

Breaking Barriers: Female Access to Finance in a Controlled Experiment

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Abstract

Entrepreneurship is crucial for economic growth and job creation, yet gender disparities in funding persist, resulting in market inefficiencies and unequal opportunities. This study investigates this issue by using master's students from top European business schools as stand-ins for investors in a controlled experiment. Participants evaluated identical business pitches, differing only by the entrepreneur's gender. The findings reveal a statistically significant gender bias in funding allocation that disadvantages women, with female entrepreneurs receiving an average of €8,790 less from a €100,000 budget solely due to their gender. This bias is also evident in lower assessments of entrepreneurial ability and perceived profitability of business ideas when the pitcher is a woman. The study explores homophily—the tendency for individuals to favor those with similar characteristics—and gender-role congruity theory as potential drivers of the funding gap. It finds that while homophily—particularly among male respondents—contributes to the disparity, gender-role congruity also plays a significant role. Notably, female investors also exhibit biases, suggesting that increasing female representation among investors alone may not fully close the gap. The study underscores the need for further research into gender norms to better understand and address these funding disparities.

Keywords: Women/ Minority issues, Gender Discrimination, New Ventures, Entrepreneurship

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1 Introduction

Despite significant strides towards gender equality over time, entrepreneurship has not kept pace with this progress (Fackelman & De Concini, 2020; Gompers & Wang, 2017; Karlstrøm et al., 2023). Entrepreneurship plays a vital role in economic success by driving employment creation, innovation, and productivity growth (Brooks et al., 2014). However, securing capital remains a critical challenge for entrepreneurs, particularly for women (Balachandra et al., 2017; Pavlova & Gvetadze, 2023). There is widespread recognition of substantial gender disparities in access to finance, yet consensus on their underlying causes remains elusive (Pavlova & Gvetadze, 2023). Barriers to funding access for female entrepreneurs result in significant resource misallocation and inefficiencies in fund utilization (Pavlova & Gvetadze, 2023). Gender bias in the investment landscape leads to the systematic undervaluation of high-potential ventures led by women, causing many promising businesses to struggle or fail before they can launch. This is particularly evident in the venture capital (VC) industry, where women are vastly underrepresented — over 90% of VC investors are men (Gompers & Wang, 2017). This disparity not only limits the diversity of investment perspectives but also results in missed opportunities for job creation and economic growth (Haltiwanger et al., 2013). Therefore, understanding the root causes of these issues is crucial for addressing this market failure, designing effective policy interventions, and promoting equal opportunities.

The growing body of research on gender disparities in financial access examines various financial instruments and aspects of the funding process. Broadly, this literature focuses on three key themes: (1) structural differences between enterprises led by men and women, (2) frictions on the demand side, and (3) discriminatory practices on the supply side, or a combination thereof (Pavlova & Gvetadze, 2023). Regarding structural disparities, entrepreneurs often align themselves with industries that conform to gender stereotypes, leading women to concentrate on sectors perceived as less profitable, such as cosmetics or fashion (Ardichvili et al., 2003; Brooks et al., 2014; Thébaud, 2015). Consequently, female-led businesses tend to secure less funding compared to their male counterparts who typically operate in more lucrative fields like construction or technology (Brooks et al., 2014; Pavlova & Gvetadze, 2023). On the demand side, women may opt out of seeking financing due to higher levels of risk aversion and a reluctance to take on debt (Croson & Gneezy, 2009). They also face concerns about anticipated discrimination (Cavalluzzo et al., 2002) and encounter social network barriers that limit their access to financing opportunities (Brush et al., 2009; Howell & Nanda, 2023). Supply-side explanations often cite taste-based discrimination or homophily, where individuals tend to favor others who share similar characteristics (McPherson et al., 2001). This bias is evident in the preference male investors show towards male founders (Greenberg & Mollick, 2016). Moreover, discrimination can stem from the perceived mismatch between the qualities attributed to women and those considered necessary for success in traditionally male-dominated roles, as sug-

gested by gender-role congruity theory (Balachandra et al., 2017; Eagly & Karau, 2002; Heilman, 2012). As evident, the causes of the gender gap highlighted in the literature vary significantly, and importantly, they manifest at different stages of the funding process: The first two factors address pre-existing barriers before engaging with investors, whereas the last factor pertains to barriers originating from the investor side.

The present study aims to focus on supply-side discrimination and explore its underlying causes. The existing literature in this domain primarily relies on observational data from real entrepreneurial pitches in field settings (see e.g., Balachandra et al., 2017; Brush et al., 2017; Kanze et al., 2018; Viashima & Samila, 2020) or is derived from qualitative interviews and discourse analysis (see e.g., Karlström et al., 2023; Malmström et al., 2017). Such studies encountered two primary challenges. Firstly, as previously mentioned, women tend to gravitate towards different market sectors characterized by varying profit margins and growth prospects (Brooks et al., 2014). Secondly, obstacles within social networks and anticipated discrimination may dissuade women from pursuing entrepreneurial paths, resulting in their under-representation among founders and creating a limited pool of data for analysis (Brooks et al., 2014). Consequently, existing field studies have struggled with comparing equivalent samples and establishing causal relationships to accurately measure the impact of gender on founder success (Brooks et al., 2014). Moreover, the literature is particularly geographically limited, as it mostly focuses on single countries, almost always in the US (Cassion et al., 2021). The present study builds upon the experiment designed by Brooks et al. (2014) and addresses these challenges by creating a controlled environment to specifically examine how gender impacts funding outcomes. Recruiting students from four top-ranked business schools in Europe, I conducted an experiment where participants watched two videos portraying entrepreneurs pitching their business ideas to obtain hypothetical funding. The gender of the entrepreneur was randomized, meaning some participants saw a man presenting the idea while others saw a woman, despite both presenting the same idea in the same manner. Additionally, the startup ideas selected belonged to traditionally female- or male-typed industries. This setup allows for a *ceteris paribus* comparison, enabling a focus on supply-side discrimination while abstracting from other confounders, issues related to industry self-selection and demand-side constraints. Moreover, it extends Brooks et al. (2014)'s research efforts by not only quantifying the gender effect on funding outcomes but also delving into the root causes of this discrimination, which is crucial for guiding effective policy interventions. In fact, several questions on supply-side discrimination remain unexplored. Specifically, we have yet to compare and quantify the relative importance of homophily and gender-role congruity as deep causes of the funding gap. Additionally, the involuntary mechanisms involved in the assessment of entrepreneurs that contribute to the gender gap are not well understood.

This study enhances the existing literature in multiple ways. Firstly, it causally determines, within an experimental framework, the impact of gender on hypothetical funding outcomes as well as other

outcomes such as business profitability, entrepreneurial ability, and the nature of questions posed. As a result, this thesis effectively addresses the limitations of previous literature. It demonstrates that, in this context, the observed gender gap is solely and causally induced by the female gender of the entrepreneur, rather than by other factors such as self-selection into less profitable industries or weaker network contacts. Additionally, it ensures an equal number of female and male entrepreneurs for a balanced comparison¹. Secondly, it aims to fill the aforementioned gaps by leveraging the controlled setting to effectively quantify the relative importance of homophily and gender-role congruity in explaining the disparity. Thirdly, it also sheds light on whether the disparity in funding stems from perceived lower entrepreneurial ability of women or if gender directly influences the perceived profitability of the business idea itself, despite the ideas pitched by men and women being the same. Lastly, it provides insights, albeit not causal, into the role of cultural gender norms in different European countries and their correlation with the gender gap in entrepreneurial evaluations. Therefore, this study makes a significant contribution to the literature by rigorously isolating the gender impact on funding outcomes and elucidating factors and mechanisms driving these disparities. These insights are essential for informing policy interventions aimed at addressing gender disparities in entrepreneurial funding. Additionally, it expands the emerging literature on gender differences in perceptions and evaluations of business ventures (Balachandra et al., 2021; Kanze et al., 2018; Malmström et al., 2020; Viashima & Samila, 2020).

The paper is organized as follows. Section 2 provides a comprehensive review of the existing literature, with a specific focus on evidence related to female access to venture capital (VC). This emphasis is particularly relevant as the study's experimental setting involves a pitching competition for VC funds. Section 3 outlines the potential mechanisms and presents the hypotheses tested in this study. Section 4 offers an overview of the experiment and descriptive information on the data collected. Section 5 details the methodological approach used to derive the results, which are presented in Section 6. Section 7 includes additional exploratory analysis. Section 8 discusses the internal and external validity of the experiment, while Section 9 concludes the paper.

2 Literature Review

This paper contributes to the expanding body of literature on gender-based discrimination in access to finance. Gender discrimination in this context is well-documented, with numerous studies highlighting the differential treatment faced by entrepreneurs solely based on their gender. For instance, Aristei and Gallo (2016) found that women-led businesses have a higher likelihood of being denied

¹This is because the experiment features a total of two female actors and two male actors. They are paired up, with each pair presenting the same business idea.

credit. This higher probability of denial cannot be accounted for by observable characteristics, leading to the conclusion that irrational gender-based discrimination plays a significant role in access to finance. Moreover, de Andrés et al. (2021) discovered that in Spain, female entrepreneurs are 10% less likely to secure a loan compared to their male counterparts, even when operating within the same industry. They attributed this disparity to unconscious discrimination, supported by their finding that female-led businesses facing more stringent credit access had lower default rates in subsequent years. This effectively rules out statistical discrimination as the cause.

The funding gap is notably more pronounced in early-stage financing, where clear indicators of growth potential are less evident (Guzman & Kacperczyk, 2019). Analyzing Crunchbase data from over 48,000 startups, Cassion et al. (2021) found that male-only startup teams receive 31 times more funding than female-only teams, and that male CEOs generally secure significantly higher funding than their female counterparts. Additionally, by constructing a machine learning-based model, they identified the founder's gender as the most critical factor in determining funding success, taking precedence over other factors such as top-school education or prior entrepreneurial experience. Schillo and Ebrahimi (2021) has also observed a negative correlation between female gender and VC funding for startups based on data sourced from CapitalIQ, a widely-used commercial financial database. Further evidence of differential treatment between male and female founders is provided by Kanze et al. (2018), who analyzed data from the renowned startup pitching competition "TechCrunch Disrupt." They found that women were disproportionately asked prevention-focused questions, which concentrate on risks, potential losses, and security. In contrast, male founders were more frequently asked promotion-focused questions, oriented towards hopes, growth, and advancements. Kanze et al. (2018) demonstrated that being asked prevention-focused questions significantly hinders a founder's ability to secure funding, thus perpetuating the funding disparity between genders. One of the few experimental studies in this field is by Brooks et al. (2014). In their experiment, participants listened to identical pitches, with the gender of the entrepreneur randomized. Unlike our setting, participants in this experiment did not see a video of the entrepreneur but rather a pitch deck presentation with a voice-over narration. Each participant watched two videos and indicated which idea they would fund, serving as the outcome variable. The findings revealed that participants were 68% more likely to invest in male entrepreneurs. However, despite being innovative in using an experimental approach, the study has some limitations. Firstly, using funding decisions as the outcome variable does not allow for quantifying the actual amount by which women are left behind in funding. Secondly, the study did not explore the underlying causes of this mechanism, leaving it unclear whether the difference is due to a preference for investing in males (supporting homophily) or other factors. Thirdly, the mechanisms behind this disparity remain unexplored; it is unknown whether participants perceived female entrepreneurs as less capable or if they found the business ideas less appealing simply because they were presented by females. This

thesis builds upon this experiment but modifies certain features to address these three limitations. Overall, recent descriptive non-academic data show that the gap is large and persistent, highlighting the importance of policy intervention. Last year, startups founded exclusively by women secured only 1.6% of the total venture capital invested in European startups, representing just 5.2% of the overall deal count² (PitchBook, 2023). The gap is also persistent, as these figures have remained stagnant since the beginning of the century, with the total venture capital invested in female-led startups rarely surpassing 2% (PitchBook, 2023).

Additional research has not only quantified the gap but also proposed potential causes for this disparity. The supply-side explanations for the gender funding gap typically revolve around two primary theories: homophily and gender-role congruity theory.

Homophily. Homophily refers to the tendency of individuals to gravitate towards and prefer those who share similarities, particularly similar demographics, as this commonality fosters trust (Brashears, 2008; McPherson et al., 2001). It is defined as “the principle that contact between similar people occurs at a higher rate than among dissimilar people” (McPherson et al., 2001). In the entrepreneurship and VC literature this theory has been used many times to explain the tendency of investors to prefer those founders that shared similar characteristics, especially with respect to gender (Ardichvili et al., 2003; Balachandra, 2020; Voitkane et al., 2019). Indeed, in the context of startup financing, homophily posits that female entrepreneurs, in their pursuit of funding, may encounter reduced opportunities to access venture capital networks that have traditionally been and continue to be male-dominated (Greenberg & Mollick, 2016). For example, in Europe, women make up only 30% of investment committees (ICs) (European Women in VC, 2023), and this lack of diversity provides fertile ground for biases driven by homophily. These biases, in turn, offer a compelling explanation for the lack of diversity in the distribution of VC funds, establishing a self-reinforcing cycle.

Supporting this explanation, both Karlstrøm et al. (2023) and Gompers et al. (2021) found that almost all venture capitalists decide to invest in entrepreneurs who lie within their network circles. Moreover, various papers find that backers are more likely to support entrepreneurs of the same gender, such as Gafni et al. (2020) who used Kickstarter data on crowdfunded startups, or Ewens and Townsend (2020) who used data from AngelList, an angel investing platform. Along these lines, Greenberg and Mollick (2016) found that the homophily in funding decision-making process and the attraction between similar people stem not only from perceived similarity but also

²The percentage of deals involving a female-founded startup has shown a consistent upward trend over the past decades, rising from 2.7% in 2008 to 5.2% in 2023. Despite this increase in deal participation, the share of capital allocated to female-led startups has remained static. This suggests that the gap in average capital raised between female-led and male-led startups has widened in relative terms over time (PitchBook, 2023).

from shared perceived barriers associated with specific group memberships, a concept he terms “induced homophily.” In our context, this suggests that women are more likely to invest in other women because they perceive common barriers in the field of entrepreneurship related to their gender. However, the evidence for this theory is not definitive. Contradicting the previously mentioned studies, Voitkane et al. (2019) discovered an opposite trend: women VCs tend to be more critical of female entrepreneurs, while male VCs are more critical of male entrepreneurs. This phenomenon is explained by the Queen Bee theory, first introduced by (Staines et al., 1974), which posits that women in positions of power often exhibit a preference for the opposite gender. According to this theory, women in authority may distance themselves from other potentially successful women and assess them more harshly.

Gender-Role Congruity. An additional explanation may be found in the role congruity theory. The concept of “role” pertains to the anticipation of specific prescribed behavior from an individual based on their corresponding social identity (Biddle, 1986). Research has shown that behavior consistent with gender expectations garners positive evaluations, while deviations from prescribed stereotypes lead to negative repercussions (Akerlof & Kranton, 2000; Rudman & Phelan, 2008). In light of this, the role congruity theory suggests that discrimination against women could stem from the mismatch between the stereotypical expectations of female behavior and the attributes deemed essential for success in a leadership role, such as entrepreneurship (Eagly & Karau, 2002). It is this incongruity that diminishes the assessment of a woman as a prospective occupant of a leadership role as an entrepreneur. Consequently, this theory suggests that the logic behind this disparity lies in the notion that “there is a natural fit for men and masculine behaviors due to the congruity of males, masculinity, and entrepreneurship.” (Malmström et al., 2017).

Entrepreneurship is seen as an activity for males (Cavalluzzo et al., 2002), women are atypical in this setting and thus perceived as lacking fundamental characteristics to be entrepreneurs (Brush et al., 2004). Malmström et al. (2020) analysed Sweden governmental financing data and qualitative data on press release and financiers interviews, and found that when evaluating the ability of the entrepreneur, gender stereotypes arise that undermine the success of women. Moreover, entrepreneurs’ attributes are not evaluated equally based on gender. For instance, the adjective “young” was used to imply inexperience and unreadiness when describing women, while for men, it suggested they were young and promising. This evidence indicates that different standards are applied to evaluate individuals based on their gender (Eagly & Karau, 2002), ultimately undermining women in entrepreneurship (Malmström et al., 2017). In a Norwegian investment fund setting, Alsos and Ljunggren (2017) apply signaling theory to highlight the critical impact of gender on the investor-entrepreneur dynamic. Their research demonstrates that gender stereotypes shape how investors perceive signals from entrepreneurs. For instance, the same signal, such as a lack of ex-

perience, is interpreted differently depending on whether the entrepreneur is male or female. This supports the role congruity theory as an explanation for the funding gap, suggesting that women must emphasize their business potential more strongly to overcome the bias and skepticism they face from investors simply because they are female (Alsos & Ljunggren, 2017). However, according to Balachandra et al. (2017), venture capitalists tend to evaluate negatively behaviors that are stereotypically associated with femininity, regardless of the entrepreneur's biological gender. Such finding is consistent with role congruity theory but highlight nuanced aspects of it.

It's evident that most studies primarily rely on observational data, which inevitably limits the ability to make perfectly matched comparisons and introduces various constraints. For instance, it's challenging to objectively control for idea quality, as women may tend to select industries with lower profitability, potentially leading to less promising startups. Moreover, many studies suffer from underpowered samples (sometimes they even necessitate oversampling techniques) due to the smaller proportion of women founders compared to men. To address these challenges, the present study adopts a controlled experimental approach similar to the one used by Brooks et al. (2014). Identical business pitches from both men and women are presented across different industries (traditionally associated with either feminine or masculine characteristics), enabling *ceteris paribus* comparisons. Furthermore, this study aims to address the limitations of Brooks et al. (2014). To the best of my knowledge, no previous studies have tested the concepts of homophily and gender-role congruity theory in an experimental setting, nor have they quantified their relative importance. Additionally, existing research lacks an in-depth exploration of the unconscious mechanisms driving the funding gap. This study aims to uncover whether the disparity arises more from the perceived lower entrepreneurial ability of women or from the perceived lower profitability of the business ideas pitched by women entrepreneurs.

3 Potential Mechanisms - Hypotesis

Prior to delving into the potential mechanisms underlying gender disparities in VC funding, the initial exploration will focus on determining whether there is indeed a gender difference in the amount of funds received for a business idea within the specific experimental setting. This leads to the formulation of the first hypothesis.

H1 On average, women receive less funds when pitching their business idea

Furthermore, this study aims to disentangle the supply-side forces driving the observed gender disparity in VC funding. Previous research on the gender gap in VC funding has predominantly focused on two key theories: homophily and gender-role congruity (Pavlova & Gvetadze, 2023). This study

seeks to test both theories and quantify their relative importance in explaining the gap.

Homophily essentially reflects a tendency for individuals to gravitate toward those who share similarities (Gompers & Wang, 2017). This inclination results in differences in social characteristics, such as gender, being translated into network distances (McPherson et al., 2001). In the context of this study, homophily implies that male investors prefer to invest in male entrepreneurs, while female investors would not exhibit this pattern of discrimination. In fact, when the investor is female, homophily-based explanations posit that the gender gap in pitching should be either reversed or non-existent. This motivates the formulation of the second hypothesis.

H2 The gender gap in funding is non-existent or reversed if the potential investor is female. Conversely, the gap widens if the potential investors are male

A reversal of Hypothesis 2—where females also exhibit a bias against female pitchers—could be explained by the “Queen Bee” syndrome. The theory proposed by sociologist Staines et al. (1974) suggests that some women in power positions exhibit an opposite gender preference. They would thus penalize females in lower-ranking positions. Additionally, this outcome could also reflect a more widespread societal perception, held by both women and men, that women are less capable. In either case, such a result would imply that simply increasing the number of female VC investors may not be enough to effectively close the gender gap.

An additional explanation may be found in the role congruity theory. The concept of “role” pertains to the anticipation of specific prescribed behavior from an individual based on their corresponding social identity (Biddle, 1986). Research has shown that behavior consistent with gender expectations garners positive evaluations, while deviations from prescribed stereotypes lead to negative repercussions (Akerlof & Kranton, 2000; Rudman & Phelan, 2008). In light of this, the role congruity theory suggests that discrimination against women could stem from the mismatch between the stereotypical expectations of female behavior and the attributes deemed essential for success in a leadership role, such as entrepreneurship (Eagly & Karau, 2002). It is this incongruity that diminishes the assessment of a woman as an entrepreneur. This study proposes testing the gender-role congruity theory by examining the gender association of industries. The rationale is that when a woman pitches a startup in a male-dominated industry, it represents a more significant violation of gender stereotypes than when she competes in a traditionally female-associated industry. For instance, a woman is perceived as deviating more from her expected role when she pitches a business idea in robotics compared to fashion. Consequently, stronger gender discrimination is anticipated in male-dominated industries. However, the atypicality of a woman in the entrepreneurial field persists in both scenarios, so a gender gap is still expected in female-typed industries, albeit smaller than in male-dominated ones. Testing for role-congruity theory motivates the formulation of the second

hypothesis.

H3 The gender gap in funding is larger in male-typed industries. In female-typed industries the gender gap is smaller.

In general terms, the third hypothesis also suggests that the gender gap in venture capital can be ascribed to structural distinctions in a firm's age, size, industry, or product, which may contribute to varying probabilities of securing funding. Consistent with this proposition, the gender gap can indeed emanate from selection effects, as women tend to fund startups that ex-ante have lower profitability prospects and thus entail fewer funding needs (Brush et al., 2017; Thébaud, 2015). For example, according to this theory, women tend to gravitate toward industries traditionally associated with femininity, such as cosmetics and retail, while men may lean towards sectors perceived as more masculine, such as high-tech and construction (Pavlova & Gvetadze, 2023). While this mechanism is undeniably intriguing, it will not be the focus of this investigation. The experimental design employed here enables control for selection effects, as both women and men will present identical ideas across various industries. Consequently, this study focuses exclusively on the differences in funding outcomes across various industries through the lens of gender-role congruity theory, without considering the ex-ante self-selection perspective.

The final aspect to be explored concerns the nature of questions directed at presenters, based on research by Kanze et al. (2018). The authors examined "TechCrunch Disrupt," a major startup funding competition, and identified a gender disparity in funding outcomes, partly due to the questions that entrepreneurs received. They draw on Regulatory Focus Theory, developed by psychologist Higgins (2012), which posits two motivational systems influencing behavior: promotion and prevention focus. Promotion focus is associated with achieving goals and aspirations, characterized by eagerness and a desire for advancement. It emphasizes gains and accomplishments. In contrast, prevention focus centers on safety, responsibility, and avoiding losses. This orientation is marked by caution and a focus on fulfilling obligations (Higgins, 2012).

The findings reveal that questions with a prevention-focused orientation³, addressing safety concerns, potential risks, or losses, significantly hinder an entrepreneur's ability to secure capital. Conversely, questions with a promotion-focused approach⁴, centered on growth, profitability, and expansion, are linked to more favorable funding outcomes. Thus, this study aims to investigate whether, akin to the findings of Kanze et al. (2018), women may face a higher frequency of prevention-focused questions compared to men in this context. This leads to the formulation of the fourth hypothesis.

H4 Women receive more prevention-focused questions compared to their male counterparts. Con-

³An example of a prevention-focused question on projections is "How predictable are your future cash flows?"

⁴An example of a promotion-focused question on projections is "What major milestones are you targeting this year?"

versely, male entrepreneurs are more likely to receive promotion-focused questions.

If evidence supporting the fourth hypothesis is found, it suggests that subsequent Q&A sessions could exacerbate the gap identified in first hypothesis, as preventive questions have been demonstrated to decrease funding obtained by female entrepreneurs (Kanze et al., 2018).

4 Experimental Design and Data

Participants were recruited through university email invitations from the University of St. Gallen (HSG), the Stockholm School of Economics (SSE), and through informal channels targeting students at the Vienna University of Business and Economics (WU) and the School of Economics and Management in Turin. Participants, largely comprising students from top-ranked European business schools, were selected to approximate the future generation of investors, who typically hold educational backgrounds in Business or an MBA (see e.g., Block et al., 2019; Gompers et al., 2016). To minimize potential bias related to the study's subject matter, survey invitations intentionally avoided mentioning gender. The email text used for the invitations is included in the appendix. Two distinct data collection phases were conducted, during which students were invited to participate by completing the survey.

4.1 Overview over the Experiment

I produced four distinct videos featuring four different entrepreneurs, consisting of two women and two men, closely emulating authentic pitch presentations of business ideas. To ensure realism and maintain a consistent level of startup quality, the business ideas were selected from the final round of the South Summit 2022⁵. One idea originated from the gaming industry, traditionally male-dominated (Boholm & Wikström, 2017; Prescott & Bogg, 2011), while the other stemmed from the healthcare industry, traditionally female-typed (Kmec, 2008; Labuzova, 2021). In the former, entrepreneurs presented Nware, aiming to launch the world's first cloud-gaming platform. The latter involved Tucuvi, an AI-based medical assistant designed to help family doctors manage, prioritize, and automate patient requests. The scripts can be found in the appendix.

The actors were paired off: one woman and one man were trained together to pitch the startup Nware. They meticulously followed the provided script, coordinating their pauses, pronunciation, and tone to deliver a performance as consistent as possible. Similarly, the other pair underwent rigorous training to present the idea of Tucuvi with the same attention to detail. All actors were seated in the same manner to avoid differences in body posture and any potential disparities that might arise if they were standing and moving, as real pitching competitions would require. They

⁵<https://www.southsummit.io/madrid-2022/>

were also dressed in the same neutral attire. The video assembly was carefully curated to faithfully replicate the final pitch competition featured at the South Summit and published by the organizers on YouTube⁶. The background included the summit's logo, with two windows overlaid: one displaying the pitch deck that I created created to closely resemble the authentic format, and the other showcasing the entrepreneur delivering the presentation⁷.

During the experiment, participants were shown the two videos after each other with three evaluation questions in between, and a comparative question after having watched them both. At each step t , individual i was shown a pitch video presenting an idea j . This idea was drawn randomly out of a pool of two ideas, that is, $j_t \in \{j_1, j_2\}$, in order to ensure that there were no primacy effect in the distribution of funding to the two startups. Additionally, the gender of the presenter for each startup was also randomized. This meant that some participants saw a woman entrepreneur pitching Nware, while others saw a man, and similarly, some saw a woman pitching Tucuvi, while others saw a man. The random assignment of the female gender of the entrepreneur, considered as the treatment variable, was designed to eliminate selection bias⁸. Thus, individuals are randomly allocated on two dimensions in each step: first the idea, and then the pitcher's gender.

In addition, the ideas were differentiated based on their association with industries perceived as traditionally male or traditionally female. Idea j_1 concerns the gaming industry (traditionally male-typed), while j_0 is associated with the healthcare industry (traditionally female-typed). Lastly, the randomization guaranteed that no participant viewed presentations by two women or two men pitching the two ideas; instead, each participant observed presentations where the genders of the entrepreneurs presenting differed. As a result, the four following combinations are possible:

- First Video: female pitching Nware. Second video: male pitching Tucuvi.
- First Video: male pitching Nware. Second video: female pitching Tucuvi.
- First Video: female pitching Tucuvi. Second video: male pitching Nware.
- First Video: male pitching Tucuvi. Second video: female pitching Nware.

After watching each video, participants in the experiments are asked three evaluation questions concerning the pitch they just saw:

⁶<https://www.youtube.com/watch?v=PISDhfWEKG4&t=1869s> - Last Accessed on 12 July 2024.

⁷The script closely resembled the original, but I condensed it from its original three-minute duration to just one minute. This adjustment aimed to maintain participant engagement throughout the presentation. Additionally, I meticulously crafted the pitch deck using PowerPoint, ensuring it utilized the same colors and wording as those employed in the actual competition.

⁸Randomization establishes that gender is independent of both potential outcomes and treatment statuses, allowing for confident statements about causality in the presence of unmeasured confounding variables. By design, both measured and unmeasured confounders are equally distributed across assignment groups. Random assignment ensures that any differences observed in potential treatments and outcomes are solely attributed to the exposure to the treatment condition and not influenced by other confounding factors.

Q1 *On a scale from 0 to 10, how confident are you in the profitability of this business idea?*

Q2 *On a scale from 0 to 10, how would you rate the entrepreneurial ability of the entrepreneur?*

Q3 *If you could ask the entrepreneur one question, which one would you choose? (This is a multiple choice question, where the participant can chose between 4 questions. Two are promotion-focused questions⁹, two are prevention-focused questions¹⁰. The order of the four options is randomized)*

The answers to these three questions are used as outcome variables. Upon viewing the two videos and responding to three questions each, participants are presented with the final question. This question, serving as the primary outcome variable, asks them to compare the two pitches and decide on the hypothetical fund allocation.

Q4 *Imagine you are a Venture Capitalist looking for a profitable investment opportunity. You can allocate any amount from €0 to €100,000 to each startup, depending on your assessment of its potential. Please indicate the amount of money you wish to invest in each startup idea.*

On a scale from 0 to 100, indicate how much you would invest in Nware (Gaming Industry Startup)

On a scale from 0 to 100, indicate how much you would invest in Tucuvi (Healthcare Industry Startup)

Moreover, participants were asked to provide their impressions of the female entrepreneurs' participation in the two industries. This aimed to investigate whether the perception of these industries as traditionally female- and male-dominated held within the examined population as well.

Q5 *Out of 10 entrepreneurs in the healthcare industry, how many do you think are women?*

Q6 *Out of 10 entrepreneurs in the gaming industry, how many do you think are women?*

Lastly, demographic information about the respondents, namely their gender and nationality, was collected.

All responses were mandatory, ensuring that respondents could not opt out of answering any questions. Moreover, participants were not allowed to go back and change their answers to previous questions. This ensured that when they encountered Q5 and Q6 and possibly realized that the study was related to gender, they could not alter their earlier responses based on this new understanding.

⁹One promotion-focused question addressed the income statement: 'How do you plan to monetize this?'. The other focused on projections: 'What major milestones are you targeting this year?' (Kanze et al., 2018)

¹⁰One prevention-focused question addressed the income statement: 'How long will it take you to break even?'. The other focused on projections: 'How predictable are your future cash flows?' (Kanze et al., 2018)

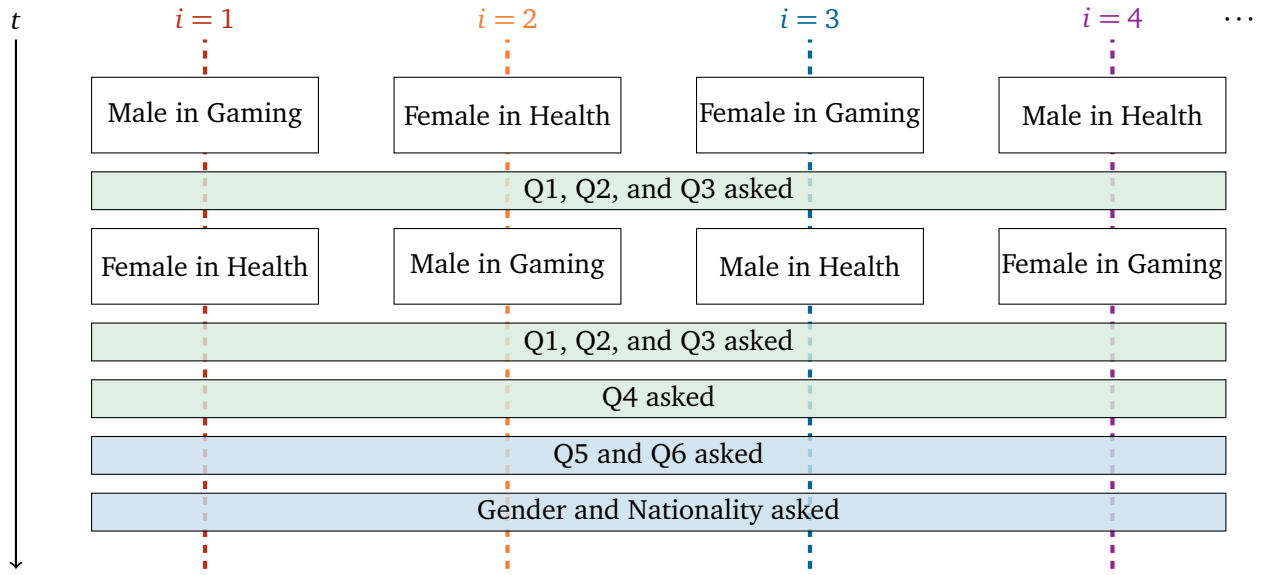


Figure 1: Experimental SetUp

Note: The figure illustrates the experimental setup and the four possible combinations of videos presented to the participants. The order in which business ideas are presented differs between Individuals 1 and 2, as well as between Individuals 3 and 4. This randomization helps prevent primacy effects. Additionally, Individuals 1 and 3, and Individuals 2 and 4, differ in the gender of the video presenter. The same set of questions is asked to all participants in the same temporal sequence, as shown in the figure. The green-highlighted questions pertain to the specific videos, while the blue-highlighted questions address the final questions.

Figure 1 illustrates the experimental setup, the sequence of questions, and the four potential combinations of videos presented to participants.

4.2 Data

Two data collection rounds were conducted, one in April and the second in June. Out of those contacted, 386 students participated in the experiment, yielding a response rate of approximately 4%. Since the information collected up to Q4 was crucial for the initial analysis, all incomplete survey responses up to that point were removed. This reduced the dataset to 252 observations, of which 64% were males, while the remaining participants were either female or preferred not to specify. Given that investment committees in Europe are composed of approximately 30% female investors (European Women in VC, 2023), our study population closely resembles a representative pool of such committees. The dataset was diverse in terms of nationality, encompassing 35 different nationalities. The most frequently recorded nationalities corresponded to the countries of the participating universities, including Switzerland (85), Italy (43), Sweden (32), Germany (28), Austria (11), and France (9). Concerning the perception of the number of female entrepreneurs, the average expected number of female entrepreneurs in the gaming industry is 1.8, whereas in the healthcare industry, it is 4.7. This confirms the expectation that, within our population, the healthcare industry is perceived as more female-dominated compared to the gaming industry. It also reinforces the notion of

the perceived atypicality of women in entrepreneurship.

The quality of both ideas was perceived as very similar, which was the goal in selecting two ideas from the same final of the same pitching competition. Both business ideas had a funding mode of 0. The median funds received were 50 for Tucuvi and 40 for Nware. The average funds received were 48.2 for Tucuvi and 42.9 for Nware. Figure 2 illustrates the distribution of funds received by both startups, irrespective of the gender of the entrepreneur.

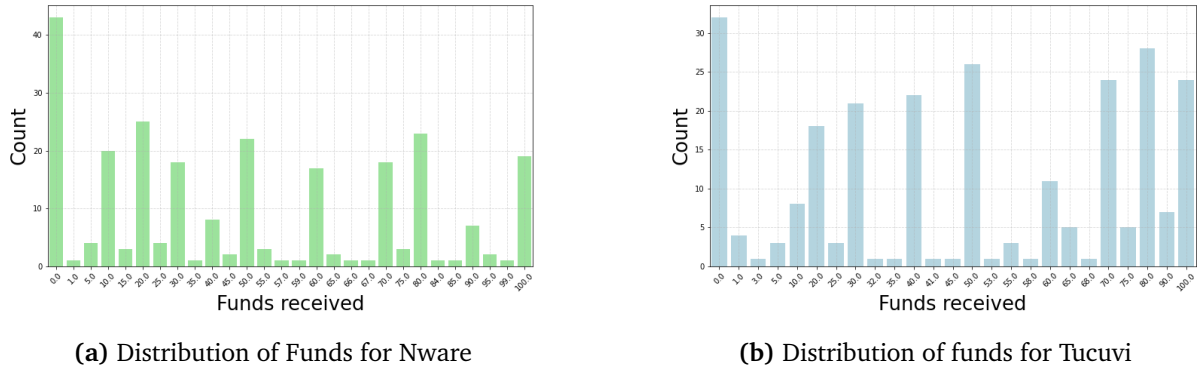


Figure 2: Distribution of funds allocated to Nware (gaming industry startup) and Tucuvi (healthcare industry startup).

Lastly, table 1 shows an overview of the data set after the experiment. $\text{Male_entrepreneur}_{ij}$ is the gender of the actor pitching for the idea j in a given video. This variable is a representation of the random allocation conducted before each experiment step. Since the gender of the pitcher is randomized for each idea, ensuring that no individual sees the same gender for both ideas, the variable carries both an i and a j subscript. Similarly, since ideas are randomly allocated to time steps for each individual separately, and industries (male or female dominated) are a function of the idea, gaming_industry carries both an i and j subscript. This variable is a dummy that switches to one when the idea belongs to the gaming industry, viewed as a male-dominated sector, and remains zero if it pertains to the healthcare industry, viewed as female-dominated sector.

Table 1: Dataset Overview

Variable	Values	Explanation
$\text{male_entrepreneur}_{ij}$	0, 1	Pitcher's gender (explained fully by (i, j))
male_respondent_i	0, 1	Respondent's gender (function of i)
$\text{nationality_respondent}_i$	0, 1	Respondent's nationality (function of i)
$\text{gaming_industry}_{ij}$	0, 1	Industry (function of j)
bp_{ij}	$\{0, 1, \dots, 10\}$	Perceived Business Profitability (individual's answer to Q1)
ea_{ij}	$\{0, 1, \dots, 10\}$	Perceived Entrepreneurial Ability (individual's answer to Q2)
fem_ent_{ij}	$\{0, 1, \dots, 10\}$	Perceived number of female entrepreneurs in the industry (Individual's answer to Q5 and Q6)
question_{ij}	$\{0, 1\}$	Individual's question to the pitcher
y_{ij}	$[0, 100]$	Funding given to idea j presented to i , in €

Note: Variables and indices. For binary gender variables, 1 means male and 0 means female. For the gaming industry variable, 1 means male-dominated and vice versa. For the question variable, 1 means promotion-focused question, 0 means prevention-focus question.

Male_respondent_i is the gender of participant i . It can be categorized into three distinct values: female, male, or other/prefer not to say. In the primary analysis, participant gender will be utilized as a binary dummy variable, where a value of one denotes male and zero denotes the rest of the answers (female and other/prefer not to say). However, the robustness check in the appendix focuses on comparing only participants who identify themselves as either male or female. The rankings assigned to entrepreneurs in questions 2 and 3, which inquire about the business profitability bp_{ij} of the idea of the idea and the entrepreneurial ability ea_{ij} of the pitcher, will serve as secondary outcome variables. Moreover, y_{ij} represents the amount of funding allocated to each individual at a specific time in the described process. Finally, fem_ent_{ij} represent the average number of female entrepreneurs expected by individual i in industry j , and question_{ij} shows the question posed by individual i to the entrepreneur pitching the idea j .

The experimental setup, the variables I intended to collect, and the analysis I aimed to conduct were detailed in the pre-analysis plan ¹¹ published on Open Science Framework (OSF) on May 20,

¹¹The Pre-analysis Plan can be viewed [here](#). Alternatively, the pdf of the PAP can be consulted in the appendix.

2024.

5 Methodology

The estimated treatment effect can be obtained by comparing the means of the outcome variable, funds raised, conditional on gender. More formally, the comparison involves examining the expected amount of money allocated to idea j by individual i over all individuals and split the sample by treatment gender. This yields first descriptive evidence of the existence of a treatment effect of the gender of the pitching entrepreneur.

To statistically test the first hypotheses, regression models were employed as follows. Equation (1) denotes the main specification. Equation (2) denotes the interacted specification to estimate differential effects based on the gender of the respondent. Equation (3) denotes the interacted specification to estimate differential effects based on the industry.

$$y_{ij} = \beta_0 + \beta_1 \text{male_entrepreneur}_{ij} + \varepsilon_{ij} \quad (1)$$

$$y_{ij} = \beta_0 + \beta_1 \text{male_entrepreneur}_{ij} + \beta_2 \text{male_respondent}_i + \beta_3 \text{male_entrepreneur}_{ij} \times \text{male_respondent}_i + \varepsilon_{ij} \quad (2)$$

$$y_{ij} = \beta_0 + \beta_1 \text{male_respondent}_i + \beta_4 \text{gaming_industry}_{ij} + \beta_5 \text{male_respondent}_i \times \text{gaming_industry}_{ij} + \varepsilon_{ij} \quad (3)$$

The main outcome y_{ij} denotes money allocated by individual i to idea j . The variable $\text{male_entrepreneur}_{ij}$ is a dummy variable turning one if the pitcher is male, for respondent i and idea j . The variable $\text{gaming_industry}_{ij}$ denotes a dummy variable turning one if it is a male-typed industry for idea j . Male_respondent_i is the gender of the respondent i turning one if the gender of the respondent is male. The treatment variable $\text{male_entrepreneur}_{ij}$ is interacted with the characteristics $\text{gaming_industry}_{ij}$, and Male_Respondent_i to estimate differential effects based on gender-association of the industry, and the gender of the respondent.

In a separate analysis, regression specification (1), (2) and (3) are conducted with the alternative outcome bp_{ij} and ea_{ij} , elicited from the respondents in Q1 and Q2 after every pitch video¹². These regressions can yield suggestive insights into whether gender disparities are mediated through

¹²For simplicity, in the description below I only describe the regressions using the funding as outcome variable

performance ratings of the startup idea or perceptions of entrepreneurial ability, or both.

In the formal representation of the hypotheses within the regression framework, the first regression (1) is employed to test the initial hypothesis, examining the existence of gender bias in the allocation of funds to pitches.

H1 *I test $\beta_1 \neq 0$ against $\beta_1 = 0$. The hypothesis is that $\beta_1 > 0$.*

Hypothesis 2 tests whether there is evidence consistent with the theory of homophily in investment allocation. Verifying such hypothesis implies using the second regression (2): I test whether there is evidence for differential effects of the treatment based on the gender of the respondent. I expect the gender gap in investments to be more pronounced when the respondent is male. This leads to the second hypothesis:

H2 *I test $\beta_3 \neq 0$ against $\beta_3 = 0$. The hypothesis is $\beta_3 > 0$.*

The analysis proceeds with the formal testing of the following three sub-hypotheses. H2a tests whether male pitchers receive less funding compared to female pitchers, when evaluated by non-male respondents. If that is the case and $\beta_1 < 0$, then there is evidence supporting the theory of homophily. Indeed, consistent with the theory of homophily, we would expect a reversed or non-existent penalty for female entrepreneurs pitching in front of a female investors. If instead I find that $\beta_1 > 0$, then this would mean that on average, a non-male respondent, gives more funds to a male entrepreneur. This could be consistent with the “Queen Bee” syndrome, in which women in power positions exhibit a preference for men over other women (Staines et al., 1974), or it could indicate that both women and men perceive women as less capable.

H2a *I test $\beta_1 \neq 0$ against $\beta_1 = 0$. The hypothesis is $\beta_1 < 0$.*

Next (H2b), consistent with the theory of homophily, I would expect smaller investments for female entrepreneurs pitching in front of a male investors, compared to the situation in which female entrepreneurs pitch in front of non-male investors. If this is the case, $\beta_2 < 0$.

H2b *I test $\beta_2 \neq 0$ against $\beta_2 = 0$. The hypothesis is $\beta_2 < 0$.*

Lastly, I expect that a male participants will give more funds to a male entrepreneur, compared to what a male respondent would give to a female pitcher, in this case, $\beta_1 + \beta_3 > 0$.

H2c *I test $\beta_1 + \beta_3 \neq 0$ against $\beta_1 + \beta_3 = 0$. The hypothesis is $\beta_1 + \beta_3 > 0$.*

For the third hypothesis I test whether the effect of gender differs depending on the gender association of the industry, using the regression (3). If I find evidence for hypothesis 3, this would be consistent with role-congruity theory. This would mean that the gender gap exists in both industries, and favors men in both industries, but it is smaller in female-dominated industries. β_1 in this case indicates the difference between the funds received by a female and male pitcher, in the female-dominated industry: if $\beta_1 > 0$, then the male entrepreneur earns more. At the same time, if $\beta_1 + \beta_5 > 0$, this would mean that male pitcher gets more in male-dominated industries as well. My hypothesis would then be that the gender gap in funds received is smaller in female-dominated industries, than in male-dominated ones, leading to the third hypothesis:

H3 I test $\beta_5 \neq 0$ against $\beta_5 = 0$. I hypothesize that $\beta_5 > 0$

Finally, to test hypothesis 4 I run the following Logit regression.

$$\log\left(\frac{P(\text{Question}_{ij} = 1 \mid \text{male_entrepreneur}_{ij})}{1 - P(\text{Question}_{ij} = 1 \mid \text{male_entrepreneur}_{ij})}\right) = \alpha_0 + \alpha_1 \text{male_entrepreneur}_{ij} + \varepsilon_{it} \quad (4)$$

Question_{ij} is a dummy turning one if the question that respondents would have liked to ask had a promotional focus. I present the specification as a Logit model.

H4 I test $\alpha_1 \neq 0$ against $\alpha_1 = 0$. I hypothesize that $\alpha_1 > 0$

If α_1 is significantly bigger than zero, there is evidence that female pitchers are less likely to receive promotion focused questions.

6 Results

In this chapter, I analyze Hypothesis 1 using various outcome variables. Then, I explore two potential explanations for the gap identified in the first section and test Hypotheses 2 and 3.

6.1 Baseline

To gain an initial understanding of the direction and magnitude of the coefficients, Figure 3 illustrates the estimated average funds allocated to startups based on the pitcher's gender. Each point represents a coefficient from regression 1, with the bars indicating the corresponding confidence intervals (CIs). The first figure provides an overview of the total funds allocated by pitcher gender, while the following two figures break down these estimates by industry category. The plots reveal

a notable gender disparity in funding allocation. Additionally, the width of the CIs highlights considerable uncertainty regarding the precise size of the effect. For example, in the main regression, the coefficient for `male_entrepreneur` is 8.79, with a CI ranging from 3.15 to 14.42. The wide CI is likely due to a small sample size, but the fact that the CI does not include zero suggests that the effect is statistically significant. Further validation is provided in Table 2, which confirms statistically significant disparities in funding distribution.

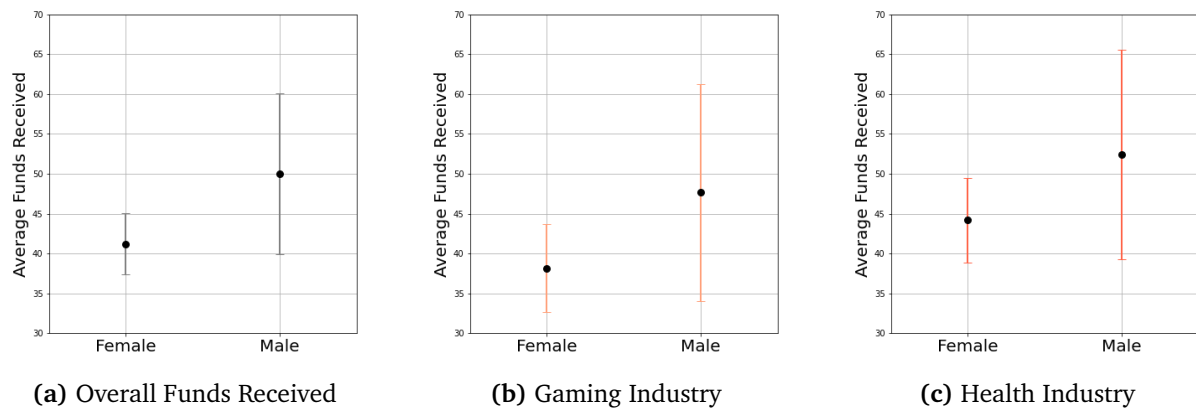


Figure 3: Estimates of Average Funds Received by Pitcher Gender

Note: The black points represent the estimated coefficients from regression 1, showing the average funds received by gender (on a scale from 0 to 100, as asked in Q4). The horizontal lines indicate the 95% confidence intervals.

Table 2 presents the regression results of equation 1. Column (1) displays the results for the total funds allocated by each individual to each startup. Columns (2) and (3) show the regression results for the gaming and healthcare industries, respectively, analyzed separately.

Column (1) examines the funds allocated to startups by each respondent and serves as a primary estimate. The result is strongly positive and statistically significant, with a p-value of 0.006. It shows that, for the same startup idea presented in an identical manner, men receive €8,790 more from a budget of €100,000 solely based on their gender. This finding supports Hypothesis 1 from Section III, confirming a significant and substantial gender funding gap that disproportionately disadvantages women entrepreneurs. However, the wide confidence interval suggests that the magnitude of the effect may vary. A larger sample size would provide a more precise estimate and reduce uncertainty around the effect size. Additionally, Columns (2) and (3) reveal that the funding gap is both large and statistically significant across both industries. Notably, the gap is more pronounced in the traditionally male-dominated gaming industry compared to the healthcare industry.

Table 2: OLS Regression Results - Funds received

	(1)	(2)	(3)
	Total	Gaming	Health
male_entrepreneur	8.79*** (3.18)		
male_entrepreneur_gaming		9.50** (4.13)	
male_entrepreneur_health			8.25** (3.96)
const	41.21*** (1.97)	38.15*** (2.82)	44.17*** (2.72)
Observations	504	252	252

Note: This table shows the results of regression 1 outlined in Section 3. In all columns, the outcome variable is the funds allocated to each startup, which respondents indicated by answering Q4. All columns are estimated using OLS. Column 1 includes the funds allocated to both startups by each individual. Since each respondent viewed two videos, the number of observations is double the sample size. Columns 2 and 3 conduct the same analysis separately for each startup (and industry). Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

Table 3 presents the results of regression 1 where the outcome variable is perceived business profitability (Q1) in columns (1), (3), and (5), and entrepreneurial ability (Q2) in columns (2), (4), and (6). Similarly as before, the first two columns present the results integrating all evaluations provided by each individual to each startup, while the remaining provide the results divided by industry.

In the first regression, the coefficient is positive and statistically significant at 1% confidence level. This coefficient indicates that, for the same business idea presented in the same manner and using the same script, startups appear more profitable when pitched by men. Specifically, respondents rated the business profitability of the startup approximately 0.65 units higher on a 10-point scale when it was presented by a man. The same trend is observed for entrepreneurial ability, perceived as approximately 0.65 units higher if the entrepreneur is male. Interestingly, a significant portion of this result stems from a pronounced gender gap in evaluations within the male-dominated industry. Specifically, in the industry traditionally associated with males, men are rated approximately 0.93 and 0.80 units higher in terms of perceived business profitability and entrepreneurial ability, respectively. In the gaming industry, the same idea, pitched in the same manner, is perceived as almost 1 point less profitable on a 10-point scale if pitched by a woman. This negative judgment is even starker than the negative assessment of the female entrepreneur's ability. These findings are

statistically significant at the 1% confidence level. In the healthcare industry, the coefficients still show a positive trend favoring men. However, the lack of statistical significance of these coefficients suggests caution in drawing definitive conclusions from these estimates.

Table 3: OLS Regression Results - Secondary Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	BP	EA	BP G	EA G	BP H	EA H
male_entrepreneur	0.65*** (0.19)	0.65*** (0.18)				
male_entrepreneur_gaming			0.93*** (0.28)	0.80*** (0.28)		
male_entrepreneur_health					0.38 (0.25)	0.49* (0.25)
const	5.45*** (0.14)	5.20*** (0.14)	5.22*** (0.20)	5.13*** (0.21)	5.68*** (0.18)	5.27*** (0.19)
Observations	504	504	252	252	252	252

Note: This table shows the results of regression 1 outlined in Section 3. In columns (1), (3) and (5) the outcome variable is the business profitability ranked by each participant in Q2. In columns (2), (4) and (6) the outcome variable is the entrepreneurial ability ranked by each participant in Q2. All columns are estimated using OLS. Column (1) and (2) includes the funds allocated to both startups by each individual. Since each respondent viewed two videos, the number of observations is double the sample size. The remaining columns conduct the same analysis separately for each startup (and industry), where G stands for Gaming Industry and H for health industry startup. Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

Overall, the results of the first regression largely support the first hypothesis: the gender gap in the allocation of funding exists in our sample, is substantial, and highly significant. Additionally, when examining alternative outcomes, it is evident that people are less likely to fund a startup pitched by a woman, not only because they perceive female entrepreneurs as less capable and less suited for this occupation. This negative judgment extends to the perception of business profitability, suggesting an anchoring effect where the perception of the entrepreneur influences the perceived quality of the idea. In fact, identical ideas pitched in the same manner and with the same script are perceived as less profitable when presented by women. This indicates that people do not only fund women-led startups less because they doubt the entrepreneurs' abilities, but also because this negative perception of female entrepreneurs translates into a lower perceived profitability of the business itself. Lastly, it is noteworthy that almost all the negative perceptions of business profitability and entrepreneurial ability originate from the gaming industry, where the funding gap is also larger. In fact, these findings seem to support the gender-role congruity theory, which we will analyze in detail later.

6.2 Heterogeneity

A) *Homophily*. Given the established gender gap identified in the previous section, our focus now shifts to investigating potential explanations behind this disparity. One proposed explanation is rooted in the concept of homophily. Homophily suggests that individuals tend to associate more closely with others who share similar attributes or characteristics (Gompers & Wang, 2017). Specifically, in this context, homophily posits that male investors may exhibit a preference for investing in startups led by male entrepreneurs. To empirically assess this hypothesis, Regression 2 is used to investigate whether the effects vary based on the investor's gender. Evidence of such variation would suggest that the gender gap in startup funding may be partly attributed to homophily tendencies in investors' decision-making processes.

As depicted in Figure 4, both female and male respondents tend to allocate more funds to male entrepreneurs. This tendency among male respondents supports the notion of homophily. Conversely, the fact that female respondents also exhibit a preference for male entrepreneurs could suggest the relevance of the "Queen Bee" syndrome hypothesis, which posits that women in positions of power may favor the opposite gender¹³ (Staines et al., 1974). Notably, the gender gap in funding allocation is more pronounced among male investors, indicating a stronger preference for male entrepreneurs within this group, thus reinforcing the homophily effect and Hypothesis 2 (H2). However, Table 4 shows that this difference is not statistically significant, limiting our ability to draw definitive conclusions. It remains unclear whether this is a consequence of the small sample size, which consists of only 252 respondents.

¹³However, it is important to clarify that, as previously mentioned, it is unclear whether this result reflects a general perception—shared by both genders—that women are less capable, or if it is indicative of the Queen Bee syndrome.

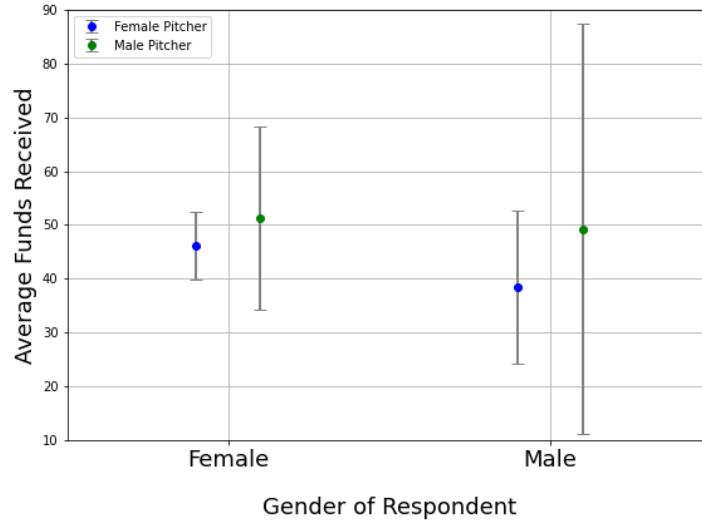


Figure 4: Funds received by pitcher gender and gender respondent.

Note: The black points represent the estimated coefficients from regression 2, indicating the average funds received by male and female entrepreneurs, segmented by respondent's gender (on a scale from 0 to 100 as asked in Q4). Horizontal lines are 95% confidence intervals.

Table 4 presents the results of Regression 2, which offer partial support for Hypothesis 2. As anticipated, the data indicate that male investors exhibit a preference for male-founded startups, with the interaction term showing a stronger preference among male investors compared to female investors. This result supports Hypotheses H2 and H2c, highlighting the influence of homophily in funding decisions. The coefficient suggests that, on average, male investors allocate €5,474 more to male entrepreneurs than female investors do. However, the interaction term has a p-value of 0.4, and its confidence interval, ranging from -6.3 to 17.2, includes zero. This indicates that the effect is not statistically significant, limiting our ability to draw definitive conclusions.

Additionally, at the 10% significance level, we find that female entrepreneurs receive less funding when evaluated by male investors compared to female investors. While this finding appears to support our hypothesis H2b, the p-value of 0.06 warrants caution in interpreting the coefficient. At the same time, female investors also exhibit a preference for male founders, though to a lesser extent than their male counterparts. This trend leans towards the “Queen Bee” theory rather than homophily, implying a rejection of H2a. Yet, like other findings, this result does not reach statistical significance.

When analyzing the two industries separately, it becomes evident that the positivity of the interaction term is primarily driven by funding decisions in the male-dominated gaming industry. Moreover, the same results hold when using the secondary variables of business profitability and entrepreneurial ability as outcomes, as detailed in the appendix. Robustness checks ¹⁴, also included in the appendix,

¹⁴In these checks, I excluded the 9 observations where respondents selected “Other or Prefer Not to Say” for the gender question, which were previously categorized as “Non-male.”

largely confirm these findings.

Table 4: OLS Regression 2 Results

	Funds	Funds Gaming	Funds Health
male_entrepreneur	5.27 (5.45)		
interaction_male_ent	5.47 (6.71)		
male_entrepreneur_gaming		2.25 (6.69)	
interaction_male_resp_gaming		11.15 (8.50)	
male_entrepreneur_health			9.49 (6.37)
interaction_male_resp_health			-1.49 (8.10)
const	46.06*** (3.21)	43.19*** (4.59)	48.56*** (4.47)
male_respondent	-7.54* (4.05)	-7.63 (5.80)	-7.02 (5.63)
N	504	252	252

Note: The table below presents the results of regression analysis as outlined in Section 3, specifically Regression 2. The only difference to The outcome variable in all columns is the amount of funds allocated to each startup, based on responses to Question 4 (Q4). All regressions are estimated using Ordinary Least Squares (OLS). Column 1 reports the funds allocated to both startups by each respondent. Since each respondent reviewed two videos, the number of observations is twice the sample size. Columns 2 and 3 provide separate analyses for each startup, categorized by industry. In this analysis, the variable male_respondent is coded as 1 for male participants and 0 for non-male participants, with those who selected “Other or Prefer Not to Say” coded as 0 as well. Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

In summary, the lack of statistical significance in the estimates prevents us from drawing firm conclusions, and it remains unclear whether this is attributable to the small sample size. Nonetheless, the direction of the interaction term provides some evidence supporting homophily as a significant factor in explaining the gender gap in investment. While female investors also tend to favor male entrepreneurs, their bias is less pronounced than that of male investors. This suggests that increasing the proportion of women among investors could help reduce the gender gap, though it may not fully eliminate it, as women still show a preference for male entrepreneurs, albeit to a lesser extent.

B) Gender-role Congruity. A second potential explanation for the observed gap can be found in gender-role congruity theory. This theory posits that behavior inconsistent with the socially prescribed role based on an individual's social identity results in negative repercussions (Akerlof & Kranton, 2000; Rudman & Phelan, 2008). The most pronounced violations typically arise from the incongruity between traditional female gender roles and occupational roles traditionally deemed masculine, such as managers or leaders (Pavlova & Gvetadze, 2023). This incongruity leads to less favorable funding outcomes for women in entrepreneurship, as entrepreneurship is often perceived as a male-typed activity (Cavalluzzo et al., 2002; Eagly & Karau, 2002; Pavlova & Gvetadze, 2023). This experiment tests for another aspect of incongruity by examining the gender associations of the industry in which the entrepreneurs present their ideas. Specifically, it observes how the gap in funds received changes when the idea is pitched in female-typed industries versus male-typed ones. Finding that female entrepreneurs receive more funding in female-typed industries would align with role-congruity theory (Butticè et al., 2022). Baseline results have already indicated a larger gender gap in the gaming industry. Additionally, the previous test for homophily revealed that the positive interaction term was primarily driven by results in the male-dominated industry, suggesting a significant influence of gender-role congruity in explaining the funding gap. Figure 5 provides an initial insight into the results specifically related to testing Hypothesis 3.

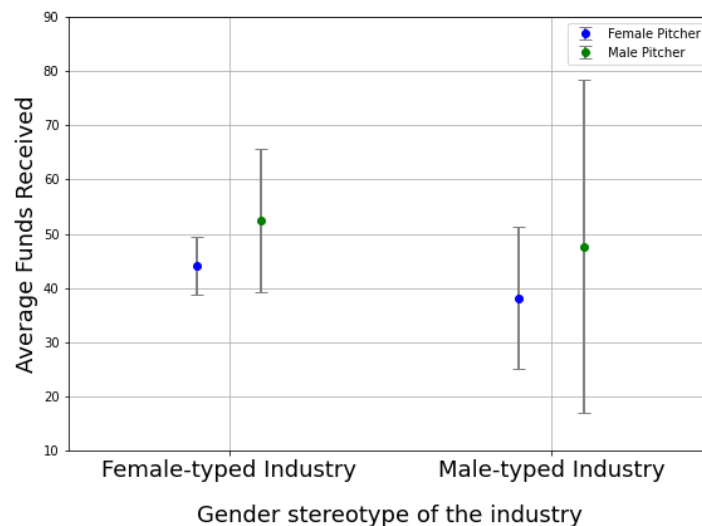


Figure 5: Funds received by pitcher gender and genderization of industry.

Note: The black points represent the estimated coefficients from regression 3, indicating the average funds received by male and female entrepreneurs, segmented by industry. Horizontal lines are 95% confidence intervals.

Table 5 presents the results of regression 3 using funds allocated, business profitability and en-

trepreneurial ability as outcome variables. The variable “gaming_industry” is treated as a dummy variable, turning to one when the industry is male-typed, namely in the case of the gaming industry startup. As a matter of fact, analyzing responses to Q5 and Q6 reveals indeed distinct perceptions of these two industries. For the gaming industry, respondents expect an average of 1.8 female entrepreneurs, with 75% of responses indicating fewer than 2 female entrepreneurs. In contrast, for the healthcare industry, the average expected number of female entrepreneurs is around 5, with 75% of responses indicating fewer than 7 female entrepreneurs expected. These findings suggest that, within our sample, the healthcare industry is perceived as more female-typed compared to the gaming industry, reinforcing the notion of the gaming industry as male-typed and the healthcare industry as female-typed. However, these findings also highlight the perceived atypicality of women as entrepreneurs, regardless of the industry.

Table 5: OLS Regression 3 Results

	(1)	(2)	(3)
	Funds	BP	EA
male_entrepreneur	8.25** (3.97)	0.38 (0.25)	0.49* (0.26)
gaming_industry	-6.03 (3.92)	-0.46* (0.27)	-0.14 (0.28)
interaction_industry	1.25 (5.06)	0.55 (0.38)	0.31 (0.40)
const	44.17*** (2.72)	5.68*** (0.18)	5.27*** (0.19)
Observations	504	504	504

Note: This table shows the results of regression 3 outlined in Section 3. All columns are estimated using OLS. Column 1 uses the funds received as outcome variable (answer to Q4). Columns 2 and 3 conduct the same analysis using business profitability (Q1) and entrepreneurial ability (Q2) as outcome variables, respectively. The variable industry is a dummy, turning 1 when the industry is male-typed, 0 otherwise. Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

Given the lack of statistical significance for the coefficient of interest, we cannot definitively determine whether an effect exists and, if it does, its magnitude. Nevertheless, despite the limited informative value of the results, the direction of the coefficients observed can still be explained in the context of our hypothesis. Firstly, the positive coefficient for the interaction term suggests that the gender gap in pitch evaluations is more pronounced in male-typed industries compared to female-typed ones. This directional trend seems to support Hypothesis 3. However, the wide confi-

dence interval reflects significant uncertainty about the true size of the effect.

Additionally, the coefficient for the industry variable is negative across all outcome measures, indicating that female pitchers receive less funding and are perceived less favorably in terms of entrepreneurial ability and profitability when pitching in male-typed industries compared to female-typed ones. However, this result is only significant at the 10% confidence level. Moreover, consistent with gender role congruity theory, male entrepreneurs receive more favorable evaluations across all outcomes and in both industries. This result is statistically significant at the 5% level, suggesting a perceived incongruence between the female gender and the role of entrepreneur, irrespective of the industry.

In summary, the direction of the estimates aligns with Hypothesis 3, underscoring the significant role of gender-role congruity theory in explaining the funding gap. This theory is pertinent both to the association between gender and industry type, and to the association between gender and the entrepreneurial occupational role. However, the lack of statistical significance in the coefficients indicates that a larger sample size is necessary to draw more generalizable conclusions.

The study aimed to quantify the relative importance of the two theories in explaining the funding gap, and the estimated coefficients provide suggestive evidence supporting both explanations. On one hand, homophily is evident as male investors show a stronger preference for male entrepreneurs. However, there is also evidence of female investors favoring male entrepreneurs, albeit to a lesser extent, indicating that homophily alone cannot fully explain the gap. Gender-role congruity theory also appears to be confirmed, as the gender gap is more pronounced in male-typed industries, where the incongruence between female entrepreneurs and the pitched idea is stronger. This is further supported by baseline results showing a larger gender gap in the gaming industry. The preference for male entrepreneurs among both genders and across industries indicates that the incongruence between the female gender and entrepreneurship also plays a significant role in explaining the funding gap.

While the direction of the coefficients generally supports the hypotheses, the lack of statistical significance highlights the limitations of the current sample size in accurately quantifying the effect size. This underscores the need for a larger sample to draw more definitive conclusions.

7 Exploratory Analysis

In this section, I present the results of Regression 4, which relate to Hypothesis 4. Additionally, I provide an exploratory analysis concerning gender norms and their correlation with the identified gap. These analyses were pre-registered in the pre-analysis plan and were designed to provide insights that could guide future research.

A) *Promotion- and Prevention-focus Questions.*

Based on the findings of Kanze et al. (2018), this section aims to analyze whether, in our sample population, men are also more likely to receive promotion-focused questions. Looking at table 6, it is evident that, both overall and when examining industries separately, men are indeed more likely to be asked questions that focus on hopes, expansion and growth.

The results presented below stem from the Logit regression analysis detailed in Section 4, specifically addressing Hypothesis 4. The coefficient for the gender variable is 0.5, indicating the change in the log-odds of a promotion-focused question being posed when the entrepreneur is male versus female. This translates to an odds ratio of 1.64 ($e^{0.5}$), implying that male entrepreneurs are 1.64 times more likely to be asked a promotion-focused question compared to their female counterparts. The significance of this result suggests that the observed association can be generalized beyond the sample used in this study.

Table 6: Logit Regression Results

	(1)	(2)	(3)
	Total	Gaming	Health
male_entrepreneur	0.50*** (0.19)		
male_entrepreneur_gaming		0.35 (0.26)	
male_entrepreneur_health			0.75** (0.30)
const	0.54*** (0.13)	0.29 (0.18)	0.79*** (0.19)
N	504	252	252

Note: The table presents the results of regression 4, detailed in Section 3. All estimates are derived from a Logit Model. Column 1 uses a dummy variable to categorize the nature of the question as the outcome variable (answer to Q3, where Promotion-focus = 1 and Prevention-focus = 0). Columns 2 and 3 replicate the same analysis while focusing separately on the gaming and health industries. The variable “male entrepreneur” is a dummy variable that equals 1 when the entrepreneur is male and 0 otherwise. Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

When analyzing the two industries separately, the findings vary. In the gaming industry, neither the intercept nor the gender coefficient is statistically significant. Conversely, in the healthcare industry, both the intercept and the gender coefficient are statistically significant. Here, the odds ratio for male versus female is 2.11 ($e^{0.75}$), highlighting a notable gender effect on the likelihood

of receiving a promotion-focused question. Thus, the significant gender effect observed in the general logistic regression is predominantly driven by the healthcare industry. However, the varied results across different industries can suggest that the relationship between gender and the type of question asked may depend on the specific context.

In light of these findings, we can confidently affirm that the field findings of Kanze et al. (2018) are consistent with our experimental observations. In our context, there is a clear tendency to “ask men to win and women not to lose.” Additionally, Kanze et al. (2018) demonstrated that responding to promotion-focused questions significantly enhances startup funding, whereas encountering more prevention-focused questions hinders funding prospects. Therefore, considering these dynamics, it is conceivable that the gender gap identified in our baseline results could further widen during subsequent Q&A sessions, which are always present in real pitching competitions.

B) Gender Norms.

Figure 6 illustrates the relationship between the average gender gap found in the experiment and elicited gender norms, following a similar approach to Kleven et al. (2019). As stated in the pre-analysis plan, I considered only those countries for which there were more than eight participants of that nationality. The gender norm variable is derived from the International Social Survey Program (ISSP)¹⁵, focusing on the statement: “A man’s job is to earn money, while a woman’s job is to stay at home.” Respondents rated their agreement with this statement on a scale from 1 (strongly agree) to 5 (strongly disagree). Thus, a higher score indicates more progressive gender norms in that country.

The figure plots the gender gap in funding observed in our experiment against the average score for this question by nationality¹⁶ as reported in the ISSP. The correlation between gender norms and the gender gap is quite striking; countries with a larger gender gap in our sample also tend to have more conservative views. However, these results should be interpreted with caution due to the small sample size, comprising only 180 respondents, and its uneven distribution across nationalities: 85 respondents from Switzerland, 43 from Italy, 32 from Sweden, 28 from Germany, and just 11 and 9 from Austria and France, respectively. Nevertheless, while this evidence does not establish a causal relationship, it provides valuable insights and suggests that gender norms may play a significant role in the challenges women face in securing venture capital funding.

¹⁵Originally, in the pre-analysis plan, I intended to use scores from the World Value Survey (WVS) as a proxy for gender norms, specifically focusing on question 31 from Wave 7 (2017-2021). This question examines perceptions regarding gender in business leadership by asking respondents: “On the whole, do men make better business executives than women?” Responses are scored on a scale from 1 to 4, where 1 represents “strongly disagree” and 4 indicates “strongly agree.” While it would have likely been a better fit for my analysis, there were no available data for this question for the countries in my dataset, except for Germany. Consequently, I used data from the ISSP instead.

¹⁶Despite having more than eight observations, Italy is not included in the sample because the ISSP data from Italy is missing.

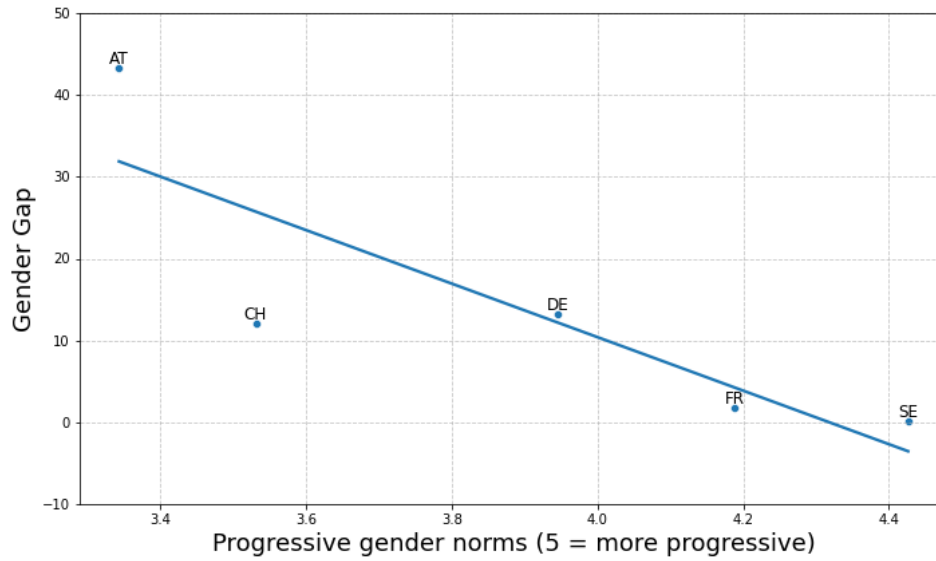


Figure 6: Estimated Gender Gap Versus elicited Gender Norms.

Note: AT = Austria, CH = Switzerland, DE = Germany, FR = France, SE = Sweden. The y-axis represents the average difference in funds received by founders across countries (on a scale from 0 to 100, as specified in Q4).

8 Discussion

This paper contributes to the literature by utilizing an experimental setting to investigate the mechanisms and potential explanations of the gender gap. The experiment was conducted in a blind manner, ensuring that respondents were unaware of the study's focus on gender when they agreed to participate. Additionally, once gender-related questions (Q5 & Q6) were introduced during the survey, respondents could not revise their initial answers based on this newfound awareness of the study's objectives. The random assignment of treatments was effectively managed through Qualtrics, further reinforcing the confidence that the results accurately reflect the study population.

However, there are ways in which the internal validity could be improved in future analyses. In fact, although I tried to minimize the objective differences between actors by asking them to dress similarly and training them to speak with the same tone and pauses, some confounders could still hinder the validity of the results. For example, the perceived attractiveness of the entrepreneur could have unconsciously influenced some results (Brooks et al., 2014). To enhance rigor and minimize potential biases, expanding the actor pool would have been advantageous, provided the respondent sample size allows for it. For example, training a total of 40 actors—20 pitching Nware (10 male, 10 female) and 20 pitching Tucuvi (10 male, 10 female)—could have strengthened the study's validity. This approach would help mitigate any observed differences in respondent rankings and funding that might stem from individual entrepreneur characteristics. However, executing this would necessitate a significantly larger sample size to maintain robust statistical power. Furthermore, leveraging

recent advancements in Artificial Intelligence to create identical female voices and actors from existing videos could offer even greater parity between actors. Yet, current technologies that I tried have not produced satisfactory results in terms of realism, where both voice and facial features remain distinctly artificial.

When considering the external validity of the experiment, it's important to acknowledge that the selected pool of students may not perfectly reflect actual angel investors or venture capitalists. The inability to directly involve real VCs in the survey does present a limitation. However, the study still provides valuable insights. These students are likely to represent the future generation of investors, given that many VCs have educational backgrounds in business schools, and entrepreneurship is a common career aspiration among business students. Moreover, the study's revelation that gender biases in funding allocations appear as early as the university level suggests that these biases may not solely develop in the job market but could originate within educational environments, or even earlier. This insight underscores the importance of implementing policies aimed at addressing biases early on in educational settings. Lastly, another limitation lies in the hypothetical nature of the scenario presented in the experiment, where students allocate a fictional budget to the pitches. In fact, it remains unclear whether they would allocate the funds in the same way in a real-world setting with actual profit-driven incentives. The students lacked a monetary incentive to allocate the funds, which may have influenced their decisions¹⁷.

9 Conclusions

The present study contributes to the literature on gender differences in access to funding by investigating supply-side discrimination in funding allocation. Unlike most existing research, this study employs an experimental approach, allowing for a causal identification of gender effects while controlling for industry self-selection and addressing the issue of low female founder representation. By having all entrepreneurs pitch the same idea in the same manner, with gender as the only changing variable, the study controls for potential confounding factors such as idea quality and pitch performance. This experimental design allows for a deep dive into the unconscious mechanisms behind funding disparities, uncovering previously unexplored factors. It reveals that entrepreneurs are not only judged as less capable based on their gender, but this bias also affects perceptions of their ven-

¹⁷I considered rewarding students based on how closely their allocations matched those of a selected pool of expert venture capital investors, aiming to incentivize more realistic responses. However, I ultimately decided against this approach, as it could have led to students internalizing the anticipated gender biases of VC investors, potentially influencing their behavior in a way that may not reflect actual decision-making. Additionally, I considered rewarding the students based on the actual growth and profitability of the startups presented, as they were real startups showcased at the South Summit 2022. However, I ultimately decided against this approach because the growth of these startups might have been influenced by various factors, including potential gender biases that could have hindered the ability of female entrepreneurs to secure funding in real life. This is particularly relevant given that Tucuvi was led by a female CEO, while Nware was led by a male founder.

tures' profitability. Despite identical ideas and pitches, female entrepreneurs are often perceived as presenting less profitable ventures, illustrating how gender biases can anchor and skew assessments of business potential.

This thesis also contributes to the literature by evaluating the relative significance of homophily and gender-role congruity theory in explaining the observed funding gap. Although the small sample size limits precise quantification of effect sizes, the direction of the coefficients supports both theories. Homophily is a relevant factor, as the funding gap is more pronounced among male investors compared to female investors. However, homophily alone cannot fully explain the disparity, as female investors also exhibit a gender bias favoring men. It remains unclear whether this should be interpreted as consistent with the Queen Bee theory or if it reflects a broader perception, shared by both genders, that women are less capable. In either case, both explanations suggest that while increasing the number of female investors or creating gender-balanced investment committees could help reduce the funding gap, such measures alone may not be sufficient to completely eliminate it. Gender-role congruity theory is also supported by the findings, indicating that incongruence between gender and industry type is negatively rewarded. The consistent preference for male entrepreneurs across investor genders and industries further underscores the impact of gender-role congruity theory on the funding gap.

Exploratory analyses reveal that men are more likely to receive promotion-focused questions, which could further widen the gender gap during Q&A sessions. Lastly, gender norms also emerge as a potentially significant factor in explaining the funding gap, suggesting that they warrant further investigation in future research.

The findings of this study provide a solid foundation for shaping policy interventions by identifying the funding gap and exploring its underlying causes and mechanisms. They also point to several key areas for future research. For instance, improving internal validity could involve using AI tools to ensure that pitching videos are perfectly identical. Expanding the sample size is essential for enhancing statistical power and accurately assessing the roles of homophily and gender-role congruity in explaining the funding disparity. Additionally, future research should seek to clarify the impact of gender norms, which could offer valuable insights for policymakers. Lastly, investigating when the funding gap first emerges during the educational journey could provide crucial insights for addressing the issue at its root.

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Appendix

A1. Experiment Details

Dear Students,

My name is Paola, and I am conducting a study on Venture Capital Funding in Pitching Competitions. I would greatly appreciate it if you could take approximately 7 minutes to participate in my survey:

https://sse.qualtrics.com/jfe/form/SV_9yR9vgSZQ12lkB0

In the survey, you will step into the shoes of a Venture Capitalist. You'll be asked to **watch two videos**, each lasting **approximately 1 minute**, and then provide your feedback by completing a short questionnaire.

Data protection: All answers to the survey remain anonymous. The answers and information collected will be only used for research purposes.

How did I get your email? Student email addresses are publicly available on the desktop version of Outlook and can be used by other students for internal research purposes.

Thank you so much for participating. If you have any questions, do not hesitate to contact me: paola.bignoli@student.unisg.ch

Kind regards,

Paola

Figure 7: Body of the Email sent to recruit participants.

Tucuvi's Pitch (Healthcare industry) & Slide Deck

In today's healthcare landscape, the demand for care is skyrocketing, due to aging populations and the prevalence of chronic conditions. On the other hand, there is crucial shortage of healthcare professionals. This imbalance is making our healthcare system more and more unsustainable. But at tucuvi, we've developed a ground-breaking solution to this pressing issue: we develop empathic AI to automate medical monitoring conversations, we developed Lola.



Lola is not just another AI; she's the first voice-based medical assistant capable of conducting health monitoring conversations via simple phone calls. No internet, no smartphones, no devices required. Lola enables healthcare providers to optimize their time and resources by automating patient monitoring. Imagine a doctor with 1,000 patients assigned, but has only the time to visit 15. Lola helps her identify the 15 patients who urgently need attention, allowing her to focus precisely where it

matters most. Setting up monitoring protocols with Lola is a breeze.



Whether it's a post-surgery follow-up or managing chronic conditions, Lola conducts natural conversations with patients based on evidence-based protocols. Our advanced natural language processing algorithms prioritize these conversations, ensuring that healthcare providers receive crucial insights in real-time¹. We are biomedical engineers, conversational designers, doctors and nurses and we believe that in the near future AI will allow to provide the care that society deserves, at tucuvi we are taking the first steps to achieve it.

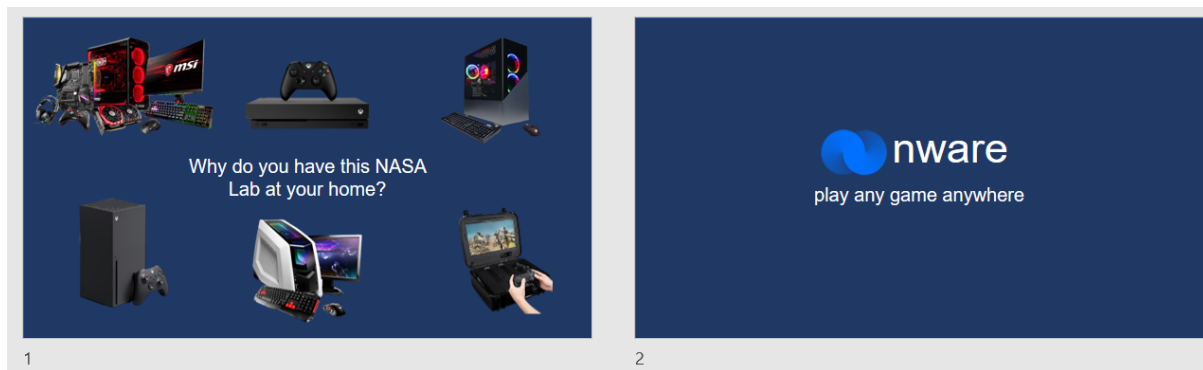


Nware's Pitch (Gaming Industry) & Slide Deck

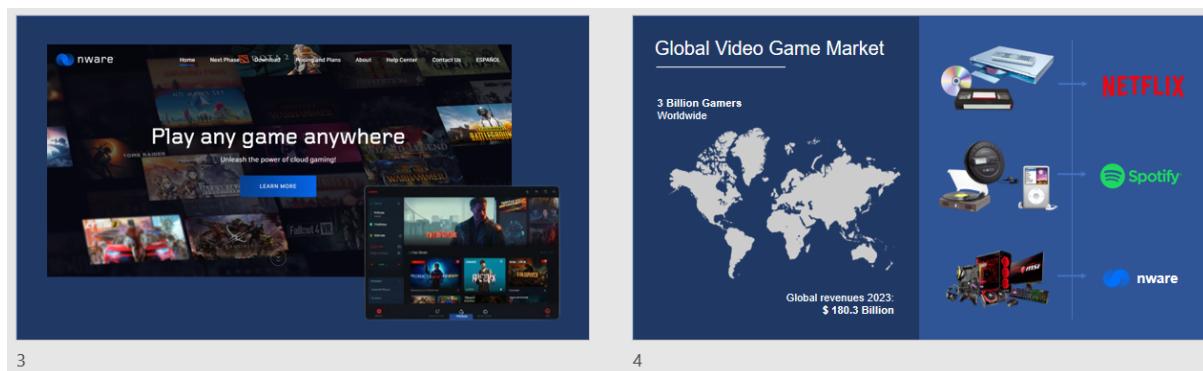
Our project is based on a pretty simple question: why do you need all this messy stuff just to be able to play video games? Think about updates, upgrades, installs, cables, all that jazz just to be able to enjoy content. Do you remember when you needed that horrible dvd box to play films?

This is what happens in the gaming industry today and this is what we want to change with nware. Nware is a cloud gaming platform that allows you to play any videogame that you already have, on any device, only for 10 bucks per month.

¹This sentence refers to slide 5, which is an animated slide, but the animations is not active in this pdf

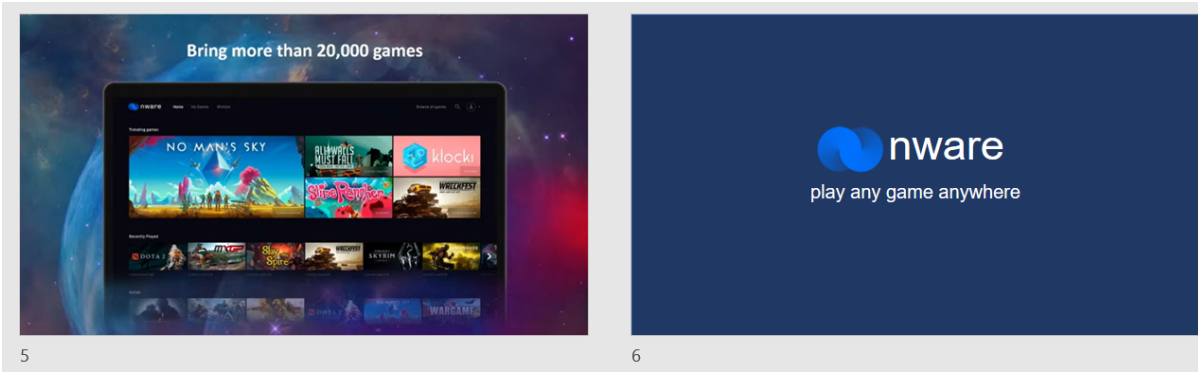


This is how the future of the gaming industry looks like¹. There are 3 billion gamers in the world and only 300 million of them have enough hardware to play all the existing content that there is in the gaming industry. An industry that is HUGE, and when I say huge, I say that it is actually the biggest entertainment industry in the world, and it's bigger than all the other entertainment industries combined. So why are we going to be a winning horse in this race?



Well, because we are the only cloud gaming platform in the world that allows you to synchronize and play more than 20 000 video games. That's 20 times more than our biggest competitor. We are a team of 12 people and if we get properly founded, you cannot imagine what we will be able to achieve.

¹This sentence refers to slide 3



A2. Robustness Checks

Table 7: OLS Regression 2 Results - Robustness Checks

	Funds	Funds Gaming	Funds Health
male_entrepreneur	5.23 (4.99)		
interaction_male_resp	5.51 (6.11)		
male_entrepreneur_gaming		4.91 (7.22)	
interaction_male_resp_gaming		8.50 (8.84)	
male_entrepreneur_health			5.78 (6.88)
interaction_male_resp_health			2.22 (8.42)
const	49.06*** (3.53)	44.85*** (5.13)	53.17*** (4.83)
male_respondent	-10.55** (4.32)	-9.29 (6.26)	-11.63* (5.94)
N	486	243	243

Note: This table presents the results of regression 2 as described in Section 3, replicating the format of Table 4. The sole distinction between this table and Table 4 is the treatment of the variable male_respondent. In this analysis, the variable male_respondent is coded as 1 for male participants and 0 for female participants, with those who selected “Other or Prefer Not to Say” excluded from the analysis. Standard errors, clustered at the individual respondent level, are provided in parentheses. ***significant at 1%, **at 5%, *at 10%.

Robustness checks largely confirm the findings presented in Table 4, with most coefficients aligning with the direction and magnitude observed previously, although significance remains absent. The only notable change is in the direction of the interaction term within the healthcare industry: it was negative in Table 4 but turns positive in this analysis. This shift contradicts the earlier finding that female investors in the healthcare industry preferred male entrepreneurs more than their male counterparts did. However, in both cases, the coefficients lack statistical significance and are accompanied by large confidence intervals, which precludes drawing any meaningful conclusions.

A3. Secondary Outcomes

Table 8: OLS Regression 2 Results - Secondary outcomes

	BP	EA	BP G	EA G	BP H	EA H
male_entrepreneur	0.51*	0.56*				
	(0.28)	(0.29)				
interaction_male_resp	0.23	0.14				
	(0.37)	(0.37)				
male_entrepreneur_gaming			0.45	0.40		
			(0.48)	(0.49)		
interaction_gender_resp_gaming			0.71	0.60		
			(0.58)	(0.60)		
male_entrepreneur_health					0.59	0.75*
					(0.37)	(0.35)
interaction_male_resp_health					-0.28	-0.34
					(0.49)	(0.48)
const	6.01***	5.68***	5.90***	5.62***	6.10***	5.73***
	(0.23)	(0.24)	(0.36)	(0.39)	(0.28)	(0.31)
male_respondent	-0.87***	-0.74***	-1.04**	-0.74*	-0.68*	-0.73**
	(0.28)	(0.30)	(0.43)	(0.46)	(0.37)	(0.38)
Observations	504	504	252	252	252	252

Note: This table shows the results of regression 2 outlined in Section 3. In columns (1), (3) and (5) the outcome variable is the business profitability ranked by each participant in Q2. In columns (2), (4) and (6) the outcome variable is the entrepreneurial ability ranked by each participant in Q2. All columns are estimated using OLS. Column (1) and (2) includes the funds allocated to both startups by each individual, controlling for industry. Since each respondent viewed two videos, the number of observations is double the sample size. The remaining columns conduct the same analysis separately for each startup (and industry). 1.659 ***significant at 1%, **at 5%, *at 10%.

A4. Pre-analysis-plan

Gender Discrimination in Pitching for Venture Capital Funding

Pre-analysis Plan

Thesis In Economics

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1 Introduction

The gender gap in access to finance for female-led startups is one of the starkest economic gender disparities. In 2022, startups exclusively led by women secured only 0.9% of the total capital invested in European venture-backed enterprises (PitchBook, 2023).

This research proposal examines the presence of gender bias when evaluating the pitch of an entrepreneur and sheds light on two potential underlying forces. To that end, an economic experiment will be conducted, inviting participants to allocate money among two different startups seeking early-stage funding. The participants watch two videos of startup ideas. The pitching videos are recorded twice, once presented by a man and once by a female actor. The “male” or “female” version of the startup pitching videos are randomly allocated to the participants so that every participant watches only one version per startup. The main outcome of interest is the amount of money allocated to the respective startups. As all participants watch exactly the same startup ideas presented as similarly as possible, with the only difference being the gender of the entrepreneur, it is possible to identify the causal effect of gender on funding outcomes.

The underlying theories potentially explaining gender discrimination are mainly two: homophily and role-congruity theory. According to the first theory, the bias may stem from individuals’ inclination to favor those who share similarities (McPherson et al., 2001). According to the second theory, the bias emerges from the mismatch between society’s expectations of women’s behavior in male-dominated fields such as entrepreneurship (Eagly & Karau, 2002).

The effect of homophily can be investigated by looking at the differential effects of the treatment based on the gender of the participant. If I restrict the pool of “investors” to only man, and I see a larger gender gap and a tendency to allocate more money to male pitchers, then this is in line with homophily-based explanations as a driver of gender biases. Additionally, the predictions of role-congruity theory can be tested by using the gender associations of the industry in which the pitchers present. Observing that female entrepreneurs receive more money in female-typed industries would be consistent with role-congruity theory (Butticè et al., 2022). The two forces are non-exclusive and can coexist in explaining a potential gender gap in the funds received by the pitchers.

2 Hypothesis and Research Questions

The first research question is: Does the gender of the pitcher affect the funding outcomes for a business idea, delivered with an identical pitch script? This question leads to the first hypothesis

H1 On average, women receive less funds when pitching their business idea

I further imagine that the gender gap is also reflected in the judgment on the profitability of the business idea and in the ability of the entrepreneur as well, both ranked on a scale from 0 to 10.

Subsequently, I investigate the driving forces behind this disparity. Testing for homophily hypothesis leads to the second research question: Is the gender gap in funding (and in the scores received on the profitability of the idea and judgment on the entrepreneurial ability of the pitcher) more pronounced if the investor is male? My hypothesis is:

H2 *The gender gap in funding is smaller if the potential investor is non-male¹ compared to if the potential investor is male.*

Then, I test for another explanation, which would support the congruity-role theory. The third research question: is the gender gap more pronounced in a male-dominated industry, compared to a female-dominated one? The hypothesis is:

H3 *The gender gap in funding is larger in a male-typed industry than in a female-typed industry.*

The primary outcome variable for the hypotheses will be the funds received. Additionally, the profitability of the business idea and the entrepreneurial ability will be incorporated as secondary measures for the last two regressions. In the study, I will explore two distinct industries: the gaming industry, often perceived as male-dominated according to existing literature, and the health-care industry, commonly regarded as female-dominated. In order to confirm my findings, I aim to investigate whether these perceptions align with the actual population of interest. Therefore, as part of our survey, I will include a specific question aimed at understanding participants' perceptions regarding the gender distribution of entrepreneurs in these industries. This question will be structured as follows:

H3 *Out of 10 entrepreneurs in the gaming/healthcare industry, how many do you think are women?*

I will utilize the responses to this question to evaluate whether the prevailing classification of these industries proposed by the literature accurately reflects the reality within my surveyed population.

Finally, I want to test in this setting the finding of Kanze et al. (2018), which highlights that female entrepreneurs are more likely to receive preventive-focused questions, while man entrepreneurs receive more promotion-focused question. So the last research question here would be: Does it hold, in this setting, that women are more likely to receive preventive-focused questions? My hypothesis:

H4 *Women receive more preventive-focused questions compared to their male counterparts. Conversely, male entrepreneurs are more likely to receive promotion-focused questions.*

¹The gender of the participant can be categorized into four distinct values: female, male, non-binary, or other/prefer not to say. In the primary analysis, I'll employ participant gender as a binary dummy variable, assigning a value of one if the gender is male, and zero otherwise. However, in the robustness checks, I'll focus solely on comparing male against female genders

3 Dependent Variable

The primary dependent variable will be the funding amount acquired for each business idea. I will examine whether female entrepreneurs receive, on average, less funding for the same business idea presented with an identical script.

Additionally, I will utilize two other secondary outcome variables for hypothesis 2 and 3: participants' rankings of the profitability of the business idea and the entrepreneurial ability of the presenter, assessed on a scale from 0 to 10.

The outcome variables are three, where the first one is the primary outcome variable, and the second ones are secondary measures:

- *Funds received for the business idea (from 0 to 100)*
- *Score received for the profitability of the business idea (from 0 to 10)*
- *Score received for the ability of the entrepreneur (from 0 to 10)*

Finally, for the fourth hypothesis, the outcome variable will be a dummy variable indicating whether the question posed is preventive- or promotion-focused.

4 Experiment Design and Conditions

Participants are asked to participate to the survey via e-mail both at the University of St. Gallen and the Stockholm School of Economics.

They will watch a video that I produced, which closely mirrors a genuine pitching presentation to obtain early-stage funding. The pitching is taken from the South Summit 2022 (Madrid). The actors, evenly split between genders, portray entrepreneurs pitching business ideas. The clothes and visual appearance of the actors is kept inconspicuous and neutral. The scripted performances are executed with precision, ensuring identical script, movements, and expressions.

During the experiments, participants are shown the two videos after each other, with three evaluation questions in between, and comparative questions after having watched the two videos. At each step t , individual i is shown a pitch video presenting an idea j . This idea is drawn randomly (without replacement) out of a pool of two ideas, that is, $j_t \in \{j_1, j_2\}$. This is to ensure that there are no primacy effect in the distribution of funding to the two ideas. Thus, individuals are randomly allocated on two dimensions in each step: first the idea, and then the pitcher's gender. However, I will make sure that each participant will never see two women or two men pitching the two different ideas. In addition, I differentiate the ideas based on association with industries that are either

perceived as traditionally male or traditionally female (gaming industry and healthcare industry respectively). Idea j_1 concerns traditionally male industries, while j_2 is associated with traditionally female industries.

After watching each video, participants in the experiments are asked three evaluation questions concerning the video they just saw:

Q1 *On a scale from 0 to 10, how confident are you in the profitability of this business idea?*

Q2 *On a scale from 0 to 10, how would you rate the entrepreneurial ability of the entrepreneur?*

Q3 *If you could ask the entrepreneur one question, which one would you chose? (This is a multiple choice question, where the participant can chose between 4 questions. Two are promotive-focused questions, two are preventive-focused questions. The order of the four options is randomized)*

The answers to these three questions will be used as outcome variables, as explained in the previous section. After watching the two videos and responding to three questions each, participants are presented with the final question. This final question serves as the primary outcome variable and prompts them to compare the two pitches, determining the fund allocation accordingly.

Q4 *Imagine you are a Venture Capitalist looking for a profitable investment opportunity. You can allocate any amount from €0 to €100,000 to each startup, depending on your assessment of its potential. Please indicate the amount of money you wish to invest in each startup idea.*

On a scale from 0 to 100, indicate how much you would invest in Nware (Gaming Industry Startup)

On a scale from 0 to 100, indicate how much you would invest in Tucuvi (Healthcare Industry Startup)

variable	values	explanation
pitcher_gender _{ij}	0, 1	pitcher's gender (explained fully by (i, j))
participant_gender _i	0, 1	respondent's gender (function of i)
industry _j	0, 1	industry (function of j)
subjective_profitability _{ij}	{0, 1, ..., 10}	individual's answer to Q1
entrepreneurial_ability _{ij}	{0, 1, ..., 10}	individual's answer to Q2
y _{ij}	[0, 100 000]	funding given to idea j presented to i, in €

Table 1: Variables and indices. For binary gender variables, 1 means male and 0 means female. For the industry variable, 1 means male-dominated and vice versa.

Table 1 shows an overview of the data set after the experiment. $\text{pitcher_gender}_{ij}$ is the gender of the actor pitching for the idea j in a given video. This variable is a representation of the random allocation conducted before each experiment step. Since pitcher gender is randomized anew for each step and individual, the variable carries both an i and a j subscript. Similarly, since ideas are randomly allocated to time steps for each individual separately, and industries (male or female dominated) are a function of the idea, industry carries both an i and a j subscript. $\text{Participant_gender}_i$ is the gender of participant i . It can be categorized into four distinct values: female, male, non-binary, or other/prefer not to say. In the primary analysis, I'll employ participant gender as a binary dummy variable, assigning a value of one if the gender is male, and zero otherwise. However, in the robustness checks, I'll focus solely on comparing male against female genders. Finally, y_{ij} is the individual and time-specific amount of funding allocated in the process described above.

5 Empirical Analysis

The estimated treatment effect can be obtained by comparing the means of the outcome variable, funds raised, conditional on gender. More formally, I compare the expected money allocated to idea j by individual i over all individuals and split the sample by treatment gender. This yields first descriptive evidence of the existence of a treatment effect of the gender of the pitching entrepreneur.

To statistically test the first hypotheses, I run the following regressions. Equation (1) denotes the main specification. Equation (2) denotes the interacted specification to estimate differential effects based on the gender of the respondent. Equation (3) denotes the interacted specification to estimate differential effects based on the industry.

$$y_{ij} = \beta_0 + \beta_1 \text{pitcher_gender}_{ij} + \varepsilon_{ij} \quad (1)$$

$$y_{ij} = \beta_0 + \beta_1 \text{pitcher_gender}_{ij} + \beta_2 \text{respondent_gender}_i + \beta_3 \text{pitcher_gender}_{ij} \times \text{respondent_gender}_i + \varepsilon_{ij} \quad (2)$$

$$y_{ij} = \beta_0 + \beta_1 \text{pitcher_gender}_{ij} + \beta_4 \text{industry}_j + \beta_5 \text{pitcher_gender}_{ij} \times \text{industry}_j + \varepsilon_{ij} \quad (3)$$

The main outcome y_{ij} denotes money allocated by individual i to idea j . The variable

$\text{pitcher_gender}_{ij}$ is a dummy variable turning one if the pitcher is male, for respondent i and idea j . The variable industry_j denotes a dummy variable turning one if it is a male-typed industry for idea j . $\text{respondent_gender}_i$ is the gender of the respondent i turning one if the gender of the respondent is male. I interact the treatment variable $\text{pitcher_gender}_{ij}$ with the characteristics Industry_j , and $\text{Respondent_gender}_i$ to estimate differential effects based on gender-association of the industry, and the gender of the respondent.

In a separate analysis, I run regression specification (2) and (3) with the alternative outcome “subjective_profitability $_{ij}$ ” and “entrepreneurial_ability $_{ij}$ ”, which I elicit from the respondents in Q1 and Q2 after every pitch video ². I expect the estimated coefficients to generally reflect the ranking of the funding allocations, meaning that subjectively better rated ideas also receive more funding. These regressions can yield suggestive insights into whether gender disparities are mediated through performance ratings of the startup idea or perceptions of entrepreneurial ability, or both.

The formal representation of the hypotheses in the context of the regression equation is laid out below. In the first regression (1), I test the first hypothesis, and I investigate the existence of a gender bias in allocating funds to pitches.

H1 *I test $\beta_1 \neq 0$ against $\beta_1 = 0$. The hypothesis is that $\beta_1 > 0$.*

For hypothesis 2, I use the second regression (2): I test whether there is evidence for differential effects of the treatment based on the gender of the respondent. I expect the gender gap in investments to be more pronounced when the respondent is male. This leads to the second hypothesis:

H2 *I test $\beta_3 \neq 0$ against $\beta_3 = 0$. The hypothesis is $\beta_3 > 0$.*

Then I proceed with the formal test of the following three sub-hypotheses:

H2a *I test $\beta_1 \neq 0$ against $\beta_1 = 0$. The hypothesis is $\beta_1 < 0$.*

In general, hypothesis 2 tests whether there is evidence consistent with the theory of homophily in investment allocation. H2a tests whether male pitchers receive less funding compared to female pitchers, when evaluated by non-male respondents. If that is the case and $\beta_1 < 0$, then there is evidence supporting the theory of homophily. If instead I find that $\beta_1 > 0$, then this would mean that on average, a non-male respondent, gives more funds to a male entrepreneur. This could be consistent with the interpretation of a “Queen Bee” syndrome, meaning that women in power positions exhibit an opposite-gender preference (Staines et al., 1974).

²For simplicity, in the description below I only describe the regressions using the funding as outcome variable

H2b I test $\beta_2 \neq 0$ against $\beta_2 = 0$. The hypothesis is $\beta_2 < 0$.

Next (H2b), consistent with the theory of homophily, I would expect smaller investments for female entrepreneurs pitching in front of a male investors, compared to the situation in which female entrepreneurs pitch in front of female investors. If this is the case, $\beta_2 < 0$.

H2c I test $\beta_1 + \beta_3 \neq 0$ against $\beta_1 + \beta_3 = 0$. The hypothesis is $\beta_1 + \beta_3 > 0$.

Lastly, I expect that a men repondent will give more funds to a male entrepreneur, compared to what a male respondent would give to a female pitcher, in this case, $\beta_1 + \beta_3 > 0$. Such hypothesis will be tested using a two-sided test and a $p < 0.05$ for statistical significance threshold.

For the third hypothesis I test whether the effect of gender differs depending on the gender association of the industry, using the regression (3). If I find evidence for hypothesis 3, this would be consistent with role-congruity theory. This would mean that the gender gap exists in both industries, and favors men in both industries, but it is smaller in female-dominated industries. β_1 in this case tells me the difference between the funds received by a female and male pitcher, in the female-dominated industry. If $\beta_1 < 0$, then the male entrepreneur earns more. At the same time, if $\beta_1 + \beta_5 < 0$, this would mean that male pitcher get more in male-dominated industries as well. My hypothesis would then be that the gender gap in funds received is smaller in female-dominated industries, than in male-dominated ones, leading to the third hypothesis:

H3a I test $\beta_5 \neq 0$ against $\beta_5 = 0$. I hypothesize that $\beta_5 < 0$

Finally, to test hypothesis 4 I run the following regression.

$$\text{Promotion_Focus}_{ij} = \alpha_0 + \alpha_1 \text{pitcher_gender}_{ij} + \varepsilon_{it} \quad (4)$$

$\text{Promotion_Focus}_{it}$ is a dummy turning one if the question that respondents would have liked to ask had a promotional focus. I present the specification as a Probit model.

H4 I test $\alpha_1 \neq 0$ against $\alpha_1 = 0$. I hypothesize that $\alpha_1 > 0$

If α_1 is significantly bigger than zero, there is evidence that female pitchers are less likely to receive promotion focused questions.

For all the regressions, I plan to cluster the robust standard errors at the individual level of the respondent.

6 Outliers and exclusions

In the regression analysis where the amount invested serves as the outcome variable, individuals who did not complete the entire survey will be excluded from the analysis.

For the regression examining entrepreneurial ability, profitability of the business idea, and the nature of the question, observations that did not view both videos will be excluded from the analysis.

When analyzing interactions with respondent gender, observations that did not specify their gender in the last demographic questions will be excluded. Similarly, in the explanatory analysis examining gender norms in different countries, individuals who did not specify their nationality will be excluded from the analysis.

7 Sample Size

The objective is to collect as many observations as possible. I will then report the minimum detectable effect size that I have 90% power to find at $p < 0.05$. To maximize the number of observations, I plan to enhance participation by sending the survey email twice, targeting individuals from both universities. Additionally, I aim to incentivize engagement by pledging a charitable donation for each participant.

8 Exploratory Analysis

I plan to conduct a final exploratory analysis to investigate whether gender discrimination could originate from established gender norms prevailing in specific countries. In this analysis, I will delve into the correlation between responses provided by individuals from diverse nationalities and the scores documented in the World Value Survey (WVS). Specifically, I will concentrate on question 31 from Wave 7 (2017-2021) of the survey. This question examines perceptions regarding gender in business leadership, asking respondents: 'On the whole, do men make better business executives than women?' Responses to this question are scored on a scale ranging from 1 to 4, where 1 represents 'strongly disagree' and 4 indicates 'strongly agree'.

To ensure robustness, I will run this analysis only if there is sufficient variation in nationalities. I aim to include a diverse representation of at least eight different nationalities, with a minimum of eight respondents for each nationality. While this variation could shed light on the correlation between nationality-specific responses and gender-related attitudes from the World Value Survey, the results should not be over-interpreted as the test is likely to be low-powered.

Additionally, I plan to conduct another explanatory analysis comparing responses from students in

Sweden and Switzerland. This comparison aims to explore if aggregate differences in responses can be correlated with variations in the gender balance among students or professors at the respective schools. This analysis will provide insights into the influence of educational environments on gender-related perceptions and outcomes.