subjects, but the effect is statistically insignificant. Averaging out age and education effects increases the size of the estimated effect to about $21 (s.e. $10), which is an economically and statistically significant effect. Similarly, subjects primed with power invest about \$17 (s.e. \$9) more than control subjects in the baseline specification of column (1), and the size of the effect increases to about \$23 (s.e. \$10) once we average out age and education fixed effects. Untabulated results for estimating the tobit specification on the female subsample find no effect of the two primes on women's average invested amounts.

Overall, both male identity and overconfidence primes increase men's willingness to invest and their desired invested amounts. The effects of the two primes are economically and statistically significant, and they are similar in magnitude.

8 Experiment 4 - Identity, Overconfidence and Delegated Investment Decisions

In Experiment 4, I test whether identity has a causal effect on delegated investment decision-making (Hypothesis 4).

A. Design and Procedure

220 subjects were recruited on Amazon Mechanical Turk (mTurk) in October 2012. Subjects were invited to work on a survey on creative writing for \$0.5, plus a chance to earn a bonus by simulating investment decisions. The subject pool was restricted to mTurk workers residing in the United States and who had a history of more than 95% completed tasks approved by requesters. The experimental design was a 2 (male, female) by 2 (control, male prime) factorial design.[34]

The procedure was the same as in Experiment 3, except for the third stage. Investment decisions were framed as delegated decisions: in each of two periods, subjects were given money by Sally, a lady in their heighborhood who wanted to invest instead of keeping her money in her checking account, but was not able to do so. Each period, subjects faced an investment opportunity. They decided if and how much of Sally's endowment they wanted to invest. Their compensation for this service would be a performance-based

[34] Given the strikingly similar effect of overconfidence and identity primes on individual investment decisions in Experiment 3, and given the similar categorization of stereotypes attached to a male individual and a powerful individual in Table 1, I maximize the power of this test by only considering one of the two treatment conditions, the male identity prime

fee, calculated as a scaled amount of the sum of money Sally ended up with after the first and second investment decisions. One opportunity succeeded with probability 1/2 and paid off 2.2 times the invested amount (sound investment). The other opportunity succeded with probability 1/2 and paid off 1.8 times the invested amount (money-burning investment). A risk neutral agent would have invested her whole endowment in the first case, nothing in the second case. The two opportunities were presented in random order to each subject. Subjects could not invest more than the endowment they received each period, or less than zero, i.e. they could not pay to avoid to make an investment choice. Each period, they were given feedback on investment outcomes just after making their choices.

Panel A of Table 9 shows the distribution of subjects across experimental conditions. 7 subjects (3% of whole sample) were excluded because they did not write meaningful words/sentences in the priming task, leading to a final sample of 213 subjects. Subjects were assigned in equal proportions to the two experimental conditions.

B. Results

The left panel of Table 9.A reports marginal effects implied by estimated coefficients of the same specification in Equation B., with a Male Identity prime category only. Male subjects whose identity was primed were 10.7% more likely to invest (s.e. 5.0 p.p.) than control men. The effect is robust to controlling for age and education effects, and to computing marginal effects from a linear probability model.

The right panel of Table 9.A shows results for estimating a tobit model whose the dependent variable is the average invested amount by a subject in the two opportunities, censored at $0 at $100. Covariates include a dummy equal to one for the Male prime condition and age group and education level effects. Male subjects whose identity was primed invested on average $27.4 more (s.e. $9.8) than control men. The effect on the intensive margin of investment is also robust to controlling for age and education fixed effects. Table 9.B reports results for estimating the same tobit specification separately for the sound and for the money-burning investments. Interestingly, the intensive margin effect is higher for the money burning opportunity, and quite weak for the sound opportunity, where on average control subjects invested a higher amount.

Hence, results in Experiment 3 hold in a setting with delegated investment decision-making, and for both sound and money-burning investment opportunities: men primed with male identity invested more often and more money than controls. The effect on the intensive margin was stronger for money burning investment opportunities, consistent with Malmendier and Tate (2005).

9 Preferences or Beliefs?

Results from Experiment 1 through Experiment 4 show that identity and overconfidence, as induced in a controlled environment, have a positive causal effect on the willingness to take on financial risk by men. They also affect men's investment behavior: men primed with identity or overconfidence invest more often and more money than controls. In this section, I investigate the mechanisms which drive the results described above.

Identity and overconfidence primes may act through two channels: i) preferences: priming identity and overconfidence could be a negative shock to the risk aversion of men. This would increase the certainty equivalent they require to give up a chance to take part in lotteries, and it would increase their willingness to invest in terms of the extensive and intensive margins; ii) beliefs: priming identity and overconfidence could be a positive shock to men's subjective probability of experiencing good investment outcomes. Keeping objective probabilities of success constant, subjects would choose risky lotteries more often, and invest more often and more money after the shock, since they believe they are more likely to experience success than what the objective probabilities suggests.

Incidentally, evidence in Experiment 4 cannot be fully explained by the preference channel, unless we think that preferences may change dramatically across the sound and the money-burning investment. When proposed a sound investment opportunity, a risk neutral agent would invest all her endowment ($100). No investment, or investment below $100, should only be observed for subjects who are risk averse. 82% of subjects invest less than $100, (91% of those in the control condition). In the money burning investment, a risk neutral (and a risk averse) agent would invest nothing. In order to observe any positive investment, subjects should be risk loving. Yet, 78% of subjects invest a positive amount, (63% in the control condition).

Suppose that we allow individuals to hold subjective beliefs of experiencing a good outcome. Then, the results could be rationalized in a framework were agents are risk averse, but some of them believe they are more likely to experience good outcomes than the objective probabilities suggest. This would increase the expected value of investing both in the sound and in the money-burning cases.

To disentangle the two channels, I run a final experiment to elicit individual beliefs irrespective of preferences for risk. After answering four background questions, subjects are exposed to identical experimental conditions as in Experiment 3 (control, male identity priming, power priming). Subjective beliefs are elicited in three steps. First, subjects are presented with an investment opportunity that succeeds on average 5 out of 10 times. No additional details about the investment are disclosed. Subjects are asked to imagine they invest ten times, and to report the number of times they think they would succeed. This gives a direct measure of the subjective probability of experiencing a good outcome.

In a second step, subjects are confronted with the same information about the investment opportunity, and asked to suppose that everyone in their neighborhood invests 10 times. They report the number of times they think, on average, people in their neighborhood would succeed. This gives a direct measure of subjective probabilities that peers will experience a good outcome.

The difference between the first and the second reported numbers is a direct measure of better-than-average beliefs at the subject level. For robustness to framing, in a third step subjects are told that an investment opportunity succeeds with probability 50%. They are asked to write down the probability they think they would succeed if they invested.

330 subjects (125 male) were recruited on Amazon Mechanical Turk in December 2012 and January 2013. Subjects were invited to work on a three-question survey to earn $0.4. 6 subjects (2% of whole sample) were excluded because they did not write meaningful words or sentences in the priming task, leading to a final sample of 324 subjects. Subjects were assigned in equal proportions to the three experimental conditions.

Panel A of Figure 3 plots average individual beliefs of experiencing positive investment outcomes if investing in an opportunity which succeeds on average 5 out of 10 times for men and women. Men (averaged across all experimental conditions, including control) think they will succeed more than 5 times. This is not true for women, whose subjective probability is not different from the objective one. Unreported results for the framing robustness question are almost identical.

Panel B plots the mean better-than-average beliefs of men by experimental conditions, where identity and power primings are merged into the same category.[35] The better-than-average measure is statistically and economically indistinguishable from zero for control men. It is significantly positive for primed men.[36] Thus, priming identity and overconfidence increases the subjective probability of succeeding of male subjects.

Although a direct effect of priming on risk preferences is not ruled out, beliefs appear to be a major channel through which identity and overconfidence affect the investment behavior of men.

10 Discussion and Conclusions

In this paper, I test whether social identity contributes to explain the systematic heterogeneity in the risk tolerance and investment behavior across genders. Social identity prescribes opposite behaviors to men and women, as theorized in the sociology literature and consistent with evidence in Table 1. In a set of artefactual field experiments, I find that priming or threatening the gender identity of men increases their risk tolerance. Moreover, primed men invest more often and more money in risky opportunities, even when they act as agents of a principal, and especially in money-burning investments. Primes have no effect on the behavior of women.

I analyze the interplay between identity and overconfidence, which is induced into subjects by priming their power over other individuals. Stereotypical behaviors attached to powerful individuals and to men are similar, as shown in Table 1. The investment behavior

[35] This is because priming identity and power have very similar effects on the willingness to take on financial risks by subjects and on investment outcomes in Experiments 1 through 3.

[36] The better-than-average beliefs measure is statistically undistinguishable from zero for women exposed to any experimental condition.

of men primed with power is qualitatively and quantitavely similar to that of men primed with male identity.

Overall, I conclude that social identity could be an important unexplored channel to explain the systematic heterogeneity of attitudes towards risk across genders, and complementing the biological channels explored in previous literature.

These results can also be interpreted as a causal test of Barber and Odean (2001), who use male gender as a proxy for overconfidence and to verify its correlation with investment behavior in field data. Results on delegated investments can also be interpreted as a causal test of Malmendier and Tate (2005) and Malmendier and Tate (2008) who find that two alternative proxies for overconfidence of executives correlate with their investment behavior as predicted by theory. Consistent with their evidence, men induced with overconfidence overinvest, i.e. the invest in money-burning opportunities if they have enough cheap funds to do so. At the same time, these results can be interpreted as an empirical test of Gervais et al. (2011),[37] who prove that overconfident agents are less conservative than other agents when investing in sound opportunities. This is also consistent with the evidence in Hirshleifer et al. (2012), who show that overconfident CEOs undertake riskier projects, they invest more in innovation and they obtain more innovative success keeping R&D expenditures constant.

Welfare implications of the results in this paper are ultimately driven by the quality of the risky investment opportunities individual investors and corporate executives face.[38] As long as opportunities have a positive net present value, male identity and overconfidence benefit investors or firms who hire executives by increasing their willingness to invest. At the same time, male identity and overconfidence cause agents to overinvest in money-burning opportunities, if presented with any and if not tight by liquidity constraints.

The priming techniques employed in this paper show that identity and overconfidence can in principle be manipulated. Male identity and overconfidence cues may be used to design policies or compensation contracts which foster the willingness to take on financial risks

[37] Note that the definition of overconfidence as better-than-average beliefs is different from that of perceived overprecision of signals in Gervais and Odean (2001) and Gervais et al. (2011).

[38] Claims on external validity of results are subject to the caveat that there is no uncertainty about future states of the world in the experiments described in this paper.

by individual investors or corporate executives. Figure 4 shows a set of financial ads across different countries and products. Those who care the most about take up rates of financial products seem to believe in the effects of manipulating identity and overconfidence.

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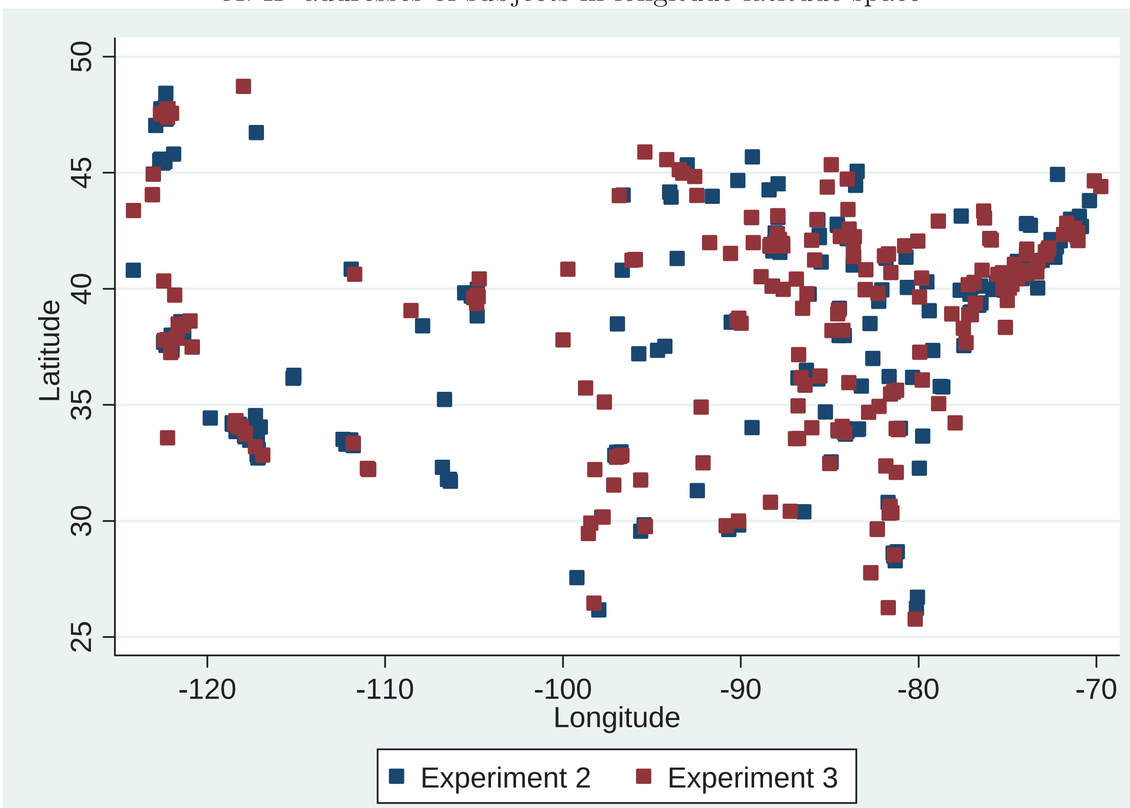
Figure 1: **Amazon Mechanical Turk vs. University Laboratory**

Panel A plots IP addresses of subjects of Experiment 2 and Experiment 3 in longitude-latitude space (two observations from Hawaii not reported). Panel B plots the age distribution of subjects across all four Experiments.

A. IP addresses of subjects in longitude-latitude space

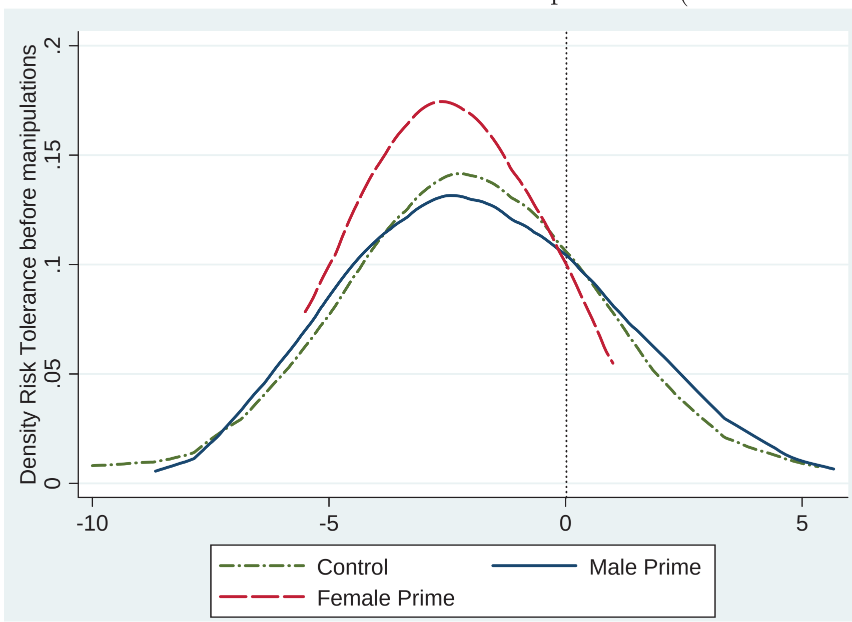


B. Age distribution of subjects

Figure 2: **Densities of Risk Tolerance Change induced by the Identity Primes**

This graph depicts estimated densities for the risk tolerance before manipulations (panel A) and the change in risk tolerance measured at the subject level across experimental conditions (panel B) in Experiment 1 (Identity prime) for male subjects. The green dash-dot line refers to men in the control condition; the blue solid line to men in the male identity prime condition; the red dashed line to men in the female identity prime condition. The change in risk tolerance is measured as follows: $\Delta RiskTolerance_i = RiskTolerance_{post,i} - RiskTolerance_{pre,i}$, *where* $RiskTolerance_{pre,i}$ *and* $RiskTolerance_{post,i}$ *are elicited via lottery choices a la Holt and Laury (2002) before and after exposure to the experimental conditions, respectively. All densities are estimated based on an Epanechnikov kernel with a bandwith of 0.5.*

A. Distribution of Risk Tolerance before manipulations (male subsample)



B. Distribution of ΔRisk Tolerance induced by manipulations (male subsample)

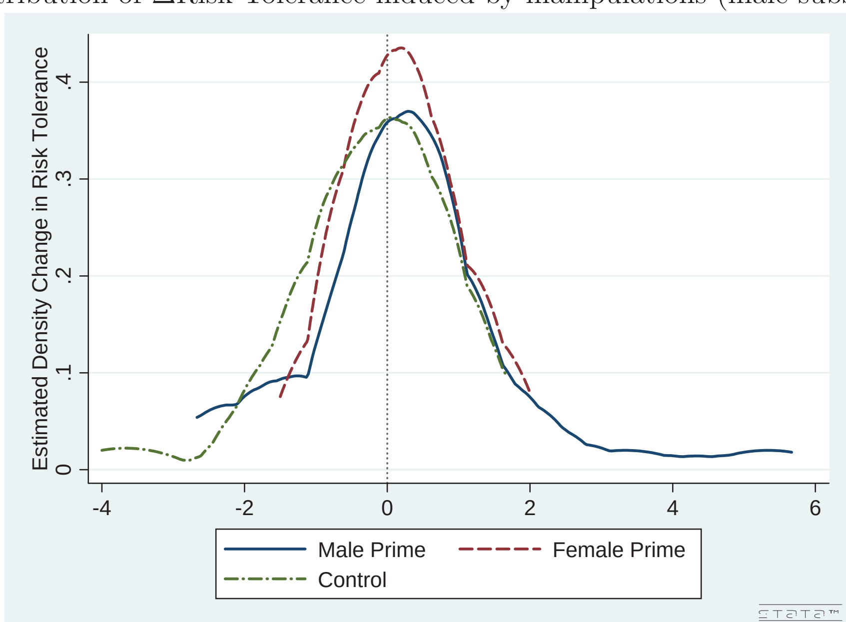
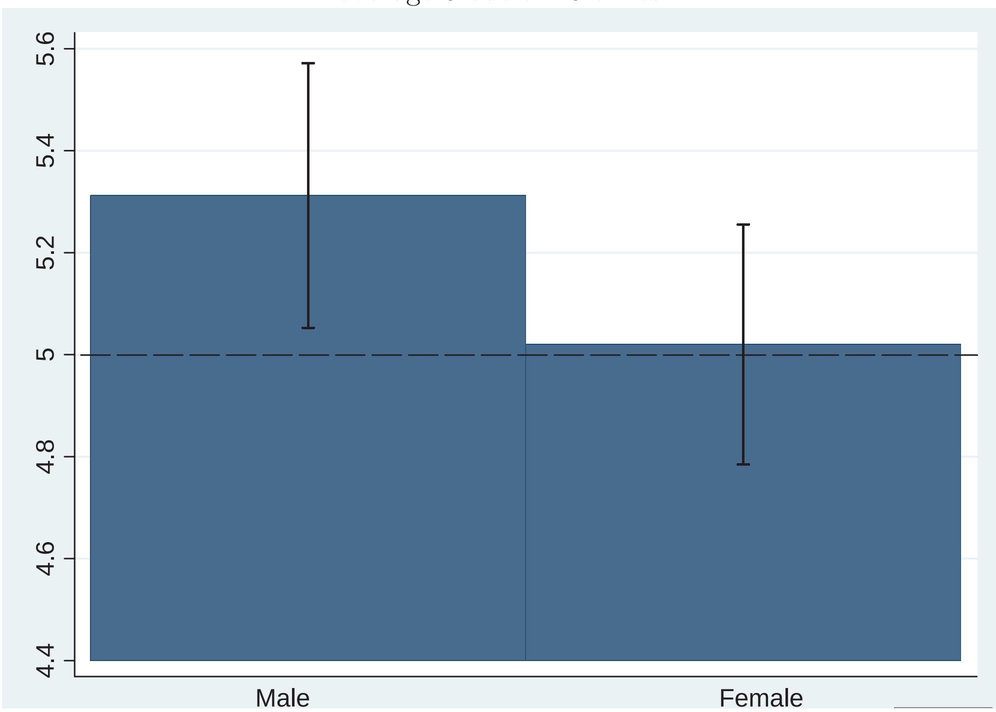


Figure 3: **Better-than-Average Beliefs**

Panel A plots mean subjective beliefs of experiencing a positive outcome for subjects who invest ten times on an opportunity which on average succeeds 5 out of ten times, by gender. Bandwiths are 95% confidence intervals for estimated means. The bottom graph plots mean subjective better-than-average beliefs of success for male subjects in the control group and in the primed group (which collects both male identity and power primings). Bandwiths are 95% confidence intervals for estimated means.

A. Subjective beliefs of succeeding in an investment which succeeds on average 5 out of 10 times



B. Better-than-average beliefs across experimental conditions (men only)

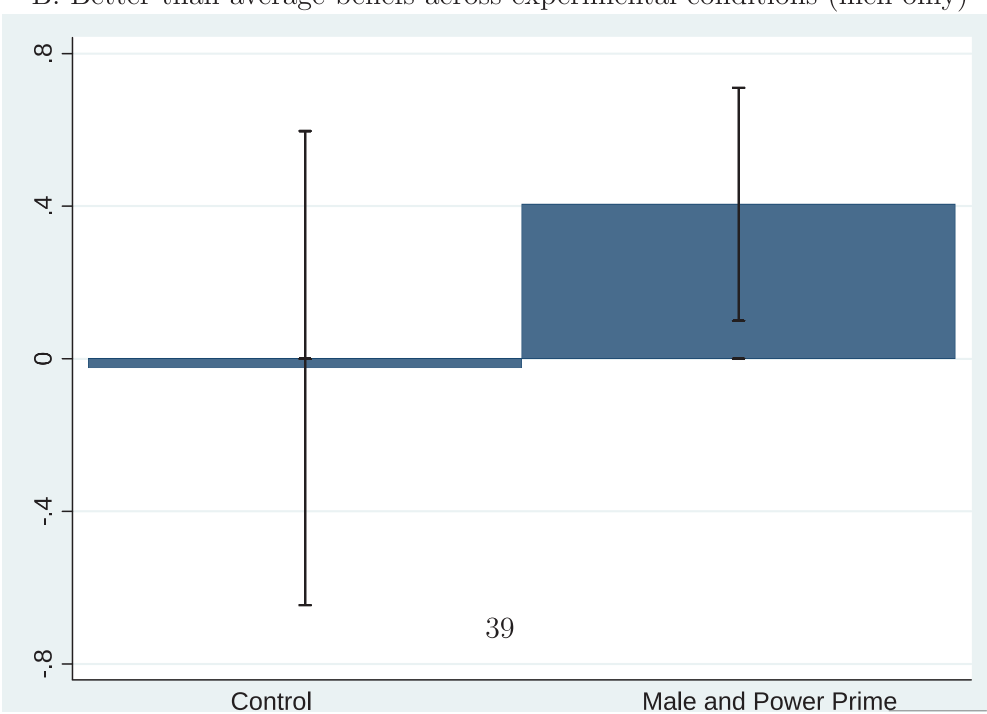


Figure 4: **Identity and Overconfidence cues in financial products ads**

The set of pictures below are examples of financial products ads across countries and for different types of products with male identity and overconfidence cues.

Table 1: **Characterization of stereotypes**

This Table reports the words mentioned most frequently by 200 survey respondents recruited on mTurk to describe how a typical male individual, powerful individual, successful individual, or female individual behaves. Numbers indicate the absolute frequency of each word in the sample. Subjects were asked to write 3 to 5 words for each type of individual. Types were presented in a random order to survey respondents.

MALE		POWERFUL		SUCCESSFUL		FEMALE	
Strong	37	Strong	50	Confident	46	Caring	40
Loud	27	Confident	45	Smart	36	Emotional	34
Aggressive	26	Arrogant	19	Happy	26	Flirty	16
Confident	18	Aggressive	18	Proud	19	Passive	15
Arrogant	15	Assertive	15	Determined	15	Smart	13
Dumb	12	Dominant	13	Focused	12	Loving	13
Stubborn	11	Greedy	9	Motivated	11	Happy	12
Assertive	11	Cocky	8	Assertive	10	Gossipy	12
Proud	10	Proud	8	Ambitious	10	Helpful	10
Dominant	10	Smart	7	Strong	10	Kind	10

Table 2: **Experiment 1 - Design and Subjects**

Table A describes the design of Experiment 1, which tests the effect of priming own and opposite gender identity on individual willingness to take on financial risk. Table B shows the number of men and women assigned to each experimental condition.

A. Design of Experiment 1

	Control	T1 (male prime)	T2 (female prime)
Stage 1	Background + R.T. elicitation	Background + R.T. elicitation	Background + R.T. elicitation
Stage 2	Text on *ayurveda* principles for healthy lifestyle + recall task	Text with male identity stereotypes + recall task	Text with female identity stereotypes + recall task
Stage 3	R.T. elicitation	R.T. elicitation	R.T. elicitation

B. Assignment of subjects to experimental cells in Experiment 1

	Control	Male prime	Female prime	
Male	55	61	32	148
Female	74	64	34	172
	129	125	66	320

Table 3: **Experiment 1 - Identity Effect on Financial Risk Taking**

This Table reports results for estimating the following OLS equation:

$$\Delta RiskTolerance_{iae} = \alpha + \gamma_1 \times MalePrime_{iae} + \gamma_2 \times FemalePrime_{iae} + \eta_a + \eta_e + \epsilon_{iae}$$

*where $\Delta RiskTolerance_{iae}$ is a measure of within-subject change in risk tolerance for subject i, in age group a and education group e, before and after being exposed to experimental conditions (see definition in Section 5.B). $MalePrime$ and $FemalePrime$ are dummies which equal one if the subject is exposed to the male identity or female identity prime, respectively; η_a and η_e are fixed effects for subjects' age and education level groups. The left Panel limits the analysis to the subsample of male subjects, while the right Panel uses all subjects. White Standard errors are reported below each coefficient. Statistical significance is marked as follows: ** 5%, * 10%.*

	(1)	(2)	(3)	(4)	(5)	(6)
		Male only			Full Sample	
M. Prime	0.528	0.557	0.577	-0.364	-0.375	-0.286
	(0.250)**	(0.253)**	(0.264)**	(0.279)	(0.280)	(0.268)
F. Prime	0.549	0.554	0.564	-0.057	-0.116	-0.089
	(0.232)**	(0.252)**	(0.258)**	(0.262)	(0.273)	(0.271)
Male*M. Prime				0.897	0.904	0.836
				(0.374)**	(0.380)**	(0.375)**
Male*F. Prime				0.630	0.668	0.659
				(0.335)*	(0.343)*	(0.344)*
Male				-0.294	-0.310	-0.329
				(0.216)	(0.218)	(0.223)
Mean omitted		-0.212			0.045	
Median omitted		0			0	
Session f.e.	X	X	X	X	X	X
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	148	148	148	320	320	320
R^2	0.04	0.09	0.09	0.03	0.04	0.10

Table 4: **Experiment 1 - Identity Effect by Age and Education**

This Table reports results for estimating the following OLS equation:

$$\Delta RiskTolerance_{ig} = \alpha + \gamma_M MalePrime_{ig} + \gamma_{MB} MalePrime_{ig} \times Bottom_{ig} + \gamma_{MM} MalePrime_{ig} \times Medium_{ig} \\ + \gamma_F FemalePrime_{iae} + \gamma_{FB} FemalePrime_{iae} \times Bottom_{ig} + \gamma_{FM} FemalePrime_{iae} \times Medium_{ig} \\ + Bottom_{ig} + \eta_e + \epsilon_{iae}$$

*where $\Delta RiskTolerance_{iae}$ is a measure of within-subject change in risk tolerance for subject i, in age (education) level g, before and after being exposed to experimental conditions (see definition in Section 5.B). $MalePrime$ and $FemalePrime$ are dummies which equal one if the subject is exposed to the male identity or female identity prime, respectively. Subjects are sorted and split into three groups based on characteristic g. $Bottom_{ig}$ is a dummy capturing subjects in the group at the bottom of the distribution based on g. $Medium_{ig}$ captures subjects in the middle group based on the distribution of g. The left Panel reports results for sorting subjects on age, while the right panel on their education level. White Standard errors are reported below each coefficient. Statistical significance is marked as follows: ** 5%, * 10%.*

	(1)	(2)	(3)	(4)	(5)	(6)
		Age			Education	
M. Prime	0.890	0.547	0.902	0.956	0.566	0.935
	(0.365)**	(0.252)**	(0.376)**	(0.367)**	(0.264)**	(0.378)**
M. Prime*Low	-0.476		-1.060	-1.151		-1.138
	(0.540)		(0.580)*	(0.528)**		(0.563)**
M. Prime *Medium	-0.533		-0.482	-0.492		-0.294
	(0.491)		(0.529)	(0.651)		(0.706)
F. Prime	0.513	0.382	0.540	0.498	0.341	0.441
	(0.238)**	(0.417)	(0.396)	(0.231)**	(0.242)	(0.245)*
F. Prime*Low		-0.274	-0.897		0.701	0.034
		(0.526)	(0.555)		(0.641)	(0.673)
F. Prime *Medium		0.404	0.165		0.531	0.409
		(0.442)	(0.467)		(0.478)	(0.464)
Low	0.070	0.035	0.658	0.492	-0.189	0.478
	(0.302)	(0.307)	(0.351)*	(0.296)	(0.283)	(0.342)
Medium	-0.327	-0.614	-0.374	0.116	-0.202	-0.081
	(0.231)	(0.256)**	(0.295)	(0.241)	(0.375)	(0.355)
Mean omitted		-0.076			-0.324	
Median omitted		0			0	
Session f.e.	X	X	X	X	X	X
Observations	148	148	148	148	148	148
R^2	0.09	0.09	0.10	0.07	0.05	0.08

Table 5: **Experiment 2 - Design and Subjects**

Table A describes the design of Experiment 2, which tests the effect of inducing overconfidence on individual willingness to take on financial risk. Table B shows the number of men and women assigned to each experimental condition.

A. Design of Experiment 2

	Control	T1 (power prime)	T2 (success prime)
Stage 1 (10 min)	Background + R.A elicitation (lottery tasks)	Background + R.A elicitation (lottery tasks)	Background + R.A elicitation (lottery tasks)
Stage 2 (10 min)	Recall task: situation when felt relaxed	Recall task: situation when had power over another individual	Recall task: situation when felt successful
Stage 3 (10 min)	R.A elicitation (lottery tasks)	R.A elicitation (lottery tasks)	R.A elicitation (lottery tasks)

B. Assignment of subjects to experimental cells in Experiment 2

	Control	Power prime	Success prime	
Male	56	54	59	169
Female	51	53	50	154
	107	107	109	323

Table 6: **Experiment 2 - Overconfidence Effect on Financial Risk Taking**

This Table reports results for estimating the following OLS equation:

$$\Delta RiskTolerance_{iae} = \alpha + \gamma_1 \times PowerPrime_{iae} + \gamma_2 \times SuccessPrime_{iae} + \eta_a + \eta_e + \epsilon_{iae}$$

*where $\Delta RiskTolerance_{iae}$ is a measure of within-subject change in risk tolerance for subject i, in age group a and education group e, before and after being exposed to experimental conditions (see definition in Section 5.B). $PowerPrime$ and $SuccessPrime$ are dummies which equal one if the subject is exposed to the power or success prime, respectively; η_a and η_e are fixed effects for subjects' age and education level groups. The left Panel limits the analysis to the subsample of male subjects, while the right Panel uses all subjects. White Standard errors are reported below each coefficient. Statistical significance is marked as follows: ** 5%, * 10%.*

	(1)	(2)	(3)	(4)	(5)	(6)
		Male only			Full Sample	
Power Prime	0.517	0.599	0.595	0.073	0.080	0.122
	(0.258)**	(0.276)**	(0.270)**	(0.331)	(0.340)	(0.348)
Success Prime	0.007	0.019	-0.005	0.262	0.278	0.274
	(0.261)	(0.265)	(0.262)	(0.322)	(0.319)	(0.328)
Male*P. Prime				0.455	0.435	0.394
				(0.422)	(0.435)	(0.444)
Male*S. Prime				-0.251	-0.279	-0.292
				(0.415)	(0.412)	(0.417)
Male				0.053	0.075	0.103
				(0.322)	(0.326)	(0.331)
Mean omitted		-0.332			-0.536	
Median omitted		-0.167			-0.333	
Session f.e.	X	X	X	X	X	X
Age group f.e		X	X		X	X
Education f.e.			X			X
Observations	169	169	168	323	323	322
R^2	0.04	0.06	0.12	0.02	0.02	0.04

Table 7: **Experiment 3 - Design and Subjects**

Table A describes the design of Experiment 3, which tests the effect of inducing male identity or overconfidence on individual investment decisions. In Stage 3 (Investment Decisions), subjects are assigned a virtual endowment of $100 in each of three periods, and proposed three investment opportunities. The expected value from investing is higher than the invested amount in all three cases (see Gneezy and Potters (1997)). Subjects are paid a fraction of their virtual profits at the end of the session. Table B shows the number of men and women assigned to each experimental condition.

A. Design of Experiment 3

	Control	T1 (male prime)	T2 (power prime)
Stage 1	Background + Recall event when felt relaxed	Background + Recall event when felt relaxed	Background + Recall event when felt relaxed
Stage 2	Text on *ayurveda* principles for healthy lifestyle + recall task	Text with male identity stereotypes + recall task	Recall task: situation when had power over another individual
Stage 3	Investment Decisions	Investment Decisions	Investment Decisions

B. Assignment of subjects to experimental cells in Experiment 3

	Control	Male Prime	Power prime	
Male	35	38	32	105
Female	43	41	45	129
	78	79	77	234

Table 8: **Experiment 3 - Identity, Overconfidence and Investment Decisions**

The left Panel reports marginal effects computed from estimating the following probit model:

$$Pr(Invest = 1)_{iae} = \Phi(\alpha + \beta \times MalePrime + \gamma \times PowerPrime + \eta_a + \eta_e)$$

*where $Invest$ is one if subject i in age group a and education level group e invests any positive amount, zero otherwise. $\Phi(.)$ is the normal cdf. $MalePrime$ and $PowerPrime$ equal one for subjects exposed to the male identity or power prime, respectively; η_a and η_e are fixed effects for subjects' age and education level groups. Tabulated results only refer to male subjects, who decide on three investment opportunities. Standard errors are clustered at the subject level, and computed with the delta method from probit marginal effects. The right Panel reports results for fitting a tobit model whose dependent variable is the amount of money a subject invests in each opportunity, which is censored at \$0 and \$100. Standard errors are clustered at the subject level. In both Panels, statistical significance is marked as follows: *** 1%, ** 5%, * 10%.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probability of Investing				Amount Invested			
Male Prime	0.123	0.124	0.132	0.136	15.66	17.01	21.09	20.59
	(0.065)*	(0.064)*	(0.063)**	(0.063)**	(9.92)	(9.86)*	(9.85)**	(9.72)**
Power Prime	0.170	0.171	0.179	0.173	16.97	17.75	22.55	22.77
	(0.068)**	(0.068)**	(0.070)**	(0.069)**	(9.32)*	(9.21)*	(9.96)**	(9.77)**
Constant					16.77	8.31	-21.69	7.19
					(6.67)***	(9.00)	(13.47)	(13.71)
Age group f.e.		X	X	X		X	X	X
Education f.e.			X	X			X	X
Success prob. f.e				X				X
Observations	315	315	315	315	315	315	315	315
(pseudo-)R^2	0.03	0.03	0.03	0.09	0.01	0.01	0.01	0.03

Table 9: **Experiment 4 - Identity and Delegated Investment Decisions**

The left Panel of Table A reports marginal effects computed from estimating the following probit model:

$$Pr(Invest = 1)_{iae} = \Phi(\alpha + \beta \times MalePrime + \eta_a + \eta_e)$$

*where $Invest$ is one if subject i in age group a and education level group e invests any positive amount, zero otherwise. $\Phi(.)$ is the normal cdf. $MalePrime$ equal one for subjects exposed to the male identity prime; η_a and η_e are fixed effects for subjects' age and education level groups. Subjects decide on two investment opportunities. Standard errors are clustered at the subject level, and computed with the delta method from probit marginal effects. The right Panel of Table A reports results for fitting a tobit model whose dependent variable is the amount of money a subject invests in each opportunity, which is censored at \$0 and \$100. Standard errors are clustered at the subject level. In both Panels, results only refer to male subjects. Table B reports results for estimating the tobit model in A separately for the money-burning investment opportunity (whose expected value is lower than the any invested amount) and the sound investment opportunity (whose expected value is greater than any invested amount). Statistical significance is marked as follows: *** 1%, ** 5%, * 10%.*

A. Marginal effects of treatment on likelihood of investing (male subjects only)

	(1)	(2)	(3)	(4)	(5)	(6)
	Probability of Investing			Amount Invested		
Male Prime	0.107	0.105	0.105	27.35	24.93	24.99
	(0.050)**	(0.049)**	(0.048)**	(9.82)***	(9.64)**	(9.57)**
Constant				44.30	57.27	66.12
				(6.19)***	(11.29)***	(19.73)***
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	194	194	194	194	194	194
(pseudo-)R^2	0.05	0.05	0.06	0.01	0.01	0.02

B. Effect of treatment on amount invested in each opportunity by type (male subjects only)

	(1)	(2)	(3)	(4)	(5)	(6)
	Money-burning Investment			Sound Investment		
Male Prime	35.53	34.51	35.27	19.66	16.00	15.46
	(12.28)***	(11.94)***	(11.85)***	(10.45)*	(10.20)	(10.11)
Constant	37.37	48.37	68.47	50.80	65.27	63.87
	(7.38)***	(13.38)***	(21.08)***	(7.10)***	(11.83)***	(20.69)***
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	97	97	97	97	97	97
pseudo-R^2	0.01	0.02	0.02	0.01	0.01	0.02

Appendix A - Experimental Materials

This Appendix provides part of the materials used in Experiments 1 through 4. Figure 5 shows the screenshot subjects faced any time they had to perform a risk aversion elicitation lottery task à la (Holt and Laury, 2002). For each line, subjects were asked to choose between a lottery paying a strictly positive amount with probability 50%, zero otherwise, and a certain amount. The certain amount decreases from one line to the other, while the lottery is fixed. The number of times a subjects chooses the certainty equivalent is subtracted from the number of times a risk neutral agent would pick the certain amount over the lottery to obtain a measure for the subject's risk tolerance (see Section 5.B). In Experiments 1 and 2, subjects perform lottery tasks before and after being exposed to the experimental condition, so as to obtain a within-subject measure of the change in risk tolerance due to the experimental treatment.
Figure 6 shows the screenshot subjects faced if assigned to the male identity priming condition. It is an excerpt from an internet blog, which makes the treatment as close as possible to daily-life experiences by subjects, who are regular internet users. The excerpt describes a series of characteristics attributed to the "masculine side" of life, which are similar to the traits survey responders in Table 1 think best describe how a typical male individual behaves. Figure 7 shows an analogous screenshot subjects faced if assigned to the female identity priming condition. The excerpt describes a series of characteristics attributed to the "feminine side" of life. Finally, Figure 8 shows the screenshot subjects faced if assigned to the control condition. The excerpt, also from a blog, describes lifestyle according to the "ayurveda principles". In all three cases, after reading the excerpt, subjects were asked to recall a situation when the behaved in line with the principles presented in the text, and describe the situation, their thoughts and feelings in detail in a short essay (5 to 10 sentences). Computing a within-subject measure of change in risk tolerance helps to ensure results are not driven by individuals exposed to the control condition. To further address this concern, all subjects were asked to recall a situation when they felt relaxed, and describe it in detail before being exposed to any experimental condition in Experiment 3 and Experiment 4.

Figure 5: **Set of lottery pairs choice**

This picture reports the screenshot of one of the sets of lottery pair choices subjects were faced with in Experiment 1 and Experiment 2. Lottery pairs are a degenerate version of those introduced by Holt and Laury (2002).

For each line, please pick one choice by filling the corresponding circle:

$6 for sure		50% -- $7
$5.7 for sure		50% -- $7
$5.4 for sure		50% -- $7
$5.1 for sure		50% -- $7
$4.8 for sure		50% -- $7
$4.5 for sure		50% -- $7
$4.2 for sure		50% -- $7
$3.9 for sure		50% -- $7
$3.6 for sure		50% -- $7
$3.3 for sure		50% -- $7
$3 for sure		50% -- $7
$2.7 for sure		50% -- $7
$2.4 for sure		50% -- $7
$2.1 for sure		50% -- $7
$1.8 for sure		50% -- $7
$1.5 for sure		50% -- $7
$1.2 for sure		50% -- $7
$0.9 for sure		50% -- $7
$0.6 for sure		50% -- $7
$0.3 for sure		50% -- $7
$0 for sure		50% -- $7

Figure 6: **Male Identity Priming text**

This picture reports the screenshot of the text subjects in the male identity prime treatment were asked to read. It is an excerpt from a blog entry on the internet. After reading the excerpt, subjects were asked to recall a situation when the behaved in line with the "masculine side" as presented in the text, and describe the situation, their thoughts and feelings in detail in a short essay (5 to 10 sentences).

The Masculine Side

The Masculine Side deals with the strength of the self. It is what causes you to act either timidly or self-confidently. The thing that is most important in determining the strength of the masculine side, is the value that you, at a deep level, place on yourself. This is a value you know within yourself that you have really and truly earned. It could be thought of as a sort of self esteem. Placing a high value on yourself affects your whole being and helps you feel strong and confident in operating your life. And, in the reverse direction, when you are able to operate your life confidently, things can really turn around for you because you get more out of life, and this automatically makes you place a higher value on yourself. You can build the masculine side through progress and small wins, through positive reinforcement, by practicing, and by doing things and generally taking an active part in operating your life.

If you have a strong masculine side, you are in charge of your own life because you are internally controlled. You tend to look people in the eye. You stand straight, and you usually command attention when you walk into a room, whether you say anything or not. This happens because of the strength within. [...] if you have a strong masculine side you are self-confident, and don't feel it is necessary to show off.

The masculine side is full of things that you have to be strong and self-confident in order to do. These include being able to claim your basic rights, such as the right to feel free to operate independently of others, and the right to belong or fit into society in any way you please. Claiming your rights also includes being able to stand up to people who try to take away your rights, either by force or intimidation, or by manipulation, or by trying to hinder you in choosing your own direction in life. The masculine side also includes the ability to take risks when appropriate, to be decisive when necessary, and to focus or concentrate in order to get something done. In addition, it includes being able to figure out how to accomplish things so you can get more of what you want out of life. Part of this is being able to figure out how to operate your life in a responsible manner, how to reason without distorting reality and without fooling yourself, and how to accurately weigh probabilities so that you know the most likely outcome to expect in situations you come across.

Extract from ***http://www.lovesedona.com/02.htm.***

Figure 7: **Female Identity Priming text**

This picture reports the screenshot of the text subjects in the female identity prime treatment were asked to read. It is an excerpt from a blog entry on the internet. After reading the excerpt, subjects were asked to recall a situation when the behaved in line with the "feminine side" as presented in the text, and describe the situation, their thoughts and feelings in detail in a short essay (5 to 10 sentences).

The Feminine Side

[...] the Feminine Side is based, [...] on a value that you place on others. It could be thought of as a sort of other esteem. The value you place on others affects your whole being. If you have a strong feminine side and place a high value on others, you are often giving and unselfish. You usually know what is good for people, and you tend to operate in ways that help others get what they want out of life. You happily let people operate their own life without interference from you, but when asked, you are also willing to help by supporting, cooperating, and giving advice. People feel comfortable with you because you give them who you are without pushing yourself on others.
If you have a strong feminine side, people also feel comfortable being around you because there is no selfishness for them to detect. [...]

If you have a strong feminine side, you often behave in ways that are considered feminine in nature. You do things you have to be giving and unselfish in order to do. These include recognizing the basic right of all people to use their own will to operate their own life, for example, by allowing them freedom to operate independently, freedom to fit in where and how they want, and freedom to choose what things to confront or face up to in life. Allowing people their basic rights also includes allowing them to control their own life without interference from you, to choose their own obligations in life without being manipulated by you, and to choose their own path or direction in life without hindrance from you. The feminine side also includes having enthusiasm and zest for life, and recognizing what things are worth getting enthusiastic about. And it includes having the persistence and tenacity to stay with things to the end, while still knowing when to give up on something if your energy is better used elsewhere.

In addition, the feminine side also includes being kind, compassionate, patient, responsive to the needs of others, and it includes knowing how much energy you can put into each of these without hurting yourself by draining your own energy.

Extract from ***http://www.lovesedona.com/02.htm.***

Figure 8: **Control Condition text**

This picture reports the screenshot of the text subjects in the control condition were asked to read. It is an excerpt from a blog entry on the internet. After reading the excerpt, subjects were asked to recall a situation when the behaved in line with the "ayurveda principles" as presented in the text, and describe the situation, their thoughts and feelings in detail in a short essay (5 to 10 sentences).

Dincharya [Daily Routine]

In Sanskrit, the word 'dincharya' means daily routine. According to Ayurveda, one should follow the dincharya in order to lead a healthy and disease-free life. Everyday, two cycles of change pass through the human body, each bringing a Vata, Pitta, or Kapha predominance. Based on the cycles of vata, pitta and kapha, our daily routine should be divided into morning, noon, evening/twilight, dinner and bedtime. In the Ayurvedic texts, it is written that a person should wake up two hours prior to the sunrise, if he/she is not suffering from any diseases such as fever or diarrhea. Very young, very old and sick people are some of the exceptions.

According to dincharya, the day should be kick-started by eliminating the colon and the bladder, followed by a through cleaning of the senses - ears, eyes, mouth etc. This should be followed by an oil self massage. Exercise in the morning, just after the massage, helps rejuvenate the body and soul. After bathing, one should head towards the dining table for breakfast. The day follows by activities like studying, working or traveling. During the lunch, one should consume nutritious meal [...]. Dinner should consist of a light meal. Before going to bed, one should sit back and relax. By following the dincharya of Ayurveda, one can ensure a healthy life.

Though it is difficult to follow a stringent dinacharya in this fast moving life, it is highly recommended by Ayurvedic physicians, because a number of health benefits are associated with it. The dinacharya makes one to lead a healthy and disciplined life. According to the latest studies in the field of medical science, people who stick to the daily routine are more fit than those, who do not have a particular time to perform their everyday activities. It is said that dinacharya reduces the stress level to a great extent. In addition to this, the person's body is purified and detoxified. Therefore, barring a few exceptions like sickness, very old and young age, Ayurvedic dinacharya is recommended for everyone.

Extract from http://ayurveda.iloveindia.com/dincharya/index.html

This page reports sample essays written by subjects in the four conditions across the experiments presented in the paper: priming relax, male identity, female identity or power over other individuals.

Control condition:

I was at our lake house. The kids were reading and taking care of themselves. The lake was calm and the bugs were scarce. All you could hear was the occasional boat, which to me is relaxing. The sound of the tiny waves lapping at the shore in the twilight was music to my ears. I had a book, but spent most time looking out at the mountains and clear water.

Priming male identity:

It was a typical weekend after work. [...] I was with a group of friends in a bar and in walked the hottest group of girls that night. Every guy immediately turned their heads to look, including me, and the girls knew it and loved it. However, everyone quickly averted their glances thinking they were out of league. However, I remained calm and kept my steady gaze until the one I was eyeing saw me in her sweep of the room. She looked back, cocked her head slightly, and I saw a faint smile forming at the edge of her lips. After about half an hour, I confidently walked up to the group of girls, straight to the girl I picked out, and asked her to join me at the bar for a drink. The rest is history.

Priming female identity:

My best friend was recently laid off from his job and his lease to his apartment was set to expire. Although I live with 3 other roomates, I allowed my friend to stay in my apartment for 4 months until he got back on his feet with a full-time job. I felt a sense of responsibility to be

compassionate and help him in this situation.

Priming Power over other individuals:

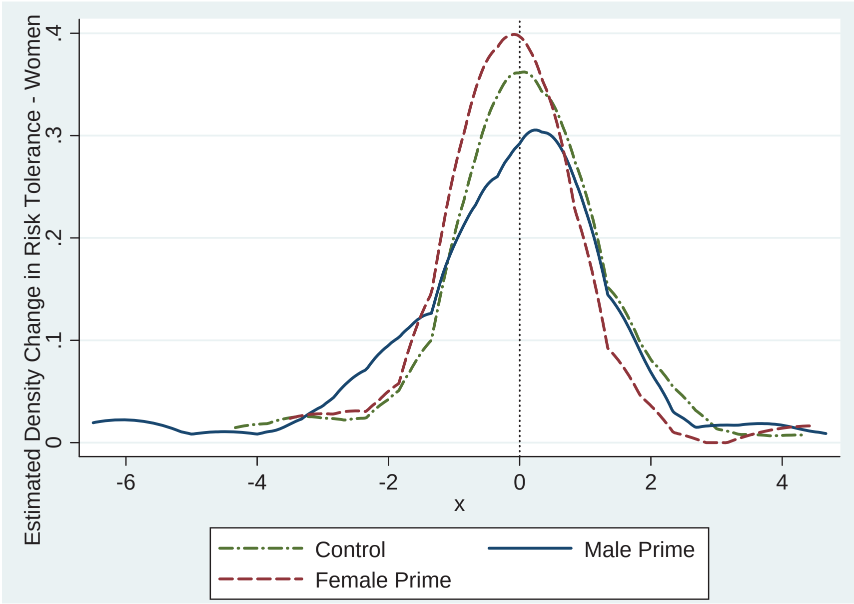
When I became the executive director of my actual company, my attributions were many. I was almost the most powerful person. I could do whatever I wanted, but I did only what was fair for every employee. Everyone got what they deserved and they seemed satisfied with me. I felt very capable and skillful. I did exactly what was right.

Appendix B - Additional Results

Figure 9: **Risk Tolerance Change and Beliefs in the Female Subsamples**

Panel A depicts estimated densities for the change in risk tolerance measured at the subject level across experimental conditions (panel B) in Experiment 1 (Identity prime) for female subjects. The green dash-dot line refers to women in the control condition; the blue solid line to women in the male identity prime condition; the red dashed line to women in the female identity prime condition. The change in risk tolerance is measured as follows: $\Delta RiskTolerance_i = RiskTolerance_{post,i} - RiskTolerance_{pre,i}$, *where* $RiskTolerance_{pre,i}$ *and* $RiskTolerance_{post,i}$ *are elicited via lottery choices a la Holt and Laury (2002) before and after exposure to the experimental conditions, respectively. All densities are estimated based on an Epanechnikov kernel with a bandwith of 1.5. Panel B depicts the average measure of "better-than-average" beliefs constructed in Experiment 4 for the female subsample across experimental conditions.*

A. Distribution of ΔRisk Tolerance (female subsample)



B. Better-than-Average Beliefs (female subsample)

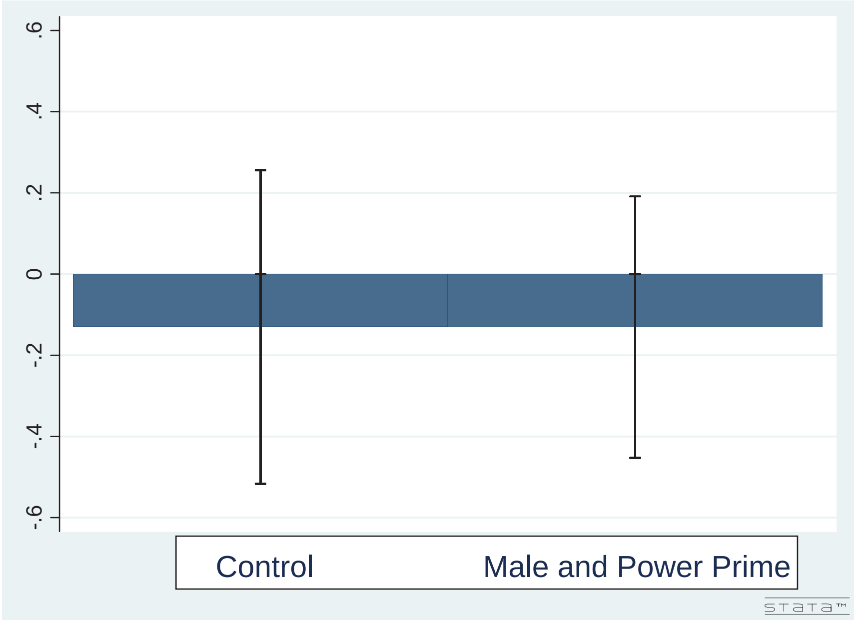


Table 10: **Investment Decisions by the Female Subsamples**

Panel A shows results for the investment decisions made by women in Experiment 3. The left panel reports marginal effects computed from estimating the following probit model:

$$Pr(Invest = 1)_{iae} = \Phi(\alpha + \beta \times MalePrime + \gamma \times PowerPrime + \eta_a + \eta_e)$$

*where $Invest$ is one if subject i in age group a and education level group e invests any positive amount, zero otherwise. $\Phi(.)$ is the normal cdf. $MalePrime$ and $PowerPrime$ equal one for subjects exposed to the male identity or power prime, respectively; η_a and η_e are fixed effects for subjects' age and education level groups for female subjects, who decide on three investment opportunities. Standard errors are clustered at the subject level, and computed with the delta method from probit marginal effects. The right panel reports results for fitting a tobit model whose dependent variable is the amount of money a subject invests in each opportunity, which is censored at $0 and $100. Standard errors are clustered at the subject level. In both panels, statistical significance is marked as follows: *** 1%, ** 5%, * 10%.*

A. Experiment 3: Investment Decisions (female subsample)

Female subsample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probability of Investing				Amount Invested			
Male Prime	0.113	0.137	0.135	0.136	3.554	5.638	5.961	5.763
	(0.076)	(0.074)*	(0.074)*	(0.073)*	(5.667)	(5.321)	(5.384)	(5.359)
Power Prime	-0.026	-0.017	-0.004	-0.003	-7.751	-6.813	-6.616	-6.778
	(0.073)	(0.073)	(0.074)	(0.073)	(6.060)	(5.851)	(5.864)	(5.848)
Constant					11.94	14.87	-13.54	2.803
					(4.48)***	(5.64)***	(15.82)	(15.32)
Age group f.e.		X	X	X		X	X	X
Education f.e.			X	X			X	X
Success prob. f.e				X				X
Observations	387	387	384	384	387	387	384	384
(pseudo-)R^2	0.01	0.02	0.02	0.09	0.01	0.01	0.01	0.03

B. Experiment 4: Investment Decisions (female subsample)

Female Subsample	(1)	(2)	(3)	(4)	(5)	(6)
	Probability of Investing			Amount Invested		
Male Prime	0.005	0.001	0.004	0.54	0.50	0.84
	(0.055)	(0.053)	(0.052)	(5.37)	(5.22)	(2.18)
Constant				38.26		
				(3.92)***		
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	230	230	228	230	230	228
(pseudo-)R^2	0.00	0.03	0.06	0.00	0.01	0.01

Table 11: **Experiment 1 - Contribution of right tail and average to results**

*Panel A shows results for the change in risk tolerance in the male subsample in Experiment 1. Panel B shows results for the change in risk tolerance for the full sampleof sujects in Experiment 1. In both cases, the left panels reports results for winsorizing the outcome variable ($\Delta RiskTolerance$) at the 5-95 percentiles. In the right panels, the outcome variable is winsorized at the 10-90 percentiles. Standard errors are White-Hubert heteroskedasticity robust. Statistical significance is marked as follows: *** 1%, ** 5%, * 10%.*

A. Experiment 1: Winsorizing outliers (male subsample)

Male Only	(1)	(2)	(3)	(4)	(5)	(6)
	Winsorize 5-95 perc.			Winsorize 10-90 perc.		
M. Prime	0.319	0.336	0.335	0.293	0.306	0.304
	(0.197)	(0.195)*	(0.195)*	(0.165)*	(0.161)*	(0.163)*
F. Prime	0.481	0.447	0.450	0.419	0.377	0.373
	(0.208)**	(0.215)**	(0.221)**	(0.189)**	(0.194)*	(0.199)*
Mean omitted		-0.170			-0.133	
Median omitted		0			0	
Session f.e.	X	X	X	X	X	X
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	148	148	148	148	148	148
R^2	0.03	0.09	0.09	0.04	0.09	0.09

B. Experiment 4: Winsorizing outliers (full sample)

Full Sample	(1)	(2)	(3)	(4)	(5)	(6)
	Winsorize 5-95 perc.			Winsorize 10-90 perc		
M. Prime	-0.265	-0.269	-0.237	-0.189	-0.188	-0.169
	(0.194)	(0.196)	(0.196)	(0.154)	(0.155)	(0.156)
F. Prime	-0.117	-0.162	-0.153	-0.088	-0.127	-0.122
	(0.202)	(0.209)	(0.209)	(0.162)	(0.167)	(0.167)
Male*M. Prime	0.590	0.588	0.566	0.489	0.484	0.469
	(0.276)**	(0.277)**	(0.278)**	(0.225)**	(0.225)**	(0.227)**
Male*F. Prime	0.628	0.650	0.643	0.543	0.557	0.553
	(0.276)**	(0.280)**	(0.281)**	(0.235)**	(0.239)**	(0.241)**
Male	-0.253	-0.262	-0.271	-0.244	-0.248	-0.252
	(0.179)	(0.179)	(0.182)	(0.151)	(0.151)	(0.154)
Mean omitted		0.050			0.072	
Median omitted		0			0	
Session f.e.	X	X	X	X	X	X
Age group f.e.		X	X		X	X
Education f.e.			X			X
Observations	320	320	320	320	320	320
R^2	0.03	0.04	0.06	0.03	0.05	0.10

Table 12: **Just Post It - Evidence vs. Fabricated Data**

Panel A and Panel B report statistics on the outcome variables across experimental conditions for each experiment. Panel A refers to the full sample, Panel B is limited to the male subsample. In each cell the sample mean is reported, the standard deviation is reported in round parentheses, and the number of observations in the experimental cell is reported in curly parentheses. Panel C reports results for running the test of Simonsohn (2013) for each experiment and sample. The test consist of: i) estimating 100,000 samples randomly drawn from a normal distribution with mean equal to the one in the condition, and standard deviation equal to the average across conditions in each experiment (samples are drawn from a binomial distribution with probability equal to the mean of the extensive margins in Experiment 3 and Experiment 4); ii) Computing the standard deviation of the standard deviations in each drawn sample; iii) reporting the ratio of times that the simulated standard deviation of standard deviations are lower than the actual one in the data.

A. Summary Statistics (full samples)

	Male Identity Prime	Female Identity Prime	Power Prime	Success Prime	Control
Experiment 1	-0.01 (1.74) {125}	0.05 (1.07) {66}			-0.06 (1.22) {129}
Experiment 2			-0.21 (1.43) {107}	-0.38 (1.37) {109}	-0.51 (1.62) {107}
Experiment 3 (extensive)	0.747 (0.436) {237}		0.680 (0.468) {231}		0.624 (0.485) {234}
Experiment 3 (intensive)	27.95 (29.81) {237}		23.34 (28.55) {231}		23.41 (29.40) {234}
Experiment 4 (extensive)	0.904 (0.296) {208}				0.852 (0.356) {216}
Experiment 4 (intensive)	49.93 (32.17) {208}				42.04 (30.07) {216}
Experiment 5	0.079 (1.711) {214}				-0.090 (1.743) {110}

B. Summary Statistics (male subsamples)

	Male Identity Prime	Female Identity Prime	Power Prime	Success Prime	Control
Experiment 1	0.30 (1.54) {61}	0.22 (0.81) {32}			-0.21 (1.09) {55}
Experiment 2			0.03 (1.32) {54}	-0.47 (1.39) {59}	-0.49 (1.40) {56}
Experiment 3 (extensive)	0.781 (0.416) {114}		0.823 (0.384) {96}		0.648 (0.480) {105}
Experiment 3 (intensive)	34.92 (35.42) {114}		35.47 (33.97) {96}		26.99 (33.41) {105}
Experiment 4 (extensive)	0.949 (0.221) {98}				0.844 (0.365) {96}
Experiment 4 (intensive)	60.88 (35.03) {98}				44.96 (32.75) {96}
Experiment 5	0.405 (1.407) {84}				-0.024 (1.968) {41}

C. P-values for random draw of samples across conditions

	Full Sample	Male Subsample
Experiment 1	0.99991	0.99982
Experiment 2	0.82831	0.10523
Experiment 3 (ext. margin)	0.45736	0.41635
Experiment 3 (int margin)	0.20449	0.17365
Experiment 4 (ext. margin)	0.50212	0.47808
Experiment 4 (int. margin)	0.67175	0.49040
Experiment 5	0.17617	0.98543