Can Competition Reduce Moral Hazard? A Laboratory Experiment

By

Raja Abdar Rahman

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Supervised by: Dr. Farah Said

Abstract

Moral hazard aggravates mistrust between principals and agents and leads to economic inefficiency. Although literature has investigated if competition can reduce moral hazard, the evidence is mixed at best. This thesis examines the existence of moral hazard in a lab setting, and then tests if introducing competition can reduce moral hazard. In addition, we test for the effects of two types of competition - competition against others and competition against own past performance (self-competition). We also test if the results for competition are different for men and women, and whether they vary by the gender of their competitor. We find that a participant who performs under competition is 19.2 % less likely to have moral hazard than one who performs under a fixed wage setting without competition. Self-competition is more effective than competition against others in motivating individuals to perform better. This effect is greater for women who are 15.1 % less likely to have moral hazard than men. Both men and women are less likely to display moral hazard when competing against someone of the same gender than when they compete against the opposite gender. Performance based contracts can be used to incentivize employees to better their performances to meet either preset targets or their best performance in the past. Where possible, competition against the same gender can be introduced to achieve similar improvements in performances.

Keywords: moral hazard, competition, gender, lab experiment, effort task

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1. Introduction

The outcomes for principals often rely on the performances or recommendations of agents across different contexts. These may include scenarios such as an investor seeking financial advice from a broker, a patient seeking medical advice from a doctor, or an employer expecting his workers to meet the required production targets. Agents may not always act in the best interest of the principal, especially when stakes are misaligned – a phenomenon known in the literature as 'moral hazard'. [1] For instance, a broker may recommend the stocks that earn him the highest commissions regardless of their quality, the quality of advice given by a doctor on a fixed monthly payroll may deteriorate due to fatigue, or an employee working on a fixed wage may not feel incentivized to work up to his potential. Moral hazard can lead to inefficient outcomes, with the principal making misguided decisions or the outcomes of principal-agent scenarios being less than pareto optimal.

Prior empirical research has emphasized on examining whether competition can work as a mechanism to counter moral hazard. Some studies suggest competition effectively improves performance and reduces moral hazard primarily because agents tend to avoid the loss of income (see e.g. Huck et al., 2012; Angelova and Regner, 2017, etc). Others claim that competition leads to inefficient outcomes and worsens moral hazard when agents fear that giving their honest advice to principals will enable competitors to lie and earn more (e.g. Bolton et al., 2012; Rud et al., 2018, etc). Some conclude that even though competition increases market transactions, it has no effect on efficiency at all (e.g. Dulleck et al., 2011; Ishiguro 2002, etc).

[1] See Dowd (2009).

The literature discussed above differs from our research in four aspects. Firstly, it studies moral hazard particularly in credence or experience goods markets where principals pay agents for their advice. Secondly, it analyzes the effect of only one type of competition on moral hazard i.e. competition against others. Thirdly, it does not investigate if the effect of competition on moral hazard differs across gender. And lastly, it does not explore whether the effect of competition on moral hazard varies for men and women depending on the gender of their competitor.

This thesis attempts to investigate if moral hazard exists in a random sample of students from a higher education institute in Pakistan. In our design, the agents actually work for the principals as their performance in counting letters in senseless paragraphs influences the rewards of the principals.[2] Since the principals rely on the overall performance of agents rather than just their advice, the results of our study are applicable to a greater set of market scenarios.[3] Another difference in our study is that along with examining the impact of competition against others on moral hazard, we also assess the impact of competition against the agent's own past performance (self-competition). This distinction is important because agents are expected to react differently to each kind of competition (Apicella et al. 2017).

Furthermore, we seek to find if the effect of each type of competition on moral hazard is different for men and women. This is an important concern as literature tells us that women respond more to self-competition than competition against others (Nazif and Said, 2018). Therefore, the reduction in likelihood of moral hazard under self-competition can be expected to be greater for women. We also examine whether the effect of competition on moral hazard varies

[2] Counting letters in senseless paragraphs has been frequently used in literature to elicit performance related behavior because it does not involve a gender stereotype i.e. no gender is expected to perform better or worse than the other (e.g. Hogarth and Villeval, 2010; Rosaz and Villeval, 2012, etc).
[3] Details of the experiment can be found in section 3.

for men and women when their competitor is of the same gender and when their competitor is of the opposite gender. Prior studies have shown that women are less comfortable than men when they compete against someone of the opposite gender (Gneezy et al., 2003; Nazif and Said, 2018). This implies that the effect of competition on moral hazard should be lower for women when their competitor is of the opposite gender.

We conduct the experiment with 290 graduate and undergraduate students from a higher education institute in Pakistan. We find that moral hazard exists in sample tasks involving a principal and an agent, and that competition can effectively reduce the likelihood of moral hazard by 19.2 %. Self-competition is more effective than competition against others in improving performance and reducing the likelihood of moral hazard, especially in the case of women. The results show that both men and women perform better when they are competing against someone from the same gender and the likelihood of moral hazard reduces by 14.8 % under same gender competition as compared to competition against the opposite gender. It can be deduced from the results that competitive work settings can be used to reduce the occurrence of moral hazard. Performance based contracts can incentivize employees to improve their performance to meet either a preset target or their best performance in the past. An improvement in performance can also be encouraged through settings where workers compete with others of the same gender.

The thesis is organized as follows. Section 2 provides a review of relevant literature. In Section 3, we present our research questions, a thorough explanation of the experimental setup, and the estimation techniques. Section 4 presents and discusses the results of the experiment. Section 5 concludes with policy implications.

2. Literature Review

2.1. Moral Hazard

The term was first used by Arrow (1963) and Pauly (1968) to refer to the effect of health insurance on efforts to reduce health risks, moral hazard has since then been referred in multiple contexts where: (i) there is a presence of information asymmetry between an agent and the principal – the principal does not have the full information set available with the agent;[4] (ii) there is a misalignment of interests and one entity, responsible for the interests of another, has an incentive to put their own interests first (Dowd, 2009).

Moral hazard has been detected in different markets using varying techniques. Dam and Koetter (2012) employ a structural econometric approach to conclude that moral hazard arises in the German banking sector due to an increase in safety nets and bailout. Corgnet et al. (2013) find participants shirk responsibilities under team, rather than individual, incentives due to a diffusion of responsibility. The results show that production levels are significantly lower under team incentives and, therefore, moral hazard is present. Evidence of moral hazard has been found in a number of settings, including automobile insurance (Cummins and Tennyson, 1996), health insurance (Dave and Kaestner, 2009), microfinance (Hermes et al., 2005), investment advice from an agent to a principal investor (Rud et al., 2018).

Moral hazard is an important source of concern in the financial and labor markets, but it is also present in other sectors and affects them significantly. Elofsson (2014) shows that when there is a high probability of climate change or when the watershed authority (agent) responsible for nitrogen abatement is guaranteed a high minimum compensation, the cost of moral hazard to

[4] Also see Akerlof (1970).

international funding agency (principal) is much higher. Using a nationally representative dataset of outpatient visits in Taiwan, Bennett et al. (2008) show that physicians often prescribe more antibiotics than required to attract more clients than their competitors which leads to a greater antibiotic resistance and drug expenditure. Roberts et al. (2011) use data from the U.S. Department of Agriculture's Risk Management Agency to show that moral hazard in the agricultural insurance sector leads to a statistically significant decrease in average crop yields.

Some theoretical studies have also shown the implications of moral hazard in different markets. The model developed by Brekke and Nyborg (2008) shows that more morally motivated workers are also more productive and demand lesser wages from a green than a brown firm. Therefore, in a perfectly competitive market, green firms may be able to survive in the long run by attracting more morally motivated and productive workers on lesser wages through their strong corporate social responsibility profiles and drive brown firms out of competition. In other words, it means that hiring less motivated workers would lead the firm to exit from a competitive market in the long run. Gaynor et al. (1998) claim that health insurance results in moral hazard in the healthcare market as consumers demand too much healthcare and that leads to an inefficient healthcare market.

Literature has also cited differences in the likelihood of moral hazard among male and female agents. Zheng et al. (2017) develop a theoretical model on risk aversion, moral hazard and gender differences in healthcare which proposes a slightly larger, but significant moral hazard in women. Feess and Nardi (2017) conduct a laboratory experiment revealing that women tend to cooperate more and shirk less often than men when they are randomly assigned to teams and the reward is divided equally between each member of the team i.e. providing them with the

opportunity to shirk. Jordan and Mueller (2017) find that in more complex tasks conducted in a lab experiment, women display greater moral hazard than men.

2.2. Mechanisms Used to Reduce Moral Hazard and the Role of Competition

Several lab experiments recommend mechanisms that can be used to reduce moral hazard. Corgnet et al. (2013) suggest that peer pressure created as a result of introducing profit-sharing in teams eradicates moral hazard. Since profit depends on the performance of each member of the team, the participants make sure that their partners perform efficiently to maximize the average payoffs of the team members. Angelova and Regner (2013) conduct a lab experiment where they test if offering bonuses for improved performance reduces moral hazard and find the results to significantly favor of the hypothesis. In other experiments, enabling agents to build a reputation by allowing for repeated transactions results in improved performances since they want their clients to keep coming back to them and therefore maximize their earnings over the series of transactions (Darby and Karny, 1973; Huck et al., 2012).

The effect of competition on moral hazard has received considerable theoretical attention. Ishiguro (2002) develops a theoretical model based on a market where multiple principals compete each other by offering contracts to agents who choose unobservable ex post actions. The model implies that when moral hazard, on the side of agents, is caused by the trade-off between incentive and risk sharing, intense competition compels the principals to offer full insurance contracts which make payments (to agents) constant across all state realizations and market efficiency decreases. On the other hand, when moral hazard is caused by the limited wealth of risk neutral agents, intense competition among the principals results in a contract that eliminates the moral hazard problem and maximizes social welfare. Therefore, whether more intense competition reduces moral hazard depends on the source of moral hazard.

Gaynor et al. (1998) prepare a model comprising of healthcare and health insurance markets, where moral hazard is caused in the medical care market as consumers demand too much healthcare due to health insurance. They show that in the presence of a competitive insurance market, an imperfectly competitive healthcare market will not mitigate the moral hazard problem and a competitive healthcare market will be required to enhance efficiency. In another model formalized by Hart (1983), increased competition in the product market leads to a reduction in the manager's opportunistic behavior and managerial slack.

The effect of competition on improving performance and removing moral hazard has been assessed in a set of previous studies, with mixed results depending on the context and type of competition. Dulleck et al. (2011) develop a buyer-seller game based on credence goods and introduce competition by allowing buyers to choose from a group of sellers based on their past performances. They find that while reputation improves market efficiency, competition has no incremental effect.

Huck et al. (2012) use a repeated binary-choice trust game to analyze how reputation and competition in a market for experience goods improve the quality of recommendations provided by agents to principals. To observe the effect of competition on the quality of recommendations, the principals are either exogenously matched with an agent or they are empowered to choose from a set of agents based on their past performances. The results show that even though reputation fosters trust, combining reputation with competition eliminates mistrust altogether

We also find evidence for competition encouraging moral hazard when financial incentives are not based on performance. Rud et al. (2018) conduct a lab experiment where investors (principal) use financial intermediaries (agent) for advice regarding the decision to invest in a project. The intermediaries can only earn a commission when they advise the investor to invest. If

an agent advises the principal to not invest, the principal will move on to the next agent who can then advise him to invest or not. The authors find that when competition is introduced by letting the principal choose the agent that they want to employ; an agent is tempted to advise the principal to invest even if the project is risky or risk their commission going to a competing agent.

2.3. Gender Difference in the Effect of Competition on Moral Hazard

Literature has mixed evidence on the effect of competition on moral hazard and, to the best of our knowledge, no study has explored whether this effect varies by gender. There are a number of studies that have explored differences in how men and women react to competition. Gneezy et al. (2003) find that men perform better under competition than women. The evidence on how men and women may react to competition depending on the gender of their competitors is also mixed. The results of a study on 9 years old children reveal that girls perform worse than boys in single-sex (same gender) competitions (Gneezy and Rustichini, 2004). On the contrary, a lab experiment with graduate students of a higher education institution in Pakistan reveals that women are less competitive than men when they are competing against someone of the opposite gender (Nazif and Said, 2018). Women also respond better to competition against their own past performance than when they are competing against others (Apicella et al., 2017).

2.4. Contribution to Literature

The thesis contributes to the literature in several ways. First, where prior research has analyzed how competition affects performance and moral hazard of individuals in credence and experience goods markets, we use a simplified environment where agents have to perform real-effort work tasks for principals. The nature of the task helps the external validity of our findings, with the results applicable to a wider set of markets. Second, we also look at competition in

isolation, without diluting the effect of competition with the effects of reputation of the agent in the mind of the principal.

Third, this study explores the mechanisms behind the role of competition in reducing the likelihood of moral hazard. Specifically, we explore whether competition works through motivation to improve performance over one's own past performance or if agents are affected more by how well they can perform compared to others. The idea of self-competition has been studied in relation to sports and business goal setting (e.g. Brown et al., 1998; Howe, 2008), but its repercussions on moral hazard are yet to be explored. While competition against others motivates people to outperform their competitors, self-competition urges them to improve on their past performance.

Fourth, we contribute to the literature on gendered effects of competition, in this case, whether competition affects men and women differently when reducing their likelihood of displaying moral hazard. This study also tests for gender differences in the effect of competition on moral hazard depending on the gender of the competitor.

Finally, to the best of our knowledge, it is the first study that examines these research questions using a sample of students from a higher education institute in Pakistan. The results of this research will help us identify the use of competition as a tool to reduce the occurrence of moral hazard and improve efficiency and can provide important insights, e.g. for labor market transactions. The type of competition that reduces moral hazard of both genders equally and significantly can be employed in designing contracts in such a way that encourages both men and women to perform efficiently.

3. Research Methodology

3.1. Research Questions

This thesis focuses on the following research questions:

1. We test if incentives are an important determinant of moral hazard. That is, does performance deteriorate if participants are paid fixed wage instead of piece rates? In other words, we explore if moral hazard exists in a setting where agent earnings are not determined by the performance of an agent;

2. If moral hazard can be affected by competition. We also test if self-competition affects moral hazard differently than competition against others.

3. If the effects of competition differ by gender of the respondent. Specifically, we look at whether competition works differently for men and women by: (a) the type of the competition; and (b) the gender of the competitor.

3.2. Experiment Design

Our design employs two incentive schemes i.e. piece rates and fixed payment in a real-effort task to examine the change in performance of individuals. This method has been widely used in experiments (e.g. Shearer, 2004; Cadsby et al., 2007; Dohmen and Falk, 2011; Gielen et al., 2010, etc). But along with measuring the change in performance, our research question demands us to establish if moral hazard exists in our sample. In order to answer this, we follow a small addition made by Jordan and Mueller (2017) to this technique. Jordan and Mueller (2017) attempt to examine how moral hazard varies with task complexity. In simpler words, they examine whether moral hazard is greater in more complicated tasks.

Jordan and Mueller (2017) divided the participants (agents) equally and randomly across two types of tasks. Participants were informed that they have to perform in two rounds and their rewards in one of the rounds will be paid out. In the first round, the players were informed that they were being paid piece rates that will depend on their performance. In the second round, the participants were informed that they will receive a fixed payment regardless of their performance. However, in both rounds, agents were also informed that their performance will determine the reward of an individual in another session. This is an important feature of the design because it automatically makes the participant an agent of an individual in the other session (principal). The agent is not informed of the identity of the principle but can infer from the information given that the earnings of the principle depend on the performance of the agent (and not vice versa). That is, in the presence of informational asymmetries where the agent knows his/her own effort level, the fixed wage introduces a misalignment of interests with the agent earning a fixed amount of money regardless of performance and subsequent earnings of the principal.

In both of the tasks, the two incentive schemes play a crucial role. Following Jordan and Mueller (2017), the difference in the performance of individuals across the two payment schemes determines the extent of the moral hazard. The piece rates directly affect the payoff of an agent, so they are expected to perform well to increase their reward. The fixed payment with the information that the agent's performance will impact the reward of another participant in another session but not his own reward provides the agent with the option to shirk without losing their income. A poor performance in the fixed payment will automatically indicate the presence of moral hazard.

We have used a similar method to establish whether moral hazard is present in our sample and if it can be reduced with the introduction of competition. Additionally, we want to see if the

effect of competition on moral hazard differs according to its types. We further want to see how the change in the moral hazard of agents due to each type of competition differs with the gender of agents. Lastly, we examine whether the effect of competition on moral hazard is different for men and women depending on the gender of their competitors. Each round of the lab experiment provides information about competition, the nature of competition and the gender of competitor, allowing us to test the above mentioned dimensions.

3.3. Experiment Protocol

The participants in our experiment consist of both graduate and undergraduate students of a higher education institute in Pakistan specializing in economics, finance, management, marketing, media, and political science. The participants were randomly recruited and offered Rs. 100 as a participation fee to perform in a laboratory experiment along with the information that they can win more rewards in the experiment. They became a part of the experiment after they accepted the offer. Upon arrival, basic information including their age, gender, study year, study major, CGPA, and household income was recorded after which the experiment began.

The experiment consists of five rounds. The task in each round required the participants to count letters in senseless paragraphs. This task has been frequently used in literature because it is not tainted with a gender stereotype (e.g. Hogarth and Villeval, 2010; Rosaz and Villeval, 2012). In each round, the participants were given ninety seconds to count sets of four letters in four paragraphs. The paragraphs were randomly chosen and each paragraph had a different set of letters assigned to it i.e. the participants were not asked to count the same combination or set of letters twice. To avoid wealth effects, participants were informed before the activities began, that they will be paid their earnings from only one of the five rounds, and that this will be paid at the end of

all activities. Participants were given relevant information before the start of each round and the experiment was then carried out. A detailed experiment protocol is provided in Appendix 1.

Round 1: Piece rates without competition

Participants were informed that they have ninety seconds to count sets of four letters in four senseless paragraphs and that they are going to be rewarded on the basis of piece rates i.e. Rs. 40 for each correctly counted letter.[5] Additionally, they were informed that their performance will also affect the reward of another participant (principal) in another session and, therefore, each correctly counted letter will add Rs. 40 to the reward of that participant. This piece of information indirectly indicated to the participants that they were working as agents for someone else (the principal). In this round, the participants were expected to perform efficiently since their interests were perfectly aligned with the interests of the principal i.e. the rewards of both the participant and the principal depended on the performance of the participant.

Round 2: Fixed wage without competition

The participants were told that they are going to get a fixed payment of Rs. 500 regardless of their performance.[6] They were further informed that even though their performance does not affect their reward, it still affects the reward of another participant in another session and that each one of their correct answers will add Rs. 40 to the reward of that participant. This information is crucial to our design because it misaligned the interests of the participant and the principal since the participant earned Rs. 500 regardless of their performance but the principal still got Rs. 40 for

[5] This is equivalent to the amount paid to participants for each correctly counted letter in prior studies (e.g. Jordan and Mueller, 2017).
[6] This is equal to the average reward earned in the piece rates round in the pilot study.

each letter that the participant counted correctly. Therefore, if a participant performed worse in the fixed wage setting compared to piece rates, they were expected to have moral hazard.[7]

Every participant performed in rounds 1 and 2, but the order of these rounds was randomized to avoid order effects. The participants then moved on to round 3.

Round 3: Fixed wage with competition against own past performance (self-competition)

The participants were again informed that they will get a fixed payment of Rs. 500 and that their performance affects the reward of another participant in another session. Additionally, they were informed that they are now going to be competing with their own performance in the piece rates round and they will get paid only if they beat their performance in piece rates. If a participant performed at least as well as their performance in piece rates, it would mean that they do not have moral hazard.

Round 4: Fixed wage with competition against another participant with the gender of competitor unknown

The participants were informed that they will earn a fixed wage of Rs. 500 and that their performance affects the reward of another participant in another session. Furthermore, they were informed that they are now going to compete with another participant and they will only get rewarded if they manage to beat their competitor's performance in piece rates. If a participant

[7] Although this reduction in performance can be called shirking, literature suggests that shirking behavior stems from moral hazard, meaning that agents shirk because they have moral hazard (e.g. Brekke and Nyborg, 2008; Glaser et al., 2009; Flammer and Luo, 2014). Shirking has also been termed as moral hazard in previous studies (e.g. Gayle and Miller, 2009; Esteve-González, 2016; Gaballo and Zetlin-Jones, 2016; Jordan and Mueller, 2017).

performed as well as their performance in piece rates, it would mean that their moral hazard has been reduced.

Round 5: Fixed wage with competition against another participant with the gender of competitor known

The participants were informed that they will earn a fixed wage of Rs. 500 and that their performance affects the reward of another participant in another session. One-half of the participants were randomly paired with a male competitor. They were informed that they will only be rewarded if they beat their competitor's performance in piece rates. Similarly, the other half were paired with a female competitor and informed that they will only earn the reward if they perform better than their competitor's performance in piece rates. The information on the gender of the competitor was provided using randomly generated but clearly gendered names e.g. Ahmed for male and Fatima for female. This protocol has been followed in literature to ensure that the participants do not realize that the examiner wants to elicit gender effects. The observations of this round would reveal whether the effect of competition on moral hazard is different for men and women when they are competing against the same gender and when they are competing against the opposite gender.

Each participant had to perform in rounds 3, 4 and 5 but the order of these rounds was randomized to ensure that order effects are eliminated.

Self-competition and competition against others have been defined in this way in a number of previous studies (e.g. Niederle and Vesterlund, 2007; Apicella et al., 2017; Nazif and Said, 2018; and Bönte et al., 2018). It can be argued that performance would improve in rounds 3, 4 and 5 because of monetary incentives instead of competition. While monetary incentive is indeed a

motivation to achieve a target, the target is defined by whether it is set by the respondent themselves (round 3) or by another person i.e., the competitor (rounds 4 and 5).[8] It can be noticed that the monetary incentives are exactly the same in rounds 2, 3, 4, and 5 and the participants are informed that their rewards in rounds 3, 4 and 5 are conditional on whether they achieve the targets which keep changing in all rounds according to who the respondents are competing against. And therefore, the variations in performances are caused by different types competition.

Similar to Jordan and Mueller (2017), there was no explicit interaction between principals and agents throughout the experiment.[9] While the concept of a principal was notional i.e., the agents worked for but did not know of or see the principal, they were informed that their performance will affect the reward (utility) of 'another participant in another session' i.e., the principal was someone like them who had participated in lab sessions. Though this is not as credible a signal as actually interacting with a principal, possibly viewing the principal being compensated in accordance to the agent's performance, the interaction was kept 'implicit' for logistical reasons and for simplification of the design by keeping the element of principal's characteristics (e.g. age, gender, perceived income bracket) from affecting the agent's performance.[10] For the same reasons, there was also no explicit interaction between competitors. In round 3, the participants had to perform better than their own past performance (self-competition). In rounds 4 and 5, they were only informed that they are competing with another participant whereas their performances in these rounds were actually being compared to their performance in round 1.

[8] See Apicella et al., (2017), Nazif and Said (2018).
[9] Keeping interaction implicit has been regularly employed in lab experiments (e.g. Agranov and Tergiman, 2013; Hoppe and Kusterer, 2010).
[10] The limitations have been discussed in section 5.

After the completion of these five rounds, we elicited each participant's risk preference using an incentivized version of the Binswanger (1980) protocol. Their level of altruism was then measured using a one-shot, unincentivized dictator game, developed by Forsythe et al. (1994). At the end of the experiment, the participants were paid their reward in these two tasks and one of the five rounds.

Order of rounds 1 and 2 was randomized, as was the order of rounds 3, 4 and 5. However, rounds 1 & 2 were always conducted before rounds 3, 4 & 5. In piloting, we found respondent understanding was improved when the rounds without competition (1&2) were not mixed with the rounds with competition (3, 4 & 5). Appendix 1 provides the questionnaire administered to the participants of the experiment.

3.4. Empirical Estimation

The data collected from the experiments for agents and principals is used to examine our research questions. We start with testing whether moral hazard is present in our sample through the following OLS regression:

$$Score_{ir} = \beta_0 + \beta_1 FW_{ir} + \beta_x X_i + u_i \quad (3.1)$$

Where $Score_{ir}$ is the number of letters correctly counted by agent *i* and is a measure of the participant's performance in the activity. FW_{ir} is a binary variable equal to 1 if agent *i* performs in a round that is incentivized by fixed payment without competition. Otherwise, *FW* is 0 which means that observed performance is of the agent participating in piece rates without competition which is the base category. In this regression, and in all regressions described in this section, *X* is a set of other control variables including Age, Gender, University Year, Semester, CGPA, Household Income, Risk Preference and Altruism. A negative coefficient on *FW* would indicate

that fixed wage decreases performance and, therefore, moral hazard is present. We expect β_1, the coefficient of *FW*, to be negative.

To examine if moral hazard still exists in the sample when competition is introduced, we test the following OLS regression.

$$Score_{ir} = \beta_0 + \beta_1 FWC_{ir} + \beta_x X_i + u_i \quad (3.2)$$

FWC_{ir} is a binary variable equal to 1 if agent *i* performs in a round that is incentivized by fixed payment with any type of competition. Otherwise, *FWC* is 0 which means that observed performance is of the agent participating in piece rates without competition.

A negative coefficient on *FWC* would indicate that fixed wage with competition also decreases performance and, therefore, moral hazard is present even after the introduction of competition. We expect β_1, the coefficient of *FWC*, to be insignificant. This would imply that the performance of participants is similar across piece rates without competition and fixed wage with competition meaning that moral hazard is not present when competition is introduced.

The equation below is tested to see if either type of competition succeeds in reducing the likelihood of moral hazard of agents. For this equation and the following equations, we run probit regressions with errors clustered at the session level.

$$MoralHazard_{ir} = \beta_0 + \beta_1 Comp_{ir} + \beta_x X_i + u_i \quad (3.3)$$

Where *MoralHazard* is a binary variable equal to 1 if agent *i* in round *r* exhibits moral hazard.[11] That is, *MoralHazard* is 1 if the score of an agent in round *r* is less than their score in piece rates; 0 otherwise. $Comp_{ir}$ is a binary variable equal to 1 if agent *i* faces any type of

[11] Moral hazard is defined as a likelihood (binary) variable as opposed to a discrete measure of the extent of moral hazard to maintain statistical power with a small sample.

competition in round *r*. Each of the coefficients in the probit regression helps us see the effect of the variable on the *likelihood* of observing moral hazard. We expect β_1, the coefficient on competition, to be significantly negative which will indicate that performance improves or moral hazard reduces due to competition.

Next, we examine the equation below to see if the effect of competition on moral hazard varies across the types of competition.

$$MoralHazard_{ir} = \beta_0 + \beta_1 Comp_{ir} + \beta_2 SelfComp_{ir} + \beta_3 X_i + u_i \quad (3.4)$$

$SelfComp_{ir}$ is a binary variable that takes the value of 1 if agent *i* performs in fixed payment with competition against self and 0 if agent *i* performs in fixed payment with competition against another participant. The coefficient on $SelfComp_{ir}$, β_2, will inform us whether self-competition is more effective than competition against others in reducing the likelihood of moral hazard.

The following equation will reveal the gender difference in change in moral hazard due to the introduction of each type of competition.

$$MoralHazard_{ir} = \beta_0 + \beta_1 Comp_{ir} + \beta_2 SelfComp_{ir} + \beta_3 Female_i + \beta_4 Comp.Female_{ir} + \beta_5 SelfComp.Female_{ir} + \beta_x X_i + u_i \quad (3.5)$$

Where $Female_i$ takes a value of 1 if the participant is a woman and 0 otherwise. $Comp.Female_{ir}$ is an interaction term that takes a value of 1 if participant *i* is a female and performs in any kind of competition in round r. $SelfComp.Female_{ir}$ is an interaction term that takes a value of 1 if agent *i* is a female and performs in a round consisting of fixed payment with competition against own performance in piece rates and 0 otherwise. The vector of control variables, X, does not include the gender of the participant. A significant β_4, in any direction, will

reveal that there is a gender difference in the effect of competition on moral hazard of agents. Similarly, a significant β_5, in any direction, will show that the effect of self-competition on moral hazard varies across the gender of the participant.

The probit regression below will examine if the effect of competition on the likelihood of moral hazard varies due to the gender of the competitor i.e. by whether the respondent is competing against someone of the same gender.

$$MoralHazard_{ir} = \beta_0 + \beta_1 Comp_{ir} + \beta_2 CompSame_{ir} + \beta_3 X_i + u_i \quad (3.6)$$

Where $CompSame_{ir}$ is a binary variable equal to 1 if agent i is performing in a round with competition against a participant of the same gender and 0 otherwise. A significant β_2, in any direction, will tell us that the effect of competition on moral hazard varies with the gender of the competitor.

The following regression will tell us if the effect of competition on moral hazard is different for men and women when they are competing against the same gender as compared to when they are competing against the opposite gender.

$$MoralHazard_{ir} = \beta_0 + \beta_1 Comp_{ir} + \beta_2 CompSame_{ir} + \beta_3 Female_i + \beta_4 CompSame.Female_{ir} + \beta_x X_i + u_i \quad (3.7)$$

$CompSame.Female_{ir}$ is an interaction term that takes a value of 1 if agent i is a female and performs in a round consisting of competition against a participant of the same gender. A significant β_4 will imply that there is a difference in the effect of competition on moral hazard for men and women when they compete against a participant of the same gender.

4. Results

Our sample consists of 290 participants, 137 females (47 %) and 153 males (53 %), over 41 sessions, with a minimum of 4 and a maximum of 9 participants per session. Table 1 summarizes the key characteristics of the experiment sample. The ages of participants range between 18 to 27 years with an average of 21 years. 86 % of the sample were undergraduate students. 54 % of the students were final year students from either the undergraduate or the graduate program. The mean household income ranged from Rs. 400,000 to Rs. 600,000. The sample is risk-neutral and mildly altruistic on average. Table 1 below shows the total number of observations and summary statistics for participants' characteristics.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	290	21.61	0.5	0	1
Female	290	0.472	1.798	18	27
Household Income	290	3.582	1.49	1	6
University Year	290	3.393	1.454	1	6
CGPA	290	3.262	0.437	1.35	3.99
Risk Measure	290	2.875	1.704	1	6
Degree of Altruism	290	0.3	0.341	0	1

Note. Household Income takes a value of 1 if participant's household income is below Rs. 100,000 a month, 2 if the household income is between Rs. 100,000 to Rs. 200,000, 3 if the household income is between Rs. 200,000 to Rs. 400,000, 4 if the household income is between Rs. 400,000 to Rs. 600,000, and 5 if the household income is above Rs. 600,000. Risk Measure takes a minimum value of 1 if the participant is strictly risk-averse and a maximum of 1 if the participant is extremely risk-loving. Degree of Altrusim takes values between 0 and 1 with 0 for the lowest degree of altruism and 1 for the highest degree of altruism.

Next, we discuss the average effect of the incentive schemes and competition on performance and moral hazard. Table 2 shows the probit results from estimating equations 3.1 – 3.7. Table 3 shows the corresponding marginal effects.

4.1. Average Performances across Incentive Schemes and Competitive Environments

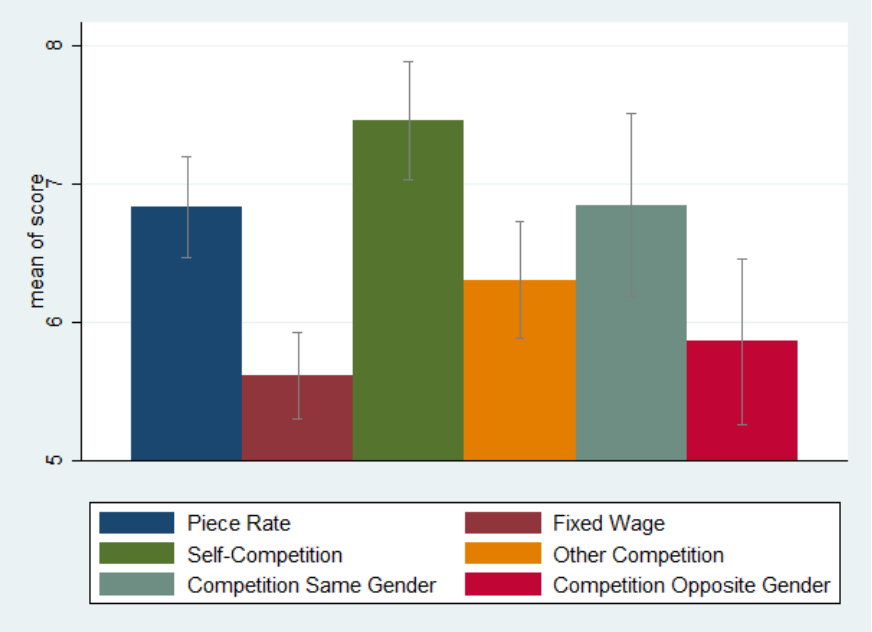
Figure 1 shows the mean scores of participants across the five rounds at a 95% confidence interval. The first two bars show a significant difference between the scores in piece rates without competition (blue bar) and fixed wage without competition (maroon bar). The bars suggest that since the rewards of the participants in the piece rates round solely depend on how they perform, they put more effort in the task. On the other hand, in the fixed wage round without competition, when they are implicitly informed that their performance only affects the reward of the principal but not their own, a significant decline in their scores is observed. In column 1, Table 2, we show OLS regression results when we control for age, gender, risk preferences, altruism, university year and majors, and CGPA. Scores fall by 1.22 (out of 16) when participants perform for fixed wage vs piece rates incentives without competition. This tells us that moral hazard is present in the sample and we can move on to test the effectiveness of competition and its types in decreasing the likelihood of moral hazard.

Figure 1 also shows that average scores are higher in all of the rounds with competition compared to the performance in fixed wage without competition. However, the average difference from the performance in the fixed wage is only statistically significant in the case of self-competition and same-gender competition. Interestingly, we find that even with fixed wage, self-competition can improve performance to the same extent as the piece rates payment scheme. In fact, the average score in the round with self-competition is even higher than the average score in piece rates without competition, but this difference is not statistically significant.

Column 2 in Table 2 shows the regression results from equation 3.2. We find that there is no significant difference in the scores of participants across the piece rates round without

competition and fixed wage rounds with competition, proving that introducing competition in the fixed wage setting improves performance.

Figure 1. Average scores over rounds



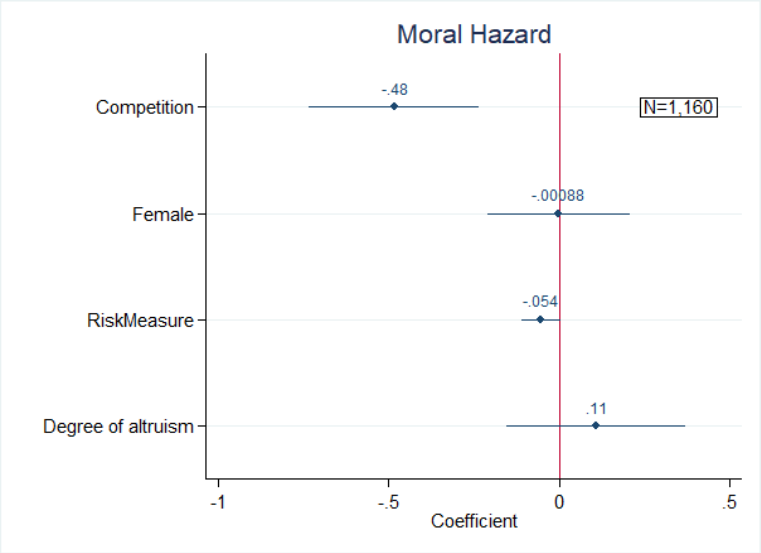
Note. Mean of Score is a variable for average scores, out of a total of 16, in each round. The blue bar shows the average score in the piece rates round. The maroon bar shows average scores in the fixed wage without competition setting. The green bar shows the average score in the self-competition setting. The orange bar shows the average score in the competition against others setting. The teal bar shows the average score in competition against same gender setting. The red bar shows the average score in competition against the opposite gender setting.

4.2. Effect of Competition on Moral Hazard

Our main research question, after establishing the existence of moral hazard in the sample, was to investigate if competition can reduce the likelihood of moral hazard. Figure 2 is a coefficient plot with a 95 % confidence interval that shows us the results of the probit regression, in column 3 in Table 2, which examines the general effect of any kind of competition on the likelihood of moral hazard. The likelihood of moral hazard significantly decreases as a consequence of the introduction of competition, signifying that competition can be used as a mechanism to reduce the incidence of moral hazard.

The marginal effects shown in column 1 in Table 3 show that for two hypothetical individuals with average values on other variables, the predicted probability of moral hazard is 19.2 percentage points lower for an individual who performs under competition than for one who perform under fixed wage without competition.

Figure 2. Effect of any type of competition on the likelihood of moral hazard



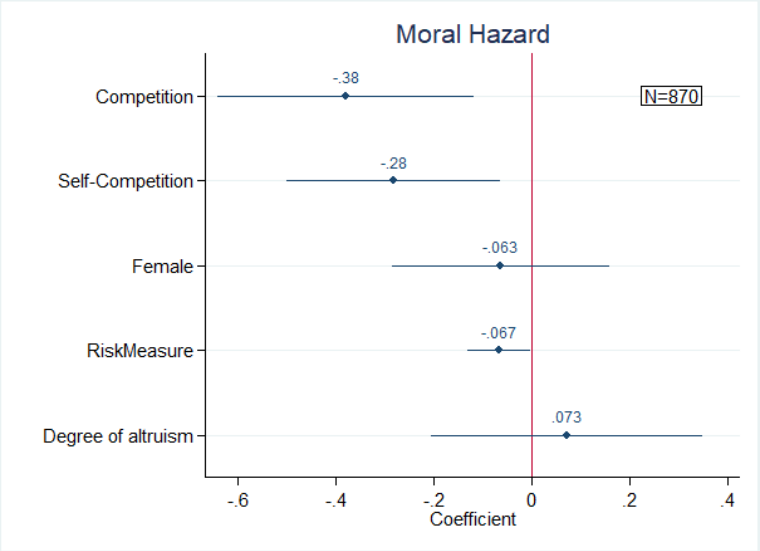
Note. The graph shows coefficients from a probit regression of equation 3.3. Moral Hazard is the dependent variable which takes a value of 1 if participant i exhibits moral hazard in a round. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Female is equal to 1 if participant i is a female. Risk Measure is a measure of participant i's risk appetite. Degree of altruism measures agent i's level of altruism. The x-axis represents the values of the coefficients of the independent variables on the y-axis. The point estimates are represented by the circles in front of the variables and the horizontal bars show 95 % confidence intervals. Negative coefficients denote a reduction in the likelihood of moral hazard.

4.3. Comparison of the Effects of Types of Competition on Moral Hazard

Figure 3 and column 4 in Table 2 show the results for the probit regression which tests if one type of competition is more effective in reducing the likelihood of moral hazard than the other. We expected the effect of competition to be different for its two types mainly because of the difference in how they motivate people to perform. The coefficient on self-competition depicts that it is significantly more effective in reducing the likelihood of moral hazard than competition against others. The marginal effect at means for self-competition (column 2, Table 3) shows that

the predicted probability of moral hazard is 11.2 percentage points lower under self-competition than any other competition i.e. the cumulative effect of self-competition on the likelihood of moral hazard is to reduce it by 33.7 percentage points.

Figure 3. Difference in the Effects of Types of Competition on Moral Hazard



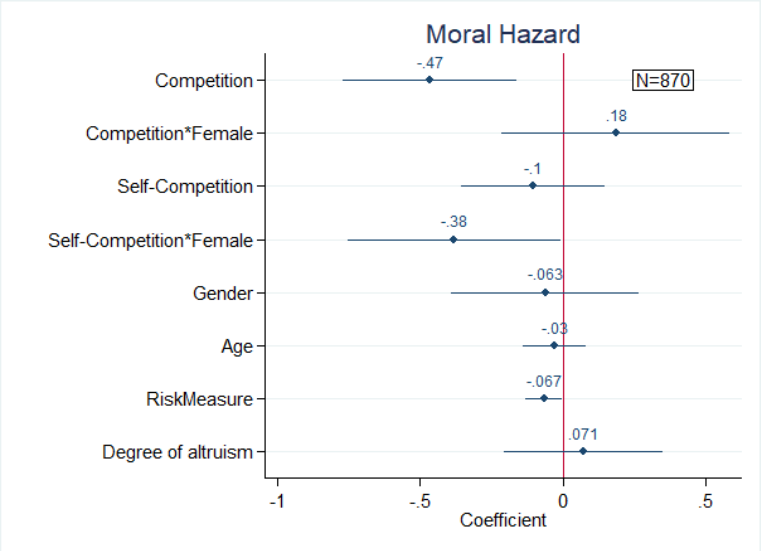
Note. The graph shows coefficients from a probit regression of equation 3.4. Moral Hazard is the dependent variable which takes a value of 1 if participant i exhibits moral hazard in a round. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Self-Competition takes a value of 1 if participant i performs under self-competition, and 0 if participant i performs under competition against others. Female is equal to 1 if participant i is a female. Risk Measure is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. The x-axis represents the values of the coefficients of the independent variables on the y-axis. The point estimates are represented by the circles in front of the variables and the horizontal bars show 95 % confidence intervals. Negative coefficients denote a reduction in the likelihood of moral hazard.

4.4. The Effects of Competition and its Types on Moral Hazard by Gender

To see if the effects of competition and its types on the likelihood of moral hazard differ for men and women, we can have a look at the results shown in Figure 4 and column 5 in Table 2. The coefficient on the interaction of (any) competition with gender is insignificant on the whole. However, we do find self-competition to be more effective in improving the performances of female participants than male participants. The marginal effect at means for the interaction term for self-competition and gender of the participant shows that, for two participants with average

values on other variables, the predicted probability of moral hazard is 15.1 percentage points lower for women under the self-competition environment and that this effect only exists for women (column 3, Table 3). This result is in line with Nazif and Said (2018) who show that women respond more to self-competition than competition against others.

Figure 4. Gender differences in the effects of competition and its types on moral hazard



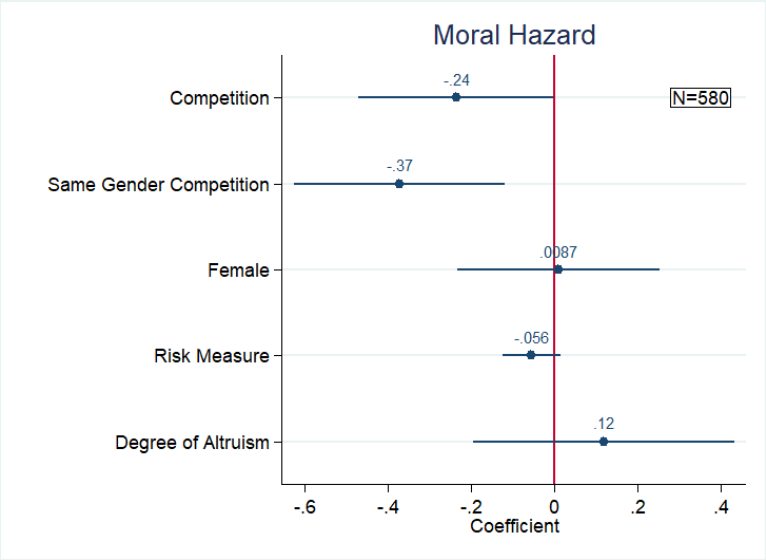
Note. The graph shows coefficients from a probit regression of equation 3.5. Moral Hazard is the dependent variable which takes a value of 1 if participant i exhibits moral hazard in a round. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Self-Competition takes a value of 1 if participant i performs under self-competition, and 0 if participant i performs under competition against others. Self-Competition*Female is an interaction term that is equal to 1 if participant i is a female and performs under self-competition, 0 otherwise. Female is equal to 1 if participant i is a female. Risk Measure is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. The x-axis represents the values of the coefficients of the independent variables on the y-axis. The point estimates are represented by the circles in front of the variables and the horizontal bars show 95 % confidence intervals. Negative coefficients denote a reduction in the likelihood of moral hazard.

4.5. The Effect of Competition on Moral Hazard across Gender of Competitor and Participant

We test whether the gender of the competitor can alter the effectiveness of competition in reducing the likelihood of moral hazard. Out of the 290 respondents, 144 were randomly administered to compete against the same gender and 146 were randomly asked to compete against the opposite gender. The results are shown in Figure 5 and column 6 in Table 2, with marginal

effects in column 4 in Table 3. We find that competition reduced the likelihood of moral hazard but that we are less likely to observe moral hazard when participants are informed that they are competing against the same gender. The marginal effect at means indicates that same gender competition reduces the likelihood of moral hazard by 14.8 percentage points compared to competition against the opposite gender (column 4, Table 3).

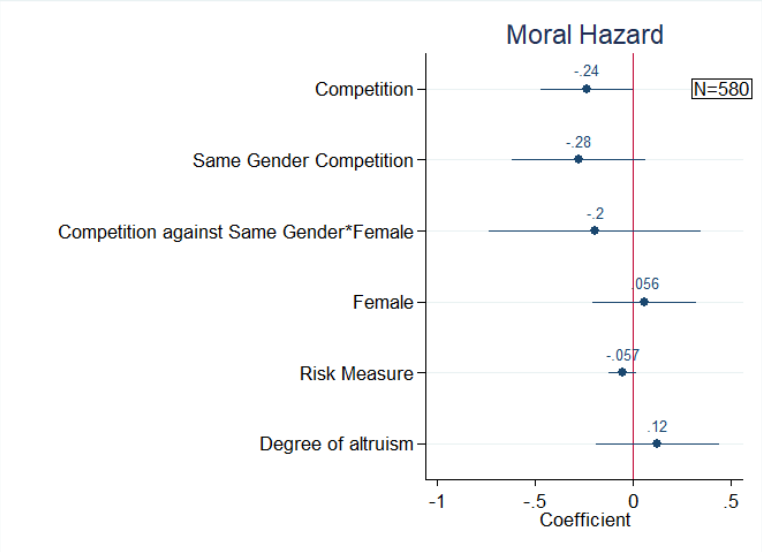
Figure 5. Difference in the effect of competition on moral hazard due to gender of competitor



Note. The graph shows coefficients from a probit regression of equation 3.6. Moral Hazard is the dependent variable which takes a value of 1 if participant i exhibits moral hazard in a round. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Same Gender Competition takes a value of 1 if participant i competes against someone from the same gender and 0 if participant is performing against someone from the opposite gender. Female is equal to 1 if participant i is a female. Risk Measure is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. The x-axis represents the values of the coefficients of the independent variables on the y-axis. The point estimates are represented by the circles in front of the variables and the horizontal bars show 95 % confidence intervals. Negative coefficients denote a reduction in the likelihood of moral hazard.

Finally, Figure 6 tells us that the effect of same gender competition is similar for both male and female participants. This means that same gender competition is more effective than competition against the opposite gender in reducing the likelihood of moral hazard of both men and women.

Figure 6. Difference in the effect of competition on moral hazard due to gender of competitor and participant



Note. The graph shows coefficients from a probit regression of equation 3.7. Moral Hazard is the dependent variable which takes a value of 1 if participant i exhibits moral hazard in a round. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Same Gender Competition takes a value of 1 if participant i competes against someone from the same gender and 0 if the participant is performing against someone from the opposite gender. Same Gender Competition*Female is an interaction term that takes a value of 1 if participant i is a female and performs against someone from the same gender. Female is equal to 1 if participant i is a female. Risk Measure is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. The x-axis represents the values of the coefficients of the independent variables on the y-axis. The point estimates are represented by the circles in front of the variables and the horizontal bars show 95 % confidence intervals. Negative coefficients denote a reduction in the likelihood of moral hazard.

Table 2: Probit regression results for the role of competition and its types on performance and likelihood of moral hazard

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.221***						
	(0.306)						
Fixed Wage with Competition		-0.130					
		(0.216)					
Competition			-0.484***	-0.379***	-0.466***	-0.236**	-0.237**
			(0.128)	(0.133)	(0.155)	(0.120)	(0.120)
Female	-0.200	-0.275	-0.000878	-0.0627	-0.0626	0.00870	0.0557
	(0.302)	(0.297)	(0.107)	(0.113)	(0.167)	(0.124)	(0.135)
Self-Competition				-0.282**	-0.105		
				(0.111)	(0.128)		
Competition*Female					0.185		
					(0.203)		
Self-Competition*Female					-0.380**		
					(0.191)		
Same Gender Competition						-0.372***	-0.280
						(0.129)	(0.173)
Same Gender Competition*Female							-0.197
							(0.277)
Risk Measure	-0.167**	-0.150	-0.0537*	-0.0666**	-0.0667**	-0.0556	-0.0566
	(0.0846)	(0.100)	(0.0290)	(0.0327)	(0.0328)	(0.0357)	(0.0363)
Degree of Altruism	-0.0196	-0.280	0.108	0.0727	0.0712	0.119	0.123
	(0.495)	(0.663)	(0.134)	(0.141)	(0.142)	(0.160)	(0.160)
Constant	-1.403	-7.691**	1.662	1.542	1.550	0.504	0.451
	(3.243)	(3.823)	(1.153)	(1.229)	(1.233)	(1.365)	(1.362)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note. Fixed Wage without Competition is a dummy variable equal to 1 if participant i performs in fixed payment without competition and 0 otherwise. Fixed Wage without competition is equal to 1 if a participant performs under the fixed wage without competition setting and 0 otherwise. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Female is equal to 1 if participant i is a female. Competition*Female is an interaction term which is equal to 1 if participant i is a female and performs under any type of competition. Self-Competition takes a value of 1 if participant i performs under self-competition, and 0 if participant i performs under competition against others. Self-Competition* Female is an interaction term which is equal to 1 if participant i is a female and performs under self-competition, 0 otherwise. Same Gender Competition takes a value of 1 if participant i competes against someone from the same gender and 0 if participant is performing against someone from the opposite gender. Same Gender Competition*Female is an interaction term that takes a value of 1 if participant i is a female and performs against someone from the same gender. Risk Preference is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. Errors are clustered at the session level.

Table 3: Marginal effects at means for probit regressions

Variables	(1) Probit Moral Hazard	(2) Probit Moral Hazard	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard
Competition	-0.192***	-0.151***	-0.186***	-0.0940**	-0.0944**
	(0.0508)	(0.0531)	(0.0616)	(0.0474)	(0.0475)
Female	-0.000349	-0.0250	-0.0249	0.00346	0.0222
	(0.0424)	(0.0450)	(0.0665)	(0.0493)	(0.0536)
Self-Competition		-0.112**	-0.0416		
		(0.0444)	(0.0510)		
Competition*Female			0.0735		
			(0.0809)		
Self-Competition*Female			-0.151**		
			(0.0761)		
Same Gender Competition				-0.148***	-0.111
				(0.0513)	(0.0690)
Same Gender Competition*Female					-0.0784
					(0.110)
Risk Measure	-0.0214*	-0.0265**	-0.0266**	-0.0221	-0.0225
	(0.0116)	(0.0130)	(0.0130)	(0.0142)	(0.0144)
Degree of Altruism	0.0430	0.0290	0.0283	0.0472	0.0491
	(0.0534)	(0.0561)	(0.0564)	(0.0635)	(0.0638)
Observations	1,160	870	870	580	580

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note. Fixed Wage without Competition is a dummy variable equal to 1 if participant i performs in fixed payment without competition and 0 otherwise. Fixed Wage without competition is equal to 1 if a participant performs under the fixed wage without competition setting and 0 otherwise. Competition takes a value of 1 if participant i performs under any type of competition and 0 otherwise. Female is equal to 1 if participant i is a female. Competition*Female is an interaction term which is equal to 1 if participant i is a female and performs under any type of competition. Self-Competition takes a value of 1 if participant i performs under self-competition, and 0 if participant i performs under competition against others. Self-Competition* Female is an interaction term which is equal to 1 if participant i is a female and performs under self-competition, 0 otherwise. Same Gender Competition takes a value of 1 if participant i competes against someone from the same gender and 0 if participant is performing against someone from the opposite gender. Same Gender Competition*Female is an interaction term that takes a value of 1 if participant i is a female and performs against someone from the same gender. Risk Preference is a measure of participant i's risk appetite. Degree of Altruism measures agent i's level of altruism. Errors are clustered at the session level.

4.6. Heterogeneity Analyses

Next, we explore how results vary by respondent characteristics. Specifically, we explore data on participant ability, age, household income, and degree of altruism. This is important because if these characteristics do have an impact on the effect that competition and its types have

on moral hazard, then policies should be designed while taking them into consideration. Results are shown in Tables 1-4 in Appendix 2.

To examine if the ability of the participants had an effect on the results, we create a dummy variable for whether a participant was a high performer or a low performer in the piece rates activity. If a participant's performance is greater than the median score for the sample, we consider them to be high performers in our analysis. The dummy variable took a value of 1 for high performers and 0 otherwise. We then interact this variable with our main independent variables to see if their effects varied due to the ability of the participants. We find that participants who perform better in the piece rates environment have lower scores in the fixed wage round without competition (Table 1, Appendix 2). This could be the case because they might not have felt incentivized enough to perform as well as they did under piece rates. As a result, high performers showed a higher likelihood of moral hazard. On the other hand, low performers are less likely to exhibit moral hazard to begin with and competition does not affect their moral hazard significantly.

Quite interestingly, we also find that competition in general, self-competition, and same gender competition work better in reducing the likelihood of moral hazard in the case of high performers. This is because the low performers do not portray a considerable change in their scores across the five rounds, indicating that competition of any kind does not motivate them to improve their performance.

We also test if a participant's level of altruism affects how they react to competition. We use responses from the unincentivized, one-shot dictator game to measure altruism and create a dummy variable that takes a value of 1 if the participant has a level of altruism above the sample median and 0 otherwise. Interacting this variable with the main independent variables and running probit regressions shows that more and less altruistic people are equally prone to moral hazard.

We find that a participant's level of altruism is not a significant determinant of the effect of competition on moral hazard (Table 2, Appendix 2).

Next, we examine heterogeneity in the effect of competition on the likelihood of moral hazard due to age and household income (Tables 3 and 4, Appendix 2). We find that older participants respond more to competition in general and they perform better under self-competition than under competition against others. We also find that participants with higher household incomes are more likely to experience a reduction in their moral hazard due to competition in general and particularly under self-competition.

4.7. Robustness Checks

Finally, though the order of the rounds with and without competition was randomized, we test if performance and likelihood of moral hazard vary by whether the respondent participated in the fixed or the piece rates without competition first. For example, if a participant performed under fixed wage first and then under piece rate, they could be expected to perform better under piece rates not just because of the incentive but also due to the fact that they had already practiced the task in the fixed wage round. Similarly, performing under piece rates first could also affect the performances of the participants, e.g. the fact that the participant will receive a fixed rate that does not reflect his or her performance may become more salient after they have already participated in a task where that is an important feature.

To test if our results are robust to which round is conducted first, we create a dummy variable that takes the value of 1 if a participant performed in piece rates first and 0 otherwise. Interacting the variable with important variables in each regression shows us that the only significant interaction is with same-gender competition, but the other results do not change by much (Table 5, Appendix 2).

We also use session fixed effects as a robustness check to control for unobserved characteristics of each session. The results shown in Table 6, Appendix 2, are similar to the results shown in Table 2 above. Lastly, we run logit regressions and find that the results are statistically similar to the results of probit regressions. The results are shown in Tables 7 and 8, Appendix 2. We use probit regression results due to their ease of interpretation.

5. Conclusion

We conduct a lab experiment based on a sample of 290 students from a private higher education institute in Pakistan to analyze whether competition can be used as a mechanism to reduce moral hazard and, therefore, decrease the economic inefficiencies that arise due to moral hazard. The study finds that competition can significantly reduce the likelihood of moral hazard. The results also suggest that self-competition is more effective in improving performance and reducing the likelihood of moral hazard than competition against others.

In disaggregating the effect of competition on the likelihood of moral hazard based on the gender of the participants, we find that women respond more to self-competition than men. It is also discovered that both men and women perform better when they know that they are competing against the same gender as compared to competing against the opposite gender.

There is evidence of heterogeneity in the effect of competition on the likelihood of moral hazard based on the ability of the participant. Competition, self-competition, and competition against the same gender all motivate only the high performers to improve their performance. The effects of competition on the likelihood of moral hazard are not driven by the degree of altruism towards others. Finally, we find that older respondents, and people with higher household incomes tend to perform better under competition, particularly under self-competition.

The study contributes to literature by examining the existence of moral hazard, the effects of competition and its different types on the likelihood of moral hazard, and the variations in these effects based on the gender of the participant and the competitor in real effort work tasks. It is also, to the best of our knowledge, the first study to provide experimental evidence on the issue of moral hazard and use of competition to reduce it, in Pakistan.

Our findings have a number of important implications for dealing with moral hazard, for example, in labor markets. Our results indicate self-competition has greater potential than competition against others to reduce moral hazard. Performance-based contracts can incentivize employees to meet either a preset target or their best performance in the past. Alternatively, it is also possible to see similar improvements in performance in settings where people compete against others but when their competitor is of the same gender.

Further study is required to replicate the findings and establish external validity in a real world context with a representative sample of men and women in the workforce. Since the experiment did not involve explicit interactions between agents and principals for logistical reasons and to keep the design simple by keeping the element of principal's characteristics (e.g. age, gender, perceived income bracket) from affecting the agent's performance, there is a chance that the likelihood of moral hazard would have been overestimated because the agents might have performed better if they could interact with the principal and view them get compensated in accordance to the agent's performance. For the same reasons, the interaction between the agents and their competitors was also kept implicit and it could have led to an over or underestimation of the likelihood of moral hazard. Despite these limitations, the results of this study, conducted with an educated sample of graduate and undergraduate students, provide us with important insights into the use of competition as a tool for reducing the likelihood of moral hazard.

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Appendix 1: Experiment

Thank you for being here today. We have invited you to participate in a few tasks that are being conducted on behalf of your university. Your performance is going to be kept anonymous. The results are eventually going to be used in a research paper.

As compensation for your valuable time, we will pay you Rs. 100 as a participation fee. You can also win more money depending upon your performances in the tasks. If you think you can give us 15 minutes of your time, please proceed.

Are you willing to proceed?

- Yes
- No

Thank you for choosing to participate. The experiment will now begin.

Please mark your gender.

- Male
- Female

What is your age (in years)?

How much is your monthly household income?

- <100,000
- 100,000 to 200,000
- 200,000 to 400,000
- 400,000 to 600,000
- >600,000

In which university year are you enrolled?

- 1st Year
- 2nd Year
- 3rd Year
- 4th Year
- 5th Year (MBA/MPHIL)
- 6th Year (MBA/MPHIL)

Please mark your majors.

- Accounting
- Economics
- Marketing
- Management
- Media
- English
- Political Science
- Finance

What is your CGPA (up to two decimal places)?

The tasks are now going to start. You have to perform in a total of five rounds. At the end of the session, one of the five rounds will be randomly selected for payment and you will be paid your reward in that round only.

Round 1

Please read the instructions carefully.

In this round, you will be shown paragraphs consisting of randomly organized words. Following each paragraph, you will see four letters. Your task is to count the occurrence of each letter in the paragraph and then write this number below in the space provided after each letter.

Here is an example.

Vocations metamorphosis undefined slate trick fluorescence misconception slump together understanding sodium

1) u _____

2) a _____

3) i _____

4) s _____

In this example, you should first count and state the occurrence of the letter "u", then the occurrence of the letter "a", then the occurrence of the letter "i" and then the occurrence of the letter "s".

You will have to count the occurrence of four letters in each paragraph. You have 90 seconds to work on a maximum of 4 paragraphs. You will earn Rs. 40 for correctly counting the occurrence of each letter. Your reward will increase with the number of correctly counted letters.

Please note that your performance will also affect the reward of another participant in another session. The other participant will also earn Rs. 40 for each letter that you count correctly.

This task will be paid out with a probability of 1/5.

Round 2

Please read the instructions carefully.

You have to count and state the occurrence of letters in a maximum of 4 paragraphs within a time limit of 90 seconds.

You will now be paid a fixed amount of Rs. 500 regardless of how many letters you count correctly. However, your performance will still affect the payoff of another participant in another session. Each correctly counted letter will add Rs. 40 to the other participant's reward.

This task will be paid out with a probability of 1/5.

Round 3

Please read the instructions carefully.

You have to count and state the occurrence of letters in a maximum of 4 paragraphs within a time limit of 90 seconds.

You will now be paid a fixed wage of Rs. 500 like the previous round. Your performance will affect the reward of another participant in another session. Each correctly counted letter will add Rs. 40 to the other participant's reward. But, in order to get this fixed wage, you have to correctly count and state the occurrence of more letters than you did in the round with piece rates. If you do not, you will earn nothing.

This task will be paid out with a probability of 1/5.

Round 4

Please read the instructions carefully.

You have to count and state the occurrence of letters in a maximum of 4 paragraphs within a time limit of 90 seconds.

You will now be paid a fixed wage of Rs. 500 like the previous round. Your performance will affect the reward of another participant in another session. Each correctly counted letter will add Rs. 40 to the other participant's reward.

In addition, you have been anonymously matched with another participant, from another session, who is your competitor. In order to get the fixed wage, you have to correctly count and state the occurrence of more letters than your competitor did in the round with piece rates. If you do not, you will earn nothing.

This round will be paid with a probability of 1/5.

Round 5

Please read the instructions carefully.

You have to count and state the occurrence of letters in a maximum of 4 paragraphs within a time limit of 90 seconds.

You will now be paid a fixed wage of Rs. 500 like the previous round. Your performance will affect the reward of another participant in another session. Each correctly counted letter will add Rs. 40 to the other participant's reward.

You have been anonymously matched with XYZ from a different session. In order to get the fixed wage, you have to correctly count and state the occurrence of more letters than XYZ did in the round with piece rates. If you do not, you will earn nothing.

This round will be paid with a probability of 1/5.

(For the participants matched with a male competitor)

Names used for males: Ali, Bilal, Umer, Ahmed, Naveed, Salman, Majid, Uzair, Jamal, and Hussain.

(For the participants matched with a female competitor)

Names used for females: Amna, Fatima, Zainab, Nida, Aiman, Mahrukh, Saira, Eman, Izza, and Maria.

Risk Measure (Binswanger, 1980)

Which option would you choose?

Choice	Head	Tail
A	100	100
B	90	190
C	80	240
D	60	300
E	20	380
F	0	400

(A person who chooses option A will be considered to have the lowest risk preference and a person who chooses option F will be considered to have the highest risk preference.)

Altruism

Out of the Rs. 100 that you will receive for participating, how much would you like to give away to another participant who may or may not have performed as well as you?

Amount: _____

The experiment is over. You will now be paid. Thank you for your time.

Appendix 2: Heterogeneity and Robustness Checks

Table 1: Heterogeneity of results by level of participant ability

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	0.825***						
	(0.223)						
Fixed Wage without Competition*Performance above Median	-3.618***						
	(0.312)						
Fixed Wage with Competition		0.815***					
		(0.225)					
Fixed Wage with Competition*Performance above median		-1.671***					
		(0.339)					
Competition			-0.0250	-0.0466	-0.159	0.0144	0.0114
			(0.110)	(0.152)	(0.191)	(0.131)	(0.132)
Female	-0.241	-0.322	-0.0120	-0.0789	-0.127	-0.0164	-0.107
	(0.242)	(0.236)	(0.101)	(0.108)	(0.245)	(0.125)	(0.217)
Competition*Female					0.258		
					(0.290)		
Performance above Median	5.293***	5.196***	1.534***	1.524***	1.524***	1.547***	1.435***
	(0.216)	(0.260)	(0.162)	(0.164)	(0.235)	(0.164)	(0.195)
Competition*performance above Median			-0.941***	-0.718***	-0.723**	-0.567**	-0.567**
			(0.233)	(0.264)	(0.349)	(0.277)	(0.277)
Female*Performance above Median					0.00814		0.232
					(0.314)		(0.262)
Competition*Female*Performance above Median					-0.0204		
					(0.379)		
Self-Competition				-0.00221	0.196		
				(0.190)	(0.198)		
Self-Competition*Female					-0.472		
					(0.345)		
Self-Competition*Performance above Median				-0.492**	-0.543**		
				(0.221)	(0.227)		
Self-Competition*Female*Performance above Median					0.171		
					(0.398)		
Same Gender Competition						0.0129	0.118
						(0.201)	(0.249)
Same Gender Competition*Performance above Median						-0.691**	-0.761*
						(0.302)	(0.396)
Same Gender Competition*Female							-0.232
							(0.340)
Same Gender Competition*Female*Performance above Median							0.175
							(0.534)
Constant	2.757	-2.535	2.760***	2.786***	2.807***	2.087	2.015
	(2.255)	(2.803)	(1.062)	(1.062)	(1.067)	(1.355)	(1.358)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Heterogeneity of results by level of participant altruism

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.323***						
	(0.320)						
Fixed Wage without Competition*High Altruism	0.182						
	(0.331)						
Fixed Wage with Competition		-0.223					
		(0.263)					
Fixed Wage with Competition*High Altruism		0.166					
		(0.320)					
Competition			-0.496***	-0.422**	-0.480**	-0.235	-0.531**
			(0.158)	(0.167)	(0.207)	(0.173)	(0.249)
Female	-0.196	-0.282	0.0110	-0.0522	-0.194	0.0178	-0.167
	(0.302)	(0.297)	(0.107)	(0.113)	(0.251)	(0.125)	(0.249)
Competition*Female					0.139		
					(0.358)		
High Altruism	-0.137	-0.226	-0.0744	-0.0628	-0.173	-0.122	-0.218
	(0.435)	(0.434)	(0.154)	(0.155)	(0.156)	(0.152)	(0.163)
Competition*High Altruism			0.0232	0.0772	0.0235	-0.0202	0.225
			(0.163)	(0.193)	(0.215)	(0.242)	(0.302)
Female*High Altruism					0.241		0.207
					(0.259)		(0.264)
Competition*Female*High Altruism					0.0726		
					(0.409)		
Self-Competition				-0.184	-0.140		
				(0.134)	(0.168)		
Self-Competition*Female					-0.109		
					(0.297)		
Self-Competition*High Altruism				-0.176	0.0707		
				(0.167)	(0.209)		
Self-Competition*Female*High Altruism					-0.455		
					(0.359)		
Same Gender Competition						-0.535**	-0.0679
						(0.210)	(0.289)
Same Gender Competition*High Altruism						0.301	-0.166
						(0.269)	(0.399)
Same Gender Competition*Female							-1.239**
							(0.567)
Same Gender Competition*Female*High Altruism							1.232*
							(0.675)
Constant	-1.381	-7.653**	1.611	1.473	1.570	0.436	0.436
	(3.319)	(3.896)	(1.168)	(1.255)	(1.282)	(1.387)	(1.466)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Heterogeneity of results by participant age

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-0.482						
	(3.187)						
Fixed Wage without Competition*Age	-0.0342						
	(0.148)						
Fixed Wage with Competition		-2.218					
		(2.256)					
Fixed Wage with Competition*Age		0.0966					
		(0.103)					
Competition			1.670	0.558	-0.118	1.468	1.510
			(1.207)	(1.225)	(1.508)	(1.377)	(1.324)
Age	0.327*	0.424**	0.0516	0.0334	0.0455	0.0940	0.0948
	(0.183)	(0.208)	(0.0797)	(0.0792)	(0.0832)	(0.0779)	(0.0821)
Female	-0.200	-0.275	-0.000932	-0.0634	0.617	0.00997	-0.222
	(0.303)	(0.297)	(0.107)	(0.113)	(1.959)	(0.124)	(1.939)
Competition*Age			-0.0997*	-0.0434	-0.0162	-0.0789	-0.0894
			(0.0564)	(0.0571)	(0.0719)	(0.0651)	(0.0630)
Competition*Female					1.582		
					(1.780)		
Female*Age					-0.0319		0.00664
					(0.0891)		(0.0879)
Competition*Female*Age					-0.0643		0.0177
					(0.0828)		(0.0111)
Self-Competition				2.084**	3.461***		
				(0.832)	(1.083)		
Self-Competition*Age				-0.110***	-0.166***		
				(0.0383)	(0.0513)		
Self-Competition*Female					-3.221*		
					(1.832)		
Self-Competition*Female*Age					0.132		
					(0.0848)		
Same Gender Competition						0.937	0.501
						(1.277)	(1.744)
Same Gender Competition*Age						-0.0605	-0.0307
						(0.0583)	(0.0802)
Same Gender Competition*Female							0.789
							(2.928)
Same Gender Competition*Female*Age							-0.0566
							(0.137)
Constant	-1.772	-6.126	0.0492	0.172	-0.108	-0.701	-0.678
	(3.578)	(4.050)	(1.691)	(1.686)	(1.855)	(1.661)	(1.852)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Heterogeneity of results by participant household income

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-0.835						
	(0.516)						
Fixed Wage without Competition*Household Income	-0.112						
	(0.121)						
Fixed Wage with Competition		-0.685*					
		(0.389)					
Fixed Wage with Competition*Household Income		0.161*					
		(0.0946)					
Competition			-0.0623	-0.0985	-0.378	0.199	-0.159
			(0.188)	(0.231)	(0.273)	(0.285)	(0.414)
Household Income	-0.0854	-0.105	0.0780	0.0778	0.0141	0.0788	0.0238
	(0.141)	(0.144)	(0.0581)	(0.0588)	(0.0818)	(0.0579)	(0.0805)
Female	-0.200	-0.275	-0.000107	-0.0620	-0.594	0.0105	-0.540
	(0.303)	(0.297)	(0.107)	(0.113)	(0.454)	(0.124)	(0.470)
Competition*Household Income			-0.123**	-0.0817	-0.0262	-0.125	-0.0716
			(0.0534)	(0.0636)	(0.0827)	(0.0778)	(0.112)
Competition*Female					0.677		
					(0.445)		
Female*Household Income					0.151		0.134
					(0.117)		(0.123)
Competition*Female*Household Income					-0.139		
					(0.111)		
Self-Competition				-0.0115	0.402		
				(0.251)	(0.274)		
Self-Competition*Household Income				-0.0794	-0.153*		
				(0.0660)	(0.0811)		
Self-Competition*Female					-1.026**		
					(0.495)		
Self-Competition*Female*Household Income					0.192		
					(0.128)		
Same Gender Competition						-0.195	0.110
						(0.402)	(0.556)
Same Gender Competition*Household Income						-0.0588	-0.0935
						(0.119)	(0.162)
Same Gender Competition*Female							-0.728
							(0.825)
Same Gender Competition*Female*Household Income							0.0950
							(0.233)
Constant	-1.596	-7.275*	1.341	1.265	1.537	0.183	0.390
	(3.219)	(3.804)	(1.138)	(1.217)	(1.233)	(1.309)	(1.345)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Robustness check for order of rounds

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.436***						
	(0.278)						
Fixed Wage without Competition*Piece Rates First	0.416						
	(0.617)						
Fixed Wage with Competition		-0.700**					
		(0.349)					
Fixed Wage with Competition*Piece Rates First		1.102***					
		(0.390)					
Competition			-0.481***	-0.433**	-0.452**	-0.287	-0.285
			(0.185)	(0.179)	(0.210)	(0.206)	(0.209)
Female	0.223	0.0178	0.105	0.0370	0.175	0.119	0.396*
	(0.262)	(0.284)	(0.102)	(0.108)	(0.291)	(0.127)	(0.225)
Competition*Female					0.0505		
					(0.302)		
Piece Rates First	-2.032***	-2.090***	-0.423*	-0.414*	-0.308	-0.439**	-0.279
	(0.630)	(0.612)	(0.231)	(0.234)	(0.286)	(0.220)	(0.258)
Competition*Piece Rates First			-0.0239	0.0922	-0.0473	0.0780	0.0809
			(0.253)	(0.264)	(0.309)	(0.251)	(0.252)
Female*Piece Rates First					-0.243		-0.401
					(0.335)		(0.267)
Competition*Female*Piece Rates First					0.217		
					(0.417)		
Self-Competition				-0.184	-0.0573		
				(0.167)	(0.159)		
Self-Competition*Piece Rates First				-0.211	-0.131		
				(0.226)	(0.270)		
Self-Competition*Female					-0.367		
					(0.271)		
Self-Competition*Female*Piece Rates First					0.0149		
					(0.403)		
Same Gender Competition						-0.226	0.00326
						(0.168)	(0.203)
Same Gender Competition*Piece Rates First						-0.291	-0.656*
						(0.267)	(0.359)
Same Gender Competition*Female							-0.658*
							(0.368)
Same Gender Competition*Female*Piece Rates First							0.882*
							(0.525)
Constant	-0.237	-6.531*	1.966*	1.828	1.838	0.698	0.591
	(2.734)	(3.569)	(1.091)	(1.157)	(1.167)	(1.354)	(1.337)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Probit regression results with session fixed effects

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.221***						
	(0.318)						
Fixed Wage with Competition		-0.130					
		(0.220)					
Competition			-0.528***	-0.421***	-0.522***	-0.271**	-0.271**
			(0.138)	(0.148)	(0.175)	(0.136)	(0.136)
Self-Competition				-0.311**	-0.114		
				(0.126)	(0.145)		
Competition*Female					0.214		
					(0.229)		
Self-Competition*Female					-0.425**		
					(0.213)		
Same Gender Competition						-0.418**	-0.320
						(0.171)	(0.216)
Same Gender Competition*Female							-0.215
							(0.319)
Female	0.0949	-0.192	0.0439	-0.0268	-0.0295	0.0651	0.120
	(0.265)	(0.263)	(0.126)	(0.134)	(0.194)	(0.163)	(0.166)
Risk Measure	-0.0666	-0.0443	-0.0569*	-0.0663*	-0.0661*	-0.0668	-0.0672
	(0.0637)	(0.0584)	(0.0341)	(0.0371)	(0.0372)	(0.0462)	(0.0465)
Degree of Altruism	0.0404	-0.155	0.0856	0.0452	0.0390	0.118	0.120
	(0.423)	(0.435)	(0.161)	(0.176)	(0.176)	(0.173)	(0.174)
Constant	4.770***	1.290	1.908	1.837	1.859	0.997	0.891
	(1.835)	(1.973)	(1.204)	(1.196)	(1.185)	(1.558)	(1.526)
Observations	580	1,160	1,160	870	870	568	568

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Logit regression results

Variables	(1) OLS Score	(2) OLS Score	(3) Logit Moral Hazard	(4) Logit Moral Hazard	(5) Logit Moral Hazard	(6) Logit Moral Hazard	(7) Logit Moral Hazard
Fixed Wage without Competition	-1.221***						
	(0.306)						
Fixed Wage with Competition		-0.130					
		(0.216)					
Competition			-0.779***	-0.611***	-0.753***	-0.384**	-0.385**
			(0.208)	(0.216)	(0.251)	(0.194)	(0.194)
Self-Competition				-0.451**	-0.164		
				(0.180)	(0.206)		
Female	-0.200	-0.275	-0.00244	-0.102	-0.106	0.0160	0.0907
	(0.302)	(0.297)	(0.172)	(0.183)	(0.271)	(0.201)	(0.218)
Competition*Female					0.301		
					(0.328)		
Self-Competition*Female					-0.616**		
					(0.308)		
Same Gender Competition						-0.599***	-0.451
						(0.210)	(0.281)
Same Gender Competition*Female							-0.315
							(0.449)
Risk Measure	-0.167**	-0.150	-0.0872*	-0.108**	-0.109**	-0.0888	-0.0904
	(0.0846)	(0.100)	(0.0472)	(0.0532)	(0.0534)	(0.0581)	(0.0589)
Degree of Altruism	-0.0196	-0.280	0.174	0.114	0.114	0.184	0.190
	(0.495)	(0.663)	(0.218)	(0.230)	(0.230)	(0.259)	(0.260)
Constant	-1.403	-7.691**	2.703	2.504	2.516	0.832	0.755
	(3.243)	(3.823)	(1.868)	(2.001)	(2.010)	(2.219)	(2.214)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Marginal effects at means for logit regressions

Variables	(1) Logit Moral Hazard	(2) Logit Moral Hazard	(3) Logit Moral Hazard	(4) Logit Moral Hazard	(5) Logit Moral Hazard
Competition	-0.194***	-0.152***	-0.188***	-0.0956**	-0.0960**
	(0.0518)	(0.0538)	(0.0627)	(0.0480)	(0.0481)
Female	-0.000608	-0.0253	-0.0264	0.00398	0.0226
	(0.0429)	(0.0456)	(0.0676)	(0.0500)	(0.0542)
Self-Competition		-0.113**	-0.0410		
		(0.0449)	(0.0515)		
Competition*Female			0.0750		
			(0.0818)		
Self-Competition*Female			-0.154**		
			(0.0769)		
Same Gender Competition				-0.149***	-0.112
				(0.0523)	(0.0701)
Same Gender Competition*Female					-0.0784
					(0.112)
Risk Measure	-0.0217*	-0.0270**	-0.0271**	-0.0221	-0.0225
	(0.0117)	(0.0133)	(0.0133)	(0.0145)	(0.0147)
Degree of Altruism	0.0433	0.0283	0.0284	0.0459	0.0474
	(0.0544)	(0.0572)	(0.0574)	(0.0645)	(0.0647)
Constant					
Observations	1,160	870	870	580	580
Number of id					

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Probit regression results without control variables

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.221***						
	(0.303)						
Fixed Wage with Competition		-0.130					
		(0.215)					
Competition			-0.477***	-0.375***	-0.464***	-0.246**	-0.246**
			(0.126)	(0.132)	(0.154)	(0.119)	(0.119)
Female					-0.0223		0.0804
					(0.160)		(0.143)
Competition*Female					0.186		
					(0.201)		
Self-Competition				-0.276**	-0.101		
				(0.110)	(0.127)		
Self-Competition*Female					-0.375**		
					(0.187)		
Female	0.0110	0.0764	0.0178	-0.0200		0.0500	
	(0.328)	(0.369)	(0.106)	(0.113)		(0.125)	
Same Gender Competition						-0.334***	-0.276
						(0.124)	(0.170)
Same Gender Competition*Female							-0.124
							(0.273)
Constant	6.829***	6.798***	0.272**	0.290**	0.291**	0.257**	0.242*
	(0.448)	(0.457)	(0.127)	(0.131)	(0.141)	(0.128)	(0.129)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10:Probit regression results with all control variables

Variables	(1) OLS Score	(2) OLS Score	(3) Probit Moral Hazard	(4) Probit Moral Hazard	(5) Probit Moral Hazard	(6) Probit Moral Hazard	(7) Probit Moral Hazard
Fixed Wage without Competition	-1.221***						
	(0.306)						
Fixed Wage with Competition		-0.130					
		(0.216)					
Competition			-0.484***	-0.379***	-0.466***	-0.236**	-0.237**
			(0.128)	(0.133)	(0.155)	(0.120)	(0.120)
Female	-0.200	-0.275	-0.000878	-0.0627	-0.0626	0.00870	0.0557
	(0.302)	(0.297)	(0.107)	(0.113)	(0.167)	(0.124)	(0.135)
Self-Competition				-0.282**	-0.105		
				(0.111)	(0.128)		
Competition*Female					0.185		
					(0.203)		
Self-Competition*Female					-0.380**		
					(0.191)		
Same Gender Competition						-0.372***	-0.280
						(0.129)	(0.173)
Same Gender Competition*Female							-0.197
							(0.277)
Age	0.310*	0.496**	-0.0228	-0.0299	-0.0301	0.0391	0.0403
	(0.170)	(0.197)	(0.0525)	(0.0556)	(0.0554)	(0.0641)	(0.0637)
Household Income	-0.141	0.0157	-0.0143	-0.00237	-0.00197	0.00307	0.00435
	(0.121)	(0.132)	(0.0340)	(0.0380)	(0.0380)	(0.0403)	(0.0404)
University Year	-0.100	-0.320	-0.0170	0.0103	0.0107	-0.0973	-0.0990
	(0.155)	(0.240)	(0.0731)	(0.0780)	(0.0780)	(0.0746)	(0.0739)
Economics Major	0.405	1.184*	-0.494***	-0.312*	-0.314*	-0.573***	-0.582***
	(0.602)	(0.612)	(0.159)	(0.184)	(0.184)	(0.216)	(0.217)
Marketing Major	1.350***	1.844***	-0.377**	-0.245	-0.247	-0.520**	-0.527**
	(0.497)	(0.653)	(0.150)	(0.178)	(0.179)	(0.203)	(0.206)
Management Major	3.018**	3.396***	-0.240	-0.133	-0.136	0.0812	0.0730
	(1.276)	(1.102)	(0.310)	(0.356)	(0.357)	(0.313)	(0.313)
Media Major	2.699***	2.731***	-0.343	-0.103	-0.106	-0.809***	-0.831***
	(0.914)	(0.752)	(0.300)	(0.321)	(0.322)	(0.311)	(0.310)
English Major	0.282	4.420***	-1.045***	-0.712***	-0.720***	-0.719***	-0.753***
	(0.644)	(0.737)	(0.153)	(0.185)	(0.186)	(0.223)	(0.236)
Political Science Major	1.839**	3.121***	-0.696**	-0.617*	-0.621*	-0.650*	-0.647*
	(0.757)	(0.723)	(0.347)	(0.373)	(0.372)	(0.360)	(0.363)
Finance Major	1.172	1.203	-0.431**	-0.311*	-0.314*	-0.723***	-0.731***
	(0.758)	(0.841)	(0.176)	(0.187)	(0.188)	(0.263)	(0.265)
CGPA	0.541	1.170***	-0.0814	-0.0567	-0.0578	-0.0305	-0.0261
	(0.335)	(0.433)	(0.126)	(0.134)	(0.134)	(0.141)	(0.143)
Risk Measure	-0.167**	-0.150	-0.0537*	-0.0666**	-0.0667**	-0.0556	-0.0566
	(0.0846)	(0.100)	(0.0290)	(0.0327)	(0.0328)	(0.0357)	(0.0363)
Degree of Altruism	-0.0196	-0.280	0.108	0.0727	0.0712	0.119	0.123
	(0.495)	(0.663)	(0.134)	(0.141)	(0.142)	(0.160)	(0.160)
Constant	-1.403	-7.691**	1.662	1.542	1.550	0.504	0.451
	(3.243)	(3.823)	(1.153)	(1.229)	(1.233)	(1.365)	(1.362)
Observations	580	1,160	1,160	870	870	580	580

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1