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When No Bad Deed Goes Punished: Relational Contracting in Ghana versus the UK

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Abstract

In relational contracting the threat of punishment in future periods provides an incentive to not to cheat. However, to what extent do people actually carry out this punishment? We compare relational contracting patterns in Ghana and the United Kingdom by conducting a repeated principal agent lab experiment, framed in a labour market setting. Each period, employers make offers to workers, who can choose to accept or reject this offer and, after accepting and being paid, what effort to exert. The employers and workers interact repeatedly over several periods. While in the UK, in line with theoretical predictions and previous experiments (e.g. Brown et al., 2004, 2012), high effort is rewarded and low effort punished, we do not find evidence for the use of such incentives in Ghana. As a result, employers fail to discipline a subgroup of "selfish" workers, resulting in a low average effort and low and often negative employers' earnings. Set identification of Fehr-Schmidt preferences of the Ghanaian and British workers shows that the share of "selfish" workers in our experiment in Ghana is not substantially different from the UK. Introducing competition for workers or a reputation mechanism does not significantly improve workers' effort.

Keywords Relational contracting, conditional reciprocity, gift-exchange game, punishment strategies, Ghana.

JEL classification C71, D2, D86, E24, O16

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1 Introduction

Worker performance is a key determinant of firm productivity. In many sub-Saharan African countries worker productivity is low, even after accounting for differences in physical and human capital (Hall & Jones, 1999; Caselli & Coleman, 2006). Firm surveys and other studies have shown that employers in developing countries have substantial difficulties in managing their workers and making sure that their employees perform (e.g. Bloom & Reenen, 2010; Fafchamps & Söderbom, 2006). At the same time, competition for jobs is high: employers often face many applicants per opening (e.g. Falco & Teal, 2012). This seems at odds with predictions from labour market models (Shapiro & Stiglitz, 1984; Bowles, 1985), as well as empirical studies in the United States and the United Kingdom (Green & Weisskopf, 1990; Wadhwani & Wall, 1991), in which competition for jobs and threat of dismissal drive higher worker performance.

Relationships and reputation are important when the enforcement of formal contracts is problematic: legal institutions in developing countries are often weak and wage contracts are often incomplete, due to the complexity of many labour tasks. This means that employers have to rely on other incentives. Interacting repeatedly with one party can provide a viable alternative: if both parties gain enough value out of a relationship, the threat of losing the relationship or having its value reduced can provide an incentive to perform well. This is the essence of relational contracting. Many studies have been conducted studying its importance, especially in developing country context (e.g, McMillan & Woodruff, 1999; Macchiavello & Morjaria, 2015) Similarly, the ability to develop a public reputation can work as an enforcement mechanism: if individuals gain enough value out of having a good reputation, the threat of losing this reputation can deter cheating (Milgrom et al., 1990; Greif, 2000).

This paper looks at relational contracting in Ghana and compares this with the United Kingdom. We conduct a labour market lab experiment to assess the use of relational contracting and reputation in labour relations. In this experiment, based on the gift-exchange games of Fehr et al. (1993) and Brown et al. (2004), participants interact as workers and employers in a principal-agent setting: employers start out by making an offer to a worker, specifying a wage in return for effort. The worker then chooses to accept or reject this offer and what effort to exert. Crucially, the employer cannot condition the wage on effort. However, the workers and employers interact repeatedly, and the employers can adjust their offers in the next periods. In five different treatments, we vary the size of the market, the contractual completeness and the information available to employers.

We find a substantial group of workers exerting low effort, despite high average wages, in both Ghana and the United Kingdom. This does not differ from previous experiments. What differs in Ghana from earlier experiments and our experiments in the UK is a *lack of punishment* by employers: employers keep offering high wages to workers choosing low effort, resulting in low and often negative payoffs for employers. This is at odds with relational contracting models where low effort is punished by termination or by a lowering of the wage (see e.g. Shapiro & Stiglitz, 1984; Kranton, 1996; Ghosh & Ray, 1996). This is in stark contract with the experiments of Brown et al. (2004, 2012), conducted in Switzerland, and experiments in other countries, where low effort was strongly punished, even when there was a shortage of labour. Furthermore, we find that introducing reputation or increasing the

number of market participants does not change this.

Our paper contributes to earlier work on the effectiveness and adoption of incentives in firms in developing countries. In a developed country context, performance-based incentives are generally seen as increasing productivity (see e.g. Shearer, 2004). However, studies and experiments from developing countries show more mixed evidence. Breza et al. (2015) showed that the income inequality resulting from rank-based incentives can actually discourage workers. A field experiment in Ghana by Bandiera & Fischer (2013) showed that individual piece rate as well as group piece rate incentive contracts did not lead to higher productivity or higher work quality. Our paper goes one step further than this study by not only studying the workers' response to a particular type of contract, but also the adoption of incentives by employers.

Furthermore, our paper contributes to an emerging literature on how norms, preferences and strategic behaviour differ across cultures (Henrich et al., 2006; Cardenas & Carpenter, 2008; Henrich et al., 2010). This experiment intends to capture labour market heuristics influenced by prevailing norms and expectations. Compared to many developed countries, the labour market in Ghana is more informal. Informal labour, such as contributing to a family firm, as well as self-employment are more common than wage employment: in 2012-13 only 20.2 percent of the country's working population and 32.5 percent of the urban working population was wage employed (Ghana Statistical Service, 2014). This lower importance of wage employment is likely to influence the expectations of both workers and employers in wage relationships. Understanding these labour market norms and expectations in a developing country is crucial, especially now given that the share of wage employment in Ghana has been rising over the last decade. Our results show that certain actions predicted by theory, such as lowering wages of low effort workers, are not commonly used by our Ghanaian subjects. This is in line with earlier empirical findings that have shown that labour management is inadequate and often problematic in developing countries (Bloom et al., 2014; Fafchamps & Söderbom, 2006).

The paper is structured as follows: Section 2 discusses related experiments. Section 3 presents the experiment and predictions based on the theory. Section 4 presents the results and tests the predictions. Section 5 concludes and discusses possible explanations for the behaviour found in this experiment.

2 Related literature

The gift-exchange game has been used widely to document the role of labour market institution and contract relations (Charness & Kuhn, 2011; Fehr et al., 2009). The first gift-exchange game lab experiment was conducted by Fehr et al. (1993). Their experiment consisted of one-shot interactions of workers and employers who were randomly rematched after each period. Despite the lack of explicit incentives or future interactions, they showed that employers offered wages above the market clearing level and workers exerted a higher level of effort in return to this higher wage. This provides evidence for the fair wage-effort hypothesis for involuntary employment as formulated by Akerlof (1982): employers and workers engage in a "gift exchange". This pattern can sustain even when there are more workers than employers and workers bid for wage contracts: Fehr & Falk (1999) find that some employers refuse to hire employees who undercut wages, fearing that they are more likely to shirk.

In a repeated interaction, these concerns can be reinforced. Gächter & Falk (2002) introduce a treatment of the gift-exchange game experiment in which an employer repeatedly interacts with the same worker for ten periods. They find that a repeated interaction makes the positive wage-effort relation stronger, compared to a treatment in which workers and employers are randomly rematched every period. Furthermore, they find that the repeated interaction can function as a disciplining device: "selfish" types imitate "reciprocal" types in the first periods of the game. This is in line with the predictions of Kreps et al. (1982) and Fehr & Schmidt (1999) on cooperation in finite games.

In Brown et al. (2004) this is taken further, by introducing multiple employers and workers who can contract with each other in the same marketplace. They allow the employers to both make public offers, made to all workers and visible to all participants, and private offers, only made to one specific worker. They show that relational contracting can emerge naturally in this environment: employers keep offering high wage contracts to workers that exerted high effort in the past. This leads to a higher effort than in a treatment in which the identifiers of workers and employers are scrambled every period so that employers cannot recognize their past workers. Follow-up experiments have replicated these results (see e.g. Brown et al., 2012; Altmann et al., 2014; Wu & Roe, 2007a). In these experiments, employers, when faced with a low level of effort, choose to either terminate the relationship (contingent contract renewal) or lower the wage in the next period.[2] The threat of economic loss if the relationship is ended or its value reduced makes these bilateral relationships feasible.

While these studies only revealed past performance to the past employers, and therefore only allowed for bilateral reputations to emerge, Falk et al. (2005) introduce a treatment in which past performance of workers is made publicly available to all employers. They find that effort in the public past history treatment is higher than in the treatment in which employers cannot keep track of past performance of workers. However, the effect of reputation is limited: bilateral relationships still play an important role.

In these experiments there is only contractual incompleteness on the side of the worker: the worker is always ensured of receiving the promised wage, while the employer is uncertain of what effort to receive. Several other experiments introduced the possibility of ex post wage adjustments, such as giving a bonus to a worker or withholding some of the promised wage (a malus) (see e.g. Fehr et al., 1997, 2007; Wu & Roe, 2007b,a; Falk et al., 2008). This is generally effective: Falk et al. (2008) find that bonus systems can work of a substitute for long-term contracts and Wu & Roe (2007b) note that the trading pattern is very close to complete contracts.

The gift-exchange game has been conducted in many OECD countries: Austria (Fehr et al., 1993, 1997), Germany (Abeler et al., 2010; Altmann et al., 2014; Falk et al., 2008; Fehr et al., 2007), Switzerland (Fehr & Falk, 1999; Brown et al., 2004; Falk et al., 2005), the Netherlands (Van Der Heijden et al., 2001), Portugal (Pereira et al., 2006), Spain (Brandts & Charness, 2004), the United Kingdom (Gächter et al., 2015) and California, Ohio and Florida in the United States (Charness, 2004; Cooper & Lightle, 2013; Wu & Roe, 2007a,b). All these experiments have found evidence for a general pattern of high effort in return for high wages. Similar results have been found in experiments in former communist countries, such as

[2] Brown et al. (2012) show that on their 10-point scale of effort, a one point increase in effort leads to an increase of the wage of 5.527 (Table 4, column 6). This is significant at a 1 percent level. Their wage is bounded between 1 and 100.

Hungary (Falk et al., 1999) and Russia (Fehr et al., 2014). However, to the best of our knowledge very few gift-exchange experiments have been conducted in a developing country and none in a sub-Saharan African country.[3]

Another group of experiments to which our experiment is related are trust games (Glaeser et al., 2000; Karlan, 2005; Bohnet et al., 2010). The gift-exchange game is very closely related to the trust game (see Berg et al., 1994; Camerer & Weigelt, 1988), with the crucial difference is that in the gift-exchange game the size of the surplus is determined by the choice of effort by the worker (the receiver), while in the trust game the size of the surplus is determined by the initial offer by the employer (the proposer). Just like in the trust game, trust plays an important role in the gift-exchange game: a high wage encourages high effort, but an employer offering a high wage is making himself or herself vulnerable to a worker choosing low effort, resulting in a potentially high loss for the employer.

3 The experiment

3.1 Experimental setup

The experiment is a multi-period gift exchange game, based on Brown et al. (2004) and the original gift-exchange game of Fehr et al. (1993). This experiment mimics labour relations in a principal agent setting. At the beginning of the experiment, participants are randomly assigned the role of a worker or an employer. Markets consists of either one worker and one employer or three workers and three employers, depending on the treatment. This game is played for five periods, after which the employers and workers are rematched. Each participant plays four games of five periods.[4] The timing of the game in each period is as follows:

- **Contracting.** In this stage employers and workers contract with each other, in a virtual marketplace. Each of the workers is listed with their identification number clearly visible. This stage consists of three steps:
  - First, the employer can make offers to every worker individually. An offer specifies the payment that the employer will make to the worker w and the desired level of effort e from the worker.
  - Second, the employer observes all the offers that are made by other employers and has then a chance to revise the offers to the workers. The initial offers are not shown to the workers.
  - Third, in a randomly determined sequence, each of the workers gets to see their offers and then can choose to accept one of the offers. In case the worker rejects all offers or no offers are available, the worker does not receive any payment. If an offer of an employer is accepted by a worker, then no other worker can accept an offer from this employer. This ensures that each worker has at most one employer and that each employer has at most one worker.

[3] Siang et al. (2011) conducted a bilateral gift exchange experiment in Malaysia.

[4] The worker-employer pairs or groups stay the same during the five periods. Participants can recognize workers and employers using a random identification letter, which is randomized at the beginning of each game.

Table 1: The payoff structure in the experiment.

		Effort level (e)		
		Low	Medium	High
$B(e)$	Employer's benefit	5	20	40
$c(e)$	Worker's cost	0	2	6
$S(e)$	Surplus ($B(e) - c(e)$)	5	18	34

- **Supply.** In this stage, the worker first receives the payment w from the employer and then chooses the amount of effort e to exert. This effort can either be low, medium or high ($e \in \{L, M, H\}$) and costs the worker $c(e)$. This level of effort gives the employer a benefit of $B(e)$. The payoffs to the employer π_E and to the worker π_W are:

$$\pi_E = B(e) - w \tag{1}$$

$$\pi_W = w - c(e) \tag{2}$$

  The choice of effort is not revealed to the employer until the end of the next stage.

- **Rehiring.** Before moving to the next period, we ask the employer to make a contingent choice for contract renewal in the next period. At this stage the employer does not know the chosen level of effort yet. For each possible effort choice we ask the employer whether he or she wants to rehire the worker in the next period and for what kind of contract (specifying a wage and effort level, as before). Similarly, we ask the worker what the *minimum* payment needs to be in order to accept the offer. If the offer of the employer is equal or higher to this minimum payment, the employer and worker will contract with each other in the next period, and proceed directly to the supply stage of the next period.

The values of $c(e)$ and $\Pi(e)$ for the three different levels of effort are described in Table 1.[5] High effort costs the worker 6 points and gives the employer a benefit of 40 points. This is a desirable outcome for the employer, but it requires trust: the wage needs to be high enough for the worker to cover the 6 point costs, but a high wage makes the employer vulnerable to the risk that the worker chooses low effort. Medium effort costs the worker 2 points and give the employer a benefit of 20 points. Finally, low effort is costless to the worker, but gives the employer a benefit of only 5 points.

The rehiring stage is novel to this experiment. The strategy method applied allows us to analyze the conditional responses to effort on behalf of the employer and the expectations on behalf of the worker. When no agreement is reached, both parties are given a new chance to contract with each other. The rehiring stage also allows for the development of "long-term" relationships in the treatments with three workers and three employers: if an agreement is reached both parties will continue to trade with each other. Due to the random order in which workers choose offers, there is no such guarantee in the normal contracting sequence.

[5]The payoff structure is designed in such a way that the marginal cost of effort is strictly increasing. The effort levels are equal to three out of the ten effort levels in Brown et al. (2004). The number has been limited to three to allow the strategy elicitation in the rehiring stage and to simplify the game.

Table 2: Overview of the five treatments.

Treatment	Number of workers and employers	Effort choice	Information on past worker's actions
(1C)	1 / 1	no	only own information
(1E)	1 / 1	yes	only own information
(3C)	3 / 3	no	only own information
(3E)	3 / 3	yes	only own information
(3ES)	3 / 3	yes	shared between employers

Our experiment differs from Brown et al. (2004) in several ways, besides introducing a rehiring stage. First, contracting takes place in stages and not continuously. We were worried that differences in the participants' technical ability would impact the result. For example, high wage offers might be taken by those who can respond the most quickly, which might be correlated with relevant personal characteristics (e.g. age, competitiveness and so on). Second, we reduced the number of effort levels to three, which simplifies the game and allows for a simpler application of the strategy method. Third, the number of workers and employers in our experimental markets is smaller and there is no market imbalance: there is no excess labour demand or supply. In Brown et al. (2004) there were 7 employers and 10 workers, which makes unemployment more costly for workers. However, a follow-up study showed that introducing an excess of labour supply did not matter for the prevalence and pattern of relational contracting, but only for the division of surplus (Brown et al., 2012). Fourth, we reduced the number of periods of each interaction, and introduced a sequential treatment design, where each participant plays four games of five periods in a row. In a series of follow-up experiments we increased the number of periods to ten and did not find significant differences. Finally, our experiment is explicitly phrased in labour market terms, instead of describing work as a "good", an employer as a "buyer" and a worker as a "seller". Our pilot tests showed that using more neutral terms decreased the understanding of the game.[6] Fehr et al. (2007) found in an earlier gift-exchange game experiment with students in Munich that labour market framing did not produce different results from a neutral framing.

As we will discuss later in the paper, despite our changes to the design, our results for the United Kingdom are very similar to earlier experiments conducted in OECD countries. Arguably, some of the changes in our paper make conditional reciprocity more likely: the introduction of the rehiring stage requires participants to explicitly think about their conditional response.

3.2 Treatments

We introduce five treatments that vary in the number of market participants, whether compliance is enforced and the available information on past actions. Table 2 presents the five treatments. In the control treatments (1C) and (3C) workers can only choose the level of effort that is demanded by the employer. The difference between these two treatments is that in (1C) markets consist of one worker and one employer, while markets in (3C) consist of three workers and three employers. These treatments are essentially an adapted version of the ultimatum game, because the worker can only choose to accept

[6] Especially the role of the buyer and seller confused participants: as it is the buyer (i.e., the employer) who specifies the price of the product, while normally in transactions the price is often determined by the seller (i.e., the worker).

Table 3: The number of participants in each treatment in each part of the sequence in Ghana.

Treatment	Ghana				United Kingdom			
	Game 1	Game 2	Game 3	Game 4	Game 1	Game 2	Game 3	Game 4
(1C)	304	28	28	28	192	–	–	–
(1E)	–	138	48	48	–	192	60	60
(3C)	–	138	30	30	–	–	–	–
(3E)	–	–	198	90	–	–	132	54
(3ES)	–	–	–	108	–	–	–	78
Total	304	304	304	304	192	192	192	192

Table 4: The seven treatment sequences of the experiment.

					Ghana	UK
	Game 1 (5 periods)	Game 2 (5 periods)	Game 3 (5 periods)	Game 4 (5 periods)	No. of subjects	No. of subjects
I	(1C)	(1C)	(1C)	(1C)	28	–
II	(1C)	(1E)	(1E)	(1E)	48	60
III	(1C)	(1E)	(3E)	(3E)	36	54
IV	(1C)	(1E)	(3E)	(3ES)	54	78
V	(1C)	(3C)	(3C)	(3C)	30	–
VI	(1C)	(3C)	(3E)	(3E)	54	–
VII	(1C)	(3C)	(3E)	(3ES)	54	–
Total					304	192

Note: After each game of five periods employers and workers are rematched randomly.

or reject the proposed split.

In treatment (1E) markets consist of one worker and one employer and the worker has full choice of effort. This treatment is similar to bilateral gift-exchange games with fixed partners (see e.g., Kirchler et al., 1996; Gächter & Falk, 2002). In treatments (3E) and (3ES) markets consist of three workers and three employers and workers have full choice of effort. These treatments are the closest to the multilateral gift-exchange games conducted by Brown et al. (2004). The difference between (3E) and (3ES) is that in treatment (3E) employers only have information on whether a worker complied with their effort demand while working for them, while in treatment (3ES) this information is shared among all three employers. Treatment (3ES) allows for a multilateral reputation mechanism, while the other effort choice treatments only allow for bilateral reputations.

Each participant plays four games of five periods. Table 4 shows the seven treatments sequences and the number of participants. This setup is designed to allow for comparisons within and between subjects as well as a gradual introduction of the more complicated treatments. In the United Kingdom, we only conducted three out of the seven treatment sequences.[7]

[7]Our aim of the United Kingdom experiments was to compare behaviour in the effort choice treatments. We therefore only replicated the three treatments which featured predominantly effort choice treatments. See Table 4 for an overview which treatments were selected.

3.3 Implementation

The participants of this study were students from colleges and universities in Accra, Ghana, and Oxford, United Kingdom. In Ghana a total 16 sessions were held, with 18 to 20 participants each and a total of 304 participants. In the UK we held 13 sessions, with 192 participants in total. The points that participants earned during the session were converted to Ghana cedis or British pounds at the end of the session, with an exchange rate of 0.05 Ghana cedi and 0.03 British pound for every point. Sessions lasted between 1.5 and 2 hours. Including show-up fees, the average earnings were 32.2 Cedis (about 10 British pounds) in Ghana and about 18 pounds in the UK.

For the experiments we developed our own tablet-based mobile lab, LabBox. This platform can operate completely independently from mains electricity or existing network structures. The experiments run on 7-inch Android tablets with a custom-built app, which collects the user input and communicates with the LabBox central server using a wireless connection. Each session started with a 15 minute instruction on how to use the touch screen of the tablet, followed by an extensive demonstration of how the game is played. The experiment was completely conducted in English, the common language of instruction higher education in both countries. Visual on-screen aids were used to tell participants of the prospective earnings every time they were about to make a specific choice (such as making an offer), to make sure that participants were aware of the payoff structure of the game.

3.4 Theory

The gift-exchange game is a *sequential* prisoner's dilemma game. The game is sequential in the sense that the worker makes a choice only after observing the employer's choice. In infinite games, the Folk Theorem tells us that grim trigger strategies can sustain cooperation. Also other strategies, such as tit-for-tat strategies can sustain cooperation in games like these (see e.g. Axelrod, 1984). The main difference between the grim trigger and the tit-for-tat strategy is that tit-for-tat allows for redemption, while for the grim trigger the punishment lasts forever. However, *conditional reciprocity* is an element of both: a player will only cooperate if the other player cooperated in the past as well.

Our experiment is a finite period game. Backwards induction, assuming that players only maximize their own earnings, predicts non-cooperation as the subgame perfect equilibrium: in the last period workers will choose low effort, regardless of the wage offered by the employer. Anticipating this, employers will choose a minimum wage of zero, such that the worker is indifferent between accepting or rejecting the offer. By backwards induction, the subgame perfect equilibrium is that the employer offers a wage of zero points in every period, regardless of past behaviour of the worker, and that the worker chooses low effort in every round, regardless of the amount offered by the employer: cooperation unravels.

However, many experimental studies have shown that cooperation is possible in a finite game. Selten & Stoecker (1986) and Andreoni & Miller (1993) show that in a finite period prisoner's dilemma game subjects tend to cooperate for some period of time, until the last couple of periods, when people defect. Theoretical models have tried to explain this, for example by assuming that players have incomplete information on the other player's options or motivations. Kreps et al. (1982) show that if a

player has a belief that there is a small probability that another player is acting "irrationally", i.e., not playing according to the subgame perfect equilbrium, but for example to a tit-for-tat strategy instead, cooperation can be feasible in a finite game. Fudenberg & Maskin (1986) use a similar argument to show that in a finite repeated game an equilibrium is possible where in the first periods of the game the game is played like an infinitely repeated game, and where players play a cooperation with punishment strategy, while switching to behaviour consistent with backward induction in the last periods of the game.

A similar result as Kreps et al. (1982) can also be achieved by incorporating other-regarding preferences, such as inequity aversion and fairness concerns into the utility function of some of the players. In the Appendix we present a model in which there are two types, a social type (S-type) and a rational self-interested type (R-type). The S-type's effort choice is solely dependent on the wage offered: higher wages attract higher levels of effort. The R-type is purely self-interested and aims to achieve the highest payoff. In the Appendix we show that when the share of S-types in the population is high enough, a Perfect Bayesian equilibrium exists in which the R-type's optimal response is to mimic the S-type until the second to last period and for the employer to keep offering a high wage as long as the worker chooses high effort. In the last period the R-type will choose low effort. If the worker chooses low effort, the employer infers that the worker must be the R-type and will subsequently offer a zero wage. This punishment by the employer following low effort provides an incentive for the R-type to choose high effort, as long as the high wage outweighs the cost of high effort. In this equilibrium, the R-type tries to build a reputation for being a S-type, allowing him or her to capture parts of the surplus of exerting high effort.

Depending on the wage parameters and the distribution of types in the population, other types of Perfect Bayesian equilbria are possible as well, for example in which the employer offers high wages in the first periods of the game and then a medium-level wage in the last period or in which the employer offers medium level wages throughout.

The behaviour of the social type can be rationalised by other-regarding preferences, such as models of altruism or inequality aversion. For example, in the Fehr-Schmidt model of inequality aversion (Fehr & Schmidt, 2002) players receive a disutility from both earning more than the other player (advantageous inequality) or from earning less than the other player (disadvantageous inequality). The utility function in the two-player case can be written as

$$U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}. \tag{3}$$

In this equation α_i represents the disutility from disadvantageous inequality and β_j represents the disutility from advantageous inequality. Generally, it is assumed that $\alpha_i \geq \beta_i$: a player has a higher disutility from disadvantageous inequality than from advantageous inequality. We will use the Fehr-Schmidt model of inequality aversion later in this paper to structurally estimate the reciprocity parameters of our participants in Ghana and the UK.

3.4.1 Competition and reputation

In treatments (3C), (3E) and (3ES) there are three workers and three employers. In our setup there is no market imbalance, as each worker can in principle find an employer and vice versa. A purely self-interested profit-maximizing principal will prefer to hire a worker that is willing to exert high effort for a low wage. If employers had full information, they would compete with each other to hire this worker, which can result in increasing the wages to outbid the other employers. In Davies & Fafchamps (2016) we show that if there is heterogeneity in the minimum wage that a worker needs to accept an offer, competition between employers to hire the worker with the lowest minimum wage will lead to employers increasing the wages offered to these workers to the level of the worker with the highest minimum wage.

Introducing reputation in treatment (3ES) can have multiple effects. First, by revealing past compliance, an employer can identify more reliable workers, which can lead to increased competition to hire this worker and therefore to wage increases. Second, the sharing of information on compliance can also function as an incentive, if employers use this information in their offers. Non-compliance for a worker can now become more costly: not only will the employer who he or she was working for lower their offer, also other employers will lower their offers. Greif et al. (1994) argue that such a multilateral reputation mechanism can function as an enforcement device and deter cheating.

3.5 Predictions

On the basis of the theoretical model as well as the results from earlier experiments, we predict three main patterns of contracting to happen.

First, we expect employers to offer high wages in the initial periods, rather than the zero wage predicted by the subgame perfect equilibrium of purely self-interested rational agents. The theoretical model shows that if there is a sizeable group of reciprocating workers, offering a high wage is rationally the optimal choice for the employer.

Second, we expect conditional reciprocity on behalf of the workers. Workers will reciprocate high wages with high effort. This behaviour is for example implied by other-regarding models of altruism or inequality aversion. As we show in the Appendix, according to the Fehr-Schmidt model of inequality aversion, a worker with inequality aversion coefficients of $\alpha_i = 0.5$ and $\beta_i = 0.5$ will choose high effort when the wage is 19 points or higher, choose medium effort for wage offers between 8 and 19 points and choose low effort for lower offers. This positive reciprocity by the workers has been shown consistently across many gift-exchange game experiments and happens even when there are no future interactions present Fehr et al. (1997, 1993, 1998); Fehr & Falk (1999).

Third, we expect conditional reciprocity on behalf of the employers. This means that we expect employers to reduce wages of workers choosing low effort or to cut the relationship completely. In the finite period theoretical model with types, this is the outcome of screening, as low effort reveals the type of the worker. The threat of lowering the wage provides an incentive even for rationally self-interested workers to exert high effort (provided their incentive compatibility constraint is satisfied).

Earlier gift-exchange game experiments have confirmed this presence of conditional reciprocity on

Table 5: The average wage, the share accepted, compliance and the average earnings in the various treatments.

Treatment		Ghana					United Kingdom				
		Average wage offer	Share accepted	Average compli-ance	Average employer's payoff	Average worker's payoff	Average wage offer	Share accepted	Average compli-ance	Average employer's payoff	Average worker's payoff
(1C)	Game 1	20.0	76.7%	100.0%	11.0	16.8	18.6	77.9%	100.0%	17.0	14.3
(1C)	Game 2	20.0	75.7%	100.0%	18.3	14.2	-	-	-	-	-
(1C)	Game 3	20.2	87.1%	100.0%	16.1	15.3	-	-	-	-	-
(1C)	Game 4	21.4	84.3%	100.0%	16.1	17.1	-	-	-	-	-
(1E)	Game 2	15.3	86.1%	42.1%	0.2	14.5	12.9	78.8%	56.1%	5.9	12.4
(1E)	Game 3	13.3	92.0%	40.2%	−1.1	12.4	13.6	80.7%	60.3%	6.3	12.7
(1E)	Game 4	13.1	88.0%	38.6%	−1.6	12.9	13.9	86.0%	72.1%	9.7	11.7
(3C)	Game 2	20.4	30.1%	100.0%	11.7	17.2	-	-	-	-	-
(3C)	Game 3	20.6	29.3%	100.0%	12.0	17.5	-	-	-	-	-
(3C)	Game 4	19.8	28.9%	100.0%	11.4	17.3	-	-	-	-	-
(3E)	Game 3	14.7	30.7%	45.3%	−0.0	14.3	12.9	30.4%	62.5%	6.5	12.6
(3E)	Game 4	11.7	30.4%	40.2%	1.5	12.0	13.5	29.9%	76.0%	10.3	13.0
(3ES)	Game 4	13.2	30.4%	53.9%	1.7	13.1	13.2	29.4%	75.6%	9.4	12.7

Note: The above figures are averaged over all five periods in each game. *Compliance* is defined as whether a worker chose the level of effort that was demanded, or a higher level of effort. For the multilateral treatments, *Share accepted* indicates the share of offers that were taken up, regardless of whether that offer was presented to any of the workers. As employers can make offers to three workers and only one can be taken up, this figure is likely to be smaller in the multilateral treatments.

behalf of employers. In the experiment of Brown et al. (2004, 2012) employers implemented a strategy of contingent contract renewal, in which they were more likely to renew contracts of workers choosing high effort. Workers choosing low effort were either fired or saw their wage reduced.

Furthermore, we anticipate that introducing competition will increase wages, due to the wage pushing up effect of bidding. Moreover, we anticipate that sharing information on the past workers' actions increases compliance as the availability of a multilateral reputation mechanism increases the scope for collective punishment.

4 Results

In our discussion of the results we will first focus on the patterns of relational contracting in the bilateral effort choice treatment (1E). Next, we discuss the impact of competition and reputation.

4.1 Patterns of relational contracting in the bilateral treatment

As discussed in the previous Section, in previous experiments like Brown et al. (2004) relational contracting emerged naturally, with three main patterns: first, employers offer higher wages than what the the classical subgame perfect equilibrium with purely self-interested agents predicts; second, workers reciprocate conditionally by exerting high effort after receiving a high wage; and third, employers reciprocate conditionally by offering a high wage following high effort. This conditional reciprocity on both sides makes deviations from cooperation costly and sustains the pattern of cooperation. In this section we describe the extent we find these patterns in the bilateral treatment (1E) in our Ghanaian and UK experiments and the differences between the two countries. Furthermore, we discuss how these difference relate to effort over time and earnings.

4.1.1 Offers

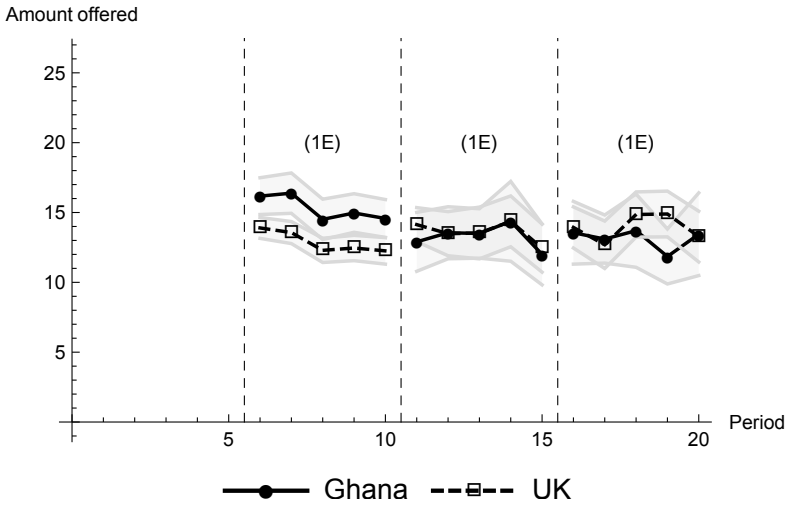


Figure 1: Average wage offers in treatment (1E) in Ghana and the UK.

Wages We confirm the first finding from previous experiments for the bilateral treatment (1E) in both our UK and Ghanaian sessions. Figure 1 shows the average wage offers across all periods in treatment (1E) for both Ghana and the UK. Table 5 shows the average offered wages, the share accepted offers, compliance with demanded effort and the average earnings for all treatments in the United Kingdom and Ghana. The average offered wage in game 2 of treatment (1E) is 15.3 in Ghana and 12.9 in the United Kingdom. In game 3 and 4 the average offered wages are respectively 13.3 and 13.3 in Ghana and respectively 13.6 and 13.9 in the United Kingdom (see also Table 5). These average wage offers are significantly higher than the wage predicted by the subgame perfect equilibrium of the model of rational and purely self-interested agents (0 or 1 points). This is in line with findings from earlier bilateral gift-exchange experiments (e.g Kirchler et al., 1996; Fehr et al., 1998; Gächter & Fehr, 2001).

Result 1. *In both countries, the average wage offers in treatment (1E) are higher than the wage predicted by the subgame perfect equilibrium of the model of rational and purely self-interested agents.*

This confirms our first prediction.

Wage offers like these expose employers to losses if a worker chooses low effort. The average wage offer is significantly higher than the employer's benefit of low effort (5 points), which means that unless the worker chooses medium or high effort an employer that offers this average wage will face a loss. Again, this is in line with the results from earlier gift-exchange game experiments as well as trust game experiments, which showed that participants are willing to make themselves vulnerable to choices made by others in order to encourage reciprocity.

We see few differences between our Ghanaian and UK sessions when comparing average wage offers in treatment (1E). The differences are small, especially in the later games, and mostly insignificant. In Ghana, compared to the United Kingdom, average wage offers are 2.4 points higher in game 2, 0.4 points higher in game 3 and 0.8 points higher in game 4. However, only the difference in game 2 is significant and only at the 10% level (the p value is 0.066).[8]

[8]The t test of the difference in means in game 2 yields a p value of 0.066 when clustering at the individual level. For games 3

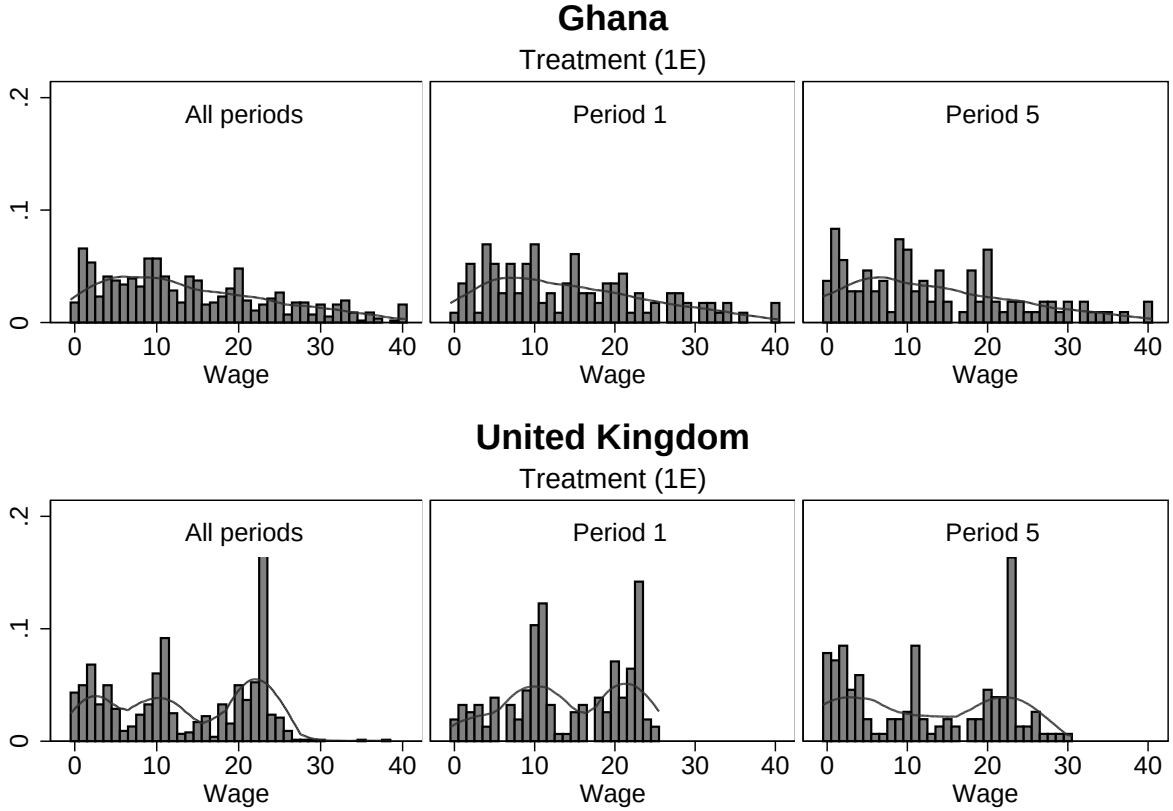


Figure 2: Histograms of the wages offered in treatment (1E), games 2-4, in Ghana and the United Kingdom. The line represents a kernel density estimate, calculated using a Epanechnikov kernel.

Result 2. *The differences between the UK and Ghana in average wage offers in treatment (1E) are small. Average wage offers are slightly higher in Ghana, but this is only statistically significant in game 2, at the 10% level.*

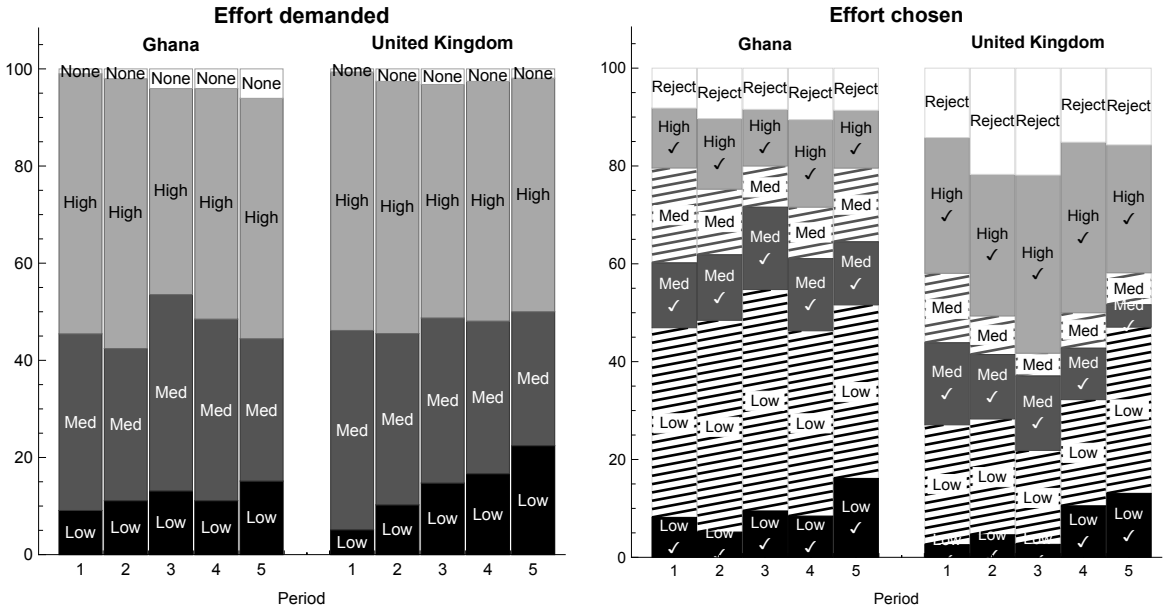
The averages mentioned so far pool data from all periods and therefore partially incorporate the employer's response to the worker's choices. In contrast, the wage offered in period 1 cannot, by construction, depend on worker effort and is therefore more informative of the employer's initial expectation. However, the results are very similar and we do not find evidence for a significant difference between the UK and Ghana. The initial average wage offers in games 2, 3 and 4 of treatment (1E) are respectively 16.2, 12.9 and 13.6 in Ghana and respectively 13.9, 14.1 and 13.9 in the United Kingdom. None of the differences between the UK and Ghana are significant.[9]

Figure 2 shows the distribution of wage offers in treatment (1E). In Ghana the distribution of wage offers is more spread out than in the United Kingdom, with only small peaks. The distribution in the United Kingdom is multimodal, concentrated around 3, 11 and 23 points. These levels correspond to more or less equal earnings when the worker chooses respectively low, medium or high effort.

However, non-parametric equality of distribution tests show that the differences in distributions are mostly insignificant. Both the Kolmogorov-Smirnov and the Mann-Whitney U rank-sum tests fail to

and 4 the corresponding p values are 0.878 and 0.738.

[9]The offer in period 1 of game 2 is 2.3 points higher in Ghana than in the United Kingdom, but this difference is marginally insignificant (the p value of the t test is 0.107). In later games the differences are smaller.



(a) Effort demanded **(b)** Effort chosen

Figure 3: The distribution of demanded effort and chosen effort in the (1E) treatment. The dashed areas indicate that the effort chosen was lower than the effort that was demanded. *Note:* In the left graph, *None* means that no offer was made.

reject the null hypothesis of equal distributions (e.g., in game 2, the Kolmogorov-Smirnov test gives $p = 0.393$ and the U-test gives $p = 0.234$, with $Z = -1.189$). The Epps-Singleton test rejects the null hypothesis of equal distributions in game 2, but only at the 10% level ($p = 0.076$).[10]

We also confirm the finding of Brown et al. (2004) that contractual incompleteness leads to lower offers. Compared to treatment (1C), where the workers cannot choose effort, average wage offers in treatment (1E) are lower. The average wage offer in treatment (1C) is 20.2 in Ghana and 18.6 in the UK, while the average wage offer in treatment (1E) is 14.5 in Ghana and 13.2 in the United Kingdom.[11] The difference between treatment (1C) and (1E) in average wages are significant for both countries (for both countries, a *t*-test of the difference in means yield *p*-values smaller than 0.001). In Appendix Section B.1 we calculate the effect of imperfect enforcement using a within-subject, between-subject and difference-in-difference approach. Most tests indicate that the difference in wage offers between treatment (1E) and (1C) is significant.

Effort demands Figure 3a shows the effort demanded by the employers in treatment (1E). For a majority of offers in both Ghana and the United Kingdom (respectively 51.4% and 51.3% of the offers), employers demand high effort. Remarkable is the substantial share of employers in both countries that

[10] All tests were conducted with unmatched data pairs, with the offer averaged across the five periods for each employer, such that each employer counts as one observation in the test. Wherever appropriate, the tests were two-sided and exact *t* statistics were used. Wage offers are discrete and therefore we expect the Kolmogorov-Smirnov test to be more conservative, as ties in the distribution are more likely to exist. As we averaged the offers across five periods, this becomes less of a concern (out of 155 combined observations, there are 96 unique observations). The discreteness of the data is not a problem for the U-test or the Epps-Singleton test. The Kolmogorov-Smirnov test detects differences in the empirical distribution functions, while the U-test detects locational shifts. The Epps-Singleton test detects differences in the distribution characteristic function, based on the Fourier transformation of the distribution (see e.g. Georg & Kaiser, 2009).

[11] These figures are averaged over all games (see Table 5 for the breakdown by game). Note that treatment (1C) only occurred in game 1 of the experiment in the UK. The difference between the UK and Ghana in average wage offers in treatment (1C) is significant at the 10% level (a *t*-test yields $p = 0.080$, clustered at the employer level).

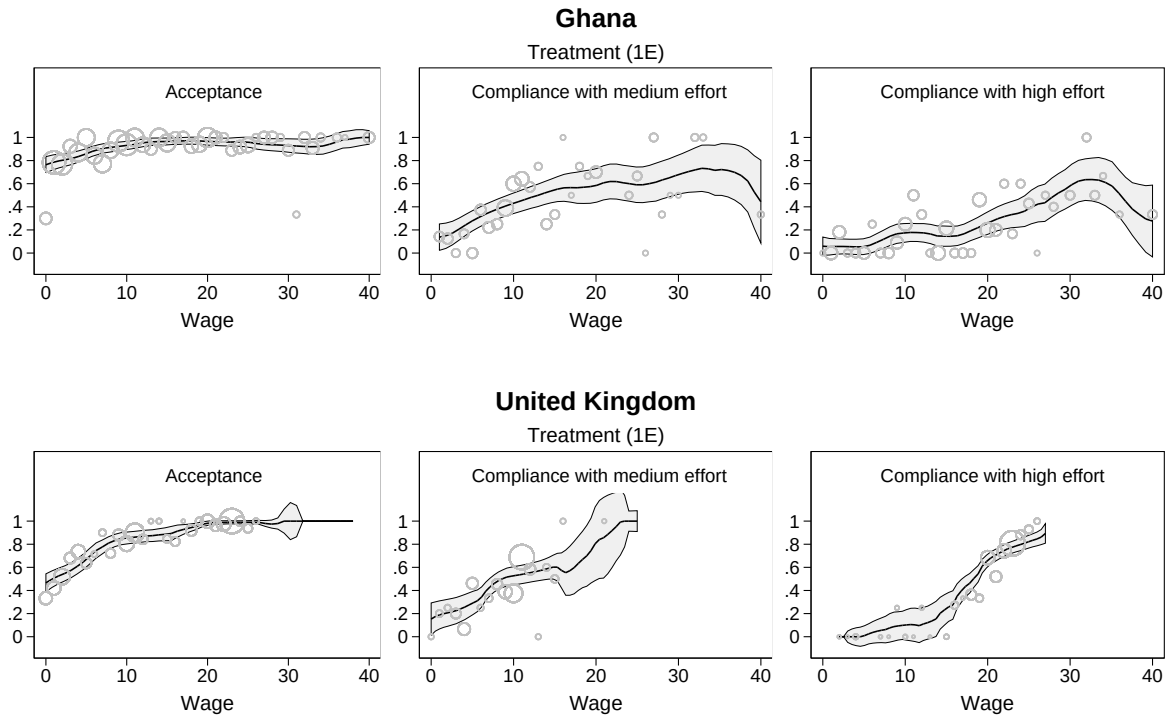


Figure 4: The relationship between the wage offered and acceptance, compliance with offers demanding medium effort and compliance with offers demanding high effort, in games 2-4 of treatment (1E). Compliance is defined as having chosen the demanded level of effort or a higher level of effort. These figures include data from all periods in each game. The size of the bubbles are scaled with the amount of offers made at this wage level. The solid line is a non-parametric local polynomial regression of the outcome variable on the wage. The confidence levels are at the 95% level.

demand low effort in their offers. 12.3% of the offers in Ghana and 14.2% of the offers in the United Kingdom demand low effort. It might seem surprising that these employers do not ask for a higher level of effort, given that effort demand is a form of "cheap talk" and that the worker cannot choose a lower level of effort than low effort. However, in most cases, low effort is only demanded when a low wage wage is offered. One explanation for this behaviour is that employers anticipate that a worker is more likely to reject a low wage offer asking for high effort than a similar offer asking for low effort.[12]

4.1.2 Response of the workers

We now discuss the workers' response to the wage offers. As discussed before, earlier experiments showed a pattern of conditional reciprocity on behalf the workers: workers reciprocate high wage offers with high effort, while they reject low wage offers or exert low effort following a low wage offer.

Acceptance Figure 3b shows a breakdown of rejection and effort choice in treatment (1E) for both countries. Across all periods and games, 12.3% of the offers in Ghana and 19.5% of the offers in the

[12]There is some evidence for this behaviour on behalf of workers in the UK. Of the wage offers of five points or less, workers reject 64.5% of the offers asking for high effort, but 51.4% and 28.6% of the offers asking for respectively low or medium effort. We do not find large differences in Ghana: the rejection rates for low wage offers asking for low, medium and high effort are respectively 24.0%, 21.2% and 25.0%.

United Kingdom in treatment (1E) are rejected. Figure 4 shows non-parametric local polynomial regressions of the rate of acceptance and compliance on the wage offered. This Figure shows that workers are more likely to reject low wage offers than high wage offers. The rejection rate of offers with a wage of five or less points is 23.6% in Ghana and 45.7% in the United Kingdom. Table 6 presents a linear probability model of acceptance and compliance on wage, for both Ghana and the UK as well as for both countries pooled. The linear probability model in Table 6 confirms this positive relation between wage offers and acceptance. This relation is stronger in the UK than in Ghana: according to the results of the linear model, a one point wage increase is related to an increase in the probability of acceptance by 0.96 percentage points in Ghana and 2.20 percentage points in the UK. The difference between Ghana and the UK in the size of this coefficient is significant at the 1% level, as the interaction term in Column (7) in Table 6 shows.

Result 3. *High wage offers are more likely to be accepted. This relationship between wages and acceptance is stronger in the United Kingdom than in Ghana.*

Compliance The dashed areas in Figure 3b indicate non-compliance with the employer's effort demand. In these cases, the worker chose a lower effort than what the employer demanded. As these areas show, there is considerable amount of non-compliance in both Ghana and the UK. We define compliance as a worker choosing the demanded effort level or a higher level of effort. Compliance is higher in the UK than in Ghana: in Ghana the level of compliance is respectively 42.1%, 40.2% and 38.6% in games 2, 3 and 4 of treatment (1E), while the corresponding figures are 56.1%, 60.3% and 72.1% in the United Kingdom (see Table 5).

For both countries, we confirm the findings of a positive wage-effort relation found in earlier studies. Both the non-parametric regressions in Figure 4 and the linear probability model in Table 6 show a positive relationship between wage and compliance.[13] The linear probability model shows that a one point wage increase is related to an increase in the probability of complying with a high effort demand by 1.56 percentage points in Ghana and 2.60 percentage points in the United Kingdom.[14] Both coefficients are significantly different from zero, at the 5% level. However, despite the coefficient for the UK being higher, the difference between Ghana and the UK in the size of the coefficient is not significant, as the interaction terms in Column (9) shows ($p = 0.196$).[15] The coefficients in the regression of compliance with medium effort demands show a similar pattern, even though not all coefficients are significant.

Result 4. *In both countries, compliance with effort demands is higher for higher wage offers.*

This means that we find evidence for conditional reciprocity on behalf of the worker: higher wage offers are more likely to be accepted and more likely to be rewarded with high effort.

[13] As can be seen in Figure 4, the relationship between wage and compliance resembles an inverted U-shape. However, the decline in compliance following higher wage offers is only driven by a few observations (there are few offers above 35 points) and is mainly driven by low effort choice following offers of 40 points. The offers of 40 points are difficult to rationalize: even in the best scenario for the employer, when the worker chooses high effort, the employer's payoff is zero.

[14] The figure and the tables pool data from all periods within each game and might therefore mask certain dynamic effects. However, inclusion of an interaction term between the wage and the period dummy in the regressions in Table 6 does not yield significant coefficients at the 5% level.

[15] The regression specifications in Table 6 include worker fixed effects and therefore control for individual differences in the likelihood of accepting or complying. The coefficients should therefore be interpreted as the worker's response to wage variations

Table 6: Compliance and acceptance in relation to the wage in treatment (1E).

	Ghana			United Kingdom			Both countries (pooled)		
	(1) Acceptance	(2) Compliance *(medium demand)*	(3) Compliance *(high demand)*	(4) Acceptance	(5) Compliance *(medium demand)*	(6) Compliance *(high demand)*	(7) Acceptance	(8) Compliance *(medium demand)*	(9) Compliance *(high demand)*
Wage	0.00959**	0.0100	0.0156**	0.0220***	0.0322**	0.0260***	0.00959***	0.0100	0.0156***
	(0.00239)	(0.00717)	(0.00495)	(0.00235)	(0.0136)	(0.00628)	(0.00224)	(0.00678)	(0.00460)
Wage × UK							0.0124***	0.0221	0.0104
							(0.00322)	(0.0150)	(0.00775)
Constant	0.784***	0.398	−0.0330	0.527***	0.178	0.0519	0.778***	0.356**	−0.0944
	(0.0395)	(0.244)	(0.154)	(0.0389)	(0.201)	(0.161)	(0.0512)	(0.145)	(0.105)
N	478	160	224	763	217	358	1241	377	582
Adjusted R^2	0.225	0.513	0.297	0.316	0.398	0.450	0.238	0.235	0.433
Fixed effects	Worker	Worker	Worker	Worker	Worker	Worker	Worker	Worker	Worker
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes†	Yes†	Yes†

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

† These regressions also include the interaction of the period dummies with the country dummy.

Note: This is a fixed effects linear probability model regression of acceptance and compliance on the wage offered. *Acceptance* is an indicator variable and is equal to one if the worker accepted the offer. *Compliance* is an indicator variable and is equal to one if the worker chooses the effort level specified by the employer, or a higher effort level. For the *Compliance (medium demand)* and *Compliance (high demand)* columns the regression only includes observations where medium or high effort is demanded by the employer. The regressions include worker fixed effects. Columns (7), (8) and (9) also include the interaction of the period dummies with the country dummy. Standard errors are clustered by session.

4.1.3 Wage revision by employers

Next we discuss the employer's response to the worker's effort. As discussed in the predictions section, one main finding from earlier gift-exchange game experiments is the presence of conditional reciprocity on behalf of the employer: employers continue to offer a high wage as long as the worker chooses high effort and low effort leads to the employer ceasing to offer high wages.

We first focus on wage revision following a high wage. For this analysis, we take the median wage of 15 points (inclusive) as the cutoff.[16] Table 7 shows the employer's response in treatment (1E) to low, medium and high effort, provided that the employer offered an above median wage in the previous period. The top rows (Panel A) relate to the response in the second period, while the bottom rows (Panel B) pool data from periods 2 to 5. The Table highlights two main differences between our British and Ghanaian sessions in how employers revise wages. First, following low effort, Ghanaian employers are less likely to *decrease* their wages than the British employers.[17] In Ghana, 41.2% of the wages are lowered in period 2 following low effort in period 1, while in the UK the corresponding figure is 71.4%. Across all periods, these figures are respectively 50.7% and 70.0%.

Second, following high effort, British employers are more likely to *keep offering the same wage* than the Ghanaian employers. In the UK, 84.6% of the wages are kept the same in the second period after

that a worker faces throughout the experiment. Excluding fixed effects in the regression does lead to a significant difference in the size of the coefficient between Ghana and the UK, as can be seen in Appendix Table 19.

[16] The median wage is 15 when pooling the data from the UK and Ghana together. The median wage in Ghana is 14 and the median wage in the United Kingdom is 16.5.

[17] Just like in Table 7 we adopt a 2 point margin in the figures presented in the text (i.e., a wage of 24 following a wage of 22 is considered as the "same" wage). This is to account for potential imprecise input from the tablet's touch screen. None of the results change qualitatively when no margin or a margin of 1 point is used.

Table 7: Response to the previous period's effort for above median wages in treatment (1E)

	Ghana				United Kingdom			
	Worker's effort in period $t-1$ for above median wages ($w_{t-1} \geq 15$)				Worker's effort in period $t-1$ for above median wages ($w_{t-1} \geq 15$)			
	Low	Medium	High	All	Low	Medium	High	All
Panel A. Response in period 2								
Share of effort in period 1	37.0%	39.1%	23.9%	100.0%	10.1%	33.3%	56.5%	100.0%
Employer's response in period $t = 2$								
Decrease wage	41.2%	38.9%	54.6%	43.5%	71.4%	60.9%	10.3%	33.3%
Same wage (± 2 points)	29.4%	38.9%	36.4%	34.8%	0.0%	26.1%	84.6%	56.5%
Increase wage	29.4%	16.7%	9.1%	19.6%	14.3%	8.7%	5.1%	7.3
No offer	0.0%	5.6%	0.0%	2.2%	14.3%	4.4%	0.0%	2.9%
Panel B. Response in all periods								
Share of effort in period $t-1$	41.3%	32.3%	26.4%	100.0%	11.0%	20.9%	68.1%	100.0%
Employer's response in period t								
Decrease wage	50.7%	29.6%	45.5%	42.5%	70.0%	70.2%	6.5%	26.7%
Same wage (± 2 points)	24.6%	46.3%	47.7%	37.7%	10.0%	19.3%	88.2%	65.2%
Increase wage	21.7%	20.4%	4.6%	16.8%	13.3%	8.8%	4.3%	6.2%
No offer	2.9%	3.7%	2.3%	3.0%	6.7%	1.8%	1.1%	1.8%

Note: Panel B includes the responses from periods 2-5. Only responses to effort following above median wages are included in this table. Rejected offers are not included in this table. We use a 2 point margin in the wage classification. Wages that were more than 2 points lower are classified as a wage decrease, and wage increases of more than 2 points are classified as a wage increase. Wages within these 2 points margin as classified as being the same wage.

Table 8: Linear regression of wage offers on rejection and previous compliance in treatment (1E).

	Ghana		United Kingdom	
Dependent variable: Wage offer in period t	(1)	(2)	(3)	(4)
Rejection in period $t-1$?	-1.192	-1.087	2.487^{***}	2.645^{***}
	(1.376)	(1.339)	(0.773)	(0.811)
Compliance in period $t-1$?	0.283		6.260^{***}	
	(0.902)		(1.228)	
Compliance in period $t-1$? (high effort demanded)		0.744		10.21^{***}
		(2.356)		(1.460)
Compliance in period $t-1$? (medium effort demanded)		0.875		4.906^{***}
		(0.945)		(1.384)
Constant	16.79^{***}	16.66^{***}	11.05^{***}	10.45^{***}
	(1.239)	(1.414)	(0.828)	(0.631)
Observations	380	380	608	608
R^2	0.0475	0.0496	0.158	0.266
Adjusted R^2	0.0136	0.0132	0.139	0.249
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

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

Note: This is a fixed effects regression of wage offered on previous compliance and rejection. *Rejection* is an indicator variable and equal to one if the worker rejected the offer. *Compliance* is an indicator variable and equal to one if the worker chose the effort level demanded by the employer, or a higher level. Only wage offers in period 2-5 are included. Standard errors are clustered on the session level.

Table 9: Evolution of effort in treatment (1E)

Ghana

$\downarrow t-1$ \ $t\rightarrow$	Low	Medium	High	No offer	Rejected
Low	69.6	10.9	5.4	4.3	9.8
Medium	25.9	37.0	22.2	5.6	9.3
High	24.2	24.2	48.5	0.0	3.0
No offer	37.5	25.0	25.0	12.5	0.0
Rejected	30.0	20.0	5.0	10.0	35.0

United Kingdom

$\downarrow t-1$ \ $t\rightarrow$	Low	Medium	High	No offer	Rejected
Low	47.3	12.2	6.8	4.1	29.7
Medium	23.6	38.9	20.8	2.8	13.9
High	11.7	9.1	74.0	1.3	3.9
No offer	40.0	40.0	20.0	0.0	0.0
Rejected	30.0	16.7	8.3	1.7	43.3

Note: These are right stochastic (transition) matrices (each row adds up to 100%). The numbers represent percentages. Data from period 5 has been omitted. The rows represent the choices in period $t-1$ and the columns represent the choice in the next period (period t).

high effort in period 1, while the corresponding figure in Ghana is 36.4%. Ghanaian employers are more likely to *lower* wages following high effort: in Ghana 54.6% of the wages were lowered in period 2 following high effort in period 1, while in the United Kingdom only 10.3% of the wages were lowered.

The lower likelihood of wage cuts following low effort and the higher likelihood of wage cuts following high effort in Ghana is also reflected in the coefficients in the linear regression of wage offers on past compliance and past rejection. Table 8 shows this regression. We see that in the United Kingdom, compliance is related to a wage increase of 6.260 points in the next period. This figure is significantly different from zero at the 1% level. In Ghana the corresponding coefficient is 0.283, meaning that, on aggregate, compliance is associated with a wage increase of only 0.283 in the next period. However, this coefficient is not significantly different from zero and small in magnitude, given that wages can range between 0 and 40 points. The difference between the UK and Ghana in the employer's response to compliance is significant: in Appendix Table 21 we pool the observations from Ghana and the UK together and add an interaction term between compliance and the country indicator, which is significant at the 1% level.

Result 5. *There is a strong and positive relation between the offered wage and compliance in the previous period in the United Kingdom. There is no such relation in Ghana. Employers in the United Kingdom are more likely to decrease wages following low effort than employers in Ghana.*

The lack of relation between compliance and wage revision in Ghana stands in a stark contrast with the results from our British sessions as well as earlier results from experiments in OECD countries.[18]

4.1.4 Evolution of effort

In this section we discuss how effort choices across periods. Table 9 shows the transition matrix of effort for treatment (1E) for both Ghana and the United Kingdom. This table omits observations from period 5 to exclude final period effects. In the United Kingdom, there are few transitions out of high effort.

[18]For example, in Brown et al. (2012) the coefficient on the relation between effort chosen and the subsequent rent that is offered is positive and significant (Table 4, Column (6)). The coefficient has a magnitude of 5.527 and is significant at the 1% level. In their experiment, effort can take 10 values and offered wages can vary between 0 and 100. This coefficient is based on data from both the ICF-S and ICF-D treatments. The data for the ICF-S treatment, with an excess supply of labour, is the same data as used in Brown et al. (2004).

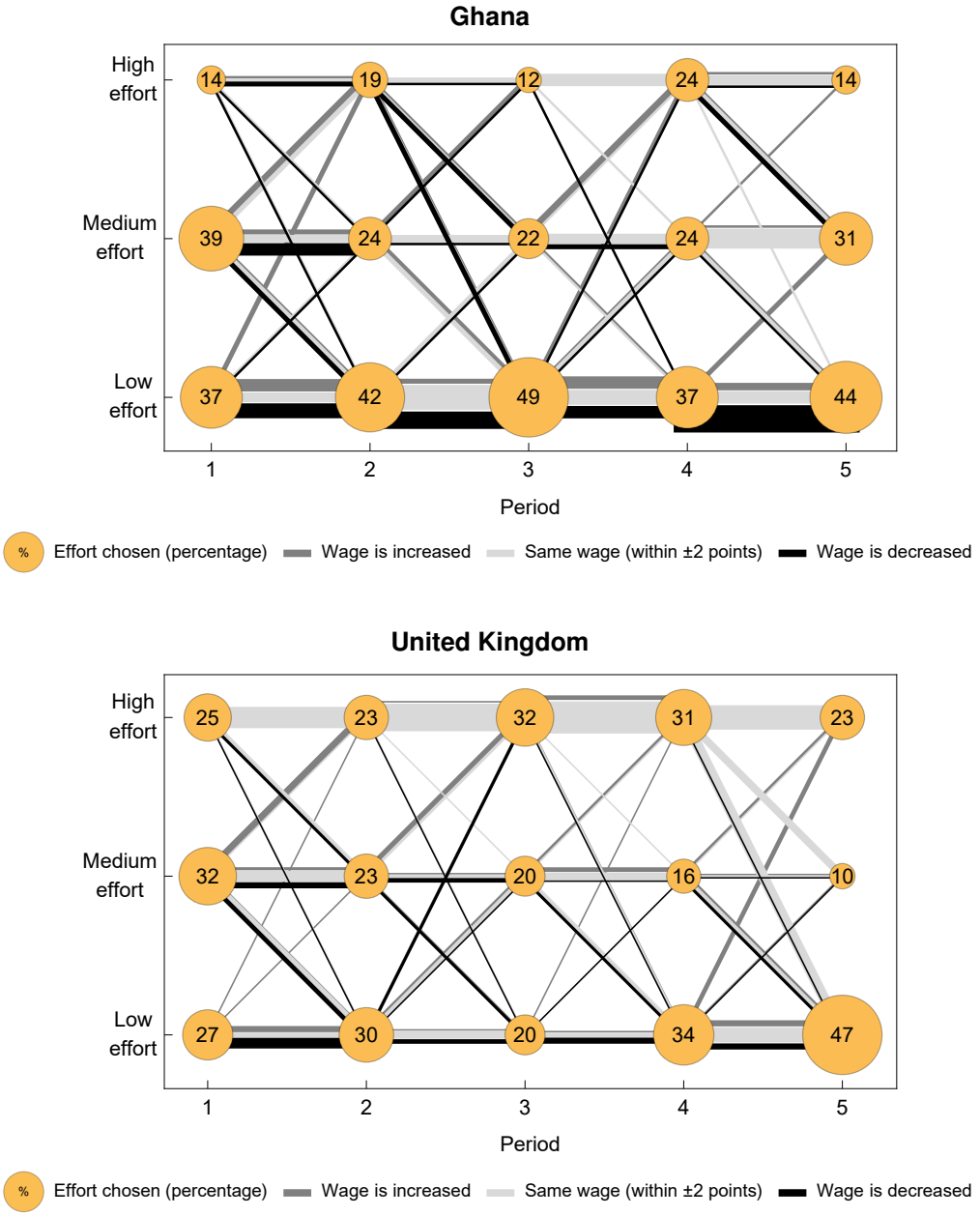


Figure 5: Transitions between effort levels of workers in game 2 of the (1E) treatment. The numbers and the size of the circles indicate the percentage of workers choosing this effort level in that particular period. The thickness of the lines indicates the share of transitions between effort levels. The shading of the lines indicate whether the employer increased the wage (with more than 2 points), kept it the same (within a ± 2 point range) or decreased the wage (with more than 2 points). Rejections are not included in this graph.

Of the workers that chose high effort in one period, 74.0% will choose high effort again in the next period. The corresponding figure in Ghana is 48.5%. This shows that the Ghanaian participants acting as employers are failing to maintain high effort provision by their workers, while the British employers are better at this. As discussed earlier, the higher likelihood of employers in our Ghanaian sessions to lower wages after high effort could play a role.

Figure 5 shows the transitions between efforts graphically. The size of the bubbles and the number inside the bubbles indicate the percentage of workers choosing a particular level of effort. The thickness of the lines indicate the likelihood of a transition. This graph confirms the observation from the Table that in the UK, apart from period 5, there are few transitions out of high effort. Furthermore, the graphs show some evidence for final period effects, which are the strongest in the United Kingdom. In period 5, the share of workers choosing low effort is similar in both countries (44% against 47%).

The shading of the lines indicate whether wages increased, decreased or remained the same. For our British sessions we see that offering the same wage (the light gray line) after high effort is almost always followed by high effort again in the next period, apart from period 5. Increasing the wage (the dark gray line) is likely to increase effort, while decreasing the wage (the black line) is likely to decrease effort. In Ghana we see a similar pattern, even though employers in our Ghanaian sessions are less likely to keep offering the same wage.

4.1.5 Earnings

These differences in contracting and effort levels also have consequences for the earnings of the employers and the workers in our experiment. Under the (1C) perfect enforcement condition, the earnings of the worker and employer are close to equal, especially in the later games (see Table 5). However, introducing imperfect enforcement, as is done in treatment (1E), reduces the employers' average earnings substantially. Compared to game 1 of treatment (1C), the average employer's earnings in game 2 of treatment (1E) drop from 11.0 to 0.2 points in Ghana and from 17.0 to 5.9 points in the United Kingdom. These differences are highly significant (see Appendix Table 17). The average employer's earnings in treatment (1E) are higher in the UK and this difference is significant. In later games the difference in average earnings between the UK and Ghana increases even further: while in Ghana, the average employer's earnings are negative in games 3 and 4 (at respectively -1.1 and -1.6 points), the average employer's earnings in the UK increase (to respectively 6.3 and 9.7 points). Just like in game 2, the difference between the UK and Ghana is significant.

Result 6. *Imperfect enforcement reduces average employer's earnings. The average employer's earnings in treatment (1E) are lower in our Ghanaian sessions than in our British sessions.*

In contrast, we do not see any significant differences in average worker's earnings, both when we compare treatment (1E) with (1C) and when comparing the United Kingdom with Ghana. Compared to treatment (1C) the average worker's earnings are slightly lower in treatment (1E) in both Ghana and the United Kingdom, but this difference is not significant (see also Table 5 and Appendix Table 17).

4.2 The role of competition

The role of competition In treatments (3C), (3E) and (3ES) there is competition between employers to find the best worker and between workers to receive the best offers. In our design there is no market imbalance: the number of workers is equal to the number of employers.

We find no evidence for a difference in wage offers when comparing treatment (3E) with treatment (1E). For example, in game 3 of treatment (3E) the average wage is 14.7 in Ghana and 12.9 in the United Kingdom, while in game 3 of treatment (1E) the average was is 13.3 in Ghana and 13.6 in the United Kingdom (see Table 5).[19] The difference between treatment (3E) and treatment (1E) is not significant. Also the treatment effect calculated using a within-subject, between-subject and a difference-in-difference estimation are not significant (see Appendix Tables 16, 17 and 18).

Figure 6 shows the distribution of wage offers made in the (1E), (3E) and (3ES) treatments in Ghana and the United Kingdom. For both countries, non-parametric tests do not find significant differences in the distribution of offers between these treatments.[20] This leads to the following result:

Result 7. *There are no significant difference in wage offers between treatment (3E) and (1E).*

However, we do find a difference when comparing the offers in the competition treatments between the United Kingdom and Ghana. The average wage offer is significantly higher in the United Kingdom and non-parametric tests reject the null hypothesis of having the same distribution of offers in Ghana and the United Kingdom.[21]

Wage setting One of the key results in models of relational contracting and from earlier experiments is that employers offer higher wages to employees with whom they have successfully interacted in the past. In Brown et al. (2004), where employers could make both private and public offers, private offers were higher than public offers and employers based their wages on how successful the past interactions were.

We see a similar pattern in the United Kingdom, but not in Ghana. Table 10 shows how the employer's wage offer relate to the number of past interactions with a worker, regardless of whether the worker complied with the demanded effort. In the United Kingdom a higher number of past interactions is associated with a significantly higher wage offer. For example, in period 5, the wage offer is 4.85 points higher when an employer has interacted with a worker for three periods. In Ghana we do not find a significant relation between the number of past interactions and the wage offered.

We see a similar difference between Ghana and the United Kingdom when we also consider whether the worker in the past interaction complied with the demanded effort. Columns (1) and (3) of Table 11 show a fixed effects regression of how the employer's wage offer depends on whether the employer contracted with this worker in the past period and whether the worker complied with the demanded

[19] We focus on game 3, since treatment (3E) is introduced from that game onwards.

[20] a Wilcoxon (Mann-Whitney) rank-sum test and a Kolmogorov-Smirnov test do not reject the null hypothesis that there is a significant difference in the distributions between treatment (1E) and (3E) (e.g. in game 3, the Wilcoxon rank-sum test yields for Ghana $Z = -0.966$ and $p = 0.334$, and for the United Kingdom $Z = -0.022$ and $p = 0.9822$).

[21] A Wilcoxon rank-sum test rejects the null hypothesis of the same distribution in Ghana and the United Kingdom for game 4 ($Z = 2.90$, $p = 0.0037$), but not for game 3 ($Z = -0.986$, $p = 0.324$). A Kolmogorov-Smirnov test rejects the null hypothesis of the same distribution for game 3 at the 10% level ($p = 0.093$) and for game 4 at the 1% level ($p = 0.000$).

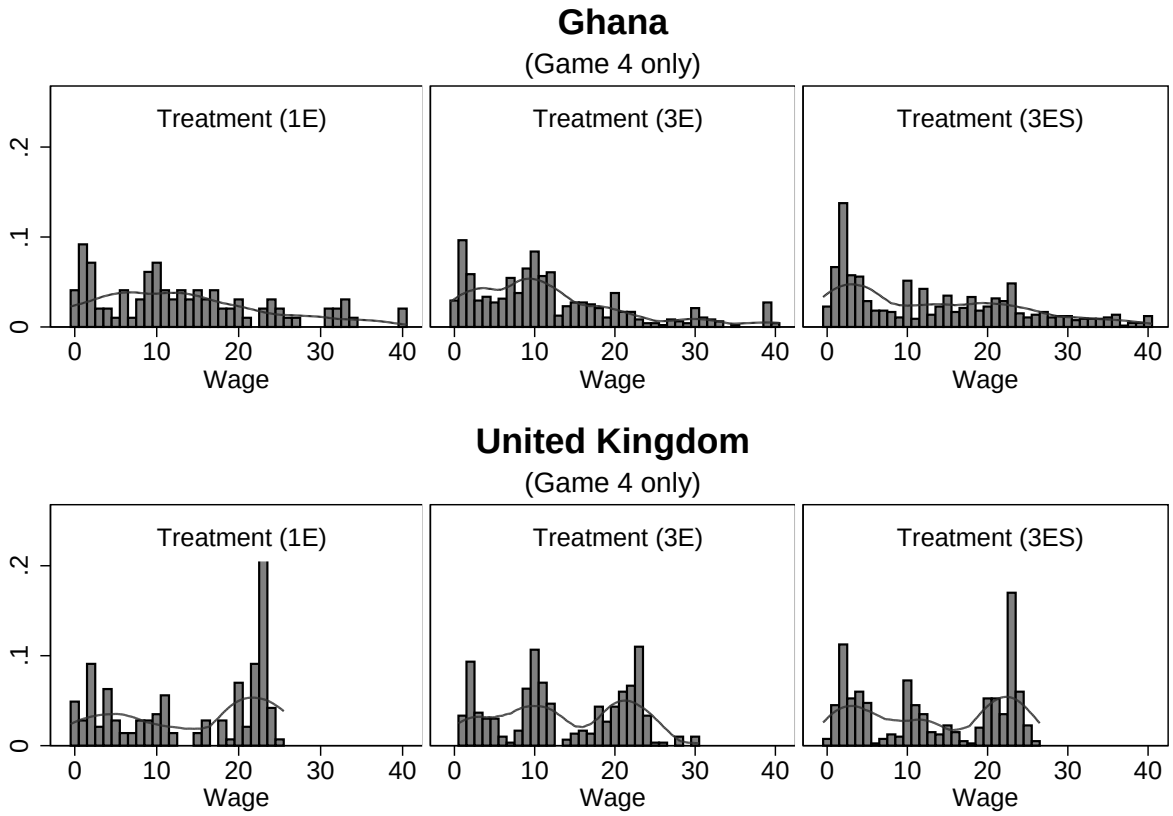


Figure 6: Histograms of the wages offered in treatment (1E), (3E) and (3ES), in Ghana and the United Kingdom. To allow for comparisons, only game 4 data has been included, because treatment (3ES) was only conducted as game 4. The line represents a kernel density estimate, calculated using a Epanechnikov kernel.

Table 10: Wages and past interactions in treatment (3E)

	Ghana					United Kingdom				
Period	1	2	3	4	5	1	2	3	4	5
Wage without past interactions	15.18	14.38	13.92	12.47	13.40	14.23	13.69	13.43	11.02	11.11
Wage increase/decrease after										
...1 past interaction		−0.60	0.18	1.21	−1.56		−1.18	−1.96	−0.83	−1.72
...2 past interactions			−0.92	1.98	−0.94			2.73*	−0.03	−0.91
...3 past interactions				−1.11	−1.72				8.94**	4.85***
...4 past interactions					−1.41					6.45**
Observations	341	329	316	310	313	273	197	200	173	180

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

Note: The reported numbers are from a fixed effects linear regression of the wage on the number of interactions. Fixed effects are taken on the employer level. For the tests, standard errors (not reported) are clustered on the session level.

effort. We find significant coefficients for our British sessions, but not for our Ghanaian sessions. In the United Kingdom, compliance is associated with a 7.512 higher wage in the next period. The corresponding coefficient for Ghana is small, at at 0.965, and not significant at a 10% level.

Result 8. *In the United Kingdom, employers offer higher wages to workers with whom they have successfully interacted in the past. We do not find evidence for this in Ghana.*

4.3 The role of reputation

The next question is how sharing information on past compliance with the effort demanded can increase effort. In treatment (3ES) employers can see past compliance not only for their own workers, but also for the workers that contracted with a different employer. This provides the employers with an additional mechanism for screening, which in itself can increase the incentive for workers to comply with the effort demanded.

Wages We find little evidence that reputation increases the average wage offer in Ghana, but find some evidence for this for the United Kingdom. Table 12 compares treatment (3ES) with treatment (3E) for a number of outcome variables, using a within subject, between groups, a (fixed effects) difference-in-difference analysis (see also Appendix Section B.1). For Ghana, the within subject estimator shows a significant drop in the wage as a result of information sharing, but when we control for a time trend, as the difference-in-difference and the fixed effects estimators do, the effect disappears. For the United Kingdom, the within subject, difference-in-difference and fixed effects estimators show a positive and significant effect of reputation on wage offers, while the between group estimator shows a small and insignificant negative effect.

We also find that in our British sessions employers are basing their wage offers on the information provided by the reputation mechanism in treatment (3ES), while we do not find evidence for this in our Ghanaian sessions. Columns (2) and (4) of Table 11 show that compliance with another's employer's offer is associated with a wage increase of 4.060 in the UK, while in Ghana the corresponding figure is only 0.414. The Ghanaian figure is not significant, while the British figure is.

Table 11: Wage offers in treatment (3E) and (3ES)

	Ghana		United Kingdom	
Dependent variable: Wage offer by employer i in period t	(1) Treatment (3E) only	(2) Both treatments	(3) Treatment (3E) only	(4) Both treatments
Contracted with employer i?$_{t-1}$	−0.872	−0.682	−3.070***	−3.292***
	(0.837)	(0.892)	(0.885)	(0.951)
Contracted with *other* employer?$_{t-1}$	−0.614	−0.442	0.525	0.518
	(0.830)	(0.877)	(0.913)	(0.950)
Compliance with employer i's offer?$_{t-1}$	0.965	0.813	7.512***	7.851***
	(0.630)	(0.743)	(1.039)	(0.981)
Compliance with *other* employer's offer?$_{t-1}$	0.543	0.401	−0.0199	0.103
	(0.467)	(0.484)	(0.765)	(0.748)
Treatment (3ES)?		0.133		2.085
		(1.658)		(1.655)
× Contracted with employer i?$_{t-1}$		−0.307		1.618
		(0.955)		(0.973)
× Contracted with *other* employer?$_{t-1}$		−0.662		−0.925
		(0.965)		(1.127)
× Compliance with employer i's offer?$_{t-1}$		0.102		0.0279
		(1.245)		(0.995)
× Compliance with *other* employer's offer?$_{t-1}$		0.414		4.060***
		(1.020)		(0.981)
Constant	14.92***	15.14***	12.43***	11.67***
	(0.719)	(0.799)	(0.499)	(0.576)
Observations	1268	1795	750	1038
R-squared	0.710	0.699	0.616	0.624
Adjusted R-sq	0.687	0.681	0.572	0.592
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

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

Note: This is a linear regression with the wage offered by employer i in period t as dependent variable. All independent variables are indicator variables and relate to period $t-1$, i.e. the period before the offer. Standard errors are clustered on the session level.

Table 12: Treatment effect of treatment (3ES) compared with treatment (3E)

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) DID	(4) FE	(5) Within	(6) Between	(7) DID	(8) FE
Offered wage								
(3ES) vs. (3E)	−2.145***	1.506	−0.306	−0.262	1.681**	−0.305	3.040***	3.264***
	(0.653)	(2.309)	(0.902)	(0.984)	(0.573)	(1.837)	(0.926)	(0.962)
Acceptance								
(3ES) vs. (3E)	−0.0112	−0.0125	−0.0143	−0.0144	0.0178	0.0267	0.0443	0.0409
	(0.0149)	(0.0164)	(0.0145)	(0.0160)	(0.0235)	(0.0433)	(0.0295)	(0.0313)
Compliance								
(3ES) vs. (3E)	0.0529	0.136	0.0643	0.0517	0.113**	−0.00452	−0.0310	−0.0406
	(0.0304)	(0.0813)	(0.0526)	(0.0598)	(0.0379)	(0.0406)	(0.0643)	(0.0686)
Surplus								
(3ES) vs. (3E)	0.283	1.214	1.022	1.022	3.718***	−1.377	2.785*	2.785
	(1.710)	(2.171)	(1.971)	(2.076)	(1.018)	(2.909)	(1.452)	(1.528)
Employer's earnings								
(3ES) vs. (3E)	1.996	0.156	1.179	1.179	2.723***	−0.943	0.0712	0.0712
	(1.625)	(1.200)	(1.697)	(1.787)	(0.538)	(1.365)	(0.836)	(0.880)
Worker's earnings								
(3ES) vs. (3E)	−0.278	1.072	1.651	2.543	−1.916	−2.644	2.139	0.623
	(1.349)	(5.109)	(2.208)	(2.271)	(1.346)	(1.838)	(2.681)	(2.889)

Note: Each cell corresponds to a separate regression. Standard errors are given in parentheses.

Result 9. *In the United Kingdom employers in treatment (3ES) base their wages on the multilateral reputation of the worker. We do not find evidence for this in Ghana.*

We see that the employers in the British sessions put more importance on the worker's compliance with their own offers than on compliance with other employer's offers. The coefficient for compliance with own offers is almost double in size, at 7.851. One explanation for this could be that employers value their own experiences more and therefore "punish" their own non-complying workers more than the non-complying workers of other employers. Another explanation is that employers, despite the reputation mechanism, have better information on their own workers. The only information that is shared is compliance and not the actual wage offered or the effort that was demanded. This information is important for evaluating whether the worker was truly at fault. For example, even an honest worker might choose to not comply with a high effort demand if the wage is unreasonably low.

Effort choice and compliance We have seen that in the UK, employers base their wages on the worker's reputation. However, does this incentivize workers to comply with high effort? We do not find strong evidence that this is the case. As can be seen in Table 5 the rate of compliance in Ghana is 53.9% in treatment (3ES) and 40.2% in treatment (3E). In the United Kingdom rate of compliance is 75.6% in treatment (3ES) and 76.0% in treatment (3E). However, as the treatment effects estimations in Table 12 show, the difference in compliance between treatment (3E) and treatment (3ES) is not significant.

Also when we correct for the wage offered, we find limited evidence that having a reputation mechanism significantly increases compliance. Table 13 presents a linear probability model of acceptance and compliance as a function of the wage and whether the participant is in treatment (3ES). While the coefficient on the wage is positive and significant in both Ghana and the United Kingdom, the coefficient on treatment (3ES) is not significant in most columns. Only the coefficient in the regression of compliance with medium effort demands in Ghana is significant at the 10% level.[22]

Result 10. *We do not find significant evidence that reputation increases compliance in both Ghana and the United Kingdom.*

5 Discussion and conclusion

We find striking differences in relational contracting patterns between the United Kingdom and Ghana. In this section we will discuss a number of alternative specifications as well as results from a series of additional experiments we ran. In the additional experiments we find a stronger response of the wage to past effort, but the relationship is weaker than in the United Kingdom. Next, we dive deeper into the question whether the differences in effort are due to different distributional preferences on behalf of the workers. To do this, we estimate a structural model of worker's preferences and categorize workers according to this model. Finally, we discuss the implications of our results as well as several hypotheses of what could be driving the observed differences.

[22] Even though mostly not significant, some of the effect sizes themselves are large: for example, Column (5) in Table 13 implies that multilateral reputation increases compliance with medium by 14.5 percentage points, when controlling for the wage.

Table 13: Compliance in treatments (3E) and (3ES)

	Ghana			United Kingdom		
	(1) Acceptance	(2) Compliance *(medium demand)*	(3) Compliance *(high demand)*	(4) Acceptance	(5) Compliance *(medium demand)*	(6) Compliance *(high demand)*
Wage	0.00579***	0.0137*	0.0101**	0.0187***	0.0548***	0.0229**
	(0.000924)	(0.00703)	(0.00424)	(0.00203)	(0.0157)	(0.00887)
Treatment (3ES) ?	−0.00566	0.217*	0.127	−0.00719	0.145	−0.0264
	(0.0194)	(0.104)	(0.100)	(0.0288)	(0.0936)	(0.111)
Constant	0.226***	0.437**	0.188	0.0329	0.190	0.235
	(0.0256)	(0.151)	(0.120)	(0.0411)	(0.174)	(0.158)
Observations	2270	288	396	1423	186	352
R-squared	0.0283	0.617	0.664	0.153	0.779	0.643
Adjusted R-sq	−0.0137	0.445	0.559	0.106	0.645	0.549
Fixed effects	Worker	Worker	Worker	Worker	Worker	Worker
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes

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

Note: This is a fixed effects linear probability model regression of acceptance and compliance on the wage offered, with data from games 3 and 4 from treatments (3E) and (3ES). *Acceptance* is an indicator variable and is equal to one if the worker accepted the offer. *Compliance* is an indicator variable and is equal to one if the worker chooses the effort level specified by the employer, or a higher effort level. *Treatment (3ES)* is an indicator variable and equal to one if the treatment is (3ES). The *medium demand* and *high demand* columns only include observations where medium or high effort was demanded by the employer. Fixed effects are taken on the worker level. Standard errors are clustered by session.

5.1 Robustness

5.1.1 Alternative specifications

Our result of the lack of wage response to past non-compliance in Ghana is robust to a number of alternative specifications. In Appendix Table 22 we present two additional specifications of the regression of the wage on past compliance. Including a lagged value of the wage or taking the change in the wage as the dependent variable does not change the results in either magnitude or significance.

In Appendix Table 23 we regress the wage offered on past effort and whether the chosen effort was a positive or negative "surprise" (i.e., higher or lower than demanded), in a similar way as Brown et al. (2012) present their results from their German experiments.[23] We find that in both Ghana and the United Kingdom higher effort is rewarded with a higher wage in the next period, but the coefficient is (significantly) higher in the UK than in Ghana. Also the response to negative surprises is significantly different: in the UK a negative surprise is related to a lowering of the wage of -2.1 points, while in Ghana this is related to a wage increase of 1.7 points.

5.1.2 Out-of-sample validation

In Davies & Fafchamps (2017) we run a second series of experiments, where we focus on the role of feedback. However, these experiments also allows us to validate the experiments conducted for this paper. For these experiments, we simplified the game and also *invited real entrepreneurs* from small and medium-sized entreprises. We reduced the effort levels from three to two (only low and high effort)

[23] See columns (4) and (5) of Table 4 of Brown et al. (2012).

Table 14: Linear regression of wage offes on rejection and previous compliance in treatment (1E) of the additional experiments in Ghana.

	Students	**Entrepreneurs**	**Both groups (pooled)**	
Dependent variable:				
Wage offer in period t	(1)	(2)	(3)	(4)
High effort in period $t-1$?	1.762^{***}	3.523^{**}	1.976^{***}	1.762^{***}
	(0.381)	(0.855)	(0.377)	(0.380)
Rejection in period $t-1$?	1.788^{***}	0.805	1.602^{***}	1.788^{***}
	(0.407)	(0.825)	(0.370)	(0.406)
Entrepreneur?				
$\times$ High effort in period $t-1$?				1.762^{**}
				(0.858)
$\times$ Rejection in period $t-1$?				-0.983
				(0.846)
Constant	15.30^{***}	12.39^{***}	14.68^{***}	14.69^{***}
	(0.278)	(0.382)	(0.273)	(0.270)
Observations	2496	458	2954	2954
R^2	0.0269	0.0612	0.0250	0.0318
Adjusted R^2	0.0207	0.0272	0.0197	0.0212
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

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

Note: This is a fixed effects regression of wage offered on previous high effort choice and rejection, for the additional experiments conducted in Ghana. *Rejection* is an indicator variable and equal to one if the worker rejected the offer. *High effort* is an indicator variable and equal to one if the worker chose high effort. Only wage offers in period 2-5 are included. Standard errors are clustered on the session level.

and made high effort the default demanded effort level. The payoff function was kept equal, only in some sessions we increased the employer's benefit from low effort from 5 to 10 or 15 points. In total we held 31 sessions with a total of 61 entrepreneurs and 559 students.

In this series of experiments we actually find a significant relationship between wage and past effort. Table 14 replicates the regression of wage on past compliance with high effort and past rejection. Unlike in the first series of the experiment, the coefficient on compliance in this experiment is significantly different from zero, at 1.976 points. However, this coefficient is small, given that wages can range between 0 and 40, and that the employer's loss of low effort ranges between 25 and 30 points.

We find evidence for a stronger degree of conditional wage setting by the entrepreneur participants. The coefficient for entrepreneurs is higher, at 3.523, and this figure is significantly higher than the corresponding figure for students, as the regression with the interaction term in Column (4) of Table 14 shows. However, compared to the British subjects from the first series of experiments, this figure is still low (the coefficient on compliance with high effort was 10.21 as Table 8 shows).

5.2 Heterogeneity of workers: a structural model

The finite period theoretical model relies on the presence of a group of "social" type workers, who act reciprocally. The "opportunistic" workers will mimic the behaviour of the social types and act reciprocally until the last period, in which they make a purely selfish choice. According to this model, the higher the share of "social" type workers is, the more likely a pattern of relational contracting can emerge.

In this section we use two different estimation strategies of a structural model of inequality aversion to show that there is little difference between the UK and Ghana when it comes to the distribution of "social" types in the population. We do not find evidence for Ghanaian workers acting more opportunistically than their British counterparts, in fact some of our results point in the opposite direction. The structural model is derived from the model of inequality aversion by Fehr & Schmidt (1999), which is more extensively discussed in the Appendix. The utility function is given by Equation 3. The key parameter here is β_i, which represents the disutility from advantageous inequality, meaning that the agent received more than the agent's partner. A higher value of β_i corresponds to a higher degree of advantageous inequality aversion. We also estimate α_i, which represents disadvantageous inequality, but our experiment is underpowered to provide precise estimates.[24] A fully rational self-interested agent would have parameters $\alpha_i = \beta_i = 0$.

We use two methods to estimate these parameters: a set identification by considering which values of α_i and β_i are consistent with the choices made and a maximum likelihood estimation of a multinomial logit model. Set identification gives an idea of the potential bounds on the parameters, while maximum likelihood gives a point estimate of the parameters that predicts the observed data the best.

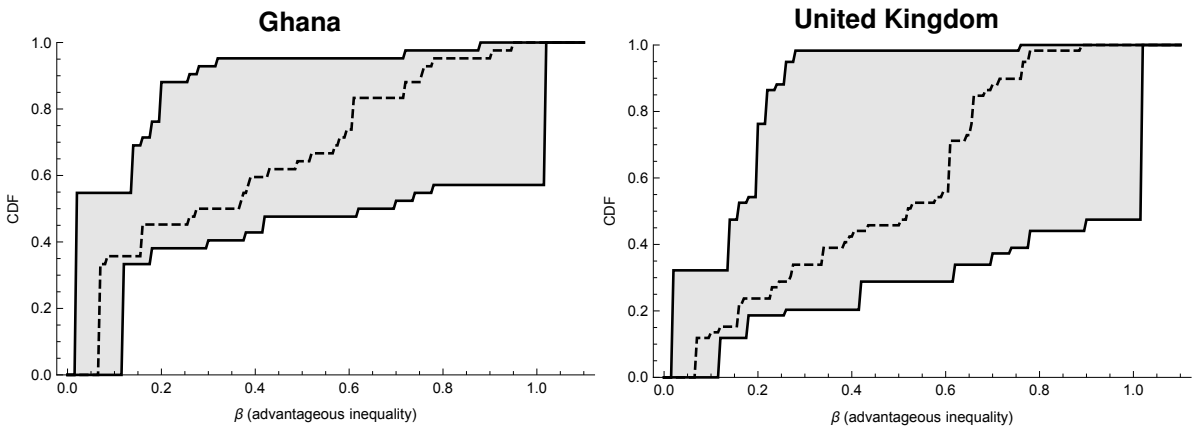
Set identification For the set identification, we construct bounds on the parameters α_i and β_i by calculating for each realized choice in each period the set of values of α_i and β_i for which this choice maximizes utility. Next, for each worker in each five period game, we calculate the overlap in the sets from each period. For 33.9% of the workers in Ghana and 23.9% of the workers in the UK we find that the sets overlap in all periods. For 71.2% of the workers in Ghana and 61.4% of the workers in the UK we find that the sets overlap in at least four out of the five periods. For the rest of the analysis, we focus on the group of workers with an overlap in at least four out of five periods.

This allows us to construct the potential range of cumulative distribution functions (CDFs) for α_i and β_i. Figure 7 shows the potential cumulative distribution function for β_i. Figures 7a and 7b show the CDFs for the values that overlap in four out of the five periods, while Figures 7c and 7d show the CDFs for the sets in period 5 only. In the Appendix B.8 we show the corresponding CDFs of α_i, but as noted before, our experiment is not particularly informative on the values of this parameters.

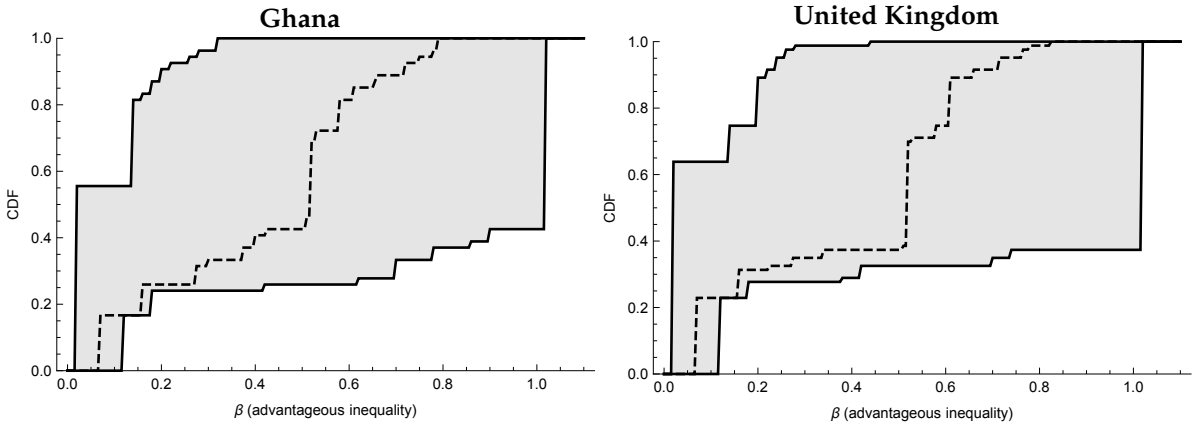
These CDFs shows that there is substantial heterogeneity in the β_i values of the workers in both countries. From Figures 7a and 7b we can see that in Ghana for 45% of the workers the value of β_i is 0.14 or higher. The corresponding share in the United Kingdom is 67%. These workers could be typed as reciprocal: workers with a β_i of 0.14 will choose medium or high effort if the wage is sufficiently high. For 33% of the workers in Ghana and 12% of the workers in the United Kingdom we find a β_i that is lower than 0.13. This value of β_i corresponds to a choice of low effort, even for high wages, and these workers could be typed as being more "selfish". From these figures follow that the share of workers acting reciprocally is larger in the United Kingdom than in Ghana.

However, this analysis masks strategic changes in behaviour. As discussed earlier, in the Kreps model purely self-interested agents mimic the behaviour of "social" types up until the last period and

[24] As noted by Charness & Haruvy (2002), in the gift-exchange game most of the worker's choices involve payoff distributions where the worker earns more than the employer, i.e. where the worker faces advantageous inequality. These choices will therefore be informative about β_i, but not very much about α_i.



(a) All periods **(b)** All periods



(c) Period 5 only **(d)** Period 5

Figure 7: Cumulative distribution of β_i in treatment (1E).

in that period the agent will lower effort. In our analysis, workers acting this way will be typed as "fair", because they are behaving reciprocally in four out of five periods, while in reality they might not have reciprocal preferences, but are just acting out of their pure self-interest. Only in period 5 their "true" social preferences are revealed. Figures 7c and 7d are based on period 5 behaviour, and we see that the differences between the UK and Ghana disappear. In fact, the pattern is reversed and the share of workers acting reciprocally is higher in Ghana than in the United Kingdom: 44% of the workers in Ghana can be classified as having a β_i parameter of 0.14 or higher and 17% as having a β_i of 0.13 or lower. For the UK, these figures are respectively 36% and 23%.[25]

Maximum likelihood As an alternative approach to estimating α_i and β_i we can use a random utility model with multinomial logit choice probabilities and estimate α_i and β_i using maximum likelihood. The multinomial logit choice probabilities are based on the four options that a worker has: rejecting an offer or choosing low, medium or high effort. Table 15 shows the maximum likelihood population

[25]However, in both countries there is a substantial group of workers for whom we cannot bound their β_i parameter. For this group, either their behaviour is not captured by the Fehr-Schmidt model or the employer's wage offer does not allow for the identification of β_i. For example, for a low wage, choosing low effort is consistent with low values of β_i as well as very high values of β_i.

Table 15: Maximum likelihood population estimates of α and β of the Fehr-Schmidt model in Ghana and the United Kingdom

	Ghana			United Kingdom			Both countries (pooled)		
	(1) All periods	(2) Period 1	(3) Period 5	(4) All	(5) Period 1	(6) Period 5	(7) All periods	(8) Period 1	(9) Period 5
α (disadvantageous inequality aversion)	-0.0291^{*}	-0.0195	-0.0393	0.0238	-0.00935	0.0263	-0.0291^{*}	-0.0195	-0.0393
	(0.0171)	(0.0285)	(0.0296)	(0.0165)	(0.0303)	(0.0194)	(0.0163)	(0.0271)	(0.0281)
UK?							0.0529^{**}	0.0101	0.0656^{*}
							(0.0230)	(0.0403)	(0.0340)
β (advantageous inequality aversion)	0.147^{***}	0.158^{***}	0.141^{***}	0.213^{***}	0.208^{***}	0.181^{***}	0.147^{***}	0.158^{***}	0.141^{***}
	(0.00777)	(0.0106)	(0.0117)	(0.00886)	(0.0125)	(0.0125)	(0.00738)	(0.0101)	(0.0111)
UK?							0.0663^{***}	0.0497^{***}	0.0399^{**}
							(0.0114)	(0.0159)	(0.0166)
Observations	562	115	108	763	155	153	1325	270	261

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

Note: The parameters have been estimated using a random utility multinomial logit model, using all observations of the entire subject pool. Positive numbers indicate inequality aversion.

estimates of α and β for both countries. While the value of α is not significantly different from zero (at the 5% level), we find that the estimate of β is significantly larger than zero, at 0.147 in Ghana and at 0.213 in the UK. The estimate for the UK is significantly larger than in Ghana, even though the difference is smaller in period 5.

We repeat this estimation, but now for each worker individually, using the observations from all five periods of the game.[26] Figure 8 shows the distribution of β_i estimated using this procedure, for both Ghana and the UK. Just like in the CDF estimated by our set identification, the estimated β_i values tend to be higher in the UK than in Ghana. Nevertheless, in both countries we find a group of workers with a positive estimate of β_i that is significantly different from zero. Therefore, a conclusion that the workers are purely self-interested across the board is unwarranted.

Response of employers We can use the classification of workers with a low value of β_i and workers with a high value of β_i to look at the contracting behaviour of employers to these types across time. Figure 9 shows the wage offered and the earnings of the employers, grouped by whether we can classify them as having a β_i below 0.13 ("selfish") or a β_i above 0.13 ("fair"). We see that in the United Kingdom employers facing with a high β_i type lower their wage offers from period 3 onwards, while in Ghana the wage offers to these types remain high in all periods. Another difference can be seen in the bottom two graphs, which show the employer's payoff. In the United Kingdom employers facing low β_i types increase their payoffs from period 3 onwards, while Ghanaian employers keep making losses.[27]

[26] Unfortunately, our data is not rich enough to estimate β_i for a particular worker in a particular period. We can therefore not detect changes in behaviour, as is possible using the set identification method.

[27] In these graphs, reverse causality is a potential issue: low wage offers by employers might lead to more selfish behaviour by the worker. We can find some evidence for this in the United Kingdom, where the low β_i workers faced lower wages in the first period. Nevertheless, if we redo the analysis where we base the classification of β_i on the behaviour in game 2 and look at the response of the employer in game 3 or 4, we see very similar patterns.

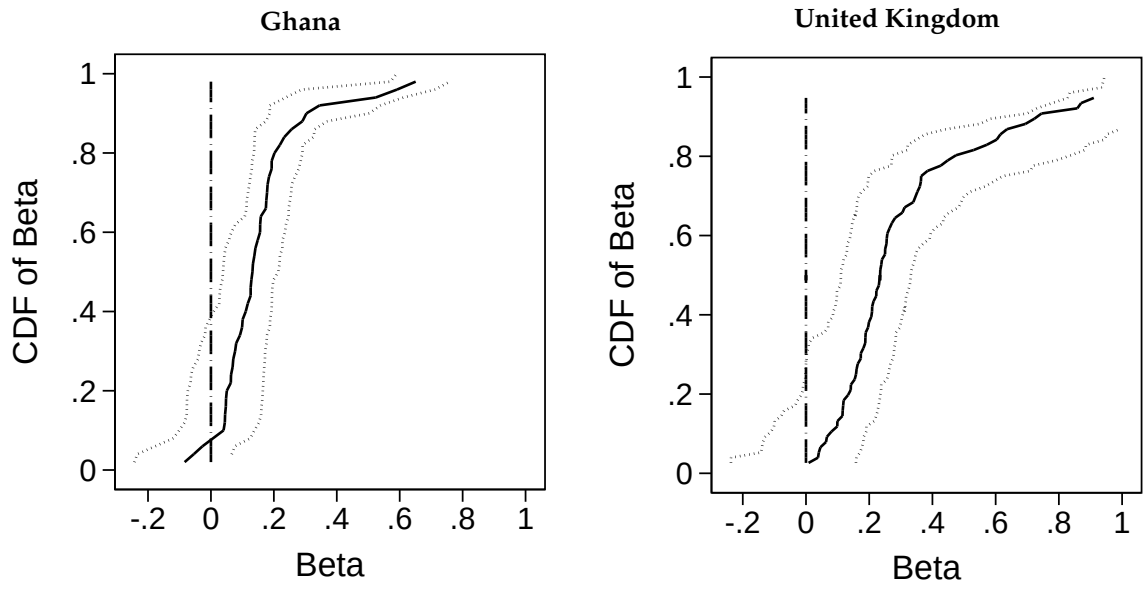


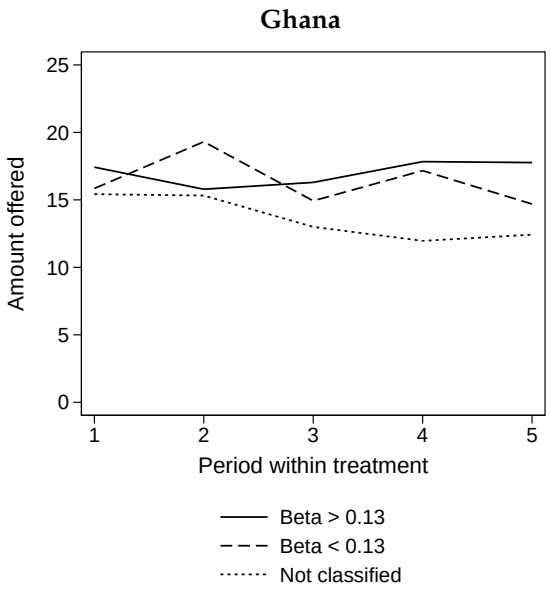
Figure 8: Cumulative distribution function of the estimated β_i using maximum likelihood estimation, based on treatment (1E).

5.3 Concluding remarks

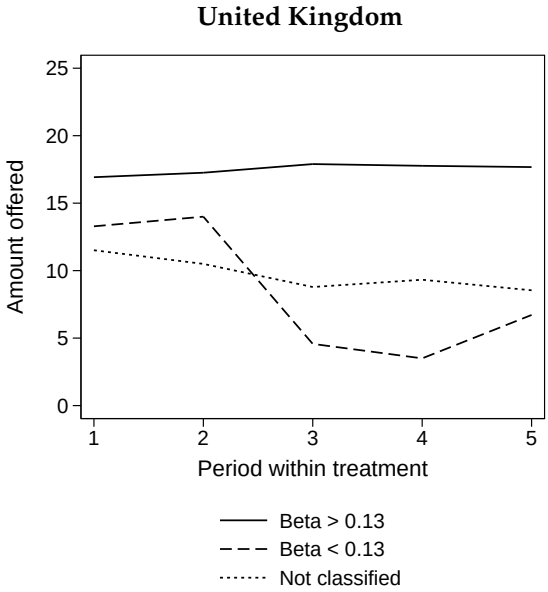
Earlier experiments with gift-exchange games in developed countries have shown strong support for cooperating behaviour and relational contracting, based on reciprocity. Our results in the United Kingdom support this. However, in our Ghanaian sessions we find low levels of effort and low levels of cooperation, especially on the side of the worker. A substantial group of workers chooses low effort, even after receiving "fair" offers, where a large share of surplus is given to the worker. We find a substantial degree of worker heterogeneity. We find little evidence for punishment behaviour on behalf of the employers: while their economic loss of a worker choosing low effort instead of high effort is 35 points, there is no significant decrease in the wage they offer to a worker choosing low effort in the next period. On average, despite low compliance, employers keep offering high wages, proposing an equal or better split of surplus.

Even though the low worker productivity found in our experiment in Ghana is in line with firm surveys in developing countries, the lack of punishment on behalf of the employers in our Ghanaian experiments is surprising. It differs from the behaviour found in the UK and is at odds with both predictions of prominent theoretical models of cooperation and other earlier experiments done in developed countries: just like in our UK treatments, in (Brown et al., 2004) and (Brown et al., 2012) employers punish poorly performing workers, even in a situation of a shortage of labour.

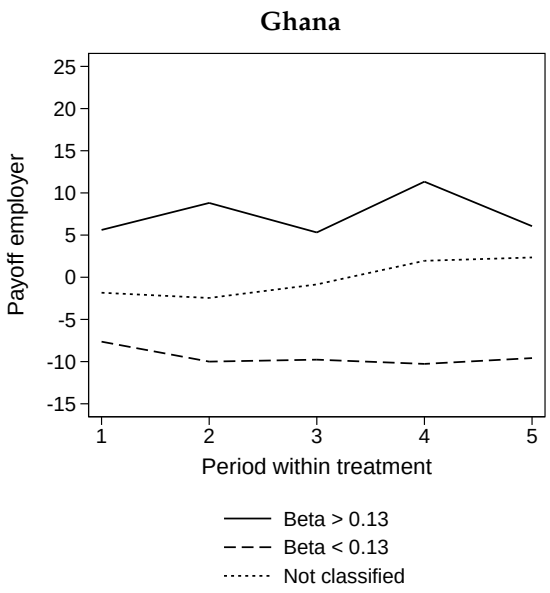
We believe that our results are not the result of a lack of understanding by the participants. In the game, we tried to make the payoffs under the different effort levels as salient as possible, by explicitly showing the possible payoffs under different levels of effort while making the offer. Also, in the rehiring stage we explicitly ask the employers to make conditional offers based on the effort chosen of the worker, encouraging the employers to think about what they would offer in the next period. Despite this encouragement, we do not find strong evidence for conditional contracting in the offer stage of the



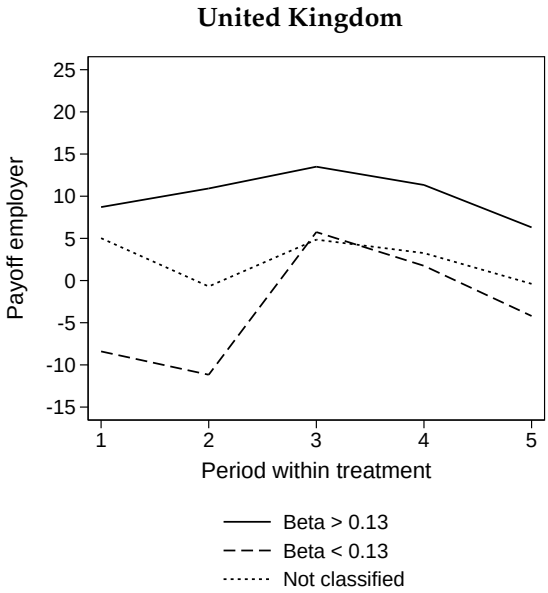
(a) Amount offered



(b) Amount offered



(c) Per period employer's earnings



(d) Per period employer's earnings

Figure 9: The amount offered by the employer and the per period employer's earnings when facing the "fair" type ($\beta_i \geq 0.13$) and the "selfish" type ($\beta_i < 0.13$). *Not classified* are workers for whom the potential range of β_i covers both values below 0.13 and above 0.13 or worker for whom we could not find an overlapping set for α_i and β_i in four out of five periods.

game.[28]

The next question is what our experiments capture about developing country labour markets. As noted in the introduction, the Ghanaian economy is characterized by a large informal employment sector. Recruitment for workers often happens informally, through social networks. This social dimension might mean that employers could be less likely to punish workers, since employment also serves a social function. Even though theory and some studies suggests that recruitment through social networks can increase effort (e.g., Montgomery, 1991; Bandiera et al., 2009), other studies have shown that incentives which result in workers receiving different wages can lead to opposite effects. For example, Breza et al. (2015) find that the effort of workers in India decreased after they received wages based on their past effort. This effect seems to be stronger when pay is relative and the effort of one worker imposes a negative externality on another worker (Bandiera et al., 2005). A field experiment in Ghana by Bandiera & Fischer (2013) showed that individual and group piece rate incentives did not lead to higher productivity, higher work quality or higher firm profits. One interpretation of our result is that employers internalize this norm while playing the game.

Another interpretation has to do with status and the expected levels of transfers that people with a certain status are expected to make to others in their surroundings. Our games were explicitly framed in labour market terms. However, introducing such a frame comes with strong cultural connotations of employers providing a living to employees. Even though roles are randomly assigned, by giving somebody the identity of being an employer and somebody else the identity of a worker, these identities could affect their fairness concerns. An employer could be seen as a person who is well off, which then could reduce the reciprocity motivations of the worker.[29]

Another question is to what extent wage cuts as opposed to termination of the relationship are effective as a punishment. In our experiments, firing is not a salient option, but it can be achieved by not making an offer to a worker. In the one-to-one treatments, there is no outside option for both the employer and the worker. Not making an offer essentially means that the employer will not have a worker for that period and players might refrain from that for that reason. Making firing a more attractive or salient option could increase the incentive to exert high effort. Nevertheless, the gift-exchange game experiment in Brown et al. (2012) showed that even when there is excess demand for labour (and firing is therefore relatively unattractive), there was little difference in contracting patterns compared to treatments with an excess supply of labour.

A further question to study is that employers rely on nonmonetary incentives instead of monetary incentives. They could vent their frustration with the worker's effort in different ways, for example by cursing at the person or spreading a negative reputation in their social networks. This is further explored in Davies & Fafchamps (2017).

[28] Note that in the rehiring stage, we do find some evidence for conditional reciprocity in some treatments. However, the difference between offers after low and high effort provision is small compared to the losses faced by the employer. See also appendix section B.7.

[29] In a pilot experiment, we switched roles halfway the experiment. The group that were employers after the switch did not behave differently from the group that were employers before the switch.

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Appendix

A Model of cooperation

A.1 Basic model of cooperation

For our model, we follow Kreps et al. (1982) as well as the Appendix of Brown et al. (2004). Let w be the wage offer. We assume there are two types in the population, a social type and a purely self-interested type:

Assumption 1. *There exist two types, a "social" type $S(\bar{w}_M, \bar{w}_H)$ and a rationally self-interested type R. The share of social types in the population is σ. The social type S-type will choose*

- *high effort if $w \geq \bar{w}_H$,*
- *medium effort if $\bar{w}_M \leq w < \bar{w}_H$,*
- *and low effort if $w < \bar{w}_M$.*

The threshold wages $\bar{w}_H$ and $\bar{w}_M$ are fixed and $\bar{w}_H > \bar{w}_M > 0$.

The rationally self-interested R-type will maximize monetary earnings across the game. The utility function of earnings in a particular period is

$$\pi_W(w, e) = w - c(e), \tag{4}$$

with $c(e)$ the cost of effort. We assume no discounting.

The employers are risk-neutral:

Assumption 2. *Employers are risk-neutral and maximize their monetary earnings, i.e. choose the wage w such that their payoff $\pi_E(w, e)$ is maximized, with*

$$\pi_E(w, e) = \Pi(e) - w. \tag{5}$$

Furthermore, we assume full knowledge of the relevant parameters:

Assumption 3. *The share social types σ and the threshold wages $\bar{w}_H$ and $\bar{w}_M$ are public knowledge.*

A.1.1 High effort equilibrium

Proposition 1. *Under certain conditions, a perfect Bayesian equilibrium exists in which the employer offers $\bar{w}_H$ in all periods, unless the worker deviates from the S-type behaviour, after which the employer will offer $w_L = 0$. The S-type worker chooses effort according to the offered wage throughout. The R-type mimics the actions of an S-type in all periods except for the final period, in which the R-type will choose low effort.*

We can use backward induction to prove the existence of such an equilibrium under certain conditions:

- In the last period, T, the R-type will choose low effort and the S-type will choose effort dependent on the offered wage, as described above. When offered a wage of zero, both types of workers accept the offer, as they are indifferent between rejection and acceptance, and both types will choose low effort.

- In the last period, the employer will choose the wage that gives the highest expected payoff. Let X_T be the history of play up until period T. The expected employer's payoff when offering w is

$$\begin{aligned} P(S|X_T)\Pi(H) + (1 - P(S|X_T))\Pi(L) - w \qquad & \text{if } w \geq \bar{w}_H, \\ P(S|X_T)\Pi(M) + (1 - P(S|X_T))\Pi(L) - w \qquad & \text{if } \bar{w}_M \leq w < \bar{w}_H, \\ \Pi(L) - w \qquad & \text{if } w < \bar{w}_M, \\ 0 \qquad & \text{if no offer is made.} \end{aligned}$$

  In the above $P_T(S|X_T)$ is the probability that the worker is a social type given history X_T.

  If the R-type mimics the social type until this period, the belief of the employer that the worker is of the S-type equals $P_T(S|X_T) = \sigma$. (For any other behaviour $P_T(S|X_T) = 0$ and the employer will offer $w_L = 0$.) The lowest wage possible to encourage high effort from the S-type is $\bar{w}_H$ and the lowest wage to encourage medium effort from the S-type is $\bar{w}_M$. The employer will offer $\bar{w}_H$ over $\bar{w}_M$ if

$$\Pi(H) - \Pi(M) \geq \frac{\bar{w}_H - \bar{w}_M}{\sigma}, \tag{6}$$

  and over $w_L = 0$ if

$$\Pi(H) - \Pi(L) \geq \frac{\bar{w}_H - w_L}{\sigma} = \frac{\bar{w}_H}{\sigma}. \tag{7}$$

  If the employer is presented with a worker that does not choose according to how an S-type chooses, $P_T(S|X_T) = 0$, and the employer will offer a wage of $w_L = 0$.

- In period $T - 1$ the R-type worker will mimic the actions of the S-type if the sum of payoffs in period $T-1$ and period T of doing so outweighs the payoffs of choosing low effort. The incentive compatibility constraint for the R-type worker in period $T - 1$ becomes, when $\bar{w}_H$ is offered,

$$\bar{w}_H - c(H) + \bar{w}_H - c(L) \geq \bar{w}_H - c(L) + w_L - c(L).$$

  so

$$\bar{w}_H \geq c(H).^{30} \tag{8}$$

- Given that the R-type will mimic the S-type in period $T - 1$, the earnings in this period are respectively $\Pi(H) - \bar{w}_H$, $\Pi(M) - \bar{w}_M$ and $\Pi(L)$ when offering $\bar{w}_H$, $\bar{w}_M$ and $w_L = 0$. The employer

[30] When this condition holds, the worker will also mimic the S-type when offered $\bar{w}_M$ in this period, because if $c(H) > c(M)$,

$$\bar{w}_M - c(M) + \bar{w}_H - c(L) \geq \bar{w}_M - c(L) + w_L - c(L).$$

will offer $\bar{w}_H$ if

$$\Pi(H) - \Pi(M) \geq \bar{w}_H - \bar{w}_M \qquad \text{and} \qquad \Pi(H) - \Pi(L) \geq \bar{w}_H \tag{9}$$

Note that these conditions are satisfied when conditions (6) and (7) are satisfied.

- We can repeat this exercise for the earlier periods and show that conditions (8) and (9) need to hold in these periods as well.[31]

Provided conditions (6), (7), (8) and (9) hold, the Perfect Bayesian equilibrium as described in Proposition 1 holds.

A.1.2 Alternative Perfect Bayesian equilibria

For other conditions, other Perfect Bayesian equilibria exist, for example in which the employer offers $\bar{w}_H$ in the first periods and then offers $\bar{w}_M$ in the last period, or in which the employer offers $\bar{w}_M$ throughout.

The equilibrium in which $\bar{w}_M$ is offered in the last period, and $\bar{w}_H$ in the periods before that, can exist under the following conditions:

- In the final period, the employer will offer $\bar{w}_M$ provided this yields a higher payoff than offering $\bar{w}_H$ or zero, so if

$$\Pi(H) - \Pi(M) \leq \frac{\bar{w}_H - \bar{w}_M}{\sigma} \qquad \text{and} \qquad \Pi(M) - \Pi(L) \geq \frac{\bar{w}_M}{\sigma}, \tag{10}$$

- In period $T-1$, the R-type worker will mimic the S-type worker and choose high effort following $\bar{w}_H$ if

$$\bar{w}_H - c(H) + \bar{w}_M - c(L) \geq \bar{w}_H - c(L) + w_L - c(L),$$

$$\bar{w}_M > c(H). \tag{11}$$

and choose medium effort following $\bar{w}_M$ if

$$\bar{w}_M - c(M) + \bar{w}_M - c(L) \geq \bar{w}_M - c(L) + w_L - c(L),$$

$$\bar{w}_M > c(M). \tag{12}$$

- In period $T-1$ $\bar{w}_H$ is the optimal wage if

$$\Pi(H) - \Pi(M) \geq \bar{w}_H - \bar{w}_M \qquad \text{and} \qquad \Pi(H) - \Pi(L) \geq \bar{w}_H \tag{13}$$

[31] E.g., the R-type worker in period t will choose high effort if

$$\bar{w}_H - c(H) + (T-t)\bar{w}_H - (T-t-1)c(H) - c(L) \geq \bar{w}_H - c(L) + (T-t)w_L - (T-t-1)c(L) - c(L),$$

which is equivalent to

$$\bar{w}_H \geq c(H).$$

- For periods $t < T-1$ the R-type will choose high effort following $\bar{w}_H$ if

$$\bar{w}_H - c(H) + (T-t-1)(\bar{w}_H - c(H)) + \bar{w}_M - c(L) \geq \bar{w}_H - c(L) + (T-t)(w_L - c(L)),$$

$$\Rightarrow \qquad \bar{w}_H \geq \frac{(T-t)c(H) - \bar{w}_M}{T-t-1}, \tag{14}$$

  which is implied by condition (11).[32]

Proposition 2. *Under conditions* (10), (11) *and* (13) *a Perfect Bayesian equilibrium is possible in which the employer offers $\bar{w}_H$ in all but the final period and $\bar{w}_M$ in the final period to workers that choose according to the wage-effort schedule of the S-type and zero to other workers. R-type workers will choose according to the S-type schedule up until the second to last period and choose low effort in the last period.*

The main difference between the all high wage equilibrium and this equilibrium is that the expected payoff in the last period from offering $\bar{w}_H$ is not high enough, for example if there are too few S-types in the population. Offering $\bar{w}_M$ in the last period will yield a higher payoff in expectation. In the periods before that offering $\bar{w}_H$ is - in expectation - the most profitable choice, as both the R- and the S-type will reciprocate this with high effort (see condition (13)).

There are also equilibria possible where the employer offers $\bar{w}_M$ throughout. This will be the case when condition (13) is violated, and the wage differential $\bar{w}_H - \bar{w}_M$ is higher than the profit differential $\Pi(H) - \Pi(M)$. For these wage levels, even if the entire population were S-types, offering $\bar{w}_M$ would be more profitable than offering $\bar{w}_H$.

A.2 Microfoundations of other-regarding behaviour

The model in the previous section did not provide a microfoundation for the behaviour of the social S-type, but rather assumed that this type would choose according to a schedule. A common model to provide such a microfoundation is the Fehr-Schmidt model of inequality aversion, where the individual utility function is defined by

$$U_i(x_i, x_j) = x_i - \alpha_i \max(x_j - x_i, 0) - \beta_i \max(x_i - x_j, 0).$$

In this equation α_i represents the disutility from having a lower payoff than the other player and β_j represents the disutility of having a higher payoff than the other player. Generally, it is assumed that $\alpha_i \geq \beta_i$: a player has a higher disutility from disadvantageous inequality (represented by α_i) than from advantageous inequality (represented by β_i).

Figure 10 shows the relation between β_i and the threshold wages $\bar{w}_M$ and $\bar{w}_H$, taking α_i fixed at 0.5 and using the parameters from our experiment. When both α_i and β_i are fixed at 0.5, the corresponding threshold wages are $\bar{w}_M = 8$ and $\bar{w}_H = 19$.

[32] We can rewrite the left had side of (14) using condition (11):

$$\frac{(T-t-1)w_H + w_M}{T-t-1} > \frac{(T-t-1)w_M + w_M}{T-t-1} = \frac{(T-t)w_M}{T-t-1} \geq \frac{(T-t)\,c(H)}{T-t-1}$$

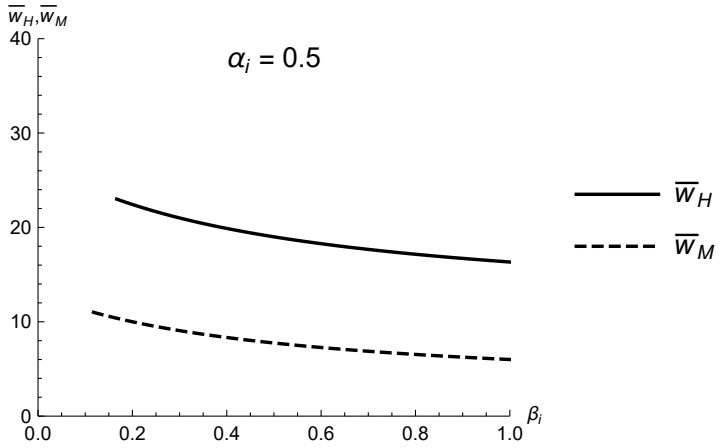

Figure 10: The levels of $\bar{w}_H$ and $\bar{w}_M$ as a function of β_i in the Fehr-Schmidt framework (using $\alpha_i = 0.5$ and the parameters from the game).

Other classes of utility functions exist that result in similar threshold wages. For example, a model of altruism with a linear weighting of individual utility functions, e.g.,

$$U_i(x_i, x_j) = \gamma v(x_i) + (1 - \gamma)v(x_j)$$

will lead to the worker choosing high effort for high wages, medium effort for medium-level wages and low effort for low wages, provided the individual value functions $v(x_i)$ are sufficiently concave.[33]

A.3 Screening and incentives

In the Perfect Bayesian equilibrium an employer observing low effort following a wage offer of $\bar{w}_M$ or $\bar{w}_H$ will infer from this that the worker is a R-type worker and subsequently reduce the wage to zero. This reduction of the wage following low effort provides the basis of the incentive compatibility constraint (8). The screening mechanism used by the employer provides the incentive for the R-type worker to exert high effort.

In the model, screening is perfect and instant: if the worker chooses low effort following a high wage, the worker is singled out as an R-type and will be offered zero wages for the remaining periods. There is no rationale for still offering a high wage following low effort. Such a rationale could be provided by models where the effort choice is not perfect. Suppose we introduce a small margin of error in the decision of the R-type.

Assumption 4. *With probability $\rho < 1$ each period, a S-type worker will choose low effort.*

For simplicity, assume we play the game for only two periods. Suppose that in period 1 the worker received a high wage, $\bar{w}_H$, but chose low effort. The probability that the worker is a S-type is

$$P(S|\bar{w}_H, L) = \frac{P(L|\bar{w}_H, S)P(S|\bar{w}_H)}{P(L|\bar{w}_H, S)P(S|\bar{w}_H) + P(L|\bar{w}_H, R)P(R|\bar{w}_H)} = \frac{\rho\sigma}{\rho\sigma + P(L|R, \bar{w}_H)(1 - \sigma)}.$$

[33]Given that the payoff functions for both the worker and employer are linear in w, using a linear value function instead of a convex value function will result in either always the same effort choice, regardless of wage, or in a corner solution, or in indifference between two effort levels for all wages.

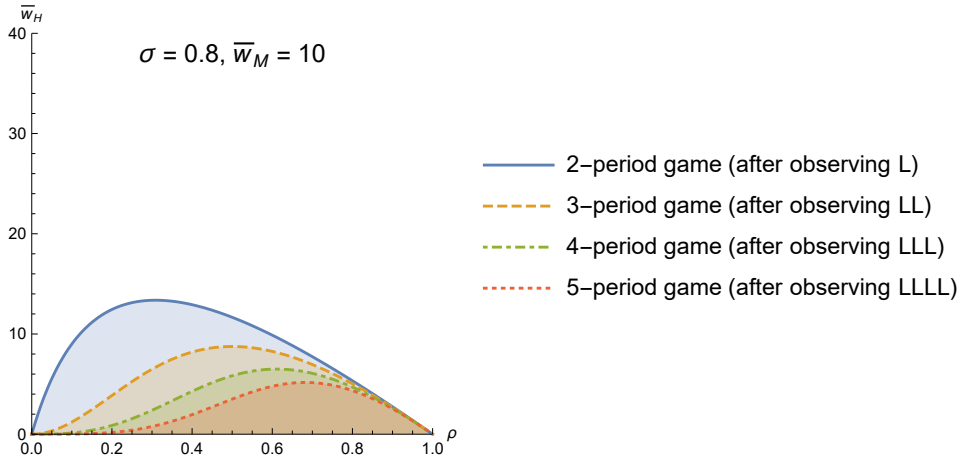

Figure 11: The maximum level of $\bar{w}_H$ for which it is rational for an employer to offer this wage, after observing low effort for one period (solid line), two periods (dashed line), three periods (dot-dashed line) and four periods (dotted line), as a function of ρ.

Now suppose the R-type always chooses low effort, so $P(L|R, \bar{w}_H) = 1$, does it make sense to offer $\bar{w}_H$ again? The employer will offer a high wage if

$$\begin{aligned} \bar{w}_H - \bar{w}_M &\leq \frac{\rho\sigma}{\rho\sigma + (1-\sigma)}(1-\rho)\left(\Pi(H) - \Pi(M)\right), \\ \text{and} \qquad \bar{w}_H &\leq \frac{\rho\sigma}{\rho\sigma + (1-\sigma)}(1-\rho)\left(\Pi(H) - \Pi(L)\right). \end{aligned}$$

If ρ and σ are sufficiently high and $\bar{w}_H$ sufficiently low, these conditions indeed hold, and it is optimal for the employer to offer high effort following low effort. Given this, it is optimal for the R-type to choose low effort in the first period.

If we add another period to the model, and look at whether it is still rational to offer high wage following two choices of low effort, we see that the conditions become even stricter: we require a higher level for ρ and σ and a lower level for $\bar{w}_H$:

$$\begin{aligned} \bar{w}_H - \bar{w}_M &\leq \frac{\rho^2\sigma}{\rho^2\sigma + (1-\sigma)}(1-\rho)\left(\Pi(H) - \Pi(M)\right), \\ \text{and} \qquad \bar{w}_H &\leq \frac{\rho^2\sigma}{\rho^2\sigma + (1-\sigma)}(1-\rho)\left(\Pi(H) - \Pi(L)\right). \end{aligned}$$

Figure 11 shows these conditions graphically, with $\sigma = 0.8$ and $\bar{w}_M = 10$, for the two-period game (solid line), the three-period game (dashed line), the four-period game (dot-dashed line) and the five-period game (dotted line), using the payoff parameters of our game. From the graph it can be seen that the maximum level of $\bar{w}_H$ that supports such an equilibrium is low for low values of ρ (if an employer sees low effort, the probability is high that the worker is an R-type), then increases for medium levels of ρ and finally decreases again (for high values of ρ offering $\bar{w}_H$ becomes to risky, because the probability that S-types choose low effort is high).

The Figure shows that when $\sigma = 0.8$, $\bar{w}_M = 10$, the highest level of $\bar{w}_H$ that can sustain offering

$\bar{w}_H$ following low effort in a 2-period game is 13, if $\rho = 0.3$. As discussed earlier, most other-regarding models point to values of $\bar{w}_H$ that are higher than this and therefore cannot sustain an equilibrium where high wages are offered following low effort. The equilibria where employers offer high effort following two instances of low effort require high values of ρ (i.e., the probability that an S-type makes a mistake must be high) and also $\bar{w}_H$ must be low (S-types are willing to exert high effort following a low wage).

Other equilibria exist, for example in which the employer lowers the wage from $\bar{w}_H$ to $\bar{w}_M$ following low effort. These equilibria can exist for higher levels of $\bar{w}_M$ and $\bar{w}_H$ and lower levels of ρ and σ.

B Further regressions and alternative specifications

B.1 Treatment effects

This section presents the treatment effects of the various treatments. The staggered sequence of treatments allows us to use both a within-subject as well as between-groups analysis. Furthermore, we can also apply difference-in-difference methods to measure the treatment effects.

We compare two treatments across two games at a time. One of the treatments functions as "control" treatment. Our notation is as follows: T_{ig} equals one if participant i receives the treatment in game g. D_i is time-invariant and equals one if participant i is in the treatment group and will receive the treatment at some point. P_g indicates the game and is equal to one for observations from the second game.

For example, if we compare treatments (1C) and (1E) across games 1 and 2, we treat (1C) as the control treatment and (1E) as the treatment of interest. The control group ($D_i = 0$) in this case consists of participants who were given treatment (1C) in both games, while the treatment group ($D_i = 1$) consists of the participants that received treatment (1C) in game 1 and treatment (1E) in game 2. T_{ig} equals one for observations from treatment (1E). P_g equals one for observations from game 2. Due to the incremental setup of our sequences (see Table 4), T_ig is equal to the interaction of D_i and P_g.

1. **Within-subject test.** For this test, we compare the outcome variable y of the same participant in the control in the first game and the treatment in the second game. Only participants from the treatment group are included, as they received the control in the first game and the treatment in the second game. This corresponds to running the following fixed-effect regression on the treatment group:

$$y_{igt} = \alpha_i + \beta_1 T_{ig} + \epsilon_{igt} \tag{15}$$

   The coefficient β_1 corresponds to the treatment effect.

2. **Between groups test.** For this test, we compare the outcome of the control group and the treatment group in the same game ($g = \bar{G}$), while receiving different treatments. We ignore the observations from the first game in which both groups received the control treatment. This corresponds to the following regression:

$$y_{i\bar{G}t} = \beta_0 + \beta_1 \, T_i\bar{G} + \epsilon_{i\bar{G}t} \tag{16}$$

3. **Difference-in-difference.** In the difference-in-difference test we correct for the common time trend of both groups across the two games. This corresponds to the following regression:

$$y_{igt} = \beta_0 + \beta_1 T_{ig} + \beta_2 P_g + \beta_3 D_i + \epsilon_{igt} \tag{17}$$

Here D_i is a time-invariant indicator on whether an individual is in the treatment group, P_g is an indicator for the second game. Note that in our setup, $T_{ig} = D_i \times P_g$.

4. **Fixed effects.** The fixed-effects regression is in its essence similar to the difference-in-difference regression, but exploits the full panel dimension of the data by controlling for individual characteristics. This approach has potentially more power. Just like in the difference-in-difference regression we rely on a common trend assumption for our estimation of the treatment effect. This corresponds to the following regression:

$$y_{igt} = \alpha_i + \beta_1 T_{ig} + \beta_2 P_g + \epsilon_{igt} \tag{18}$$

The main difference between this equation and Equation (17) is that in Equation (17) β_0 and β_3 are estimated on the basis of the entire sample, while in this equation α_i is estimated for each individual separately.

Tables 16, 17 and 18 present the effects of the treatments on the offered wages, surplus, the earnings of the worker and the employer, the rate of acceptance and the rate of compliance.

Table 16: Treatment effects.

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) DID	(4) FE	(5) Within	(6) Between	(7) DID	(8) FE
Panel A. Offered wage								
(1E) vs. (1C)								
Game 2 / Game 1	-4.025^{**}	-4.624^{*}	-2.207	-1.891	-5.698^{***}			
	(1.526)	(2.309)	(2.027)	(2.110)	(0.862)			
Game 3 / Game 1	-7.033^{***}	-6.896^{**}	-5.383^{***}	-5.140^{***}	-4.406^{**}			
	(1.184)	(2.354)	(1.282)	(1.448)	(1.473)			
Game 4 / Game 1	-7.128^{***}	-8.235^{**}	-6.722^{*}	-6.402^{*}	-4.406^{**}			
	(1.711)	(2.873)	(3.059)	(3.274)	(1.473)			
(3C) vs. (1C)								
Game 2 / Game 1	0.452	0.444	2.030	2.585				
	(0.795)	(2.112)	(1.580)	(1.646)				
Game 3 / Game 1	-2.513^{***}	0.439	-1.309	-0.621				
	(0.570)	(4.702)	(0.632)	(0.738)				
Game 4 / Game 1	-3.097	-1.587	-3.335	-2.372				
	(1.952)	(3.429)	(2.081)	(2.163)				
(3E) vs. (1E)								
Game 3 / Game 2	-0.617	1.428	1.903	1.765	0.911	-0.712	0.585	1.190
	(0.457)	(1.836)	(1.815)	(1.350)	(0.958)	(1.460)	(1.572)	(1.643)
Game 4 / Game 2	-2.079	-1.380	0.892	0.368	1.547	-0.386	0.862	1.653
	(1.705)	(3.057)	(2.835)	(1.785)	(1.245)	(1.180)	(1.606)	(1.753)
(3E) vs. (3C)								
Game 3 / Game 2	-5.146^{***}	-5.908	-5.374^{***}	-4.752^{***}				
	(0.951)	(4.503)	(1.196)	(1.045)				
Game 4 / Game 2	-6.998^{***}	-8.028^{**}	-7.187^{**}	-6.392^{**}				
	(1.448)	(2.838)	(2.445)	(2.604)				
(3ES) vs. (3E)								
Game 4 / Game 3	-2.145^{***}	1.506	-0.306	-0.262	1.681^{**}	-0.305	3.040^{***}	3.264^{***}
	(0.653)	(2.309)	(0.902)	(0.984)	(0.573)	(1.837)	(0.926)	(0.962)
Panel B. Surplus								
(1E) vs. (1C)								
Game 2 / Game 1	-7.675^{***}	-11.96^{**}	-9.017	-9.017	-10.06^{***}			
	(1.803)	(4.397)	(6.493)	(6.835)	(0.845)			
Game 3 / Game 1	-10.57^{***}	-16.97^{***}	-14.74^{***}	-14.74^{***}	-8.087^{***}			
	(1.285)	(1.528)	(1.577)	(1.658)	(1.297)			
Game 4 / Game 1	-11.06^{***}	-18.00^{***}	-15.77^{***}	-15.77^{***}	-8.087^{***}			
	(1.098)	(1.462)	(1.639)	(1.723)	(1.297)			
(3C) vs. (1C)								
Game 2 / Game 1	4.313^{***}	1.577	2.970	2.970				
	(0.954)	(4.105)	(6.469)	(6.811)				
Game 3 / Game 1	4.387	-1.522	0.215	0.215				
	(3.874)	(1.889)	(4.810)	(5.055)				
Game 4 / Game 1	3.293^{*}	-3.158	-1.421	-1.421				
	(1.746)	(2.503)	(2.665)	(2.800)				
(3E) vs. (1E)								
Game 3 / Game 2	-1.949^{**}	2.683^{*}	1.144	-0.789	3.258^{**}	2.127	2.604	2.604
	(0.826)	(1.295)	(2.639)	(2.625)	(1.395)	(2.403)	(2.305)	(2.427)
Game 4 / Game 2	-2.544	2.324	0.189	-0.894	6.267^{***}	2.433	2.527	2.527
	(1.910)	(2.091)	(3.860)	(3.071)	(2.010)	(2.136)	(2.585)	(2.721)
(3E) vs. (3C)								
Game 3 / Game 2	-12.47^{***}	-12.76^{***}	-17.21^{***}	-15.54^{***}				
	(1.576)	(2.553)	(3.456)	(3.831)				
Game 4 / Game 2	-13.23^{***}	-12.52^{***}	-16.29^{***}	-15.21^{***}				
	(2.855)	(2.509)	(2.281)	(3.580)				
(3ES) vs. (3E)								
Game 4 / Game 3	0.283	1.214	1.022	1.022	3.718^{***}	-1.377	2.785^{*}	2.785
	(1.710)	(2.171)	(1.971)	(2.076)	(1.018)	(2.909)	(1.452)	(1.528)

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

Note: Each cell corresponds to a separate regression. Standard errors are given in parentheses.

Table 17: Treatment effects (continued).

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) DID	(4) FE	(5) Within	(6) Between	(7) DID	(8) FE
Panel C. Employer's earnings								
(1E) vs. (1C)								
Game 2 / Game 1	-7.939^{***}	-13.70^{***}	-12.30^{***}	-12.30^{***}	-8.652^{***}			
	(1.326)	(2.617)	(3.034)	(3.194)	(0.590)			
Game 3 / Game 1	-8.350^{***}	-15.05^{***}	-12.88^{***}	-12.88^{***}	-7.480^{***}			
	(0.522)	(2.195)	(1.271)	(1.337)	(0.677)			
Game 4 / Game 1	-8.730^{***}	-14.96^{***}	-12.79^{***}	-12.79^{***}	-7.480^{***}			
	(1.229)	(2.556)	(1.741)	(1.830)	(0.677)			
(3C) vs. (1C)								
Game 2 / Game 1	2.103^{***}	-3.279	-2.254	-2.254				
	(0.652)	(2.594)	(3.162)	(3.329)				
Game 3 / Game 1	5.627	-3.537	1.098	1.098				
	(3.982)	(3.630)	(4.953)	(5.205)				
Game 4 / Game 1	4.960^{*}	-3.732	0.903	0.903				
	(2.621)	(2.379)	(1.404)	(1.475)				
(3E) vs. (1E)								
Game 3 / Game 2	-2.703^{***}	0.983	-2.522	-3.843	1.218	0.897	0.498	0.498
	(0.750)	(2.100)	(3.606)	(3.571)	(0.877)	(1.461)	(1.432)	(1.508)
Game 4 / Game 2	-2.256^{**}	2.764	-2.310	-3.016	4.059^{***}	0.855	0.0459	0.0459
	(0.765)	(2.618)	(2.819)	(2.729)	(0.890)	(1.194)	(1.712)	(1.801)
(3E) vs. (3C)								
Game 3 / Game 2	-10.76^{***}	-10.53^{**}	-15.71^{***}	-14.56^{***}				
	(1.569)	(4.028)	(2.769)	(3.234)				
Game 4 / Game 2	-10.06^{***}	-8.459^{***}	-13.89^{***}	-13.19^{***}				
	(2.387)	(1.897)	(1.552)	(2.472)				
(3ES) vs. (3E)								
Game 4 / Game 3	1.996	0.156	1.179	1.179	2.723^{***}	-0.943	0.0712	0.0712
	(1.625)	(1.200)	(1.697)	(1.787)	(0.538)	(1.365)	(0.836)	(0.880)
Panel D. Worker's earnings								
(1E) vs. (1C)								
Game 2 / Game 1	-0.520	4.455	1.164	1.205	-2.410			
	(0.630)	(3.657)	(3.368)	(3.957)	(1.882)			
Game 3 / Game 1	-3.421	7.279	-3.051	-4.265	1.354			
	(3.698)	(5.142)	(3.342)	(3.787)	(4.015)			
Game 4 / Game 1	-2.483	4.035	-3.216	-4.779	1.354			
	(2.451)	(4.227)	(4.096)	(3.419)	(4.015)			
(3C) vs. (1C)								
Game 2 / Game 1	2.641^{*}	5.771	4.969	4.365				
	(1.294)	(3.327)	(3.287)	(3.283)				
Game 3 / Game 1	1.321	9.840	0.428	0.478				
	(2.463)	(3.670)	(4.914)	(3.970)				
Game 4 / Game 1	0.818	7.111^{**}	1.023	-1.478				
	(6.853)	(1.534)	(4.804)	(7.535)				
(3E) vs. (1E)								
Game 3 / Game 2	0.840	-2.620	1.602	2.036	3.015	-0.290	0.139	0.261
	(2.461)	(3.164)	(4.295)	(5.360)	(2.111)	(3.411)	(3.680)	(3.724)
Game 4 / Game 2	0.996	-4.343	-3.295	-0.329	5.821^{**}	2.760	8.113	7.706
	(1.786)	(5.453)	(4.775)	(2.544)	(2.014)	(3.428)	(4.599)	(5.101)
(3E) vs. (3C)								
Game 3 / Game 2	-1.250	-5.181	1.963	1.042				
	(1.960)	(6.178)	(1.552)	(2.074)				
Game 4 / Game 2	-4.221^{***}	-7.419	-2.008	-3.683				
	(0.616)	(5.339)	(5.379)	(4.536)				
(3ES) vs. (3E)								
Game 4 / Game 3	-0.278	1.072	1.651	2.543	-1.916	-2.644	2.139	0.623
	(1.349)	(5.109)	(2.208)	(2.271)	(1.346)	(1.838)	(2.681)	(2.889)

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

Note: Each cell corresponds to a separate regression. Standard errors are given in parentheses.

Table 18: Treatment effects (continued).

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) DID	(4) FE	(5) Within	(6) Between	(7) DID	(8) FE
Panel E. Acceptance								
(1E) vs. (1C)								
Game 2 / Game 1	0.132***	0.144	0.185	0.176	0.0153			
	(0.0343)	(0.140)	(0.198)	(0.207)	(0.0189)			
Game 3 / Game 1	0.137*	0.0417	0.0497	0.0476	0.0376			
	(0.0686)	(0.0522)	(0.0674)	(0.0687)	(0.0358)			
Game 4 / Game 1	0.101*	0.0551	0.0631	0.0664	0.0376			
	(0.0501)	(0.0388)	(0.0735)	(0.0776)	(0.0358)			
(3C) vs. (1C)								
Game 2 / Game 1	−0.436***	−0.399**	−0.408*	−0.393				
	(0.0185)	(0.141)	(0.205)	(0.210)				
Game 3 / Game 1	−0.460***	−0.564***	−0.569**	−0.549**				
	(0.0797)	(0.0257)	(0.0823)	(0.0951)				
Game 4 / Game 1	−0.455***	−0.511**	−0.516**	−0.490**				
	(0.0453)	(0.0585)	(0.0740)	(0.0826)				
(3E) vs. (1E)								
Game 3 / Game 2	−0.533***	−0.597***	−0.539***	−0.534***	−0.361***	−0.401***	−0.379***	−0.361***
	(0.0232)	(0.0202)	(0.0354)	(0.0373)	(0.0428)	(0.0388)	(0.0529)	(0.0558)
Game 4 / Game 2	−0.517***	−0.554***	−0.492***	−0.478***	−0.406***	−0.499***	−0.510***	−0.484***
	(0.0465)	(0.0284)	(0.0546)	(0.0554)	(0.0730)	(0.0379)	(0.0580)	(0.0611)
(3E) vs. (3C)								
Game 3 / Game 2	−0.0235	0.00854	−0.0201	−0.0187				
	(0.0170)	(0.0312)	(0.0377)	(0.0399)				
Game 4 / Game 2	−0.0158	0.0122	−0.00618	−0.0171				
	(0.0207)	(0.0314)	(0.0344)	(0.0270)				
(3ES) vs. (3E)								
Game 4 / Game 3	−0.0112	−0.0125	−0.0143	−0.0144	0.0178	0.0267	0.0443	0.0409
	(0.0149)	(0.0164)	(0.0145)	(0.0160)	(0.0235)	(0.0433)	(0.0295)	(0.0313)
Panel F. Compliance								
(1E) vs. (1C)								
Game 2 / Game 1	−0.585***	−0.579***	−0.579***	−0.585***	−0.443***			
	(0.0401)	(0.0325)	(0.0325)	(0.0399)	(0.0334)			
Game 3 / Game 1	−0.590***	−0.598***	−0.598***	−0.590***	−0.413***			
	(0.0971)	(0.0884)	(0.0886)	(0.0935)	(0.0629)			
Game 4 / Game 1	−0.617***	−0.614***	−0.614***	−0.617***	−0.413***			
	(0.0919)	(0.0829)	(0.0831)	(0.0885)	(0.0629)			
(3E) vs. (1E)								
Game 3 / Game 2	−0.0353	0.0512	−0.0980	−0.113	0.0431	0.0213	−0.0473	−0.0524
	(0.0643)	(0.0958)	(0.157)	(0.168)	(0.0410)	(0.0672)	(0.0811)	(0.0830)
Game 4 / Game 2	−0.178	0.0161	−0.209	−0.232	0.186***	0.0394	−0.0167	−0.0168
	(0.145)	(0.0964)	(0.159)	(0.175)	(0.0262)	(0.0538)	(0.0682)	(0.0736)
(3E) vs. (3C)								
Game 3 / Game 2	−0.521***	−0.547***	−0.547***	−0.521***				
	(0.0632)	(0.0421)	(0.0421)	(0.0627)				
Game 4 / Game 2	−0.584***	−0.598***	−0.598***	−0.584***				
	(0.157)	(0.0729)	(0.0731)	(0.156)				
(3ES) vs. (3E)								
Game 4 / Game 3	0.0529	0.136	0.0643	0.0517	0.113**	−0.00452	−0.0310	−0.0406
	(0.0304)	(0.0813)	(0.0526)	(0.0598)	(0.0379)	(0.0406)	(0.0643)	(0.0686)

Note: Each cell corresponds to a separate regression. Standard errors are given in parentheses.

B.2 Excluding fixed effects

Table 19: Acceptance and compliance in treatment (1E), no fixed effects

	Ghana			United Kingdom			Both countries (pooled)		
	(1) Acceptance	(2) Compliance *(medium demand)*	(3) Compliance *(high demand)*	(4) Acceptance	(5) Compliance *(medium demand)*	(6) Compliance *(high demand)*	(7) Acceptance	(8) Compliance *(medium demand)*	(9) Compliance *(high demand)*
Wage	0.00688**	0.0145**	0.0139**	0.0205***	0.0371***	0.0453***	0.00688***	0.0145***	0.0139***
	(0.00183)	(0.00482)	(0.00424)	(0.00215)	(0.00983)	(0.00361)	(0.00171)	(0.00449)	(0.00395)
UK							−0.244***	−0.130	−0.374***
							(0.0589)	(0.211)	(0.127)
Wage × UK							0.0136***	0.0226*	0.0314***
							(0.00273)	(0.0108)	(0.00534)
Constant	0.803***	0.317	−0.0512	0.559***	0.187	−0.425***	0.809***	0.314***	−0.125*
	(0.0490)	(0.168)	(0.0830)	(0.0373)	(0.142)	(0.101)	(0.0384)	(0.0842)	(0.0700)
N	478	160	224	763	217	358	1241	377	582
Adjusted R^2	0.225	0.513	0.297	0.316	0.398	0.450	0.238	0.235	0.433
Fixed effects	None	None	None	None	None	None	None	None	None
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes†	Yes†	Yes†

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

† Columns (7), (8) and (9) also include the interaction of the period dummies with the country dummy.

Note: This is a linear probability model regression of acceptance and compliance on the wage offered, without fixed effects (see Table 6 for the table with fixed effects). *Acceptance* is an indicator variable and is equal to one if the worker accepted the offer. *Compliance* is an indicator variable and is equal to one if the worker chooses the effort level specified by the employer, or a higher effort level. For the *Compliance (medium demand)* and *Compliance (high demand)* columns the regression only includes observations where medium or high effort was demanded by the employer. Standard errors are clustered by session.

Table 20: Linear regression of wage offers on rejection and previous compliance in treatment (1E), without fixed effects.

	Ghana		United Kingdom	
Dependent variable: Wage offer in period t	(1)	(2)	(3)	(4)
Rejection in period $t-1$?	−1.195	−1.093	1.677**	1.690*
	(1.448)	(1.397)	(0.712)	(0.944)
Compliance in period $t-1$?	0.789		7.558***	
	(0.807)		(1.034)	
Compliance in period $t-1$? (high effort demanded)		1.799		13.01***
		(2.357)		(1.000)
Compliance in period $t-1$? (medium effort demanded)		1.252		5.308***
		(0.969)		(1.314)
Constant	13.82***	13.12***	8.602***	7.572***
	(2.640)	(3.521)	(1.319)	(1.021)
Observations	380	380	608	608
R^2	0.0475	0.0496	0.158	0.266
Adjusted R^2	0.0136	0.0132	0.139	0.249
Fixed effects	None	None	None	None
Period dummies	Yes	Yes	Yes	Yes

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

Note: This is a linear regression of wage offered on previous compliance and rejection, without fixed effects. *Rejection* is an indicator variable and equal to one if the worker rejected the offer. *Compliance* is an indicator variable and equal to one if the worker chose the effort level demanded by the employer, or a higher level. Only wage offers in period 2-5 are included. Standard errors are clustered on the session level.

B.3 Interaction terms

Table 21: The relation between wages offered, past compliance and past rejection, including an interaction term

	Both countries (pooled)	
Dependent variable: Wage offer in period t	(1)	(2)
Rejection in period $t-1$?	-1.172	-1.043
	(1.309)	(1.292)
Compliance in period $t-1$?	0.221	
	(0.923)	
Compliance in period $t-1$? (high effort demanded)		0.678
		(2.285)
Compliance in period $t-1$? (medium effort demanded)		0.822
		(0.973)
UK $\times$ Rejection in period $t-1$?	3.684^{**}	3.676^{**}
	(1.521)	(1.528)
$\times$ Compliance in period $t-1$?	6.092^{***}	
	(1.502)	
$\times$ Compliance in period $t-1$? (high effort demanded)		9.544^{***}
		(2.750)
$\times$ Compliance in period $t-1$? (medium effort demanded)		4.047^{**}
		(1.689)
Constant	13.25^{***}	12.85^{***}
	(0.662)	(0.629)
Observations	988	988
R-squared	0.0669	0.0882
Adjusted R-sq	0.0545	0.0742
Fixed effects	Employer	Employer
Period dummies	Yes	Yes

Standard errors in parentheses
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

B.4 Alternative specifications

Table 22: Alternative specifications of Table 8

	Ghana		**United Kingdom**	
	(1) Wage$_t$	(2) Δ Wage$_t$	(3) Wage$_t$	(4) Δ Wage$_t$
Wage in period $t-1$	0.0850		0.326^{***}	
	(0.0995)		(0.0740)	
Compliance in period $t-1$?	0.254	-0.653	6.065^{***}	5.582^{***}
	(0.896)	(1.599)	(1.073)	(1.188)
Rejection in period $t-1$?	-0.767	5.198^{**}	4.751^{***}	9.855^{***}
	(1.772)	(1.612)	(1.116)	(1.522)
Constant	15.46^{***}	0.0808	6.145^{***}	-3.998^{***}
	(2.878)	(1.227)	(1.126)	(0.685)
Observations	371	371	595	595
R-squared	0.0594	0.0565	0.239	0.205
Adjusted R-sq	0.0224	0.0221	0.221	0.187
Employer fixed effects	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 23: Alternative specifications of Table 8

	Ghana		United Kingdom		Both countries (pooled)	
Dependent variable: Wage offer in period t	(1)	(2)	(3)	(4)	(5)	(6)
Medium effort$_{t-1}$	2.502*	3.167**	3.989***	3.072**	2.502**	3.167***
	(1.065)	(0.916)	(1.195)	(1.110)	(0.995)	(0.856)
High effort$_{t-1}$	2.951	4.231*	9.583***	7.823***	2.951	4.231**
	(1.831)	(1.791)	(1.275)	(1.508)	(1.711)	(1.673)
Positive surprise$_{t-1}$		0.887		0.270		0.887
		(1.043)		(1.985)		(0.974)
Negative surprise$_{t-1}$		1.725***		−2.132**		1.725***
		(0.339)		(0.976)		(0.317)
UK × Medium effort$_{t-1}$					1.487	−0.0950
					(1.545)	(1.392)
× High effort$_{t-1}$					6.632***	3.592
					(2.126)	(2.242)
× Positive surprise$_{t-1}$						−0.616
						(2.193)
× Negative surprise$_{t-1}$						−3.857***
						(1.017)
Constant	14.49***	13.34***	5.677***	7.416***	9.221***	9.796***
	(2.197)	(2.106)	(1.447)	(1.499)	(1.189)	(1.188)
Observations	416	416	619	619	1035	1035
R-squared	0.0741	0.0818	0.263	0.273	0.182	0.191
Adjusted R-sq	0.0369	0.0402	0.243	0.251	0.156	0.162
Employer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

B.5 Extensive-form representation

Figure 12 shows an extensive form representation of the game.

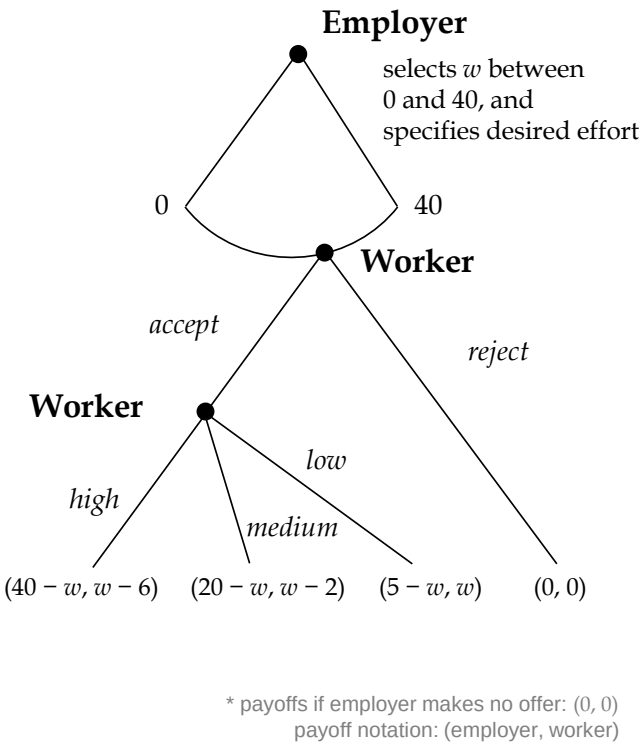

Figure 12: Extensive-form representation of the game

B.6 Fairness and effort choice

Figure 14 shows the effort choice corresponding to the α_i and β_i parameters of the Fehr-Schmidt model in a one-shot interaction.

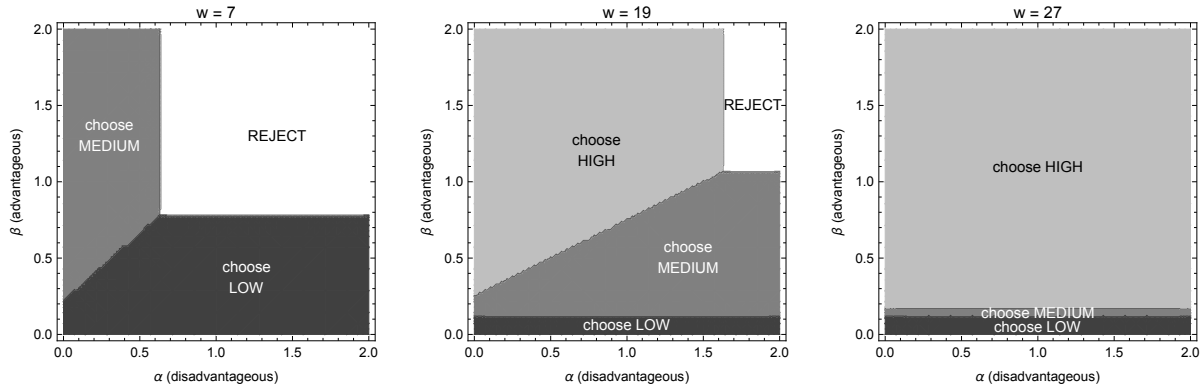

Figure 13: Expected behaviour by worker in the fairness model for different parameters of α_i and β_i, as response to the wage w offered by the employer. Figure 14 shows expected behaviour for all possible values of the wage w.

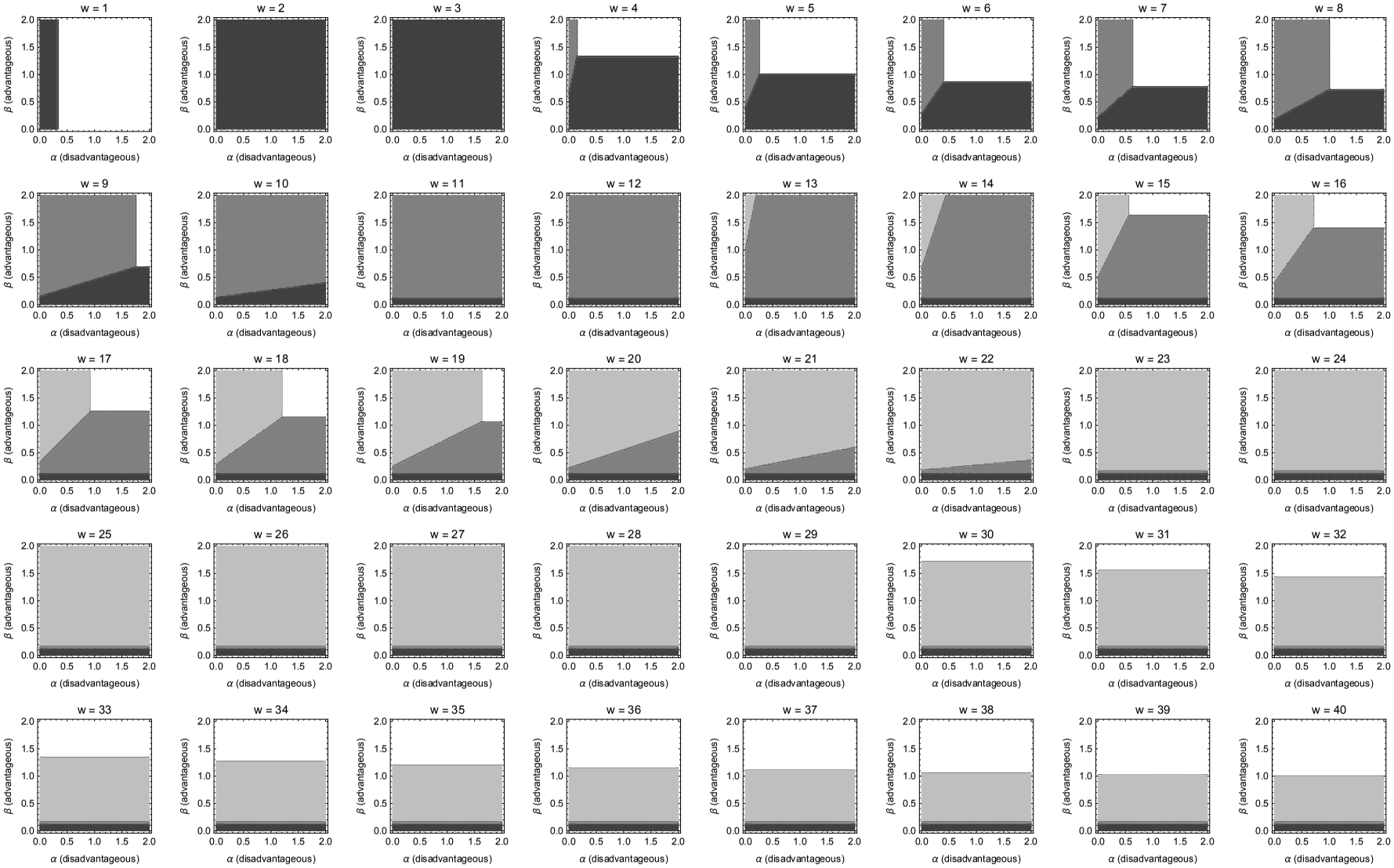

Figure 14: Expected behaviour by worker in the fairness model for different parameters of α_i and β_i. The shading indicate different effort levels (see also Figure 13.

B.7 Rehiring behaviour of employers

Dependent variable: Wage offered	(1) (1E)	(2) (3E)	(3) (3ES)
Medium effort exerted	4.139**	0.0258	0.650
	(1.230)	(0.343)	(1.521)
High effort exerted	6.749*	0.173	-0.640
	(2.855)	(0.320)	(1.305)
Constant	13.41***	13.38***	12.95***
	(1.750)	(0.169)	(0.626)
Observations	133	579	309

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 24: The amount offered by the employer to the worker in the rehiring stage in treatments (1E), (3E) and (3ES). Standard errors are clustered on the session level.

In the rehiring stage, we ask the employers for each of the possible effort levels whether they would like to make an offer to the worker again, and what the offer would be. Similarly, the workers are asked for their minimum wage in order to accept an offer. On average, 27.4% of the employers specify offers in the rehiring stage. Only a small share of trades is initiated through this rehiring: around 2-3 percent.

The Table above shows a regression of the amount offered by the employer to the worker, with the level of effort chosen by the worker as one of the regressors. In the (1E) treatment, we find that high effort is rewarded with a wage that is 6.7 points higher than a low effort offer (significant at the 10% level). A medium effort offer is rewarded with a wage that is 4.2 points higher and is significant at the 5% level. We do not find significant differences in the (3E) and (3ES) treatments.

These results show that there is some presence of conditional contacting by employers. However, the differences in wages are small and not sufficient to cover the losses incurred by low effort provision (the difference in the payoff to the employer between high and low effort provision is 35 points).

B.8 Classifying worker types

This appendix section describes the classification of types for the estimation of the structural model in a more detailed way. As a starting point, we assume that in every period the workers choose according to Fehr-Schmidt preferences:

$$U_i(x) = x_i - \alpha_i \max(x_j - x_i, 0) - \beta_i \max(x_i - x_j, 0)$$

Figure 14 shows the areas of α_i and β_i that are consistent with making a particular choice. For each worker, using these sets of values, we can take his or her choices, and plot the value sets of α_i and β_i that are consistent with this choice for the five periods in each game:

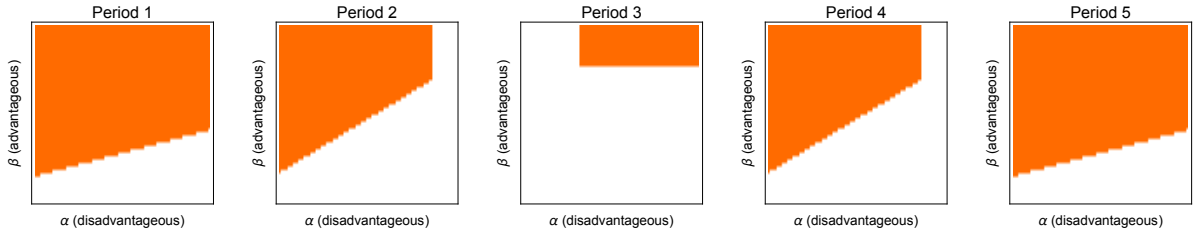

Figure 15: The value sets of α_i and β_i consistent with the choice made by one worker in the five periods of a game.

Next, we can overlap the areas with each other and then consider the set of values which are consistent with at least four out of the five choices made by a worker:

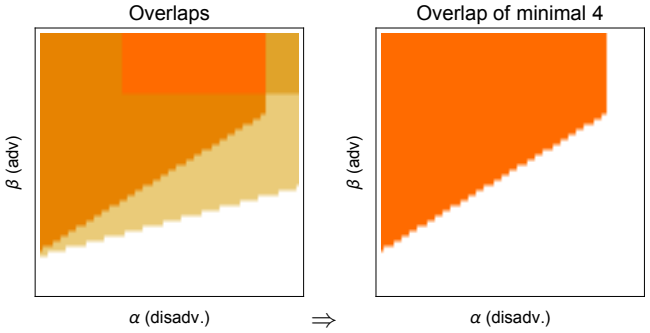

Figure 16: The overlapping area of α_i and β_i for one worker.

We repeat this process for each worker, and using this way, derive bounds for α_i and β_i.

C Instructions

Script

Below is an excerpt of the script used in the experiment for our British sessions. For our Ghanaian sessions the same script was used, with the exception of the references to the currency used for payment.

"Good morning. / Good afternoon. My name is Elwyn Davies. I am a researcher at the University of Oxford. This is [...], who will be helping out today.

Welcome to this session of the experiment. This experiment is part of a wider study done by the University of Oxford on entrepreneurship and firms. The goal is to see how people behave in a virtual marketplace. Please remain silent during the entire duration of the experiment. *Please turn off any mobile phones.*

During this session you will earn points. These points will be converted to pounds at the end of the session. *100 points is equal to 3 pounds.* You will receive this amount in private at the end of the session. You will also receive a show-up payment of 4 pounds. All earnings will be rounded up to the next 10p.

I will explain more about this experimental session later on. First, I will talk about how to use the tablet. You will use the tablet to make choices in this experiment. Please have a look at your tablet and read the message. If you are done reading, press OK.

Make sure to touch the screen gently. Do not press it too hard.

If, at any point, you have a question about the experiment, please raise your hand and we will come to your desk to answer your question in private.

(Wait.)

We are now going to practice how to make offers. In this game you will be either an employer or a worker. Employers make offers to the workers. I will talk about that more later on. First we will practice how to make an offer.

Please press the green Make Offer button. You will see a new screen in which you can make an offer. You always have to indicate two things. First you always need to select the level of effort you demand from the worker, by pressing Low, Medium or High.

Please press Low, Medium or High.

Your selected choice becomes yellow.

Now try to change your choice. For example: from High to Low, and from Low to Medium.

Second, you need to select an amount of compensation, on the right part of the screen. Please touch here, and select a number. The number has to be between 0 and 40. After selecting a number, please change the number, for example from 0 to 5, or from 32 to 37. And then change the number again.

On the bottom left of the screen you can see graphs. These graphs show you how much you can earn if the worker accepts the offer. Please change the number on the right hand side, and see how the graphs change as well. Yellow means that you are earning money, gray means that points will be deducted.

Click on OK if you want to make the offer. You can also click on Cancel, or on Delete offer, if you don't want to make an offer to the worker. After clicking on OK, you will see the offer you have made. If you want to change the offer, click on Change offer.

If you have any questions, please ask them. We will come to your desk to answer them.

(Wait until everybody is done.)

I will now talk about the experiment itself and what we are going to do.

Some of you will be employers, some of you will be workers. We will determine by chance which role you get.

Each period the employers start by making offers to the workers. Each offer must specify a level of effort and an amount of compensation. The workers then choose to accept or reject an offer. If they reject an offer, both get zero points.

If the worker accepts the offer, the worker will work for the employer. This work gives a profit to the employer, but working hard is tiring for the worker, so the worker will get less.

There are three levels of effort: high, medium and low.

- High effort means that the employer gets 40 points. The worker will lose 6 points.
- Medium effort means that the employer gets 20 points. The worker will lose 2 points.
- Low effort means that the employer gets only 5 points, but the worker will not lose anything.

We will hand out a paper to remind you about this. You can also use the graphs to help you with the calculation.

The effort level chosen is the same as what the employer demanded: the worker can only choose the effort level demanded by the employer.

So the points you get each round are as follows:

- As a worker, you get the amount offered *minus* the cost of effort, which is 6, 2 or 0 points.
- As an employer, you get the profit of 40, 20 or 5 points *minus* the payment to the worker.

Remember, the graphs will remind you of what you can earn when making an offer.

Please let us know if you have any questions about this. We will have two rounds of practice. **(Walk around and check for questions.)**

(Initialize the main game by pressing the Start button on the admin screen.)

The screen will now tell you whether you are a worker or an employer. Please press OK to continue. We will first play two rounds of practice. No points can be lost or earned. Please press OK to continue. If you see a waiting screen, please wait. You will see this screen a couple of times during the experiment. You will have to wait until everybody is finished making their choices.

(Wait until everybody has clicked OK twice)

We are now in the first practice period. If you are an employer, please make an offer by selecting a number on the gray bar. And then press Submit. Make sure to do this before the time runs out.

(Wait until the workers can choose.)

Now the workers can choose to accept or reject the offer. If you want to accept the offer, press Select. Then click OK. For this practice round, make sure to accept the offer, so that you know how this works.

Make sure to do this before the time runs out. At the top of the screen you can see how many minutes are still remaining.

If you have accept an offer, we will ask you how many points you need in the next round to accept the offer. For example, if you select 30, you will accept all offers of 30 and higher, and reject the offers of 29 and lower.

We will also ask the employers what they would like to offer to you. If both of you agree, you will automatically accept the offer in the next period. If you don't accept, the employer will make you an offer again in the next period, just as before.

(At the end of the two practice periods.)

We will now play for real points, that will be converted to pounds at the end of the session. If you have any questions, please raise your hand and we will come to your desk to answer them.

You will have the same worker or employer for the next five periods. The letter on your screen *does not* correspond to the letter on the desk: they are different. You cannot tell who in the room your worker or employer is.

You can check your number of points by pressing the **Show history** button during the experiment. You can then also see what has happened in the previous rounds.

Press *I am ready* to continue.

(Part 2: Treatment (1E))

We have now finished the first set of five periods.

For the next part of the experiment, we are going to do the same thing. However, now the workers can choose their level of effort. They do not have to do what you demanded as an employer. So for example, if you ask for high effort, the worker can also choose medium or low effort. If you ask for low effort, the worker can also choose medium or high effort.

As an employer you will now see graphs for all the three options.

During the making of an offer, you will see bullets indicating what the worker has done in previous rounds. Gray means that the worker rejected the offer. Green means that the worker chose the level of effort that was demanded, or higher. Red means that the worker choose a lower level of effort than you demanded.

You will have a different worker than before. You will have the same worker or employer for the next five periods.

(Part 3: Treatment (3E))

For the next five periods, workers can still choose their level of effort. However, some of the employer can now make offers to three workers at the same time. Similarly, workers can accept offers from different employers. Every worker can only choose one offer. An employer can only have one worker.

Workers will take turns in choosing their offer. Sometimes you might be the first one, and have all the offers available. Sometimes you might be the last one, and there might be fewer offers available. We will determine the order in which you choose by chance.

As an employer, when you make your first offer, this will be shared with the other employers that can offer to this worker.

Again, as an employer, you can see what the workers have done in the previous periods when they were working for you. You *cannot* see what workers did when they were working for someone else.

(Part 4: Treatment (3E))

For the next five periods, you will have new workers or employers. There is no practice period.

(Part 4: Treatment (3ES))

For the next five periods, you will have new workers or employers. There is no practice period.

As an employer, you can now see what the workers have done in the previous periods, not only when they were working for you, but also what they did when they were working for someone else.

(Questionnaire)

Ok, we are now almost done with the experiment. Please fill in the questions in the questionnaire. In the meantime we will prepare your payment. We will call you when we are done with making the payments."