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

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Abstract

Experimental evidence to date supports the double theoretical prediction that parties transacting repeatedly punish bad contractual performance by reducing future offers, and that the threat of punishment disciplines opportunistic breach. We conduct a repeated PD game experiment with university students in Ghana and the UK. The experiment is framed as an employment contract. Each period the employer makes a irrevocable wage offer to the worker who then chooses an effort level. UK subjects behave in line with theoretical predictions and previous experiments: wage offers reward high effort and punish low effort; this induces workers to choose high effort; and gains from trade are shared between workers and employers. We do not find such evidence among Ghanaian subjects: employers do not reduce wage offers after low effort; workers often choose low effort; and employers earn zero payoffs on average. Introducing competition or reputation does not significantly improve workers' effort. Using a structural bounds approach, we find that the share of selfish workers in Ghana is not substantially different from the UK or earlier experiments. But, while UK subjects increase effort if they receive a lower wage offer after shirking, Ghanaian workers *lower* effort further. Based on this, it is rational for Ghanaian employers not to resort to a trigger strategy. We conclude that strategic punishment in repeated labor transactions is not a universally shared heuristic.

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

JEL classification: C71, D2, D86, E24, O16

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1 Introduction

Since the advent of the cross-cultural project (e.g., Heinrich 2006), there has been a growing body of evidence showing that norms, preferences and strategic behavior differ across cultures (Cardenas and Carpenter, 2008; Herrmann et al., 2008; Henrich et al., 2010). The most recent extensive work in this area is the Global Preference Survey conducted by (Falk et al. 2018). Using simple survey questions, the authors elicit individual preferences in representative samples from 76 countries and find large differences both across and within countries. These findings are echoed in the work of Schulz et al. (2018a, 2018b) who document differences in social norms across cultures using survey questions or simple decision games, a point that is also the focus of Enke (2019). Fisman et al. (2014) similarly show large differences in attitudes towards redistributive justice between sub-populations of the US.

This work informs us that preferences and behavior vary across populations. But the logistical complexity of studying large numbers of people across many locations and countries often leads researchers to focus on simple decision problems that are amenable to a non-interactive survey or experiment format. This singularly reduces the depth of insights that can be gained from such data. To understand the processes underlying behavioral differences across populations, a more detailed investigation is required – the kind of investigation made possible by an interactive laboratory experiment.

To pursue this objective, we take a moderately complex game for which extensive behavioral evidence already exists for students in the developed Western world, namely the repeated contracting game between employer and employee of Brown et al. (2004, 2012). This game is interesting for several reasons: being a repeated (one-sided) prisoner's dilemma, its theoretical properties are well known (e.g., Fudenberg and Tirole 1991). In particular, the Folk Theorem of repeated games (Fudenberg and Maskin 1986) demonstrates that cooperation can be sustained by simple trigger strategies that punish defection. Secondly, it has long been known that laboratory subjects are capable of sustaining cooperation even in finitely repeated PD games (Andreoni and Miller 1993). Thirdly, many economic and social transactions across the world take the form of a repeated one-sided or two-sided PD game, such as: permanent employment contracts; relational contracts between clients and suppliers of a good or service; and social relationships of friendship and favor exchange. By framing the game as one of these familiar transactions, we can

therefore expect subjects anywhere to summon suitable heuristics, thereby minimizing the mistakes subjectw make in stragically unfamiliar games. Fourth, we already have considerable evidence on how students in the Western world play this specific version of the repeated PD game (e.g., Brown, Falk and Fehr 2004, 2012). In particular we know that, even in the absence of a reputation mechanism, subjects assigned the role of employer secure reasonably high effort from workers by resorting to simple trigger strategies: if a worker defects by choosing low effort, the employer reduces the wage offer in the next period and, anticipating this, the worker exerts high effort in most round.

As should be immediately clear, the above theoretical and empirical results are at the core of economic thinking on how many market works: the threat of punishment deters opportunistic breach of contract, and the fear of losing a valuable relationship serves as such threat. This thinking, for instance, underlies a large literature on relational contracting (e.g., McLeod 2007, Chakravarty and MacLeod 2009, Malcomson 2016) as well as much of the thinking on international trade (e.g., Rauch and Casella 2003) and economic institutions (e.g., Greif 1993, North 1973). Many studies have documented the applicability of these concepts to developing countries (e.g, McMillan and Woodruff, 1999; Macchiavello and Morjaria, 2015), Fisman 2003, Fafchamps and Minten 2002).

We take this game to students of two top universities, one in the United Kingdom and one in Ghana, West Africa. These two countries were chosen because they share the same language but have a very different history and culture. We conduct multiple sessions in exactly the same way in both countries, using the same equipment (tablets) and experimental protocol. We find that students in the United Kingdom behave like other Western subjects with whom the Brown et al. (2004, 2012) experiment has been run. But university students in Ghana do not behave a way predicted by the Folk Theorem of repeated games: many workers choose low effort; employers continue to pay high wages; and this results in a large efficiency loss and a low average payoff for employers. We replicate these Ghana findings in a second set of experimental sessions, with the same result.

These findings are, in themselves, surprising, given how widely accepted is the view that cooperation naturally emerges in repeated games, irrespective of context. Our main contribution, however, lies elsewhere, namely, in our extremely detailed investigation of how exactly behaviors differ between the two study populations and what could account

for the Ghana findings. In particular, we find that Ghanaian subjects assigned the role of worker do not increase their effort level if they received a lower wage offer after having shirked – if anything they are even less likely to provide high effort. Given this, it is understandable that employers choose not to punish them.

Our experiment is based on the design of Fehr et al. (1993) and Brown et al. (2004). Students are randomly assigned the role of worker or employer. This frame is chosen because it is familiar to both study populations: after they graduate, most of our subjects will work for wage.[1] Subjects interact 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 worker and employer interact repeatedly and the employer can adjust wage offers in subsequent periods. We investigate whether, as in Fehr et al. (1993) and Brown et al. (2004), employers rely on a trigger strategy to discipline shirking workers, and whether worker reputation and competition across workers create additional incentives to exert effort. This is achieved by combining five treatments that vary market size, contractual completeness, and the information available to employers about past worker performance.

In both the UK and in Ghana we find a substantial group of workers choosing low effort despite high average wages. This finding is in line with earlier experiments (e.g. Brown et al., 2004, 2012). The behavior of employers, however, is different. While low effort is punished in the UK, in line with previous experiments and theoretical predictions, we find no evidence of punishment strategies in Ghana. Similarly, in the UK high effort is rewarded but not in Ghana. The findings for Ghana are odds with earlier experimental evidence from developed countries, and they deviate from relational contracting models where low effort is punished either by terminating the relationship or by initiating a punishment stage during which the other player's payoff is lowered (see e.g. Shapiro and Stiglitz, 1984; Kranton, 1996; Ghosh and Ray, 1996). Furthermore, the Ghanaian findings remain even when we introduce worker reputation or competition between players.

This paper contributes to the above-cited emerging literature on differences in norms, preferences and strategic behavior differ across cultures. Our experiment aims to capture

[1] During the Ghana pilot we experimented with a supplier-producer frame instead. Although play was fairly similar, subjects complained that they did not understand the game. This led us to switch to the employer-worker frame as it was easily understood by all subjects. This minimizes the likelihood that our results are due to mistakes and lack of familiar heuristics.

labor market heuristics reflecting prevailing norms and expectations. Compared to high income countries, the labor market in Ghana is characterized by a large degree of informality. Self-employment and working in a family firm are more common than wage employment: in 2012-13 only 20.2 percent of the country's working population and 32.5 percent of its urban working population was wage employed (Ghana Statistical Service, 2014). The lower incidence of wage employment may influence the expectations of both workers and employers in wage relationships. Understanding labor market norms and expectations in a developing country is crucial, especially when, such as in Ghana, steady growth has occurred and the share of wage employment has been rising over time. Our results show that punishment strategies predicted by repeated game theory – such as lowering the wage after low effort to deter shirking – do not naturally come to the mind of Ghanaian subjects.

These finding resonates with earlier empirical findings showing labor management to be problematic in many developing countries (Bloom et al., 2014; Fafchamps and Söderbom, 2006) and as such contribute to a large literature arguing that 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 and Jones, 1999; Caselli and 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 and Reenen, 2010; Fafchamps and Söderbom, 2006). At the same time, competition for jobs is high: employers often face many applicants per opening (e.g. Falco and Teal, 2012). This seems at odds with predictions from labor market models (Shapiro and Stiglitz, 1984; Bowles, 1985), as well as empirical studies in the United States and the United Kingdom (Green and Weisskopf, 1990; Wadhwani and Wall, 1991), in which competition for jobs and threat of dismissal drive higher worker performance. The findings reported here offer another possible channel affecting the productivity of workers in the developing world, namely, employers' reluctance or inability to deter shirking.

Although others have documented differences in decision making between countries and study populations, we believe we are the first to document them in the context of a repeated PD game framed as a employer-employee relationship – a framework that is central to economic thinking. The objective of our paper is not to identify a key 'causal' factor behind our findings – e.g., religion, legal tradition, collective vs. individualistic

philosophy (e.g., Enke 2019, Gorodnichenko and Roland 2017). Rather our purpose is more akin to that of a watchmaker who dismantles a clock into its various components to find the missing part. In our case, the missing part is that, unlike UK subjects, Ghana workers do not work harder if they received a lower wage offer after having chosen low effort – if anything, they provide even less effort. If Ghana employers correctly anticipate this, there is no point opting for a trigger strategy. Nothing in our experimental setting allows us to say why this difference is present – but we show that it is not due to differences in worker altruism towards employers, in reputation, or in competition.

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 scrutinizes possible explanations for the behavior found in this experiment. Section 6 concludes.

2 Related literature

Gift-exchange games have been used widely to study informal labor market institutions (Charness and Kuhn, 2011; Fehr et al., 2009).[2] The first gift-exchange lab experiment was conducted by Fehr et al. (1993). It consisted of one-shot interactions between workers and employers who were randomly rematched at the end of each period. Despite the lack of explicit incentives or future interaction, the authors show that employers offer wages above the market clearing level and that workers exert a higher level of effort in return for this higher wage. This provides evidence for the fair wage-effort hypothesis formulated by Akerlof (1982) to explain involuntary employment, i.e., employers and workers engage in a "gift exchange". This pattern can arise even when there are more workers than employers and workers bid for wage contracts: Fehr and Falk (1999) find that some employers refuse to hire employees who undercut wages, possibly because they fear that they are more likely to shirk.

In a repeated interaction, these concerns can be reinforced. Gächter and 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

[2]The gift-exchange game is closely related to the trust game (Glaeser et al., 2000; Karlan, 2005; Bohnet et al., 2010) in that trust plays an important role (see Berg et al., 1994; Camerer and Weigelt, 1988). The main difference is that in the gift-exchange game the size of the surplus is determined by the choice of effort by the receiver (i.e., the worker), instead of the sender.

makes the positive wage-effort relation stronger, compared to a treatment in which workers and employers are randomly rematched every period. They further find that repeated interaction functions as a disciplining device: "selfish" workers imitate "reciprocal" types in the first periods of the game. This is in line with the predictions of Kreps et al. (1982) and Fehr and 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. The authors allow the employers to make public offers, made to all workers and visible to all participants, as well as private offers, only made to a specific worker. They show that relational contracting emerges naturally in this environment: employers keep offering high wages to workers that exerted high effort in the past. This leads to a higher effort than in a treatment in which the identity 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 and Roe, 2007). In all these experiments, when employers are faced with low effort, they choose to either terminate the relationship (contingent contract renewal) or to lower the wage in the next period.[3] This threat of reduced payoff is what incentivizes workers to exert effort, resulting in higher average payoffs for both workers and employers.

The above-mentioned studies only reveal past worker performance to the past employer, only allowing for bilateral reputation. Falk et al. (2005) introduce a treatment in which the past performance of workers is made publicly available to all employers. They find that effort in this new treatment is higher than in the absence of public reputation. The effect of reputation is limited, however: bilateral relationships still play an important role. Charness et al. (2011) similarly finds evidence of reputation effects in the trust game.

In these experiments contractual incompleteness on one-sided: the worker is always ensured of receiving the promised wage. Other experiments have introduced the possibility of ex post wage adjustments, such as giving a bonus to a worker or reducing the promised wage ex post (see e.g. Fehr et al., 1997, 2007; Wu and Roe, 2007; Falk et al., 2008). This is generally effective: Falk et al. (2008) find that bonus systems work of a substitute for long-term contracts, while Wu and Roe (2007) observe that trading patterns is close to complete contracts.

[3] 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.

Gift-exchange experiments has been conducted in numerous 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 and 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 and Charness, 2004); the United Kingdom (Gächter et al., 2016); and California, Ohio and Florida in the United States (Charness, 2004; Cooper and Lightle, 2013; Wu and Roe, 2007). All these experiments have found the same general pattern of high effort in return for high wages. Similar results have been found in experiments in former communist countries, such as Hungary (Falk et al., 1999) and Russia (Fehr et al., 2014). To the best of our knowledge, however, few gift-exchange experiments have been conducted in developing countries[4] and none in sub-Saharan Africa.

3 Experimental design

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). The game is framed as a labor contract in a principal agent setting. At the beginning of the experiment, participants are randomly assigned the role of worker or employer. This game is played for five periods, after which employers and workers are rematched for another game. Each participant plays four games of five periods.[5]

Each game involves either two or six players. The two player variant involves one worker and one employer (1-on-1 treatment). The six player variant has three workers and three employers (3-on-3 treatment). The sequencing of play is similar in the two variants, but the 3-on-3 treatment includes more steps.

The 1-on-1 treatment is similar to a gift exchange game. The sequence of moves is as follows:

- **Contracting**: At the beginning of first period $t = 1$, the employer makes a wage offer $w_t \geq 0$ and specifies a desired effort level $\widetilde{e}_t$; the worker then either accepts or rejects the offer; if the worker rejects the offer, the game moves to the next period

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

[5] A worker-employer pair (in the one-on-one treatment) or group (in the three-on-three treatment) stays the same during the five periods of a game. Participants can recognize workers and employers by their randomly generated identifier (i.e., a letter) assigned at the beginning of each game.

and a new contracting stage begins. The employer can also decide not to offer any contract, or to offer a zero wage. In both cases, both employer and worker earn a zero payoff in that period.

At the beginning of periods $t = 2$ to 5, the offer made by the employer is normally determined by the decisions made at the rehiring stage of the previous period – see below. If there was no rehiring stage, the contracting stage starts afresh as described above.

- **Effort choice:** If the worker accepts the offer, he/she then decides an effort level e_t. This effort costs $c(e)$ to the worker with $c'(e) \geq 0$ – additional effort is increasingly costly to the worker. Effort can take one of three possible values: low, medium, or high ($e \in \{L, M, H\}$). The employer collects a revenue $b(e)$ with $b'(e) > 0$ – effort benefits the employer. The payoffs to the employer $\pi_{E,t}$ and to the worker $\pi_{W,t}$ at time t are given by:

$$\pi_{E,t} = b(e_t) - w_t \tag{1}$$

$$\pi_{W,t} = w_t - c(e_t) \tag{2}$$

Mutual gains are possible if $b(e) > c(e)$ for any e, which we impose throughout. We also select functions $c(.)$ and $b(.)$ such that $b(L) - c(L) < b(M) - c(M) < b(H) - c(H)$, i.e., high effort generates larger gains from trade. The main research question is whether these gains can be achieved in a sustainable and equitable manner.

- **Rehiring**: In this stage we elicit subjects' choices using a strategy method. 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 yet know the effort level chosen by the worker. For each possible effort choice $e_t \in \{L, M, H\}$ we ask the employer to specify a conditional wage offer $w_{t+1}(e_t)$ and desired effort level $\widetilde{e}_{t+1}(e_t)$. The purpose of this step is to verify that subjects intentionally pursue a trigger strategy, i.e., that they intend to punish a worker who has chosen an effort level lower than stipulated in the contract – i.e., $e_t < \widetilde{e}_t$.

We also ask the worker to specify a reservation wage r_{t+1} below which the worker reject the contract. If the realized contract offer $w_{t+1} \geq r_{t+1}$, the worker is regarded

as accepting the offer. The purpose of this step is to investigate whether the worker anticipates a lower offer if $e_t < \widetilde{e}_t$, i.e., whether the worker has internalized the possibility of retaliation by the employer.

Following a rehiring stage, the contracting stage of period $t+1$ is automatic if $w_{t+1} \geq r_{t+1}$: it implements the conditional offer $\{w_{t+1}(e_t), \widetilde{e}_{t+1}(e_t)\}$ that corresponds to the actual effort level e_t. The game then moves to the effort choice of the worker as above before moving to the next rehiring stage. If $w_{t+1} < r_{t+1}$, the conditional offer is not implemented and period $t+1$ starts with the offer stage as explained above: the employer can make a fresh offer and the worker can choose to accept or reject this offer, as before.

- **Rematching**: The above three steps are repeated in sequence until $t = 5$, a which points the game ends. Workers and employers are then rematched for a new game – often with a different treatment. More about this later.

In the 3-on-3 treatment, the sequence of moves is similar, except that it allows for multiple actions by employers and workers. The order of play is as follows:

- **Contracting:** At the beginning of period $t = 1$, 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, each employer j makes offers to each individual worker i. An offer by employer j to worker i specifies the payment that the employer will make to the worker w_{ijt} and the effort level $\widetilde{e}_{ijt}$ desired from the worker. The employer can also decide not to make an offer to a particular worker. Employers make these choices without seeing the choices made by other employers. At this stage, choices are private, i.e., they are not yet seen by workers and other employers.
  - Second, when all employers have finished selecting offers to all three workers, the selected offers are revealed to all three employers. Having seen the offers of the other employers, each employer then has one chance to revise his offers to each of the three workers. All these initial offers are not shown to the workers.
  - Third, when all employers have finished revising their initial offers, workers are allowed to see the three offers made to them. This is done in a randomly

determined sequential order. One of the three workers is selected at random; that worker sees all the offers made to him/her; the worker either accepts one of them or none. It is then the next worker's turn, and so on. If a worker rejects all offers or no offer was made, the worker receives a zero payoff for that period. Once an offer by employer j is accepted by a worker i, no subsequent worker can accept an offer from employer j. This ensures that each worker has at most one employer and that each employer has at most one worker.

- **Effort choice:** If a worker has accepted an offer, he/she then decides an effort level e_t. The rest is as in the one-on-one treatment.

- **Rehiring.** Before moving to the next period, we ask each employer i matched with a worker i to choose a contract offer for next period. As in the one-on-one treatment, this contract $\{w_{ijt+1}(e_{it}), \widetilde{e}_{ijt+1}(e_{it})\}$ is contingent on the effort level of worker i. We also ask worker i to specify a reservation wage r_{ijt+1} for employer j.

  The game then moves to the contracting stage of period $t+1$. If employer j was matched with worker i at period t, the contingent offer $\{w_{ijt+1}(e_{it}), \widetilde{e}_{ijt+1}(e_{it})\}$ is automatically made to that worker. If worker i also stipulates a reservation wage r_{ijt+1} below $w_{ijt+1}(e_{it})$, the offer is deemed accepted and the employer-worker pair is removed from set of subjects yet to be matched. The purpose of this construct is to allow employer and worker to form a long-term bond, free of the vagaries of the randomized order in which workers accept employer offers. If the worker's stipulated reservation wage is higher than the offered wage, the offer is deemed rejected. All unmatched employers then make offers to the unmatched workers, as described in the contracting stage above.

- **Rematching**: The above three steps are repeated in sequence until $t = 5$, a which points the game ends. Workers and employers are then rematched for a new game, possibly with a different treatment. In total, each subject plays four different games of five periods. Their precise sequence is discussed more in detail below.

The number of effort levels is limited to three to simplify strategy elicitation in the rehiring stage.[6] The values of $c(e)$ and $b(e)$ are as follows. High effort costs the worker

[6]The effort levels are equal to three out of the ten effort levels in Brown et al. (2004).

6 points and gives the employer a benefit of 40 points. Medium effort costs the worker 2 points and give the employer 20 points. Low effort is costless to the worker but only gives the employer 5 points. High effort maximizes joint surplus but requires trust: offering a high wage exposes the employer to shirking (i.e., low effort) by the worker.

While our experimental design is largely inspired by that of Brown et al. (2004), it differs from it in several important ways. The rehiring stage is novel to our experiment. The strategy method allows to investigate whether subjects explicitly pursue conditional strategies: does the employer intentionally reduce the wage offer after low effort by the worker; does the worker intentionally accept a contract conditional on the wage offered? This aspect is important to test the existence of punishment strategies capable of deterring deter opportunistic behavior. We also allow subjects – under certain conditions – to revisit their strategy after the action of the other player has been revealed. The purpose of this aspect of the design is to test whether the intent to punish is self-commitment-proof, i.e., do players stick to their guns and carry through their punishment strategy, or do they cave in when the desired result fails to materialize. These two features of our experimental design will prove useful in the empirical analysis.

To elicit information about the conditional strategies of employers and workers, our design must depart from that of Brown et al. (2004) in other, less essential ways: since it is not possible to elicit conditional play in continuous time, contracting takes place in discrete stages, not continuously; we reduce the number of effort levels to three to reduce the number of conditional play decisions for employers; and in the multiple workers/multiple employers treatment, we limit the number of workers and employers to three in order to simplify the range of conditional strategies subjects can choose from.

Although these changes are forced upon the experiment by the strategy method design, they nonetheless enhance the experiment in a number of ways. First, when played in continuous time, the experiment tends to reward technical ability, something that puts less experienced subjects at a disadvantage and may create artificial differences across subject pools. Continuous play may also distract subjects from adopting simple conditional strategies, e.g., punishment for low effort. Secondly, we do not introduce excess labor demand or supply in the multiple workers and employer treatment. This stands in contrast with Brown et al. (2004) who originally combined 7 employers and 10 workers in an effort to make unemployment more costly for workers. The literature has however shown that this

complication is not required for relational contracting to emerge. A follow-up study has indeed shown that excess labor does not affect the prevalence and pattern of relational contracting; it only affects the division of surplus (Brown et al., 2012). Third, we reduce the number of periods in each game from 15 or 20 to only five so that we could subject participants to different treatments, to be detailed below. A within-subject design increases power and gives more opportunities for subjects to learn the value of conditional play. Whether five periods are sufficient for repeated game reasoning to kick in is an issue we examine in detail in the empirical section. There we also discuss a follow-up experiment in which the number of periods was increased without affecting our main findings (Davies and Fafchamps 2016).

The last difference with earlier work is framing. The original experimental design of Brown et al. (2004) seeks to use a neutral language, describing work as a "good", employers as "buyers" and workers as "sellers". We did try using such neutral terms in our Ghana pilot. But we found that they decreased the understanding of the game – an interpretation confirmed by answers to questions on the understanding of the game by our subjects. In particular, subjects found counterintuitive that the buyer would make a take-it-or-leave-it price offer, since it contradicts what subjects observe in their everyday purchases where the price is set by the seller. Understanding improved considerably by framing the experiment as an interaction between an employer and a worker, probably because doing so triggered heuristics more in line with the strategic structure of the game. There is evidence that framing is not a major concern for this type of game: in a gift-exchange game experiment with Munich students, Fehr et al. (2007) found that using a neutral frame or a labor market frame does not not produce different behavior. We revisit this issue in the empirical section.

While we have argued that each of these changes, taken individually, should not have a dramatic effect on subjects' behavior, taken together they make the game simpler and more intuitive. This in turn should make subjects more likely to follow heuristics and behavioral norms with which they are already familiar. Indeed, we are not interested in how our subjects would behave in a highly unusual and unintuitive setting. On the contrary we wish the experiment to reveal, in a way least contaminated by experimental artifacts, how the subjects would naturally tend to behave in a labor relationship.

We are particularly keen to ascertain the generality of the type of conditional play

strategies documented in European student populations in Brown et al. (2004) and subsequent papers. Many of the simplications we have introduced should make conditional play more salient, a feature that we deliberately set to reinforce. We nevertheless remained concerned that our findings may be driven by design differences with earlier work. It is to address this concern that we have repeated the experiment with two distinct populations of college students: in Ghana and in the United Kingdom. As we will show later in the paper, our results with United Kingdom students are very similar to earlier experiments conducted in OECD countries. This provides reassurance that making conditional play more salient in our design does not have the inherent but paradoxical consequence of making it less common.

3.1 Other treatments

In addition to the 1-to-1 and 3-to-3 treatments described above, we vary whether contract compliance is enforced (treatment C) or not (treatment E); and whether information about the past actions of workers is automatically shared among all employers (treatment S). Since the latter treatment only applies in the 3-to-3 treatment and is only relevant when the contract is not externally enforced, there is a total of five possible treatment configurations.

The control treatment is when the contract is externally enforced, which means that the worker can only choose the level of effort stipulated in the employer's offer. The 1-on-1 and 3-on-3 versions are denoted 1C and 3C, respectively. These treatments are essentially a modified version of an ultimatum game: the worker can only accept or reject the division of gains from trade proposed by the employer, and refusal yields a null payoff for both.

Treatments 1E and 3E are as described in the previous sub-section: after accepting a contract, the worker is free to choose any of the three effort levels. Treatment 1E is similar to a bilateral gift-exchange game with a fixed partner (see e.g., Kirchler et al., 1996; Gächter and Falk, 2002). In contrast, the 3-on-3 treatment 3E allows competition between employers and workers. It is closest to the multilateral gift-exchange games conducted by Brown et al. (2004). Treatment 3ES only differs from 3E in that information about the past actions of each worker is available to all three employers. Treatment 3ES allows for a multilateral reputation mechanism, while 3E and 1E only allow for bilateral reputation/relational contracting.

Each participant plays four games of five periods. Table A2 shows the seven treat-

ments sequences used in the experiment and the number of participants for each. This setup is designed to allow comparisons within and between subjects and to facilitate the gradual introduction of more complicated treatments. These treatments allow us to compare the impact of imperfect enforcement, the role of competition (increasing the number of employers and workers) and the role of sharing information between employers. In treatment 1C and 3C the worker has to comply with the demanded effort. Comparing these treatments with treatments 1E and 3E estimates the impact of imperfect enforcement on effort choice. In treatments 3C, 3E and 3ES, there is competition between workers and and between employers. Comparing these treatments with treatment 1C and 1E estimates the impact of having a larger market on wage offers and on effort. Finally, comparing treatments 3E and 3ES tests whether information on past effort results in a reputational equilibrium in which employers offer higher wages to workers who have supplied higher effort to other employers in the past.[7]

3.2 Implementation

The participants to the study reported here were recruited among 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. Sessions lasted between 1.5 and 2 hours. The points earned during the session were converted to Ghana cedis or British pounds at the end of each session, with an exchange rate of 0.05 Ghana cedi and 0.03 British pound for every point. Including the show-up fee, average earnings are 32 Cedis (about 10 British pounds) in Ghana and 18 pounds in the UK.

For the experiments we developed our own tablet-based mobile lab, LabBox. This platform can operate completely independently from electricity mains and existing network structures. The experiments run on 7-inch Android tablets with a custom-built app. This app collects user input and communicates with a LabBox server using a wireless connection. Each session starts 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

[7] In the United Kingdom, we only conduct the three treatment sequences that are most relevant to demonstrate the comparability of our findings with the literature.The purpose of the UK sessions is to test whether differences in findings between our Ghana and earlier experiments can be ascribed to variation in design. To achieve this, we only need to replicate in the UK the effort choice treatments with exactly the same design as in Ghana. See Table A2 for a treatment summary.

experiment is entirely conducted in English, which is the language of instruction in the higher education system of both countries. To make sure that participants are always fully cognizant of the payoff implications of their actions, we provide visual on-screen aids that display to participants the prospective earnings of the choices they are about to make (such as making a job offer or setting an effort level). This is to ensure that differences in behavior between subjects are not driven by differences in their ability to calculate payoffs or memorize game rules.

The experimental sessions in Ghana were held in September 2013 in the central Osu neighborhood of Accra. The UK sessions took place at the Oxford CESS lab in November 2015 and between January and May 2016. These sessions were preceded by an extensive pilot held in Ghana in April 2013 and involving 4 sessions with 48 students and 20 small entrepreneurs. This pilot served to test the visual interface used in the experiment and to refine the experimental design. As a result of the pilot, changes were made to make the game easier to understand. These improvements did not eliminate the main finding of this paper which is that Ghanaian subjects do not punish low effort by reducing subsequent wage offers: this finding is also apparent in the pilot, both with student subjects and with small entrepreneurs.

4 Empirical results

When introducing the experimental design we have already outlined the testing strategy behind most of the design choices we have made. In Appendix we formally derive testable hypotheses from a conceptual framework based on the theoretical literature on relational contracting and on the experimental literature on gift exchange. Since these predictions are probably familiar to most readers, we directly move to the empirical results.

We are interested in testing three main hypotheses: (1) do employers offer wages higher than what is predicted for finitely repeated games such as ours; (2) do workers reciprocate conditionally by exerting high effort when receiving a high wage; and (3) do employers reciprocate conditionally by offering a high wage following high effort. The first hypothesis relates to a large literature showing that experimental subjects placed in a finitely repeated game are capable of improving on the Nash equilibrium of the stage game. In our experiment, this equilibrium is low effort and low wage. The other two hypotheses come from

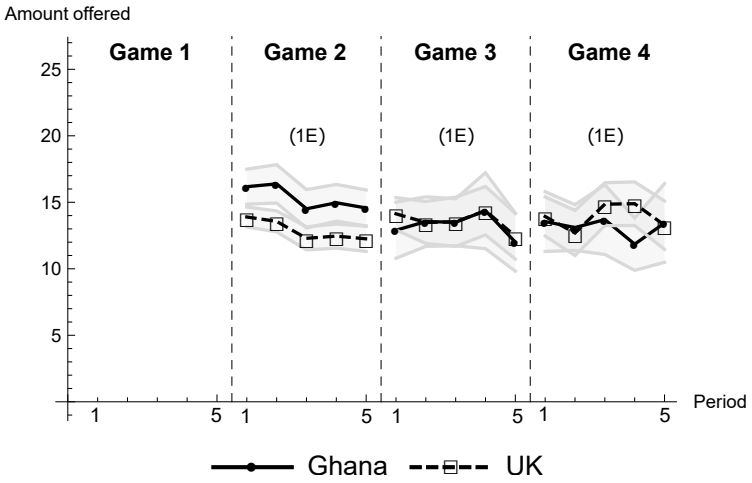


Figure 1: Average wage offers in treatment 1E in Ghana and the UK.

the literature on relational contracting: by conditioning high wage on high effort and vice versa, players can establish an incentive structure that sustains cooperation.

Before delving into the analysis proper, it is useful to take a look at Table 1 which provides a summary of average play for all treatments in the United Kingdom and Ghana. The Table shows the average offered wage, the share of accepted individual offers, compliance with demanded effort, and the average earnings. We find little difference across the two experimental populations in terms of wage offers, share of accepted offers, and worker payoff. But in all treatments where workers choose their effort level (i.e., 1E, 3E and 3ES), there is a difference between the Ghana and UK results in terms of effort compliance and, even more strikingly, in terms of employer payoffs: the employer's average payoff is close to zero in Ghana and much lower than in the UK sessions. What drives this difference is the focus of the rest of our analysis.

4.1 Contract offers

We start by investigating our first hypothesis, namely, that employers offer a wage above the subgame perfect equilibrium of finitely repeated games, which is 0 or 1 point in treatment 1E. Figure 1 shows, for each of the three 1E games played by subjects in group II (see Table A2), the average wage offer in each periods for both Ghana and the UK. In game 2 the average wage is 14.9 points in Ghana and 12.9 in the UK, with a slight downward trend across the five periods. This drops in games 3 and 4 to an average offer of 12.6 and

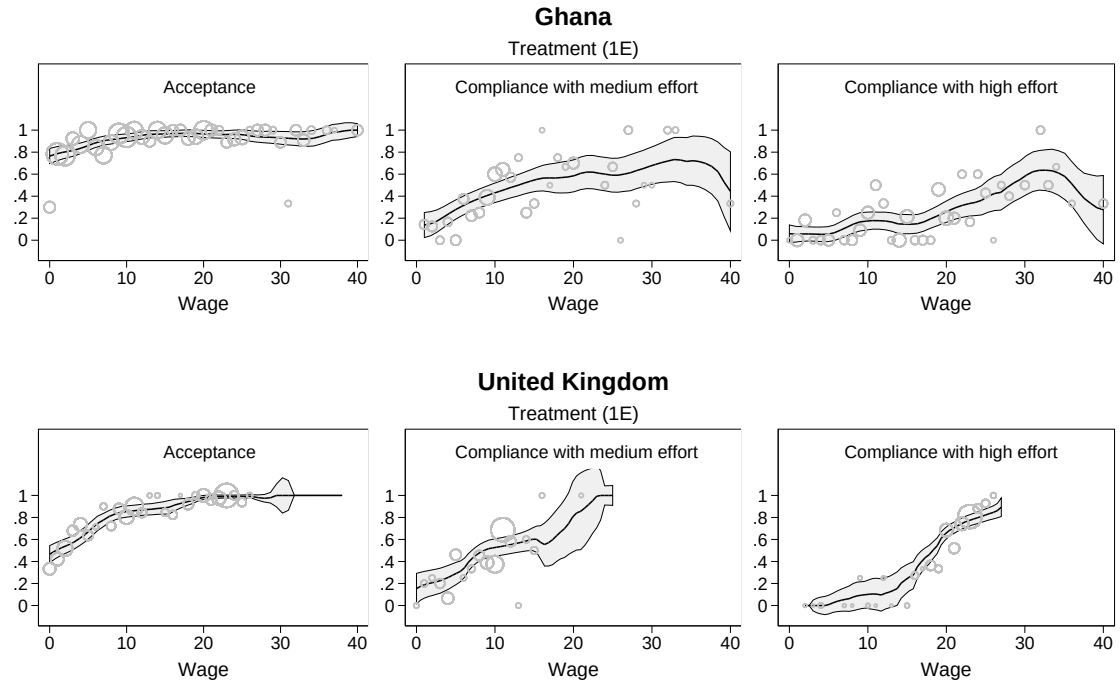


Figure 2: The Figure shows the relationship between the wage offered and acceptance, compliance with offers demanding medium effort, and compliance with offers demanding high effort. Only games 2-4 of treatment 1E are used for this Figure. Compliance is defined as chosing a level of effort equal or greater than that demanded by the employer. The figures include data from all periods in each game. The size of the bubbles represents the number of offers made at this wage level. The solid line is a non-parametric local polynomial regression of the outcome variable on the wage, together with 95% confidence intervals.

12.8 points in Ghana and 13.6 and 13.9 in the UK, with little noticeable trend over time. The differences between the Ghanaian and UK sessions are mostly non-significant.[8]

Average offers are significantly higher than the Nash equilibrium of the stage game, which is 0 or 1 point. This finding is in line with findings from earlier bilateral gift-exchange experiments (e.g., Kirchler et al., 1996; Fehr et al., 1998; Gächter and Fehr, 2001). We also find no drop in wage offers in the last period of each game, suggesting that the short duration of each game is unlikely to drive any of our results. Finally we note that average offers are higher than the employer's revenue with low effort, which is 5 points. Hence unless the worker chooses high or medium effort, the employer suffers a net loss: $b(e) - w < 0$. A high wage may induce a worker to reciprocate with high effort, but it leaves the employer vulnerable if reciprocation does not occur. This feature is at the heart of trust games and gift exchange games.

The averages reported 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 regarding effort. We do not, however, find different results if we limit our attention to wage offers in period 1 of game 1E: initial wage offers in Ghana are on average 16.2, 12.9 and 13.6 in periods 2, 3 and 3, respectively; in the UK, they are 13.9, 14.1 and 13.9. None of the differences between the UK and Ghana are statistically significant.[9]

Figure A1 shows the distribution of wage offers in treatment 1E. In the UK the distribution is multimodal, with peaks around 3, 11 and 23 points – wage levels that roughly correspond to equal payoffs for employer and worker when the worker chooses low, medium or high effort, respectively. In Ghana the distribution of wage offers is more spread out than in the UK. Non-parametric tests of equality of distribution nonetheless show that these differences are mostly insignificant.[10]

We also find that average wage offers in treatment 1E are lower than in treatment 1C when workers cannot choose effort: wage offers are on average 19.8 in Ghana and 18.6

[8] A t-test for game 2 yields a p-value of 0.066. For games 3 and 4 the corresponding p-values are 0.878 and 0.738. All p-values are corrected for clustering at the individual level.

[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 only marginally significant (the p-value of the t-test is 0.107). In later games the differences are smaller and definitely not significant.

[10] Both the Kolmogorov-Smirnov and the Mann-Whitney U rank-sum tests fail to 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 tests are conducted with unmatched data pairs. The offer is averaged across the five periods for each employer such that each employer counts as one observation. Wherever appropriate, the tests are two-sided and exact t statistics are used.

in the UK for treatment 1C, compared to 14.9 in Ghana and 12.9 in the UK for treatment 1E. These differences between treatment 1C and 1E are significant for both countries, with p-values smaller than 0.001.[11] This is in line Brown et al. (2004)'s findings, which the authors interpret as suggesting that contractual incompleteness leads to lower offers.

Next we examine the effort levels requested by employers. Figure A2a shows the effort demanded by employers in treatment 1E. For 51% of the offers in both Ghana and the UK, employers demand high effort. A substantial fraction of employers nonetheless request low effort: 12.3% of offers in Ghana and 14.2% in the UK. In most cases this occurs in combination with a low wage offer, and indicates a lack of trust in the worker. Although low wage/low effort is the Nash equilibrium of the stage game, in principle the employer could have requested a high wage knowing that worker can adjust his effort downwards anyway. The data however shows that UK workers tend to reject low wage offers asking for high effort, even though the requested effort is not binding.[12] To examine these patterns more in detail, we turn to the choices made by workers.

4.2 Acceptance and effort choice

We first test our second hypothesis, i.e., conditional reciprocity: do workers reciprocate a high wage with high effort, and do they respond to a low wage offer either by rejecting the offer or applying low effort. We start with acceptances and then turn to effort choice.

Figure A2b presents a breakdown of rejection and effort choice in treatment 1E for both countries. Across all periods and games, the proportion of rejected offers is 12.3% in Ghana and 19.5% in the UK. Figure 2 displays non-parametric regressions of the acceptance and compliance rates on the wage offered. We see that workers are more likely to reject low wage offers than high wage offers: offers of five points or less are rejected 23.6% of the time by Ghana subjects and 45.7% of the time by UK subjects. In Table 2 we present the results of a linear probability model of acceptance and compliance on wage. They confirms that the relation between wage offer and acceptance is positive and that it is stronger for UK than Ghana subjects: a wage increase of one point increases the acceptance probability 0.96 percentage points in Ghana and 2.20 percentage points in the UK.

[11] In Appendix Section D we calculate the effect of imperfect enforcement using within-subject, between-subject, and difference-in-difference approaches. Most tests confirm that the difference in wage offers between treatment 1E and 1C is statistically significant.

[12] There is some evidence of this in the UK. For 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 low and medium effort, respectively. We find no such differences in Ghana: rejection rates for low wage offers asking for low, medium and high effort are 24.0%, 21.2% and 25.0%, respectively.

Table 1: 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 1-4	20.0	78%	100%	12.8	16.2	18.6	78%	100%	17.0	14.3
1E	Game 2-4	14.0	87%	41%	0.0	13.1	13.2	81%	60%	6.7	12.3
3C	Game 2-4	20.1	30%	100%	12.2	17.0					
3E	Game 3-4	13.4	30%	43%	0.3	13.3	13.1	30%	66%	7.6	12.7
3ES	Game 4	12.3	31%	50%	1.5	12.3	13.2	29%	76%	9.4	12.7

Note: The above figures pool observations from all games. *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.

The difference between Ghana and the UK is significant at the 1% level, as indicated by the interaction term in Column (7) of Table 2 shows. This confirms that high wage offers are more likely to be accepted, a result in line with conditional reciprocity.

Turning to effort levels, we show in Figure A2b the frequency of non-compliance with the employer's requested effort level – i.e., when the worker chose an effort lower than what the employer demanded. As the Figure shows (dashed area), there is considerable non-compliance in both Ghana and the UK in treatment 1E. But as shown in Table 1, compliance is higher among UK than Ghana subjects: in Ghana compliance levels are around 40% throughout; in the UK they rise steadily from 56% to 72% between games 2 and 4, suggesting increased coordination on the efficient effort level.

To summarize, we find some evidence of conditional reciprocity among workers. The positive correlation between wage offer and effort choice corresponds to findings from earlier studies. We similarly find a positive relationship between wage and effort compliance – in the non-parametric regressions of Figure 2 as well as in the linear probability model of Table 2.[13] According to the latter, a one point wage increase is associated with a 1.6 percentage point increase in the probability of compliance in Ghana, and 2.6 percentage points in the UK. Both coefficients are significantly different from zero at the 5% level but the difference between subject pools is not significant, as shown by the interaction terms in Column (9) ($p = 0.196$).

Table 2: 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	0.00897**	0.0114	0.0138**	0.0220***	0.0322**	0.0260***	0.00897***	0.0114	0.0138**
	(0.011)	(0.153)	(0.021)	(0.000)	(0.067)	(0.002)	(0.002)	(0.148)	(0.026)
Wage × UK							0.0130***	0.0207	0.0122*
							(0.002)	(0.210)	(0.094)
Constant	0.784	0.472	0.0318	0.527	0.178	0.0519	0.636	0.316	0.0435
N. Observations	562	193	255	763	217	358	1325	410	613
Adjusted R^2	0.220	0.493	0.271	0.316	0.398	0.450	0.298	0.443	0.480
N. Clusters	7	7	7	13	13	13	20	20	20
Fixed effects	Worker	Worker	Worker	Worker	Worker	Worker	Worker	Worker	Worker
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes†	Yes†	Yes†

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.
† 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 equal to one if the worker accepts the offer. *Compliance* is an indicator variable equal to one if the worker chooses an effort level equal or higher than that specified by the employer. In 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 regression specifications in Table 2 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 faced during 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 A11. Columns (7), (8) and (9) also include interaction terms between period dummies and a country dummy. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table 3: 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 periods 2 to 5								
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 are 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 a 2 points margin as classified as being the same wage for the purpose of this Table.

Table 4: Linear regression of wage offers on past rejection and compliance by the worker – treatment 1E.

	Ghana		**United Kingdom**	
Dependent variable:				
Wage offer in period t	(1)	(2)	(3)	(4)
Rejection in period $t-1$?	0.378	0.519	2.487^{***}	2.645^{***}
	(0.853)	(0.866)	(0.006)	(0.006)
Compliance in period $t-1$?	0.606		6.260^{***}	
	(0.449)		(0.000)	
Compliance in period $t-1$?		1.538		10.21^{***}
(high effort demanded)		(0.530)		(0.000)
Compliance in period $t-1$?		1.420		4.906^{***}
(medium effort demanded)		(0.130)		(0.011)
Constant	16.28^{***}	16.03^{***}	11.05^{***}	10.45^{***}
Observations	447	447	608	608
Adjusted R^2	0.029	0.033	0.139	0.249
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

Note: The Table presents a fixed effects regression of the wage offered on previous compliance and rejection. *Rejection* is an indicator variable equal to one if the worker rejected the offer. *Compliance* is an indicator variable equal to one if the worker chose an effort level equal to or higher than that demanded by the employer. Only wage offers in period 2-5 are included. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table 5: Conditional wages offered in the rehiring stage (strategy method)

	Ghana				**United Kingdom**			
	Suppose effort is...				Suppose effort is...			
	Low	Medium	High	N	Low	Medium	High	N
Treatment 1E								
Would re-offer?	6.4%	11.5%	18.1%	409	10.8%	36.7%	61.3%	499
Mean offered wage	13.0	16.9	19.4		2.7	10.9	19.4	
Pre-acceptance rate	5.6%	10.5%	5.3%		0.0%	15.9%	51.1%	
Treatment 3E								
Would re-offer?	11.2%	12.9%	19.3%	518	10.9%	38.1%	69.6%	339
Mean offered wage	11.7	12.0	13.8		3.8	11.1	19.6	
Pre-acceptance rate	13.3%	5.6%	16.7%		42.8%	24.1%	52.1%	
Treatment 3ES								
Would re-offer?	16.2%	19.2%	19.2%	198	13.2%	24.3%	66.9%	136
Mean offered wage	11.2	13.8	13.2		2.7	10.3	20.0	
Pre-acceptance rate	5.8%	25.0%	33.3%		30.7%	6.7%	54.0%	

Note: The Table presents summary statistics on the conditional wage offers made by employers at the rehiring stage, before the effort level chosen by the worker is revealed. N refers to the number of cases in which employers could select a conditional wage for the next period. *Would reoffer?* is the percentage of employers who re-offer a wage to the worker. *Mean offered wage* is the average wage offered, conditional on re-offering. *Pre-acceptance rate* is the percentage of offers that are above the minimum reservation wage specified by the worker; these offers are automatically implemented at the beginning of the next period.

Table 6: Linear regression of conditional wage offer on effort (strategy method)

	Ghana			United Kingdom		
Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
Conditional wage offer	1E	3E	3ES	1E	3E	3ES
High effort	7.789**	0.296	-0.496	14.23***	15.46***	9.310*
	(0.022)	(0.513)	(0.536)	(0.000)	(0.000)	(0.076)
Medium effort	4.555*	0.285	0.913	7.183***	8.838***	4.310*
	(0.062)	(0.365)	(0.910)	(0.000)	(0.000)	(0.067)
Constant	12.06***	12.52***	12.66***	4.459***	3.499***	8.588**
Observations	147	225	108	543	402	142
Adjusted R^2	0.570	0.732	0.788	0.686	0.701	0.796
Fixed effect	Employer	Employer	Employer	Employer	Employer	Employer

$^{*}p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.
Note: The Table presents OLS regressions of the conditional wage offers made by employers at the rehiring stage, before the effort level chosen by the worker is revealed. The constant term can be interpreted as the average wage offer conditional on low effort. The high effort and medium effort coefficients represent the additional wage offered conditional on high or medium effort, respectively. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

4.3 Revision of wage offers by employers

Having found evidence of conditional reciprocity in the behavior of workers, we now ask whether employers also condition their wage offers on past effort levels, i.e., reward high effort with a high wage offer next period, or punish low effort with a low wage offer – or no offer at all. As argued in models of relational contract, such behavior creates an incentive for workers to exert high effort, thereby increasing efficiency.

We first focus on wage revision in the period following a wage offer above the median of 15 points. For these cases Table 3 shows the employer's response in treatment 1E to low, medium and high effort. Panel A only includes wages offered in the second period, conditional on effort; Panel B pools data from periods 2 to 5.

The Table highlights two main differences between the UK and Ghana subjects. First, Ghanaian subjects are less likely than UK subjects to decrease their final wage offer following low effort: 41% of Ghana subjects lower their wage offer in period 2 following low effort in period 1; the corresponding figure for UK subjects is 71%.[14] When we pool periods 2 to 5, these figures are respectively 51% and 70%. Second, after high effort, UK subjects are more likely to keep their wage offer unchanged: 85% of UK employers offer

[13] As can be seen in Figure 2, the relationship between wage and compliance has an inverted U-shape. This result is only driven by a few observations above 35 points, and is mainly driven by low effort choices following offers of 40 points. Such high wage offers are difficult to rationalize since, even when with high effort, the employer's payoff is zero.

[14] To account for the use of a touch screen, we follow Table 3 in adopting a 2 point difference for an offer to be regarded as the "same" wage. The results do not change qualitatively when no margin or a margin of 1 point are used.

the same wage compared to 36% among Ghanaian subjects. If anything, Ghanaian employers are more likely to lower their wage offer after high effort: 55% lower their wage offer in period 2 after high effort, compared to 10% in the UK.

As shown in Table 4, similar findings are obtained using regressions. Among UK subjects compliance with a high effort request is associated with a 6.26 points increase in wage offer, a result that is significant at the 1% level. In Ghana the corresponding coefficient is 0.28 and it is not statistically significant. Furthermore the difference between the two estimates is significant at the 1% level, as shown by the interaction term between compliance and a country dummy in the last two columns of Table 4. These results confirm that UK subjects are more likely to lower their wage offer following low effort and to keep their wage offer unchanged after high effort. Neigher of these behavioral patterns is present among Ghanaian subjects, rejecting the conditional reciprocity hypothesis as it applies to wage offers. The fact that Ghana subjects do not naturally adopt a punishment-and-reward strategy to discipline workers stands in a stark contrast with other experiments conducted in developed countries, including our own replication in the UK.[15]

Could it be that Ghanaian employers initially intend to punish low effort but cave in when the worker refuses a low wage offer? To throw light on this question, we recall that, before employers observe the effort level selected by the worker in round t (i.e., low, medium, or high), they state whether they would reemploy the worker and, in that case, are asked to stipulate a period $t + 1$ wage offer for each of these effort levels. This is the so-called strategy method.

Answers, shown in Table 5, confirm the stark difference between Ghanaian and UK subjects. In the UK, most employers follow a deliberate trigger strategy: re-employment frequencies and wage offers increase steadily in effort level in all three treatments 1E, 3E and 3ES. In contrast, Ghanaian subjects are much less likely to stipulate a conditional wage offer: less than 20% of them are willing to specify a wage even after high effort, compared to 60-70% of UK subjects. Furthermore, when Ghanaian subjects do make a conditional wage offer, the wage offered varies much less by effort than the offers made by UK subjects: average offers in Ghana range from 11-13 units after low effort, to 13-19

[15]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).

units after high effort, compared with offers ranging from 2-4 units for low effort to 19-20 units for high effort in the UK. To confirm the statistical significant of these differences, we report in Table 6 an employer fixed-effect regression of wage offers on hypothetical effort level for each of the three treatments in Ghana and the UK. Results for Ghana show some evidence of conditional offers only in treatment 1E – when there is no competition with other employers. In contrast, UK subjects show strong evidence of conditional play in all three treatments. Furthermore, even in treatment 1E where Ghanaian subjects do condition on effort, the range of offers they make is narrower than those of UK subjects. From this we conclude that Ghanaian subjects assigned the role of employer are more reluctant to condition wage on effort than their UK counterparts. Put differently, it is not the case that Ghanaian subjects intend to punish low effort but subsequently cave in when the worker demands a high wage; rather, they show little a priori desire to punish workers for low effort.

What about workers? Do they anticipate being punished for low effort and thus are more likely to subsequently accept a low offer? To examine this issue, we rely on the fact that, after choosing an effort level, workers are asked to stipulate a reservation wage above which an employer's offer is automatically accepted. Table 5 also reports the automatic acceptance rate of offers made by employers, conditional on effort. We see that, in Ghana, the acceptance rate is low for all effort level: even though Ghanaian employers offer higher wages after low effort than UK subjects, there is no evidence that these wages are more likely to be accepted. In fact, in treatments 3E and 3ES the opposite is true: UK employers make very low offers, but these offers are above the worker's reservation wage in 30-43% of the cases – suggesting that workers anticipate being penalized for low effort. In Ghana the frequencies are a much lower 6-13%. In the UK, we also observe that workers accept the majority of conditional wage offers made after high effort – suggesting some kind of convergence towards a mutually acceptable remuneration for high effort. The same is not true in Ghana where workers overwhelmingly set a reservation wage above the conditional offers made after high effort. Workers seem intent on receiving a wage that is high and does not depend on their effort level – with no evidence of convergence towards a mutually acceptable wage level.

4.4 Consequences on effort and earnings

We now show that the absence of punishment strategy in Ghana has consequences on worker effort, payoffs, and efficiency. In Table A5 we contrast the transition matrix of effort for treatment 1E for both Ghana and the United Kingdom. Observations from period 5 are omited to eliminate possible final period effects. In the UK there are few transitions away from high effort: of the workers who chose high effort in one period, 74% choose it again in the following period. The corresponding figure for Ghana is 49%, implying that Ghana subjects assigned the role of employer are less able to maintain high effort provision by their workers than UK subjects. This is undoubtedly related to the fact that Ghana employers often reduce their wage offer after high effort.

Figure A4 presents a graphical representation of transition patterns between effort levels. The size of a bubble (and the number inside it) represent the share of workers choosing that level of effort in that period. The thickness of a line denotes the relative strengths of transitions across periods, while their shading indicates whether the wage offer increases (dark grey), decreases (black) or remains the same (light grey). The graph confirms that, apart from period 5, there are few transitions out of high effort in the UK sessions. The light gray lines further indicate that, with the exception of the last period, high effort is almost always followed by high effort in the next period. We also note that a higher wage offer tends to increase effort while a lower wage decreases it. A similar pattern is present in Ghana in terms of workers' responses to wage offers, but Ghana employers are less likely to reward high effort by keep the wage high. As a result, fewer workers in Ghana exert high effort. The graphs also show a fall in effort in the last period, again suggesting that workers respond to incentives: since workers cannot be rewarded for high effort or punished for low effort after period 5, they have less reason to choose high effort. The fall in effort is strongest among UK subjects, bringing the share of low effort to similar levels in the two subject pools – i.e., 44% versus 47%.

Differences in effort levels between the two subject pools have dramatic consequences for the earnings of employers and workers in our experiment. As shown in Table 1, under treatment 1C (perfect enforcement) the earnings of workers and employers are nearly equal, especially in later games. Imperfect enforcement (treatment 1E) significantly reduces employers' average earnings: between treatment 1C in game 1 and treatment 1E in game 2, employer earnings fall from 12 to 0.6 points in Ghana and from 17 to 6 points

Table 7: 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 Table reports the coefficient estimates of an employer fixed-effect regression in which the dependent variable is the wage and the regressors represent the number of past interactions with the employer. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

in the UK. These differences between games 1 and 2 are highly significant, as shown in Appendix Table A9. Furthermore, the difference in employer earnings between UK and Ghana subjects in treatment 1E in game 2 is also significant. This difference even increases in later games: in Ghana, employer's earnings fall further in games 3 and 4 (to -1.0 and -0.6 points, respectively), while they increase slightly in the UK (to 6.3 and 9.7 points, respectively). These differences between UK and Ghana subjects are all significant.

In contrast, we do not observe significant differences in worker's earnings, both between treatments 1E and 1C, and between UK and Ghana subjects. Workers' earnings are slightly lower in 1E than 1C in both subject pools, but this difference is not significant (see Table 1 and Appendix Table A9). This indicates that it is Ghana employers who are "paying the price" of lower effort.

4.5 Competition and reputation

So far we have only considered 1-on-1 games. Can the situation be improved by introducing competition among workers and employers? To investigate this possibility, we compare treatments perfect and imperfect enforcement treatments 1C to 1E to their 3-to-3 counterparts 3C and 3E.

We first compare wages across 1-on-1 and 3-on-3 treatments. Since employers make the first move, competition between them for workers may increase the wages they offer. We indeed find some evidence in Ghana that wage offers are higher in 3C compared to 1C. This is in particular beneficial to workers who capture a larger share of the surplus – see Davies and Fafchamps (2016) for details.

Table 8: 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 at $t-1$	-0.872	-0.682	-3.070^{***}	-3.292^{***}
	(0.396)	(0.603)	(0.004)	(0.004)
Contracted with *another* employer at $t-1$	-0.614	-0.442	0.525	0.518
	(0.356)	(0.529)	(0.544)	(0.607)
Complied with i's requested effort at $t-1$	0.965	0.813	7.512^{***}	7.851^{***}
	(0.479)	(0.591)	(0.000)	(0.001)
Complied with *another* employer's requested effort at $t-1$	0.543	0.401	-0.0199	0.103
	(0.185)	(0.302)	(0.982)	(0.888)
Treatment 3ES?		0.133		2.085
		(0.619)		(0.257)
$\times$ Contracted with employer i at $t-1$		-0.307		1.618
		(0.989)		(0.153)
$\times$ Contracted with *another* employer at $t-1$		-0.662		-0.925
		(0.843)		(0.446)
$\times$ Complied with i's requested effort in $t-1$		0.102		0.0279
		(0.928)		(0.973)
$\times$ Complied with *other* employer's requested effort at $t-1$		0.414		4.060^{***}
		(0.914)		(0.002)
Constant	14.92^{***}	15.14^{***}	12.43^{***}	11.67^{***}
N. Observations	1268	1795	750	1038
Adjusted R-sq	0.687	0.681	0.572	0.592
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. p-values in parentheses.

Note: The Table presents coefficient estimates of a linear regression using the wage offered by employer i in period t as dependent variable. All regressors are indicator variables and relate to period $t-1$, i.e., the period before the offer. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Turning to imperfect enforcement treatments 1E and 3E, we find no evidence that wage offers differ between them. For example, in game 3 when treatment 3E is first introduced, the average wage offer is 14.3 points in Ghana and 12.9 in the UK, while in game 3 of treatment 1E the average is 12.6 in Ghana and 13.6 in the UK (see Table 1). Unsurprisingly, these small differences between treatments are not statistically significant in within-subject, between-subject or difference-in-difference comparisons (see Appendix Tables A8, A9 and A10 for details). As shown in Figure A3, there is also no noticeable difference in the dispersion of wage offers in either of the two study populations, and non-parametric tests similarly find no significant difference in the offer distribution between the two treatments.

We do, however, find a significant difference in offer levels between the UK and Ghana

Table 9: The effect of the reputation treatment on experimental outcomes

	Ghana		United Kingdom	
	(1) Within subject	(2) Between subject	(3) Within subject	(4) Between subject
Offered wage				
3ES vs. 3E	-2.067^{***}	0.293	1.678^{***}	3.007
	(0.406)	(2.731)	(0.403)	(2.517)
Acceptance				
3ES vs. 3E	-0.00892	-0.0125	0.0192	0.0448
	(0.0100)	(0.0196)	(0.0197)	(0.0610)
Compliance				
3ES vs. 3E	0.0380	0.00701	0.114^{***}	-0.0292
	(0.0227)	(0.109)	(0.0270)	(0.0944)
Surplus				
3ES vs. 3E	0.189	1.140	3.718^{***}	2.785
	(1.057)	(3.073)	(0.708)	(4.292)
Employer's earnings				
3ES vs. 3E	1.870^{*}	0.910	2.723^{***}	0.0712
	(1.008)	(2.173)	(0.375)	(2.424)
Worker's earnings				
3ES vs. 3E	-2.200^{***}	0.288	-2.101^{*}	2.002
	(0.718)	(6.141)	(1.009)	(3.112)

Note: Each cell of the Table corresponds to a separate regression. The reported coefficient is the treatment effect of 3ES relative to 3E. Each row corresponds to a different dependent variable, defined as in earlier Tables. The 'Within subject' regressions are subject-fixed-effect linear regressions using only those subjects included in both treatments 3E and 3ES; it compares outcomes within subjects across games played at different times in the same session. The 'Between subject' regressions compare subjects from different sessions, some of whom are assigned to treatment 3ES and some are not. These regressions include a dummy equal to 1 if subject i is assigned to treatment 3ES and 0 otherwise, as well as a game order dummy. Observations from games other than 3E and 3ES are omitted throughout. Standard errors clustered at the session level are given in parentheses.

in treatment 3E: average wage offers are lower in the United Kingdom and non-parametric tests reject the null hypothesis of equal offer distribution in Ghana and the UK.[16]

Next we examine the data for evidence that, in treatment 3E, employers offer higher wages to individual workers who have supplied high effort to them in the past. Evidence of this kind of behavior was found by Brown et al. (2004). In their experiment employers could make public offers to all workers as well as private offers to individual workers. They found that private offers were on average higher than public offers and that employers tailored their wage offers to past effort levels. We examine whether we find similar behavior in our experiment, in spite of the difference in design – in our design all offers are a specific worker, but employers can make different offers to different workers.

We first look for evidence of higher wages in repeated interactions. Table 7 shows how wage offers vary with the number of past interactions with a worker, regardless of past effort level. For UK subjects we find a pattern of wage offers similar to that of Brown et al. (2004). But not in Ghana. In the UK wage offers are increasing in the number of

[16]The Kolmogorov-Smirnov test rejects the null for both game 3 ($p = 0.093$) and 4 ($p = 0.000$). The rank-sum test similarly rejects the null for game 4 ($Z = 2.90$, $p = 0.004$), but not for game 3 ($Z = -0.986$, $p = 0.324$).

Table 10: Wage offer as a function of past effort and past offer rejection in treatment 1E in additional experiments conducted 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^{***}
	(0.000)	(0.036)	(0.000)	(0.002)
Rejection in period $t-1$?	1.788^{***}	0.805	1.602^{***}	1.788^{***}
	(0.002)	(0.419)	(0.001)	(0.000)
Entrepreneur?				
$\times$ High effort in period $t-1$?				1.762
				(0.132)
$\times$ Rejection in period $t-1$?				-0.983
				(0.329)
Constant	15.30^{***}	12.39^{***}	14.68^{***}	14.69^{***}
Observations	2496	458	2954	2954
Adjusted R^2	0.0207	0.0272	0.0197	0.0212
Fixed effects	Employer	Employer	Employer	Employer
Period dummies	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

Note: The Table presents coefficient estimates from a fixed effects regression of wage offered on previous high effort and rejection, using data from the additional experiments conducted in Ghana (see text for details). *Rejection* is an indicator variable equal to one if the worker rejects the offer. *High effort* is an indicator variable and equal to one if the worker chooses high effort. Entrepreneur is a dummy equal to 1 if the subject is an entrepreneur, and 0 if the subject is a university student. Only wage offers in period 2-5 are included. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

past interactions, suggesting that repeated contracting is associated with more beneficial exchange for employers. 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 contrast, among Ghana subjects we find no significant correlation between wage offer and the number of past interactions.

Similar findings are obtained if we control for whether the worker complied with the requested effort level in the past. Columns (1) and (3) of Table 8 present fixed effects regressions of wage offer on whether the employer contracted with this worker in the past period and whether the worker complied with the requested effort level. We find a significant coefficient for past compliance among UK subjects, but not in Ghana. In the UK past compliance is associated with a 7.5 points increase in wage offer in the subsequent period. The corresponding coefficient for Ghana is small (1 point) and not significant at a 10% level. These findings confirm that our UK subjects behave in a way similar to that documented by Brown et al. (2004) for Swiss subjects. But Ghanaian subjects behave

differently. This suggests that populations differ in the kind of heuristics they bring to contractual situations: punishing and rewarding workers for low and high effort is not something that comes naturally to Ghanaian college students, while it does for students in the UK and, from the literature, in other developed economies.

Why is this the case? One possibility is that Ghanaian subjects find 1-on-1 punishment problematic but expect reputation to discipline workers. Testing this hypothesis is the object of treatment 3ES which, within each game, introduces public information about the past effort choices of each worker, irrespective of which employer hired them. The existing literature has found that introducing reputation in this way does act as an additional (albeit weak) incentive for workers to provide high effort in subjects populations from developed countries. Is this also true in our Ghana sample?

We first compare average wage offers between treatments 3E and 3ES. As in earlier experiments, we find some evidence that reputation increases wages in the UK, but no such effect in Ghana. This is shown in Table 9 which compares 3ES to 3E for a number of outcome variables, using a within subject and difference-in-difference approaches (see also Appendix Section D). For Ghana, the within-subject estimator shows a significant drop in wage as a result of information sharing but in the diff-in-diff regression where we control for a time trend, the effect disappears. In contrast, for the UK the within-subject, diff-in-diff and fixed effects results all show a positive and significant effect of information sharing on wage offer.

We also find that UK subjects modulate their wage offer on the information provided on past effort. We find no such evidence for Ghanaian subjects. This is shown in columns 2 and 4 of Table 8: compliance with another's employer's requested effort is associated with a significant wage increase of 4 points in the UK, while in Ghana the corresponding coefficient is less than half a point and is not significant. Ghanaian subjects do not appear to rely on a reputation mechanism to incentivize workers. We also find that UK subjects reward more a worker's compliance with them than with another employer: compliance to oneself is associated with a wage increase of 7.9 points, almost double that for compliance with another employer's requested effort. UK employers thus reward more strongly a worker's compliant behavior with their own contract than with other employers. This could be because they value compliance more when it benefits them – and wish to reward it more. Another possibility is that employers have more detailed information for own workers –

they know the wage they paid, not the wage paid by other employers. Consequently, they are in a better position to assess who was 'at fault' for non-compliance: a worker may not be expected to provide high effort when the wage is unreasonably low. None of these patterns are present among Ghanaian subjects, however.

So far we have examined whether employers reward workers for compliance with other employers effort requests. But do reputational incentives induce workers to comply more – i.e., is reputation effective in deterring shirking? We do not find strong evidence that this is the case. From Table 1 we see that the rate of effort compliance in Ghana is higher (50%) in treatment 3ES than in treatment 3E (43%), even though employers do *not* modulate wage offers based on past compliance with other employers. This difference, however, is not statistically significant (see Table 9). In contrast, in the UK where employers do vary wage offers to reflect compliance with others, the compliance rate in treatment 3ES in game 4 is identical to treatment 3E in game 4 – 76% in both cases.[17]

If we also control for the wage offered, we again fail to find that having a reputation mechanism significantly increases compliance. Table A7 presents a linear probability model of acceptance and compliance as a function of wage offer and being in treatment 3ES. As before we find that the wage coefficient is positive and significant in both Ghana and the UK. But the coefficient on treatment 3ES is mostly not significant. This suggests that multilateral reputation is not a stronger disciplining mechanism compared to bilateral reputation/relational contracting, even though it leads to higher wage offers.

4.6 Robustness analysis

We have found striking differences between UK and Ghanaian subjects in the behavior of subjects assigned the role of employer: in the UK – but not in Ghana – employers make a higher wage offers following compliance with a high effort request by self or other employers; in Ghana – but not in the UK – employers reduce their wage offer following high effort. Since the Ghana findings differ from previous evidence from developed countries, we check their robustness to other specifications and we subject them to out-of-sample validation.

In Appendix Table A13 we present two alternative specifications for the Ghana regres-

[17] This is a between-subject comparison. The within-subject treatment effect estimate for compliance is positive: compliance of workers in treatment 3ES in game 4 is 11 percentage points higher than the compliance rate of these workers in treatment 3E in game 3.

sion of wage offer on past compliance: in the first specification we add the lagged value of the wage, to allow for the possibility that low effort in the previous period was seen by employers as a response to low wage. Adding this control does not change our main finding. In the same spirit of controlling for past wage, we estimate a model in which the dependent variable is the change in wage relative to the last period – rather than the wage level. This again does not change the magnitude or significance of the coefficient of past compliance among Ghana subjects.

In Appendix Table A14 we regress the offered wage on past effort and whether the chosen effort was a positive or negative "surprise" (i.e., higher or lower than demanded). This specification is similar to that of Brown et al. (2012) with German subjects.[18] We find that both Ghana and UK employers reward higher effort with a higher wage in the next period. But the coefficient is significantly higher for UK subjects. The response to negative surprises is also different: in the UK, a negative surprise lowers the offered wage of -2.1 points; in Ghana it raises the offered wageby 1.7 points. Ths difference is statistically significant, confirming again that the two subject populations behave differently when assigned the role of employer.

We also worry that our Ghana results are a 'fluke', that is, they apply to one particular set of experimental sessions but do not replicate to other sessions with similar or different Ghanaian subjects. To this effect we compare our findings to those of an experiment run in Ghana by Davies and Fafchamps (2017) and designed to test whether allowing employers to send messages of praise or criticism to workers can alleviate the incentive issues outlined in this paper. The basic design of the experiment is a simplified version of ours: it only allows two effort levels (instead of three) and makes high effort the default contractual setting.[19] If anything these changes should make rewards and punishment even more salient. In total 31 sessions were held with a total of 559 students from the same Ghanaian universities, to which are added 61 entrepreneurs recruited from small and medium-size enterprises.

In Table 10 we use data from those sessions to replicate our regression of wage offer on past compliance. Results are slightly more encouraging: past compliance is now associated with a statistically significant 2 point increase in wage offer. The magnitude of

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

[19] The payoff function is the same as ours, except that some sessions the employer's earning from low effort is raised from 5 to 10 or 15 points.

the coefficient is however small relative to the employer's loss from low effort – which ranges between 25 and 30 points. For entrepreneur subjects, the estimated coefficient is 3.5, suggesting a stronger willingness to condition wage offers on past compliance, but the pooled regression in column (3) suggests that the differences are not statistically significant. These estimates nevertheless remain well below what we find for UK subjects: as shown in Table 4, an equivalent regression for UK sessions yields a wage increase of 10.2 points for compliance with high effort.

5 Worker heterogeneity

We have found striking differences in contracting patterns between UK and Ghana experimental subjects. We would like to know why. One possibility that we explore in this Section is that workers have different distributional preferences in the UK and Ghana, and these differences translate in different effort levels. This could arise, for instance, out of a sense of entitlement: very few Ghanaians go to university, and those who do may believe they deserve to be paid even if they do not work hard. Alternatively, they may perceive employers as 'rich' and feel justified to distort payoffs to their advantage by shirking. Although employers in the experiment are just other students and the choice of high effort does not require any actual effort, subjects may nonetheless apply heuristics that reflect how they would tend to behave in realistic situations. To investigate this idea, we examine whether Ghanaian workers in the experiment exhibit distributional preferences that are significantly different from those of UK subjects.

To do this, we estimate a structural model of effort choices that categorizes workers according to their distributional preferences. The starting point of our estimation is the model of inequality aversion proposed by Fehr and Schmidt (1999) whereby the utility that individual i derives from his own payoff x_i and the payoff of another player j is:

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

where the key parameters of interest are: β_i which represents 'altruism' or, more precisely, the disutility from advantageous inequality (i.e., when i has a higher payoff than j); and α_i which represents 'envy' or, more precisely, the disutility from disadvantageous inequality (i.e., when i has a lower payoff than j). A fully rational self-interested agent has parame-

Table 11: 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

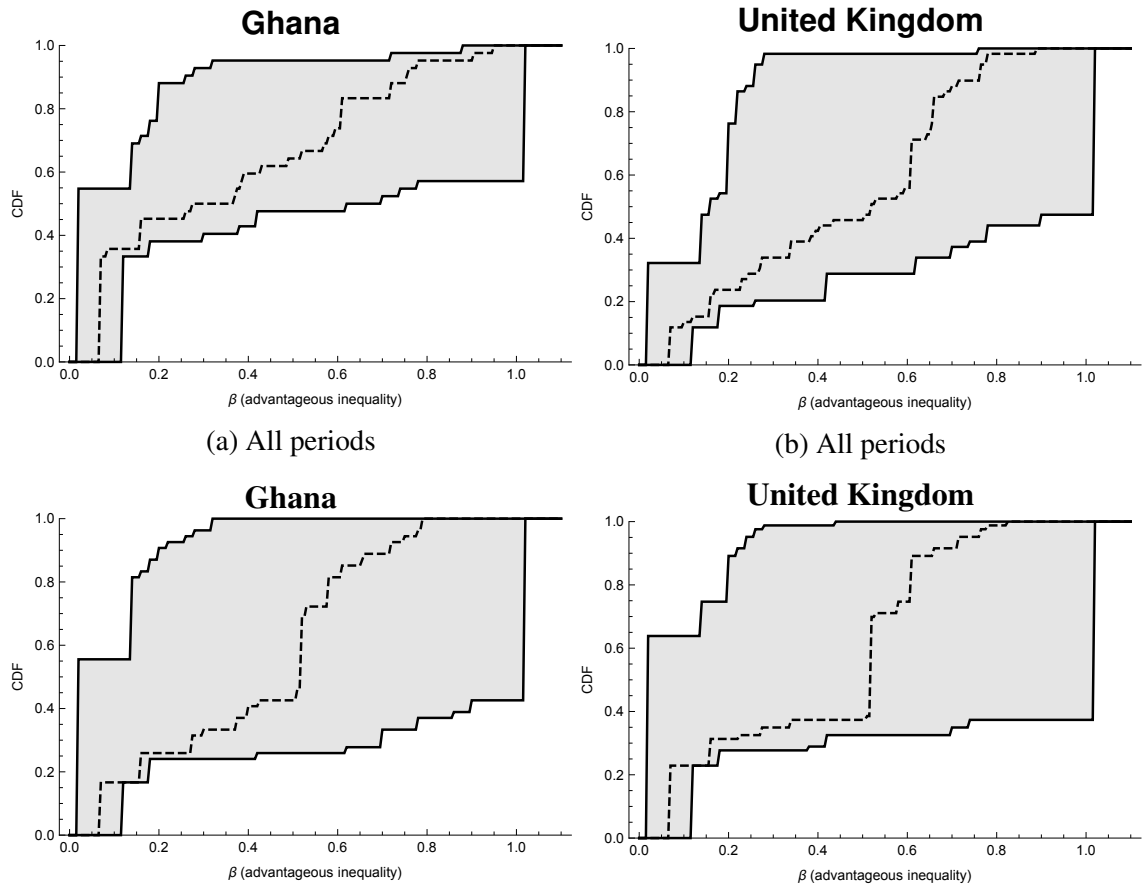
$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

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

ters $\alpha_i = \beta_i = 0$; an inequality averse agent has $\alpha_i > 0$ and $\beta_i > 0$. We discuss this model more in detail in the Appendix. The key identifying assumptions are workers set their effort level in each period to maximize $U(x_i, x_j)$, and that parameters β_i and α_i are constant throughout the experiment for individual i. The latter assumption rules out strategic motives on the part of workers – see the Appendix for a discussion.

We endeavor to obtain estimates of β_i and α_i for each experimental subject, based on all the decisions made over all games and periods. Relative to self-interested agents, workers with a high β_i choose an effort level that reduces the earnings gap between themselves and the employer. As noted by Charness and Haruvy (2002), in a gift-exchange game most of the worker's choices involve payoff distributions where the worker earns more than the employer, i.e., faces advantageous inequality. These choices are therefore more informative about β_i than about α_i, for which we are naturally underpowered.

In order to obtain estimates of β_i and α_i, we rely on two different methods: a set identification approach that brackets the values of α_i and β_i that are consistent with the choices made by i; and the maximum likelihood estimation of a multinomial logit model. ML estimtes yield point estimates of β_i and α_i that predict the data best, while set identification yields bounds on the values of β_i and α_i that are allowed by observed choices.



(a) All periods

(b) All periods

(c) Period 5 only

(d) Period 5

Figure 3: The Figure presents the cumulative distribution of β_i in treatment 1E. The dashed line represents the cumulative distribution of the β_i value of the geometric centre (i.e., the two-dimensional average) of each choice set.

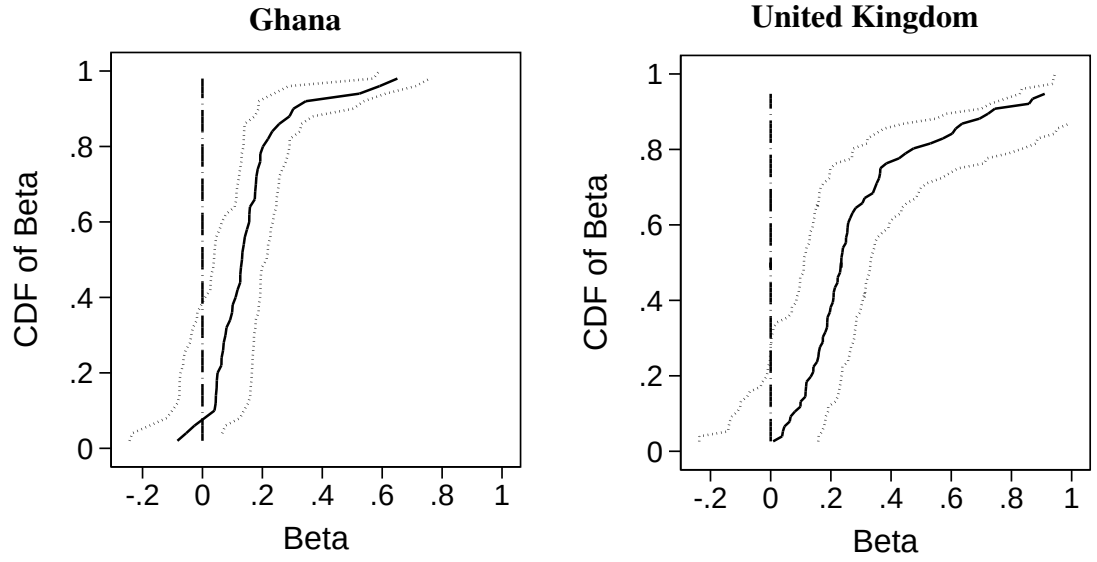
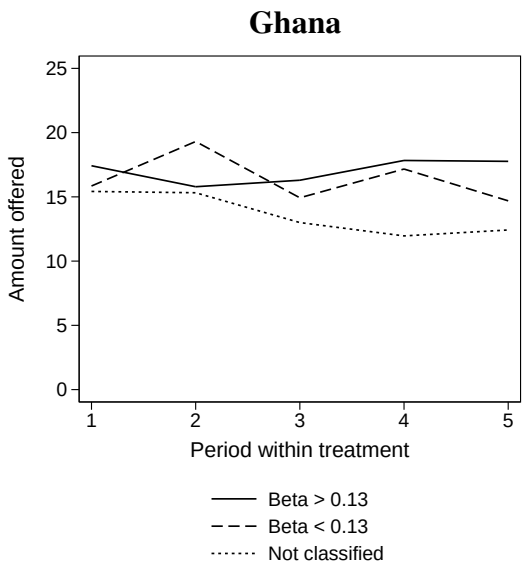
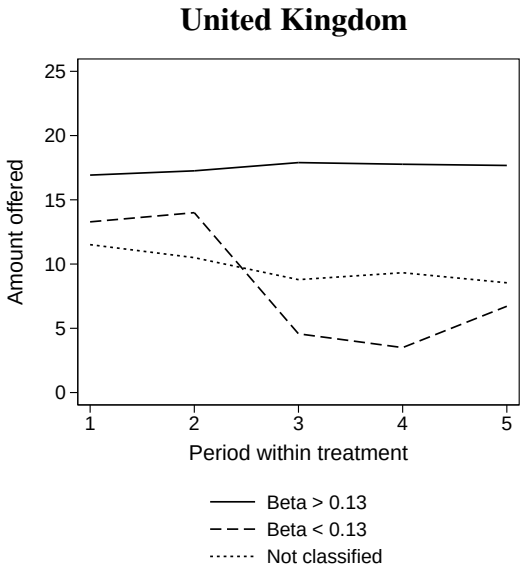


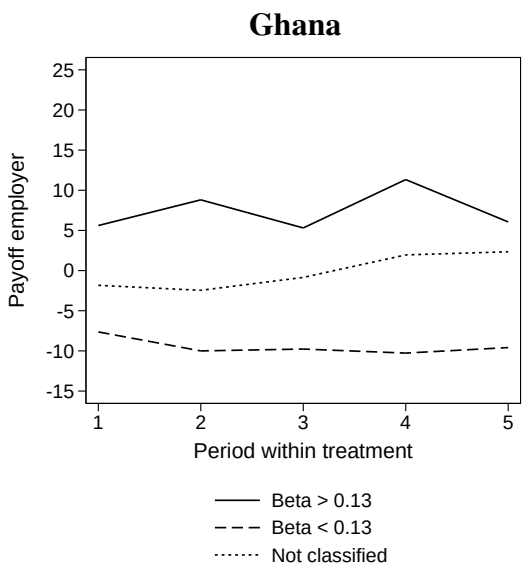
Figure 4: Cumulative distribution function of the estimated β_i using maximum likelihood estimation, based on treatment 1E.



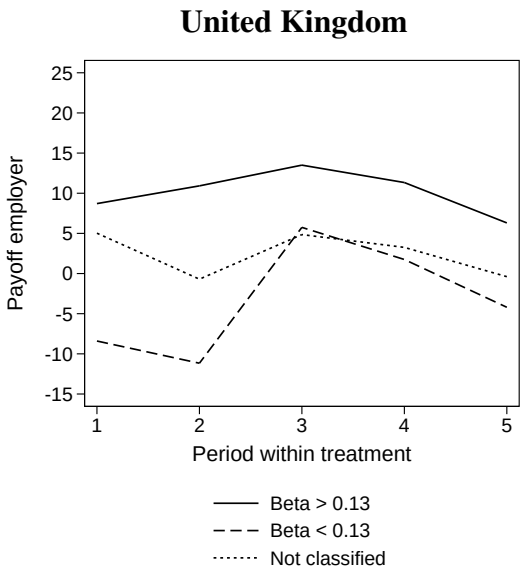
(a) Amount offered



(b) Amount offered



(c) Per period employer's earnings



(d) Per period employer's earnings

Figure 5: 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 includes values that are below 0.13 as well as 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.

5.1 Set identification

In the set identification method, we proceed as follows. First we calculate, for each realized effort choice, the set of values of α_i and β_i for which this choice maximizes utility. Second, for each worker in each five-period game we calculate the overlap in the sets for each of the five periods. For 34% of Ghana workers and 24% of UK workers the sets overlap in all five periods. For 71% of Ghana workers and 61% of UK workers the sets overlap in at least four of the five periods. These are the subjects we focus on in the rest of the analysis presented in this sub-section.[20]

Using the above set overlaps, we construct the potential range of cumulative distribution functions (CDFs) for α_i and β_i. Figure 3 shows the potential CDFs for β_i. In the Appendix E we report the corresponding CDFs of α_i but as noted before, our experiment is not particularly informative about this parameter, so we do not discuss it further. These CDFs indicate that there is substantial heterogeneity in β_i's in both countries.

From Figures 3a and 3b we see that 45% of Ghana workers have a value of β_i of 0.13 or higher. The corresponding share in the United Kingdom is 67%. These workers can be characterized as reciprocal: they 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 UK β_i is lower than 0.13. This corresponds to a low effort choice even for high wages. Subjects with these preferences can thus be characterized as selfish. These results therefore suggest that the proportion of workers acting reciprocally is larger among UK than Ghanaian subjects.

This analysis, however, conflates two types of motivations: pure inequality aversion; and a strategic reciprocation motive, i.e., high effort to get a high wage reward or to avoid a low wage punishment. In a repeated game setting, selfish workers may act reciprocally for a while. But they should act selfishly in the last period when the shadow of the future no longer incentivizes them to choose high effort.[21] This means that pure preferences for distribution are only revealed in period 5.

Figures 3c and 3d display estimates of β_i that are based solely on period 5 behavior. The differences between UK and Ghana subjects disappear. If anything, the pattern is reversed: 44% of Ghana subjects have a β_i of 0.14 or higher, and 17% a β_i of 0.13 or

[20] In both countries there is a group of workers for whom we cannot bound the β_i parameter: either their behaviour is not captured by the Fehr-Schmidt model; or the employer's wage offer does not allow the identification of β_i.

[21] Remember that, by experimental design, subjects never play two games with (some of) the same subjects. There is also no information sharing across games, thereby ruling out any repeated game motive across games.

lower. For the UK, these figures are respectively 36% and 23%. The findings suggest that for 31% (=67% - 36%) of UK subjects, reciprocal behavior is driven by strategic play: these workers choose high effort only in response to incentives. Similarly, the proportion of selfish play among UK subjects increases from 12% to 23% in period 5, again suggesting that 11% of subjects act less selfishly for strategic reasons.

In contrast, in Ghana the proportion of workers who stop acting reciprocal in period 5 is only 1% (=45% - 44%). Furthermore, the proportion of workers who act selfishly drops from 33% to 17% in period 5, instead of increasing. These suggest that Ghanaian subjects do not, as a rule, act strategically, thereby confirming our earlier results. It follows that if Ghana workers are not responding to incentives, and employers correctly anticipate that, they may rationally choose not to introduce rewards and punishment in their choice of wage offers.

5.2 Maximum likelihood

To further check the robustness of our set indentification findings, we derive ML point estimates of α_i and β_i using a random utility model with multinomial logit choice probabilities. The choice probabilities are based on the four options that a worker has: rejecting an offer or accepting it and choosing low, medium or high effort.

Table 11 presents ML population estimates of α and β for both countries. While the estimated value of α is not significantly different from zero at the 5% level, estimates for β are significantly greater than zero in both subject pools. Point estimates for β are 0.147 in Ghana and at 0.213 in the UK, indicating significantly more reciprocal play by UK subjects. But the difference between the two subject pools is smaller in period 5.

We repeat the estimation for each worker individually, using the observations from all five periods of the game.[22] Figure 4 shows the distribution of estimated β_i for both Ghana and the UK. Just like for the CDFs obtained by set identification, estimated β_i values tend to be higher in the UK than in Ghana, again consistent with more reciprocal behavior among UK subjects – a feature that set identification has shown to be driven more by strategic play than by aversion to inequality per se. It remains that in both countries we find a probability mass of workers with a positive β_i significantly different from zero.

[22]There is not enough variation in the data to identify a point estimate of β_i for a particular subject in a given period.

5.3 Response of employers

As a final check, we examine whether the behavior of employers varies according to whether a worker is reciprocal or selfish. To this effect, we classify workers with a low β_i as selfish and those with a high β_i as reciprocal and we look at the offers made by employers to these two types of workers. Figure 5 shows wage offers and employer earnings depending on whether they are matched with a high or low β_i worker.

We see that in UK subjects assigned the role of employer offer lower wages after period 2 while in Ghana wage offers remain high in all periods. In other words, UK employers seem able to identify those workers willing to work for lower pay; Ghanaian employers do not, again indicating that they do not act strategically. We also find that worker types are associated with differences in employer earnings (see Figure 5c and d). In the UK sessions, employers facing a low β_i type tend to increase their earnings after period 2 – e.g., by reducing the wage they offer. In contrast, Ghanaian employers matched with such workers keep making losses until the end of the game.[23]

6 Discussion

The results presented here raise a number of questions regarding the interpretation of our findings. A common interpretation of results from gift exchange experiments in Western countries (e.g., Brown et al. 2004, 2012) is as an equilibrium of a repeated game with reputational punishment strategies: workers expect to receive lower wage offers if they shirk, and this induces them to choose high effort. This raises the question of whether workers' expectations arise from observed employer behavior – as in 'tit-for-tat' strategies – or from commonly held beliefs in the society – e.g., it is 'legitimate' and hence expected that employers punish shirking workers (e.g. Davies and Fafchamps 2019).

We did not collect information about expectations of punishment among our two subject pools, so we cannot test whether subjects who a priori expect to be punished shirk less in the experiment. But we can investigate whether experimental subjects who receive a lower wage offer after shirking shirk less later in the experiment. If they do, this would suggest a strategic understanding of the game consistent with a punishment equilibrium:

[23] In this analysis, reverse causality is a potential issue: a low wage offer in the first period could encourage more selfish behavior by the worker. We can find some evidence for this in the UK: workers that we identify as having a low β_i tend to have received a lower wage in the first period. We can circumvent this problem, by taking the estimated β_i value of an earlier game and look at the response of a new employer. We find a very similar pattern.

workers start by putting employers to the test; if they are punished, they revise their expectations and improve their behavior; if they are not, they continue to shirk.

To investigate this possibility, we test whether subjects who have been punished for low effort in Game 2 (the first game with free effort level) are less likely to shirk in Games 3 and 4. Naturally we limit our attention to treatments in which the worker can choose the effort level. Shirking is defined as exerting less effort than required by the contract or choosing low effort in response to a high wage level (i.e., above 23, which would equare the subjects payoffs if the worker chooses high effort). Similar results obtain if we define shirking as exerting less effort than required in the contract. Conditional on shirking in the previous period, we define punishment as either offering no contract or offering a contract with a reduced wage. We show in Table A15 the frequency distribution of the number of shirking episodes in Games 2, 3 and 4, for UK and Ghanaian subjects. We see that, as noted before, shirking is much more prevalent in Ghana. Furthermore, shirking falls across games in the UK – from 1.76 to 1.13 episodes from Game 2 to Game 4 – but remains essentially constant in Ghana – 2.77 in Game 2 and 2.71 in Game 4. These country differences are strongly statistically significant. Similarly, the frequency of punishment is roughly constant in Ghana – 1.2-1.4 episodes per Game – and falling in the UK – from 0.97 to 0.67 episodes from Game 2 to Game 4. In Game 2 the difference between countries is not statistically significant, but it becomes so in Games 3 and 4. In terms of sample averages, therefore, Ghanaian subjects do not appear to reduce their shirking over time in spite of a reasonably high frequency of punishment.

To verify this at the individual level, we regress shirking in Games 3 and 4 on the number of times the subject was punished in Game 2, conditioning on the number of times the subject shirked in Game 2. We estimate the coefficients separately for Ghanaian and UK subjects. A UK subject dummy is also included to control for differences in the unconditional propensity to shirk. Estimation results are presented in Table 12. Standard errors are clustered at the session level. Unsurprisingly given the heterogeneity analysis that we conducted in the previous Section, we see that subjects who shirked in Game 2 are more likely to shirk again in Games 3 and 4. This is true in both country populations, but the effect is stronger for UK subjects, suggesting the presence of particularly persistent shirkers. The effect is less pronounced in Ghana where subjects seem less persistent in their behavior – but also more likely to shirk on average. UK shirkers tend to shirk less in

Table 12: Testing responsiveness of subjects' shirking to past punishment in Game 2

	Game 3	**Game 3 & 4**
	(1)	(2)
Number of times shirked in Game 2 (UK subjects)	0.793^{***}	1.294^{***}
	(0.165)	(0.335)
Number of times shirked in Game 2 (Ghana subjects)	0.295^{*}	0.606^{***}
	(0.143)	(0.143)
Number of times was punished for shirking in Game 2 (UK subjects)	-0.165^{*}	-0.156
	(0.0886)	(0.166)
Number of times was punished for shirking in Game 2 (Ghana subjects)	0.0533	0.0819^{***}
	(0.0371)	(0.0262)
UK subject dummy	-1.072^{***}	-2.764^{***}
	(0.330)	(0.468)
Constant	1.823^{***}	3.741^{***}
	(0.279)	(0.388)
Observations	5520	5520
R-squared	0.280	0.455

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

Note: The dependent variable is an indicator variable with value 1 if the subject shirked in the current period. Standard errors in parentheses are all clustered at the session level.

Games 3 and 4 if they have been punished for shirking in Game 2. The effect is statistically significant in Game 3, and of similar magnitude (but not significant) in Game 4. This finding is consistent with the idea that some subjects learn that shirking is punished and correct their behavior over time. In contrast, we see no such learning among Ghanaian subjects who were punished in Game 2: if anything, punished shirkers are slightly more likely to shirk again than those who were not punished. This confirms that subjects in the two countries differ in the way they conceive the strategic nature of the game.

As a final robustness check, we examine whether differences in shirking behavior between the two subject pools could have been predicted from differences in their observable characteristics such as gender, age, having a parent entrepreneur, and answers to the Big 5 questions. Indeed we know from Table A3 that there are some differences across the two subject pools. Put simply, the question we are asking is: suppose we modify the composition of the UK sample to match the subject mix in the Ghana sample; will we observe the same behavior as the Ghana sample. If we do, this means that behavioral differences between the two country samples can be attributed to differences in sample composition. If we do not, this means that there exist a systematic difference in behavior between the countries that cannot be accounted for by average differences in individual characteristics

across the two samples. We cannot say for sure what causes this difference in average behavior, but cultural differences is one possibility that we cannot rule out a priori.

We estimate a random forest machine-learning algorithm on each of the country subject pools separately and we test its predictive performance on the other subject pool – and vice versa. For comparison purposes, we do the same using OLS. We then tests whether the predicted difference in average behavior between Ghana and the UK is statistically significant and has the same sign as the difference observed in the data itself.

For this approach to be convincing, we need to take care of two issues. First, if survey characteristics are unable to predict behavioral differences between countries when we pool data from the two samples, then we should not be surprised if they do not predict them when we allow regression coefficients to vary across the two countries. To take care of this concern, we test that the behavior predicted by the pooled regressions is significantly different between the two country samples. Second, tests based on regression predictions are affected by prediction error and overfitting bias, whether in sample or out of sample. To correct for this, we use randomization inference to simulate the distribution of each test under the null that regressors are independent of the dependent variable and thus have no true predictive power. This is achieved by constructing counterfactual samples in which the dependent variable y_i is permuted across observations so that, say, the permuted $\widetilde{y}_i$ for observation i happens to be y_j with $j \neq i$, while the vector of regressors X_i remains unchanged. Random permutation ensures that, in expectation, $E[X_i\widetilde{y}_i] = 0$ across all replications. For each permuted sample we calculate the various test statistics that we are interested in. We then compare the actual t-test statistic to the histogram of simulated t-statistics under the null to obtain their two-way equivalent p-value.

Results are shown in Table A17 for three behavioral indicators: whether an employer punishes a shirking worker; whether a worker exert high effort; and whether a worker complies with the high effort requirement of the contract. We also report results for a randomly assigned behavior that serves as placebo. The first row of the Table gives the actual difference in average behavior between the two study samples. We also provide the p-value of a simple t-test of equality of means. The negative differences confirm that, as noted earlier in the paper, Ghana subjects are less likely to punish shirking, supply high effort, and comply with contract. Next we test whether coefficients from a pooled regression can predict behavioral differences betwen the two samples. To the extent that

there are differences in regressor means across the two populations, in-sample predictions will mechanically capture behavioral differences. The results confirms that indeed they do, whether predictions are based on a random forest algorithm or on OLS.

The test of interest is when we compare *out-of-sample* predictions for both models. In this comparison, a model is fitted to the UK data and used to predict the behavior of Ghana subjects, while another model is fitted to Ghana subjects and used to predict the behavior of UK subjects. We compare the out-of-sample predictions to each other. If differences in observed characteristics predict differences in behavior, we expect the sign and significance of the difference in predictions to be similar for in-sample and out-of-sample predictions. If the sign is reversed, it means that the ability to predict is strongly rejected. The reported positive differences for the three listed behavior mean that, based on their observed characteristics, Ghana subjects are predicted to be *more* likely to engage in these behaviors than UK subjects. In contrast, the placebo test show no significant differences in out-of-sample predictions, as it should be. These results imply that the cross-country differences in observables documented in Table A3 are unable to account for the cross-country behavioral variation in our study.

7 Conclusion

Experiments with gift-exchange games in developed countries have provided support for cooperating behavior based on conditional reciprocity. Our results in the UK support this as well. We do, however, find markedly different behavior among Ghanaian subjects, in spite of the fact that they are selected among university students as in earlier experiments.

In experimental sessions involving Ghanaian subjects, we find that subjects assigned the role of worker tend to choose a lower level of effort, even after receiving a fair wage offer. This contrasts with UK subjects, who behave reciprocally more often. A large fraction of UK subjects, however, act reciprocal not because they are more inequality averse, but rather because they act stratetically and respond to incentives.

A similar contrast is found in the behavior of subjects assigned the role of employer. While UK subjects tend to keep offering high wage following high effort and reduce their wage offer otherwise, Ghanaian employers do not act in a way that rewards workers for good behavior and penalizes low effort. For instance, Ghanaian employers are often ob-

served making high wage offers in spite of facing repeated low effort by the worker. As a result, Ghanaian subjects acting as employers have average earnings that are much lower than those of workers. We also find that employer subjects in the UK offer higher wages to workers with a good reputation, in line with the result of Charness et al. (2011) in the trust game and of Falk et al. (2005) in the gift-exchange game. No such effect is observed in Ghana.

The low level of effort observed in our Ghana experiment may resonate with firms surveys documenting low worker productivity in developing countries. But what is truly surprising is that college students acting as employers lack a natural understanding of how to discipline workers using reward and punishment strategies, even though these strategies are automatically adopted by a majority of student subjects in developed countries. Indeed, just like in our UK sessions, subjects assigned an employer role in Brown et al. (2004) and Brown et al. (2012) punish poorly performing workers, even in situations of shortage of labor. What makes these findings troubling is that, in their professional life, many of the Ghanaian university students who participated in our experiment will end up supervising and monitoring workers either as business owners or as middle managers in civil service and the private sector. Their inability to incentivize workers augurs badly of their future performance in labor management.

What could account for our findings? A first possibility – that is often raised when using subjects from developing countries – is lack of understanding. We do not believe that poor understanding explains our Ghana results. First, much fewer Ghanaians attend university, which implies that university students are, if anything, more strongly selected on ability in Ghana than university students in developed countries.[24] Secondly, we introduced a number of simplications in the design to reduce possible sources of confusion. Thirdly, we do not require subjects to make any numerical calculation to infer how their effort choice will affect their payoff: all calculations are instantaneously made for them and displayed on their screen. Fourth, at the rehiring stage we explicitly ask employers to make conditional offers based on the effort chosen of the worker. This should encourage employers to think strategically about wage offers. Yet, in spite of this, we find little if any evidence of conditional reciprocity by employers.

Could it be that our experiment reflects the different nature of employment in devel-

[24] Our UK students subjects are not only University of Oxford students, but also include students from other universities in the Oxford area – e.g., Oxford Brookes University, a former polytechnical school.

oping countries such as Ghana? As noted in the introduction, the Ghanaian economy is characterized by a large proportion of self-employment. Recruitment in formal jobs often happens through social networks, perhaps making it harder for employers to punish workers for low performance. Wage employment may also be seen as serving a redistributive social function. Some studies suggest that recruitment through social networks can increase effort (e.g., Montgomery, 1991; Bandiera et al., 2009). Others have shown that performance pay – i.e., incentives for high effort – can be demoralizing. For example, in a field experiment in India, Breza et al. (2015) find that effort fell after workers started receiving wages (weakly) based on their past effort. By setting incentives, employers de facto peg workers against each other, and the extra effort of one worker imposes a negative externality on others (Bandiera et al., 2005). One interpretation of our result is that Ghanaian subjects internalize this norm much more than UK subjects.

Another interpretation relates to the sense of entitlement or responsibility that comes with social status. Our games were explicitly framed in labor market terms. The purpose of doing this was to encourage subjects to apply relevant heuristics. In the context of Ghana, there may exist strong cultural connotations of employers providing a living for their employees. Giving a subject the role of employer and another the role of worker may well have triggered these cultural connotations, making it morally less acceptable for employers to reward or punish workers.[25]

These findings leave open the question of what alternative incentives can be brought to bear to discipline workers. One possibility is firing. Although the firing of workers is not explicitly incorporated in our experimental design, it can nonetheless be approximated by the employer not making any offer to a worker, or by only offering a very low wage. This option is more attractive when employers can choose between multiple workers, as in the 3-on-3 treatments. But we did not find evidence that competition between workers in Ghana induced more punishment and higher effort. Furthermore results from the gift-exchange experiment of Brown et al. (2012) indicate that even when there is excess demand for labor (and firing is relatively unattractive), there is little difference in contracting patterns compared to treatments with an excess supply of labor. It therefore remains to be seen whether making firing a more attractive or salient option could generate stronger incentives

[25] Further support for this interpretation comes from the observation that, in a pilot, we switched roles halfway through the experiment. We found no difference in behavior between those who were employers before or after the switch, a result consistent with the idea that subjects applied behavioral norms specific to their assigned role.

to exert high effort.

Another possibility is to introduce non-monetary incentives – e.g., by allowing employers to praise or criticize workers based on their choice of effort. This avenue is explored in Davies and Fafchamps (2017), but did not lead to a significant increase in effort.

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Online appendix

A Instructions to experimental subjects

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."

B Conceptual framework for the gift-exchange game

We start by discussing the standard conceptual framework that is behind our experiment. 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 behavior 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 and Stoecker (1986) and Andreoni and 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 and 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 behavior 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 equilibria 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 behavior 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 and 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

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

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.

B.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 and 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.

B.2 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 behavior 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 and 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 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. These three predictions can be tested by analyzing the contracting behavior in treatment 1E, where one employer can make an offer to one worker only, and where the worker can choose effort.

Furthermore, we anticipate that introducing competition will increase wages, due to the wage pushing up effect of bidding. This can be tested by comparing wage offers in treatment 3E with wage offers in treatment 1E. 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. This can be tested by comparing wage offers following low and high effort in treatment 3ES with wage offers in treatment 3E.

C A model of cooperation with types

We now introduce a model in which players differ in their propensity to cooperate. We start with a basic model of cooperation inspired by the literature, before modifying this model to suit our needs.

C.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

$$\pi_W(w, e) = w - c(e), \tag{A1}$$

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*

$$\pi_E(w, e) = \Pi(e) - w. \tag{A2}$$

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.*

C.1.1 High effort equilibrium

Proposition 4 *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 behavior, 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 behavior $P_T(S|X_T) = 0$ 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

$$\Pi(H) - \Pi(M) \geq \frac{\bar{w}_H - \bar{w}_M}{\sigma}, \tag{A3}$$

and over $w_L = 0$ if

$$\Pi(H) - \Pi(L) \geq \frac{\bar{w}_H - w_L}{\sigma} = \frac{\bar{w}_H}{\sigma}. \tag{A4}$$

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

$$\bar{w}_H \geq c(H).^{26} \tag{A5}$$

- 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 will offer $\bar{w}_H$ if

$$\Pi(H) - \Pi(M) \geq \bar{w}_H - \bar{w}_M \qquad \text{and} \qquad \Pi(H) - \Pi(L) \geq \bar{w}_H \tag{A6}$$

Note that these conditions are satisfied when conditions (A3) and (A4) are satisfied.

- We can repeat this exercise for the earlier periods and show that conditions (A5) and

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

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

(A6) need to hold in these periods as well.[27]

Provided conditions (A3), (A4), (A5) and (A6) hold, the Perfect Bayesian equilibrium as described in Proposition 4 holds.

C.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

$$\Pi(H) - \Pi(M) \leq \frac{\bar{w}_H - \bar{w}_M}{\sigma} \qquad \text{and} \qquad \Pi(M) - \Pi(L) \geq \frac{\bar{w}_M}{\sigma}, \tag{A7}$$

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

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

$$\bar{w}_M > c(H). \tag{A8}$$

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

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

$$\bar{w}_M > c(M). \tag{A9}$$

[27] 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

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

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

$$\Pi(H) - \Pi(M) \geq \bar{w}_H - \bar{w}_M \qquad \text{and} \qquad \Pi(H) - \Pi(L) \geq \bar{w}_H \tag{A10}$$

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

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

$$\Rightarrow \qquad \bar{w}_H \geq \frac{(T-t)c(H) - \bar{w}_M}{T-t-1}, \tag{A11}$$

  which is implied by condition (A8).[28]

Proposition 5 *Under conditions* (A7)*,* (A8) *and* (A10) *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 (A10)).

There are also equilibria possible where the employer offers $\bar{w}_M$ throughout. This will be the case when condition (A10) 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 $\bar{w}_H$.

[28] We can rewrite the left had side of (A11) using condition (A8):

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

C.2 Microfoundations of other-regarding behavior

The model above does not provide a microfoundation for the behavior 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 A5 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 $\bar{w}_H = 19$.

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.[29]

C.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 (A5). The screening mechanism used by the employer provides the incentive for the R-type worker to exert high effort.

[29] 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.

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 S-type.

Assumption 6 *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

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

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 A6 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.

D Additional robustness checks

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 A2), 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:

$$y_{igt} = \alpha_i + \beta_1 T_{ig} + \epsilon_{igt} \tag{A12}$$

   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:

$$y_{i\bar{G}t} = \beta_0 + \beta_1 T_i \bar{G} + \epsilon_{i\bar{G}t} \tag{A13}$$

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:

$$y_{igt} = \beta_0 + \beta_1 T_{ig} + \beta_2 P_g + \beta_3 D_i + \epsilon_{igt} \tag{A14}$$

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:

$$y_{igt} = \alpha_i + \beta_1 T_{ig} + \beta_2 P_g + \epsilon_{igt} \tag{A15}$$

The main difference between this equation and Equation (A14) is that in Equation (A14) 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 A8, A9 and A10 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.

E Classifying worker types

This appendix section provides more detailed information on the estimation of the structural model of other-regarding preferences for workers. As starting point, we assume that, in every period, the worker chooses an effort level to maximize Fehr-Schmidt preferences of the type:

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

Figure A8 shows, for three different wage values, the effort level predicted by a worker holding Fehr-Schmidt preferences with parameters α_i and β_i. The full set of graphs for all possible wage values is shown in Figure A9. These Figures can be used to identify sets of values of α_i and β_i that are consistent with observed effort choices under the maintained assumption that workers act as if in a one-shot (i.e., unconditional) one-sided PD game and have Fehr-Schmidt preferences with preference parameters α_i and β_i.

This calculation is first done separately for each worker in each period of each game, as illustrated in Figure A10. Next, we overlap the shared areas i with each other to identify the set of values of α_i and β_i that are consistent with at least four out of the five effort choices made by a worker. This is illustrated in Figure A11 for the same worker as in Figure A10. By repeating this process for each worker, we derive bounds for the distribution of α_i and β_i across all workers. These bounds are those shown in Figure 3.

F Appendix Tables and Figures

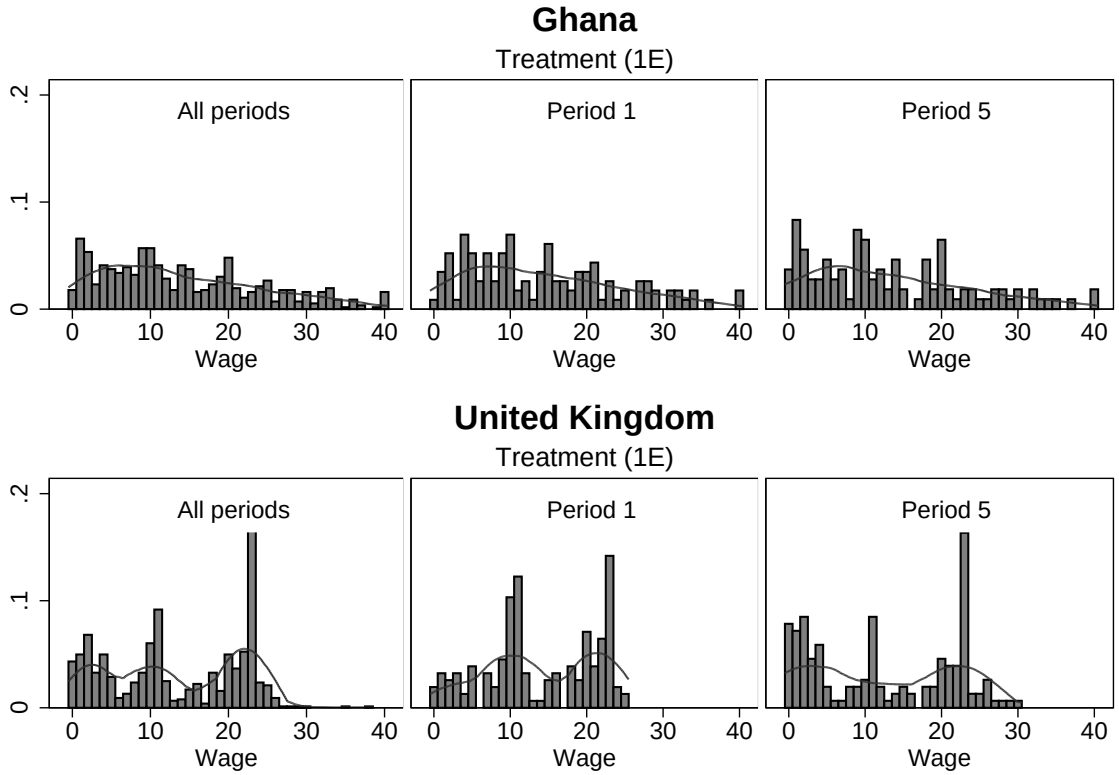
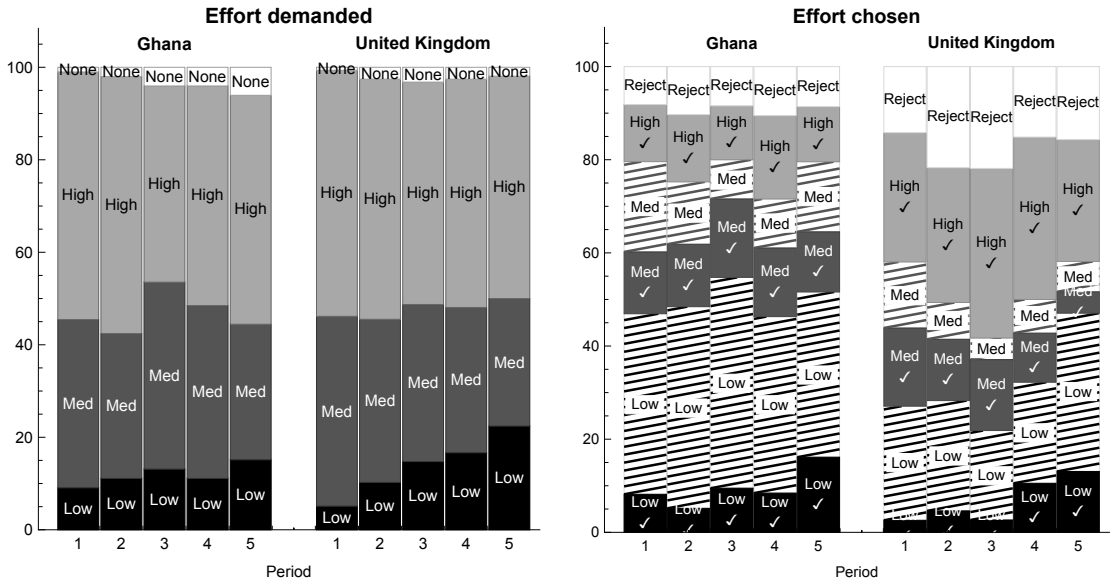


Figure A1: The Figure shows histograms of wage offers for Ghana and the UK. Only observations from treatment 1E, games 2-4, are used to construct the histogram. The line represents a non-parametric density estimate calculated using a Epanechnikov kernel.



(a) Effort demanded (b) Effort chosen

Figure A2: The Figure shows the distribution of requested and chosen effort in the 1E treatment. The dashed areas indicate that the effort chosen was lower than what was demanded. In the left part of the Figure, 'None' means that no offer was made.

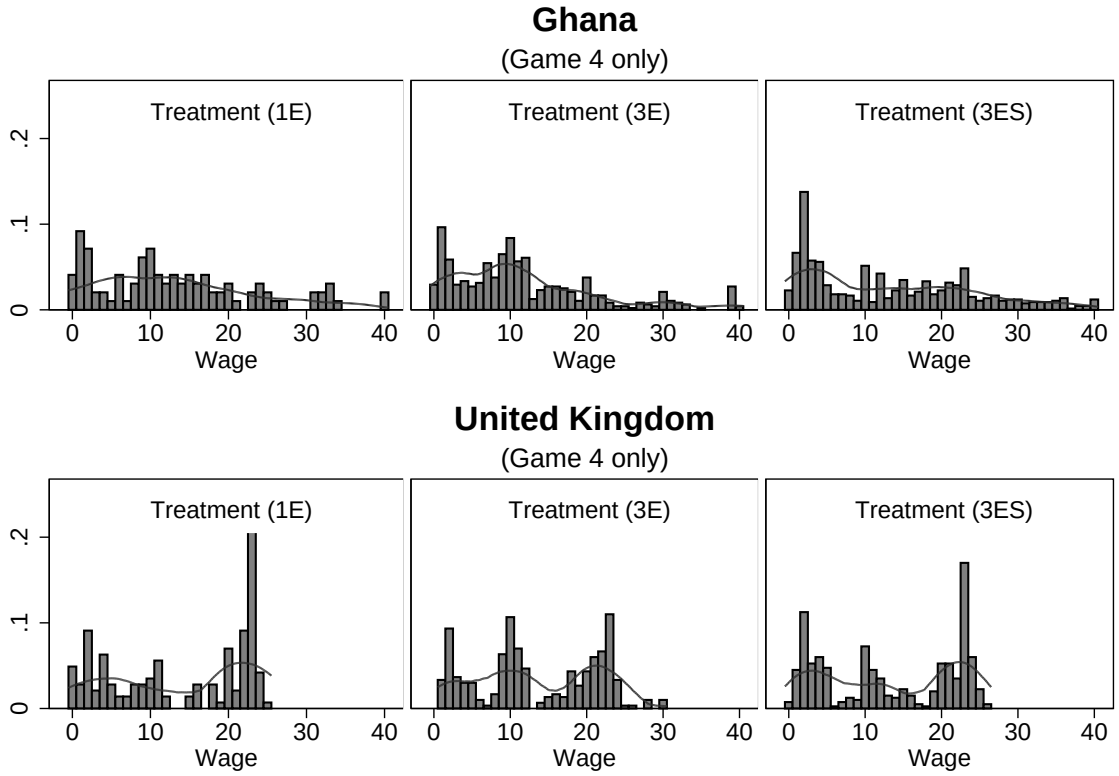


Figure A3: The Figure shows histograms of wage offers in treatment 1E, 3E and 3ES, in Ghana and the United Kingdom. To allow for comparison, only game 4 data is included because treatment 3ES is only conducted as game 4. The line represents a non-parametric density estimate calculated using a Epanechnikov kernel.

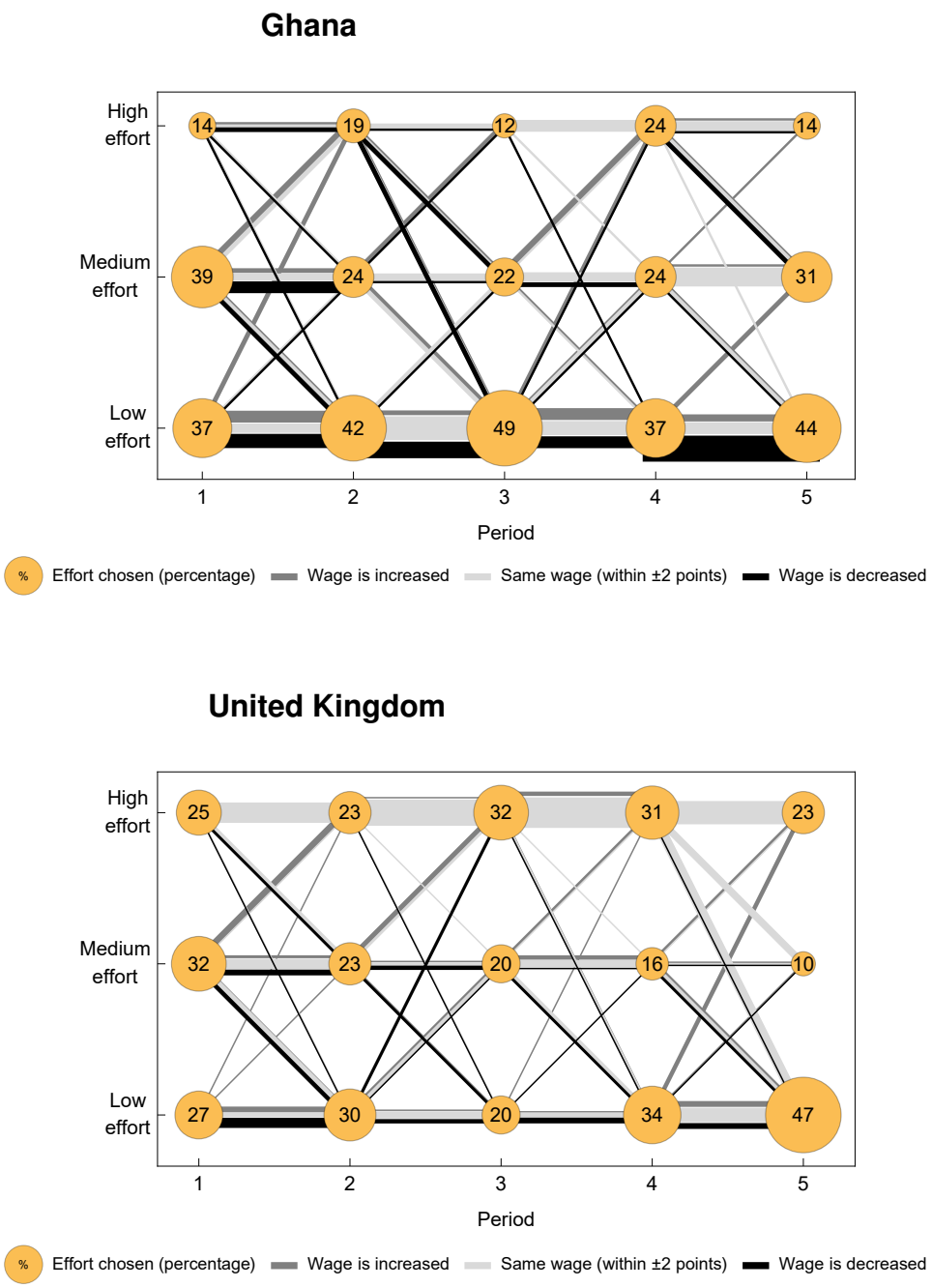


Figure A4: The Figure presents a visual summary of transitions between effort levels in game 2 of treatment 1E. The number and the size of the circle indicate the percentage of workers choosing this effort level in a particular period. The thickness of the line indicates the percentage of transitions between effort levels over all subjects. The shading of the lines indicates whether the employer increases the wage by more than 2 points, keeps it the same (within a ± 2 point range) or decreases the wage by more than 2 points. Rejections are not included in this graph.

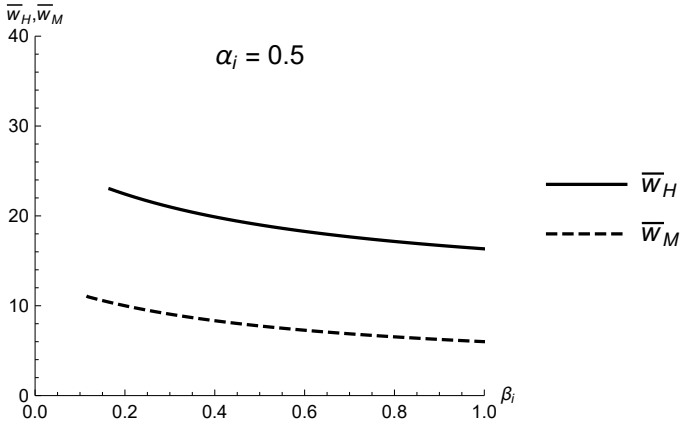


Figure A5: The levels of $\bar{w}_H$ and $\bar{w}_M$ as a function of β_i in the Fehr-Schmidt framework (using $\alpha_i = 0.5$ and the parameters from the game).

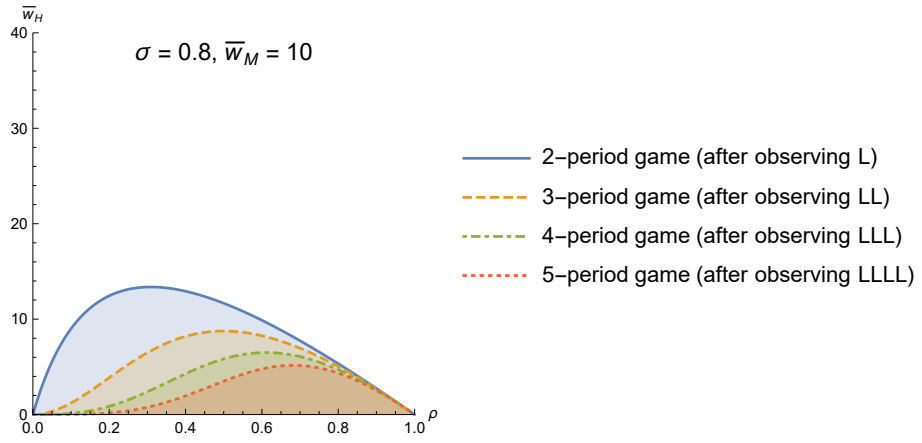


Figure A6: The maximum level of $\bar{w}_H$ for which it is rational for an employer to offer this wage, after observing low effort for one period (solid line), two periods (dashed line), three periods (dot-dashed line) and four periods (dotted line), as a function of ρ.

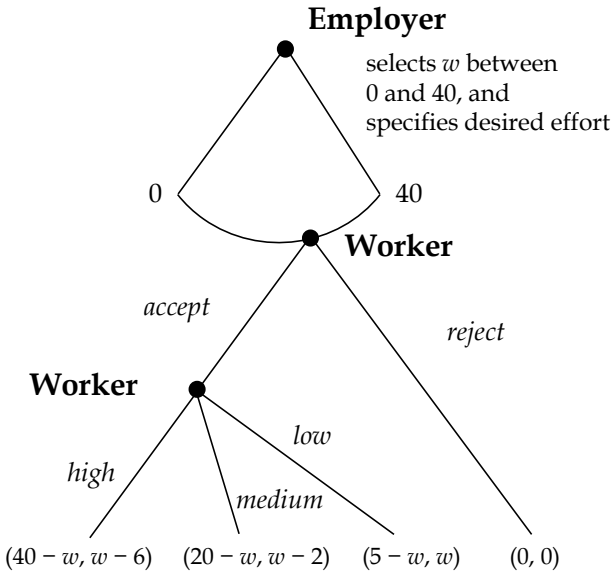


Figure A7: Extensive-form representation of the game

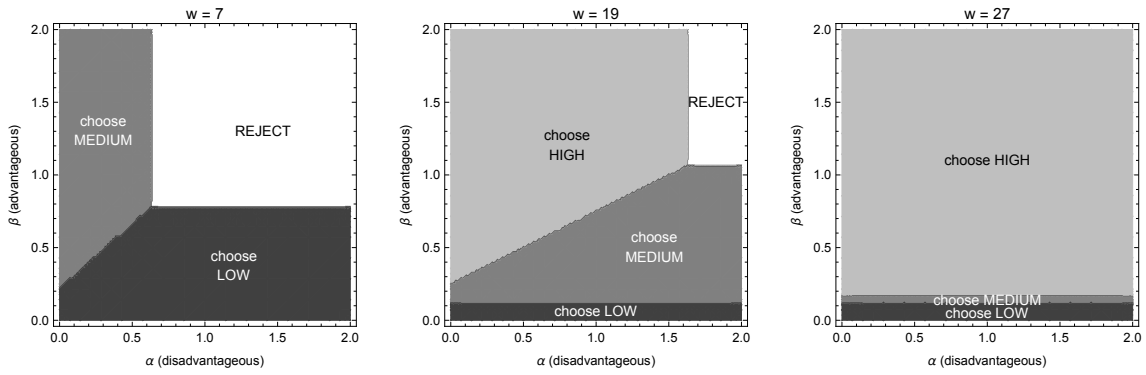


Figure A8: Expected behaviour by worker in the fairness model for different parameters of α_i and β_i, as response to the wage w offered by the employer.

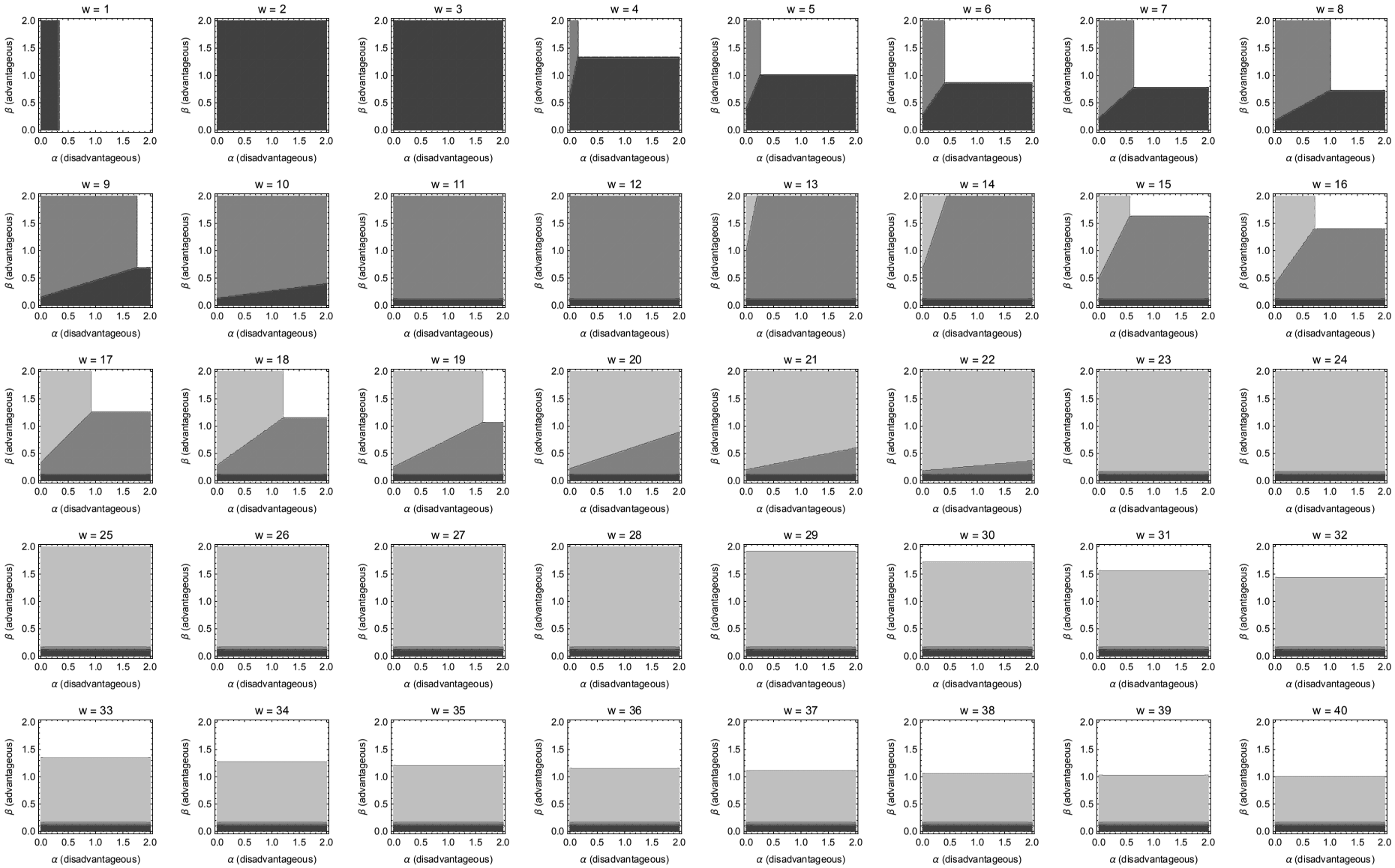


Figure A9: Each graph shows, for a given the wage level, the effort choice predicted by a one-shot interaction model with Fehr-Schmidt preferences parameters α_i and β_i. The shading represents different effort levels (see also Figure A8).

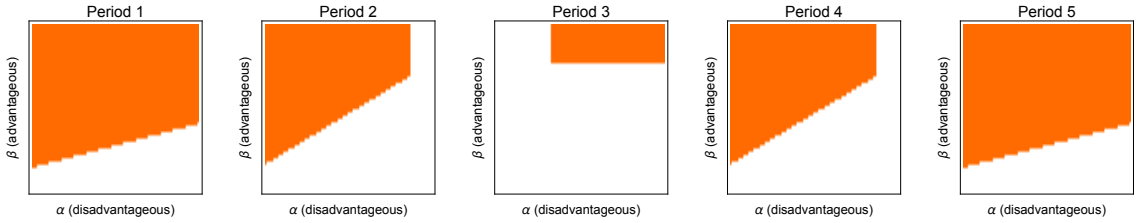


Figure A10: The value sets of α_i and β_i consistent with the choice made by one worker in the five periods of a game.

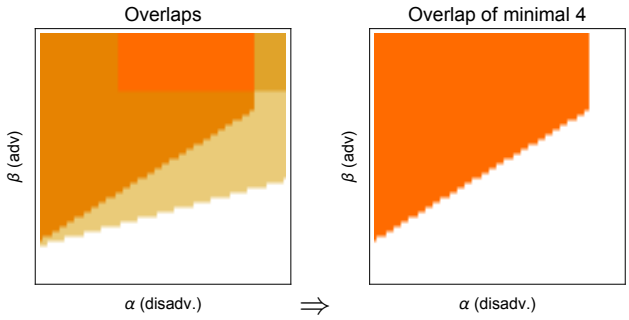


Figure A11: The overlapping area of α_i and β_i for one worker.

Table A1: The number of participants in each treatment in each part of the sequence.

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 A2: 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.

Table A3: Comparison of subjects in Ghana and the UK

	Ghana		**UK**		**Comparison**	
	Mean	SD	Mean	SD	Difference	t-value
Gender (share female)	0.27	0.44	0.49	0.50	-0.22***	(-5.15)
Age	22.32	2.39	23.25	5.79	-0.93*	(-2.33)
Parents entrepreneur?	0.61	0.49	0.31	0.46	0.30***	(6.60)
Big 5						
Extraversion	6.15	1.84	5.48	2.11	0.66***	(3.68)
Agreeableness	6.91	1.67	5.84	1.88	1.07***	(6.63)
Conscientiousness	7.75	1.62	6.06	1.74	1.69***	(10.99)
Neuroticism	3.70	1.96	4.79	2.15	-1.09***	(-5.80)
Openness	5.98	1.54	5.68	1.68	0.31*	(2.08)
Observations	304		192		496	

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

Note: The balance test applied is a difference in means t-test.

Table A4: 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	19.8	76.8%	100.0%	11.6	16.4	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	14.9	86.1%	41.0%	0.6	13.8	12.9	78.8%	56.1%	5.9	12.4
1E	Game 3	12.6	90.9%	41.2%	−1.0	11.9	13.6	80.7%	60.3%	6.3	12.7
1E	Game 4	12.8	87.5%	39.0%	−0.6	12.2	13.9	86.0%	72.1%	9.7	11.7
3C	Game 2	20.1	29.8%	100.0%	12.4	16.9	-	-	-	-	-
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	14.3	30.5%	43.3%	−0.1	14.0	12.9	30.4%	62.5%	6.5	12.6
3E	Game 4	11.5	30.3%	43.1%	1.4	11.8	13.5	29.9%	76.0%	10.3	13.0
3ES	Game 4	12.3	30.6%	50.0%	1.5	12.3	13.2	29.4%	75.6%	9.4	12.7

Note: The figures presented in the Table represent averages over the five periods of each game. Compliance equals 1 if the worker chose the level of effort equal or higher than what is demanded by the employer. In multilateral treatments 3C, 3E and 3ES, 'Share accepted' represents the share of offers that are taken up. No all offers are seen by workers since, once an offer has been accepted, other offers are not shown. Since employers can make offers to all three workers but only one can be taken up, the Share accepted is naturally smaller in the multilateral treatments.

Table A5: 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: The Table shows (right) stochastic transition matrices. The numbers represent percentages. Each row adds up to 100%). Data from period 5 has been omitted. The rows represent the choices made in period $t-1$ and the columns represent the choice made in the following period t.

Table A6: Comparison of treatments 3ES and 3E

	Ghana				**United Kingdom**			
	(1) Within	(2) Between	(3) Across	(4) FE	(5) Within	(6) Between	(7) Across	(8) FE
Offered wage								
3ES vs. 3E	-2.067^{***}	0.858	0.293	0.387	1.678^{***}	-0.343	3.007	3.243^{***}
	(0.406)	(2.093)	(2.731)	(0.654)	(0.403)	(1.805)	(2.517)	(0.678)
Acceptance								
3ES vs. 3E	-0.00892	-0.00403	-0.0125	-0.0127	0.0192	0.0289	0.0448	0.0410
	(0.0100)	(0.0160)	(0.0196)	(0.0105)	(0.0197)	(0.0473)	(0.0610)	(0.0262)
Compliance								
3ES vs. 3E	0.0380	0.0683	0.00701	-0.00279	0.114^{***}	-0.00382	-0.0292	-0.0386
	(0.0227)	(0.0819)	(0.109)	(0.0455)	(0.0270)	(0.0406)	(0.0944)	(0.0501)
Surplus								
3ES vs. 3E	0.189	0.764	1.140	1.140	3.718^{***}	-1.377	2.785	2.785^{**}
	(1.057)	(1.950)	(3.073)	(1.234)	(0.708)	(2.927)	(4.292)	(1.055)
Employer's earnings								
3ES vs. 3E	1.870^{*}	0.162	0.910	0.910	2.723^{***}	-0.943	0.0712	0.0712
	(1.008)	(0.999)	(2.173)	(1.084)	(0.375)	(1.373)	(2.424)	(0.608)
Worker's earnings								
3ES vs. 3E	-2.200^{***}	0.204	0.288	-0.204	-2.101^{*}	-3.488	2.002	2.286
	(0.718)	(4.558)	(6.141)	(1.109)	(1.009)	(1.927)	(3.112)	(2.470)

Note: Each cell of the Table corresponds to a separate regression. The reported coefficient is the treatment effect of 3ES relative to 3E. Each row corresponds to a different dependent variable, defined as in earlier Tables. The 'Within' regressions are subject-fixed-effect linear regressions using only those subjects included in both treatments 3E and 3ES; it compares outcomes within subjects across games played at different times in the same session. The 'Between' regressions compare subjects from different sessions, some of whom are assigned to treatment 3ES and some are not. Regressions 'Across' are similar, except that they also include a dummy equal to 1 if subject i is assigned to treatment 3ES and 0 otherwise, as well as a game order dummy. The 'FE' regressions combine both within and across subject comparisons; they include subject fixed effects as well as a game order dummy. Observations from games other than 3E and 3ES are omitted throughout. Standard errors clustered at the session level are given in parentheses.

Table A7: Acceptance and 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	0.00608^{***}	0.0119^{**}	0.0106^{**}	0.0187^{***}	0.0548^{**}	0.0229^{**}
	(0.000)	(0.011)	(0.008)	(0.000)	(0.012)	(0.010)
Treatment 3ES ?	-0.00831	0.205^{***}	0.0810	-0.00719	0.145	-0.0264
	(0.632)	(0.002)	(0.478)	(0.787)	(0.124)	(0.805)
Constant	0.219^{***}	0.386^{**}	0.146	0.0329	0.190	0.235
Observations	2705	336	456	1423	186	352
R-squared	0.029	0.645	0.655	0.153	0.779	0.643
Adjusted R-sq	-0.012	0.488	0.546	0.106	0.645	0.549
Fixed effects	Worker	Worker	Worker	Worker	Worker	Worker
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

Note: The Table presents coefficient estimates from a linear probability regression of acceptance and compliance on the wage offered. Only data from games 3 and 4 in treatments 3E and 3ES is used. *Acceptance* is an indicator variable equal to one if the worker accepts the offer. *Compliance* is an indicator variable equal to one if the worker chooses an effort level equal or above that specified by the employer. *Treatment 3ES* is an indicator variable equal to one if the treatment is 3ES. The *medium demand* and *high demand* columns only include observations where medium or high effort is demanded by the employer. Worker fixed effects are included throughout. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table A8: Treatment effects.

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) Across	(4) FE	(5) Within	(6) Between	(7) Across	(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 of the Table corresponds to a separate regression. The reported coefficient is the difference in value between two treatments. Each row corresponds to a different dependent variable, defined as in earlier Tables. The 'Within' regressions are subject-fixed-effect linear regressions using only those subjects included in both treatments; it compares outcomes within subjects across games played at different times in the same session. The 'Between' regressions compare subjects from different sessions, some of whom are assigned to one treatment and some are not. Regressions 'Across' are similar, except that they also include a dummy equal to 1 if subject i is assigned to the treatment and 0 otherwise, as well as a game order dummy. The 'FE' regressions combine both within and across subject comparisons; they include subject fixed effects as well as a game order dummy. Observations from other treatments/games are omitted throughout. Standard errors clustered at the session level are given in parentheses.

Table A9: Treatment effects (continued).

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) Across	(4) FE	(5) Within	(6) Between	(7) Across	(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 of the Table corresponds to a separate regression. The reported coefficient is the difference in value between two treatments. Each row corresponds to a different dependent variable, defined as in earlier Tables. The 'Within' regressions are subject-fixed-effect linear regressions using only those subjects included in both treatments; it compares outcomes within subjects across games played at different times in the same session. The 'Between' regressions compare subjects from different sessions, some of whom are assigned to one treatment and some are not. Regressions 'Across' are similar, except that they also include a dummy equal to 1 if subject i is assigned to the treatment and 0 otherwise, as well as a game order dummy. The 'FE' regressions combine both within and across subject comparisons; they include subject fixed effects as well as a game order dummy. Observations from other treatments/games are omitted throughout. Standard errors clustered at the session level are given in parentheses.

Table A10: Treatment effects (continued).

	Ghana				United Kingdom			
	(1) Within	(2) Between	(3) Across	(4) FE	(5) Within	(6) Between	(7) Across	(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 of the Table corresponds to a separate regression. The reported coefficient is the difference in value between two treatments. Each row corresponds to a different dependent variable, defined as in earlier Tables. The 'Within' regressions are subject-fixed-effect linear regressions using only those subjects included in both treatments; it compares outcomes within subjects across games played at different times in the same session. The 'Between' regressions compare subjects from different sessions, some of whom are assigned to one treatment and some are not. Regressions 'Across' are similar, except that they also include a dummy equal to 1 if subject i is assigned to the treatment and 0 otherwise, as well as a game order dummy. The 'FE' regressions combine both within and across subject comparisons; they include subject fixed effects as well as a game order dummy. Observations from other treatments/games are omitted throughout. Standard errors clustered at the session level are given in parentheses.

Table A11: 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	0.00551**	0.0160***	0.0140**	0.0205***	0.0371**	0.0453***	0.00551**	0.0160***	0.0140**
	(0.029)	(0.003)	(0.012)	(0.000)	(0.015)	(0.000)	(0.046)	(0.004)	(0.018)
UK							−0.244***	−0.130	−0.374***
							(0.001)	(0.409)	(0.005)
Wage × UK							0.0150***	0.0211*	0.0313***
							(0.000)	(0.093)	(0.000)
Constant	0.824***	0.361**	−0.0277	0.559***	0.187	−0.425***	0.824***	0.361**	−0.0277
N	562	160	255	763	217	358	1325	410	613
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†

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

† 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 2 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. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table A12: 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 $t-1$?	0.200	0.124	0.750	1.195
	(0.894)	(0.939)	(0.515)	(0.333)
Compliance in period $t-1$?	4.587***		9.381***	
	(0.004)		(0.000)	
Compliance in period $t-1$? (high effort demanded)		6.848**		14.26***
		(0.033)		(0.000)
Compliance in period $t-1$? (medium effort demanded)		5.115***		5.389***
		(0.005)		(0.002)
Constant	14.19***	14.10***	9.452***	9.118***
Observations	447	447	608	608
Adjusted R^2	0.035	0.051	0.253	0.466
Fixed effects	None	None	None	None
Period dummies	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

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. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table A13: Alternative specifications of Table 4

	Ghana		**United Kingdom**	
	(1) Wage$_t$	(2) Δ Wage$_t$	(3) Wage$_t$	(4) Δ Wage$_t$
Wage in period $t-1$	-0.168		0.0761	
	(0.140)		(0.360)	
Compliance in period $t-1$?	-0.000885	-1.552	4.036^{***}	5.358^{***}
	(0.998)	(0.450)	(0.004)	(0.009)
Rejection in period $t-1$?	0.658	7.203^{**}	3.696^{***}	10.76^{***}
	(0.584)	(0.040)	(0.000)	(0.000)
Constant	17.68^{***}	-0.491	9.893^{***}	-4.791^{***}
	(1.677)	(0.793)	(1.175)	(0.752)
Observations	435	435	595	595
Adjusted R-sq	0.056	0.062	0.082	0.199
Employer fixed effects	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

Note: The Table presents a fixed effects regression of the wage offered on previous compliance and rejection. *Rejection* is an indicator variable equal to one if the worker rejected the offer. *Compliance* is an indicator variable equal to one if the worker chose an effort level equal to or higher than that demanded by the employer. Only wage offers in period 2-5 are included. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table A14: Alternative specifications of Table 4

	Ghana		United Kingdom		Both countries (pooled)	
Dependent variable: Wage offer in period t	(1)	(2)	(3)	(4)	(5)	(6)
Medium effort$_{t-1}$	-0.954	-1.128	1.252	0.386	-0.954	-1.128
	(0.439)	(0.358)	(0.242)	(0.695)	(0.414)	(0.382)
High effort$_{t-1}$	-1.224	-1.755	6.336^{***}	4.517^{*}	-1.224	-1.755
	(0.531)	(0.464)	(0.004)	(0.080)	(0.541)	(0.483)
Positive surprise$_{t-1}$		0.0431		-0.195		0.0431
		(0.987)		(0.942)		(0.989)
Negative surprise$_{t-1}$		-0.640		-2.025		-0.640
		(0.275)		(0.113)		(0.268)
UK $\times$ Medium effort$_{t-1}$					2.206	1.513
					(0.123)	(0.280)
$\times$ High effort$_{t-1}$					7.559^{***}	6.272^{**}
					(0.001)	(0.057)
$\times$ Positive surprise$_{t-1}$					-0.238	
						(0.954)
$\times$ Negative surprise$_{t-1}$					-1.386	
						(0.272)
Constant	15.30^{***}	15.63^{***}	11.99^{***}	14.09^{***}	13.82^{***}	14.21^{***}
	(0.902)	(1.203)	(0.919)	(1.238)	(0.659)	(0.877)
Observations	395	395	486	486	881	881
R-squared	0.065	0.066	0.128	0.142	0.097	0.105
Adjusted R-sq	0.038	0.034	0.108	0.118	0.074	0.078
Employer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses.

Note: The Table presents a fixed effects regression of the wage offered on previous compliance and rejection. *Rejection* is an indicator variable equal to one if the worker rejected the offer. *Compliance* is an indicator variable equal to one if the worker chose an effort level equal to or higher than that demanded by the employer. Only wage offers in period 2-5 are included. Reported p-values are based on standard errors clustered at the session level (using a wild cluster bootstrap).

Table A15: Shirking and punishment

		Game 2		Game 3		Game 4	
		Ghana	UK	Ghana	UK	Ghana	UK
Panel A. Shirking frequency by game and subject population							
Number of times:	0	7%	18%	10%	28%	14%	42%
	1	16%	27%	19%	23%	12%	26%
	2	17%	26%	13%	16%	17%	16%
	3	22%	21%	18%	22%	20%	11%
	4	28%	7%	23%	7%	21%	5%
	5	10%	1%	18%	4%	16%	0%
Panel B. Punishment frequency by game and subject population, conditional on shirking in the previous period							
Number of times:	0	26%	38%	27%	43%	32%	57%
	1	39%	35%	29%	30%	29%	23%
	2	25%	20%	28%	20%	26%	16%
	3	9%	7%	11%	7%	12%	4%
	4	1%	0%	5%	0%	1%	0%
Number of subjects		69	96	123	96	123	96

Note: One observation per subject. Includes only subjects who played treatment 1E in game 2 and games 1E, 3E or 3ES in games 3 and 4.

Table A16: Predicting behavior across country samples

	Punishment by employer	Worker effort	Compliance with contract	Placebo test
Actual difference in behavior between the two country samples	−0.688	−0.723	−0.789	0.112
p-value	0.000	0.000	0.000	0.441
Predicted difference using a pooled regression: random forest	−0.492	−0.600	−0.628	0.101
p-value	0.000	0.000	0.000	0.258
Predicted difference using a pooled regression: OLS	−0.220	−0.375	−0.370	0.081
p-value	0.000	0.000	0.000	0.026
Predicted difference based on out-of-sample predictions: random forest	1.092	0.631	0.741	0.060
p-value	0.000	0.000	0.000	0.269
Predicted difference based on out-of-sample predictions: random forest	1.007	0.613	0.559	0.126
p-value	0.000	0.000	0.000	0.470

Note: The actual difference in behavior is simply a t-test on the difference in means. A negative value means that Ghana subjects are less likely to engage in the listed behavior. In other words, Ghanaian subjects are less likely to punish shirking workers, less likely to supply high effort, and less likely to comply with the high effort stipulated by the employer. The fourth column does the same for a randomly generated variable that serves as placebo test. Next we test whether coefficients from a pooled regression can predict behavioral differences between the two samples. Since there are differences across samples in the average values of the regressors, we expect in-sample predictions to mechanically capture behavior differences. The results show that they do, whether predictions are based on a random forest algorithm or on OLS. We then compare out-of-sample predictions for both models. In this comparison, a model is fitted to the UK data and used to predict the behavior of Ghana subjects, while another model is fitted to Ghana subjects and used to predict the behavior of UK subjects. We compare the out-of-sample predictions to each other. If differences in observed characteristics predict differences in behavior, we would expect the sign and significance of the difference in predictions to be similar for in-sample and out-of-sample predictions. If the sign is reversed, it means that the ability to predict is strongly rejected. A positive value means that, based on their observed characteristics, Ghana subjects are predicted to be more likely to engage in the behavior than UK subjects.