INSTITUTIONS AND CONTRACT ENFORCEMENT

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Abstract. We provide evidence on how two important types of institutions – dismissal barriers, and bonus pay – affect contract enforcement behavior in a market with incomplete contracts and repeated interactions. Dismissal barriers are shown to have a strong negative effect on worker performance, by interfering with firms' use of firing threat as an incentive device. Dismissal barriers also distort the dynamics of worker effort levels: effort levels are high initially and then drop sharply, if the firm activates dismissal barriers by choosing to extend the relationship beyond the institutionalized probation period. Firms shy away from long-term relationships, and rely more on the spot market for labor. The average rate of turnover is unaffected, but the distribution of relationship lengths becomes more bi-model. The impact of dismissal barriers changes dramatically when the option for firms to pay bonuses is introduced. Firms are observed to substitute bonus pay for threat of firing as an incentive device, almost entirely offsetting the negative incentive effects of dismissal barriers, and eliminating probation period effects. Contract enforcement behavior remains fundamentally changed, however, because the option to pay bonuses causes firms to rely less on relational incentives.

1. Introduction

Contractual incompleteness, and the resulting contract enforcement problem, is particularly characteristic of employment relationships, where it is often impossible to verify worker performance to third parties.[1] A prominent theoretical solution to the contract enforcement problem involves employers and employees interacting in a repeated game, initiated by one or both sides of the market, where employers use a combination of rents and threat of dismissal to give workers an incentive to perform (e.g., Gintis (1976); Klein and Leffler (1981); Shapiro and Stiglitz (1984)). Recent empirical support for efficiency wage theory is provided by Brown, Falk, and Fehr (2004), who show a strong

[1] See Williamson, Wachter, and Harris (1975) for a classic early study.

effect of introducing contractual incompleteness into an experimental labor market: in the presence of incompleteness, trade tends to occur in bilateral trading islands in which firms use rents and firing threat to deter shirkers. Various econometric studies also support the view that career concerns and long-term relations have important incentive effects (see Chevalier and Ellison (1997), Chevalier and Ellison (1999), and Hong and Kubik (2003)). A crucial open question, however, is how the strategic interaction of workers and firms in such settings changes, depending on the institutions in which labor relations are embedded.

This paper provides evidence on how two particularly relevant insititutions – dismissal barriers, and bonus pay – affect contract enforcement behavior in a setting with incomplete contracts and repeated interactions. Given the theoretical and empirical importance of firing threat in such settings, dismissal barriers are likely to lead to have a profound impact on the strategic interaction of firms and workers within relationships, as well as on patterns of relationship formation. Dismissal barriers arise, for example, in the presence of employment protection legislation (EPL), where hiring a worker beyond a probation period triggers barriers to dismissal, or in the case of relationship-specific investments which raise firing costs (see Mincer (1962)). The flexibility of the labor contract is also a key institutional feature, in particular whether firms are restricted to the wage contract focused on in the efficiency wage literature, or whether other contractual instruments such as bonus pay are also available. Previous evidence indicates that bonus pay is a credible incentive device in one-shot games, showing that firms reward performance with bonuses, and punish shirking by witholding the bonus (Fehr, Gächter, and Kirchsteiger (1997); Fehr, Klein, and Schmidt (2007)). The availability of bonus pay thus has the potential to fundamentally change firms' contract enforcement policies in a repeated game setting. Furthermore, the availability of bonus pay maybe crucial for determining the impact of dismissal barriers, to the extent that it provides firms with an alternative incentive device to threat of firing.

We begin by establishing a baseline condition, in which there are no dismissal barriers and no bonus pay. We implement the setting of Brown, Falk, and Fehr (2004), in which firms and

workers can endogenously form long-term relationships. In our baseline treatment (T-Baseline) firms offer contracts involving a wage and a desired effort. Workers choose their effort level after accepting a contract, and effort is unenforceable. The market lasts 18 periods. Despite the contract enforcement problem, average effort levels are high. High effort levels are observed mainly in long-term relationships, where firms fire workers who do not perform, and offer rents so that threat of firing provides an incentive. In the final market period, where firing threat is no longer operative, average performance drops sharply.[2] These findings, which closely replicate those of Brown, Falk, and Fehr (2004), show the central importance of firing threat as an incentive device. This sets the stage for exploring our main research questions.

We implement a second treatment (T-EPL) in which there is a dismissal institution present in the market, such that only the worker can end a relationship, once the firm chooses to hire the worker a second time in a row. Firms are also restricted in their ability to lower wages once the dismissal protection takes effect, to rule out de facto dismissal by reducing wages to zero. We predict three main changes to the type of equilibrium observed in the baseline condition, all of which are supported by the data. The first is a *negative incentive effect*, due to removal of firing threat as an incentive. Consisent with this prediction, average effort levels in long-term relationships are far below those observed in the baseline condition. A second prediction is a change in the dynamics of effort provision in the form of a *probation period effect*: worker effort is predicted to be especially high in the probation period, due to the attractiveness of long-term relationships, and then to drop sharply once the worker is re-hired the second time. Indeed, we observe a strong drop in effort following the probation period, and also a large increase in the variance of effort, whereas in the baeline condition the opposite occurs. Effort is higher in the probation period than in T-Baseline,

[2] Given the finite game, and common knowledge that individuals are motivated solely by material payoffs, standard backwards induction arguments would imply a very different outcome, namely zero cooperation in all periods. However, a sub-population of workers is observed to put in high effort even in the final period, in response to generous wages, consistent with the presence of some types who care about fairness in addition to material payoffs. The presence of these types gives firms a reason to offer non-minimal wages in the final period, creating a final-period rent. Brown, Falk, and Fehr (2004) show theoretically that a sufficient number of fair types can sustain an equilibrium in which even selfish workers cooperate in early periods, motivated by future rents and firing threat, and only fair workers perform in the final period.

and we find suggestive evidence that this mainly reflects selfish types trying to entice firms into long-term relationships, leading to adverse selection of selfish types into long-term relationships. A third prediction is a *relationship-formation effect*, such that firms are more reluctant to enter relationships, because of the negative incentive problem. The prediction for turnover, measured as the the average length of relationships, is ambiguous: the tendency to engage in more one-shot interactions is potentially offset, because the inability of firms to fire workers creates a tendency for relationships that do form to never break up. Substantially more firms adopt a policy of strict relationship avoidance in the presence of the dismissal institution, consistent with the predictions. The net effect on turnover is zero, but the distribution of relationship lengths becomes more bi-modal, with more very short relationships, and also more very long relationships, compared to baseline.

In a third treatment (T-EPL-Bonus) we implement both dismissal barriers and the option for firms to offer bonuses. Firms offer a bonus as part of the initial contract, but can decide how much of a bonus to pay at the end of the market period, after observing worker performance. Like effort, bonus payments are not bound by the initial contract. The impact of dismissal barriers is dramatically altered by the presence of bonus pay, consistent with the prediction that firms use bonus pay as an alternative incentive device. Firms credibly reward worker performance by paying bonuses, and this additional incentive device essentially eliminates the problem of worker shirking in long-term relationships, despite the absence of firing threat. The probation effect also dissappears, so that effort dynamics moving from the probation period to later periods are the same as in the baseline case. Relationship formation, however, remains strongly different from baseline, with firms being much less prone to enter relationships, despite the fact that worker performance in long-term relationships is no worse than in the baseline condition. One potential explanation for this latter finding is that bonus pay causes firms to rely less on relational incentives in general, because it provides an alternative mechanism for contract enforcement.

This latter explanation cannot be verified without introducing a fourth treatment (T-Bonus), where there is bonus pay but no confounding effect of a dismissal institution. We briefly investigate behavior in such a treatment, comparing to the baseline case. In fact, the frequency of one-shot interactions is much higher in the market with bonus pay and no dismissal barriers than in baseline or any of the other treatments. Thus, bonus pay does appear to fundamentally change the nature of contract enforcement, causing firms to shift away from relational incentives to one-shot interactions. Although bonus pay allows firms to offset the negative incentive effects of dismissal barriers, dismissal barriers do impose a cost on firms by eliminating threat of firing as an incentive device: compared to the market with bonus pay but no dismissal insitutions, firms have to pay higher bonuses to elicit the same level of effort. Interestingly, worker performance in the market with bonus pay is better than in the baseline case for the first few market periods, but once relationships have had time to form, effort levels in baseline catch up. Thus, bonus pay per se does not have a strong advantage over relational incentives in the long run. On the other hand, our findings show that in the presence of dismissal barriers bonus pay makes a large difference for worker effort levels and market efficiency.

Taken together, the findings show that contract enforcement behavior interacts with the surrounding institutional environment in important and complex ways. For example, the negative incentive effect of dismissal barriers depends on the extent of flexibility in the contracting technology, but while increased contractual flexibility undoes some effects of dismissal barriers, in other ways contract enforcement strategies are left fundamentally changed. While institutions impose constraints on contract enforcement strategies, agents are not passive, bur rather respond by finding different avenues for solving incentive problems. In other words, understanding strategic interactions within firms requires an appreciation of the institutions in which contractual relations are embedded, and contrarywise, understanding the impact of institutions requires an appreciation of how they interact with details of the contract enforcement strategies operative at the micro level. Substantial progress has been made in previous theoretical work on the interplay of contract enforcement and

institutions in repeated game settings (Gintis (1976); Klein and Leffler (1981); Shapiro and Stiglitz (1984); Bowles (1985); Bull (1987); Hart and Holmström (1987); MacLeod and Malcomson (1989); MacLeod and Malcomson (1993); MacLeod and Malcomson (1998); Baker, Gibbons, and Murphy (1994); Dixit (2003); Levin (2003); MacLeod (2005); MacLeod and Nakavachara (2007)), but empirical evidence is relatively scarce. Empirical evidence is especially important in this case, given that in repeated games there are typically a plethora of equilibria, and theory alone provides limited guidance regarding the behavior that will actually emerge (see, e.g., Fudenberg and Maskin, 1986). Experiments provide a powerful tool for studying these issues, due to the ability to observe key variables that drive contract enforcement behavior, such as rents, information conditions, worker effort levels, and worker cost functions. Experiments also offer the opportunity to implement clearly exogenous variation in institutions, something which is seldom avialable in the field (Krueger (1991)).

There is previous experimental evidence on contract enforcement behavior (e.g., Fehr, Kirchsteiger, and Riedl (1993); Fehr and Falk (1999)), but these experiments focus almost exclusively on static settings without repeated interactions, and do not allow for endogenous formation of long-term relations. While important insights are gained from one-shot interactions, the research question we address requires consideration of a setting with repeated interactions by its very nature, and thus we adopt one of the few studies to implement endogenous repeated interactions, Brown, Falk, and Fehr (2004), as a workhorse.[3] Our investigation of the interplay between dismissal barriers, bonus pay, and contract enforcement behavior in such a context is novel in the literature. Our results also complement previous research programs, for example research on the relative performance of bonus versus wage contracts in one-shot settings (Fehr, Gächter, and Kirchsteiger (1997)) and Fehr, Klein, and Schmidt (2007)); we show that the relative performance of these contract forms in a repeated game setting depends strongly on the presence or absence of dismissal barriers.

The rest of the paper is organized as follows. Section 2 describes the experiment, and Section 3 outlines predictions for behavior. Section 4 presents results, and Section 5 concludes.

[3] Wu and Roe (2007) also use this framework, but focus on varying the degree of incompleteness in contracts.

2. The Experiment

2.1. **Design.** The labor market operated for 18 trading periods. In each period a firm could hire at most one worker, and a worker could have at most one job. An individual period involved two or three phases, depending on the treatment. The first phase was always a market phase, in which the firms made contract offers and workers could only accept or reject. Firms could make as many contract offers as they wanted during the time limit of three minutes; if one of a firm's contracts was accepted, all of the other offers by that firm were immediately removed from the market.[4] In the case that a firm and a worker agreed on a contract, they entered a second phase in which the worker could decide how much effort, e to exert. In treatments where the contract offer could include an offered bonus, there was a third phase in which the firm was informed about the worker's effort choice and could decide how much of a bonus, b, to pay. Importantly, neither the worker's effort level or the firm's bonus payment were restricted by the initial contract agreement, whereas a wage specified in the agreement was binding. After the second (third) phase, the firm and worker were informed about their profits and earnings, respectively, and then a new period began.

Contract offers consisted of a wage, w, a desired effort level, $\tilde{e}$, and in some treatments an offered bonus, $\tilde{b}$. The offer also included the firm's ID number. Firms could make two types of contract offers during the market phase: public offers or private offers. Public offers were observed by all workers, and thus were available to any worker. Private offers were observed only by a worker specified by the firm, and thus were available only to that particular worker. In the case that a firm made a private offer, the firm specified a worker's ID number, in addition to the contract terms. Worker and firm ID numbers remained constant over the entire 18 periods, so it was possible for a firm to intentionally make a private offer to the same worker over multiple periods, and for a worker to recognize offers coming from a specific firm. This design made it possible for a firm and worker to endogenously form a long-term relationship, by choosing to repeatedly engage in private-offer contracts with each other over multiple periods. Public offers were a way for firms to engage in a

[4] If all firms had contracts, there was no potential for further trades. Thus, the market phase was designed to end automatically after three minutes, or after the last firm had a contract offer accepted, whichever came first.

spot market for labor rather than engaging in long-term relationships. During the market phase, firms were kept constantly informed about which workers had already accepted a contract, so as to avoid having firms make a private offer to a worker that was no longer available.

In treatments with the dismissal barrier institution, the firm lost the ability to fire a worker after making a second private offer in a row to the same worker. This design captures a common feature of EPL institutions, which is a specified probation period during which the firm is still able to fire the worker. It also has an analogue in situations where there are relationship-specific investments that increase firing costs, but where investments are made only after an initial probation period. In practice firms can at a cost fire workers after they are premanently employed. In our experiments we effectively set this price at infinity. In future research it would be interesting to explore the consequence of costly, but finite dismissal costs. On the other hand, a strong form of dismissal barrier such as the one we implement is useful for providing a boundary condition, and as a tough test of the ability of bonus pay to overcome the effects of dismissal barriers.

Having chosen to hire the worker again, after the initial private offer, the dismissal barrier took effect and the firm had to make an offer to that same worker at the beginning of each subsequent period until the end of the game or until the worker decided to quit. Firms in contracts affected by the dismissal barrier made their offers in a special phase before the market phase. Importantly, once the dismissal barrier was activated, the wage offer had to be at least as high as in the previous period. Some rigidity of the wage is required for a dismissal protection institution to work, otherwise a firm could effectively fire a worker by reducing the wage to zero.[5]

After firms had made their offers required by the dismissal barrier institution, the market period began and workers protected by the dismissal barrier could see the standing offer from their own firm, in addition to the other market activity. At any time, the worker could accept the standing offer, in which case the firm was informed. Alternatively, the worker could reject the offer by

[5] This is known as *constructive dismissal,* and is considered illegal in any jurisdiction with employment protection. See Black's Law Dictionary.

	Common Features	Distinguishing Features		Sessions	Subjects
		Dismissal Barrier	Bonus Option		
T-Baseline	Fixed wage	No	No	6	102
T-EPL	Desired effort	Yes	No	6	102
T-EPL-Bonus	7 firms, 10 workers	Yes	Yes	6	102
T-Bonus		Yes	No	6	102
			Total:	24	408

TABLE 1. Overview of Treatments

accepting another contract in the market. As soon as the worker rejected the standing offer, the firm was informed, and allowed to make offers during the remainder of the market phase.

In our design we abstract away from several issues sometimes discussed in relation to dismissal barrier institutions. The effort cost function for workers, described below, is the same across all individuals so there are no differences in ability. This allows us to focus on the moral hazard problem in terms of effort and bonus payment, without the complication of adverse selection. We also do not implement cyclical shocks to market conditions, or worker redundancies (multiple workers at one firm). This simplifies an already complex inter-temporal choice environment, and makes it possible to first understand the impact of dismissal barriers on the strategic behavior surrounding the contract enforcement problem.

We implemented four exogenous treatments, as summarized in Table 1. In a treatment called T-Baseline, contracts were wage-only. There was no dismissal barrier institution in the market, so firms could engage in as many private offers in a row with a worker as they wanted, while always having the option to fire the worker, i.e., not make the worker a private offer in the next period.[6] In T-EPL, contracts were wage-only, but we introduced our dismissal barrier institution. In T-EPL-Bonus, the dismissal barier institution was in effect, but firms had the option to offer a bonus, in addition to or instead of a wage. In T-Bonus, there was no dismissal barrier, but firms had the option to offer bonuses. There were 408 participants in the experiment. We conducted six market sessions for each of the four treatments, for a total of twenty-four sessions. Subjects were students

[6] This treatment is a replication of the ICF treatment Brown, Falk, and Fehr (2004), except that their design involved only 15 trading periods rather than 18).

at the University of Bonn, from various fields of study. No subject participated in more than one session. On average, a session lasted roughly 100 minutes, and a subject earned 25 Euros (32 USD).

2.2. **Parameters, Information Conditions, Procedure, and Subject Pool.** All market sessions lasted 18 periods, and had 7 firms and 10 workers. The material payoff to a firm was given by the function

$$\pi_f = \begin{cases} 10 \cdot e - w - b & \textit{if a contract offer was accepted} \\ 0 & \textit{if no contract offer was accepted} \end{cases} \tag{1}$$

and the payoff function for a worker was given by

$$\pi_w = \begin{cases} w + b - c(e) & \textit{if a contract offer was accepted} \\ 5 & \textit{if no contract offer was accepted} \end{cases} \tag{2}$$

where $c(e)$ was a cost of effort function, and 5 was the unemployment benefit in the case that a worker did not engage in a trade. The wage, w, the offered bonus, $\tilde{b}$, and the bonus actually paid, b, could each take on an integer value $0, 1, 2, ...100$. The desired effort level, and the actual effort level chosen by the worker could take on integer values $1, 2, ..., 10$. The effort cost function is shown in Table 2.

Effort	1	2	3	4	5	6	7	8	9	10
Cost	0	1	2	4	6	8	10	12	15	18

TABLE 2. Effort Cost Schedule

The cost function is increasing and convex. Because the marginal cost of effort is at most 3, while the marginal benefit to a firm is always 10, the efficient effort level is 10.

Payoff functions for workers and firms, including the effort cost function, were common knowledge. Participants were aware that the market would last 18 periods. Reputations could form bi-laterally: firms learned about the effort choices of workers that they traded with, but did not observe effort choices bonus decisions, in interactions that they were not a part of; workers learned about the bonus decisions of firms that they encountered, but not about worker effort choices or firm bonus decisions in other market interactions. Firms observed all public offers on the market during the market phase. Workers were informed not only about private offers they had received, but also about all public offers on the market.

The experiment was computerized using Z-Tree software (Fischbacher (2007)). There was a practice period before the experiment began, which consisted only of a market phase but not the subsequent effort or bonus phases, to give subjects experience with the process of making and accepting offers. After the practice period, the first period of the paid experiment began. At the end of each period, a subject's period profits were summarized, along with the profits of the trading partner in the case of a trade. Subjects were also reminded of the partner's ID number, the terms of the initial contract, the actual effort choice, and the actual bonus paid. Subjects could record this information on a separate sheet of paper, ensuring that subjects were fully informed about their own trading history over the course of the experiment. The experiment was framed neutrally, in terms of buyers and sellers rather than workers and firms. Effort was referred to as quality. We adopted this framing for purposes of comparison with Brown, Falk, and Fehr (2004), but Fehr, Klein, and Schmidt (2007) show that whether one uses framing as buyers and sellers, or workers and firms, is irrelevant for behavior in this class of experimental market settings.

3. Predictions

If it is common knowledge that workers and firms are motivated only by material payoffs then the theory of relational contracts, such as MacLeod and Malcomson (1989), predicts that no trade would ever occur in T-Baseline. This follows immediately from the familiar backwards induction argument. In the last period of the game, period 18, the worker would never perform. This implies

that the firm would choose a wage equal to 5, the worker's outside option. This in turn implies that in the penultimate period there are no gains from continuing the relationship, and hence effort would be zero and wages would be equal to 5 in that period, and so on. Thus, a very inefficient outcome would prevail, and the resulting small surplus would be entirely claimed by the firms.

If material self-interest of firms and workers is not common knowledge, however, predictions change dramatically. Brown, Falk, and Fehr (2004) show theoretically that a sufficient number of fair-minded subjects, who respond to generous wages with high effort even in the absence of strategic incentives to do so, is sufficient to sustain an equilibrium in which all workers provide high effort levels in early market periods, and only the fair workers provide non-minimal effort in the final market period. The key mechanism for eliciting high effort from selfish workers (selfish in the sense of caring only about own material payoffs) is the existence of a rent in the final period, which arises because the presence of some fair workers makes it profitable for firms to pay generous wages even when there is no prospect for future interactions. The possibility of a future rent, and the threat of firing, discipline even selfish workers in the second-to-last period. Because only the future rent matters for selfish workers' incentives, firms could be expected to pay a low or zero rent in period 17. Given the plausible belief that the lack of a rent in the current period signals that a firm will not pay a rent in the future, however, firms will have an incentive to pay a rent even in this period. If firms pay rents in the current period, this makes it easier to enforce non-minimal effort levels in period 16, and earlier periods, because the loss from termination of the relationship invloves losing rents from multiple periods.

The model leads to several qualitative predictions for contract enforcement behavior in T-Baseline. Firms are predicted to trade repeatedly with the same worker if he performed well in the past. For this reason firms will rely on private offers, because in the case of public offers firms cannot exclude poor performers. In order for the possibility of future interactions to provide an incentive, the firm will need to pay a generous wage that offers a rent relative to being unemployed, and thus workers are predicted to gain some of the surplus from trade. Some workers are predicted to perform well

even in the final period, in response to a generous wage, indicating fairness concerns. Other workers who are concerned only with material payoffs will imitate fair workers in early market periods, but will reduce effort to the minimum in the final market period when threat of firing no longer has an impact. These predictions are part of a potential equilibrium, but it is well-known that in repeated games there exists a plethora of equilibria. This highlights the need to perform an experiment, in order to determine which equilibria are selected. Brown, Falk, and Fehr (2004) find empirical support for these predictions, and our analysis in T-Baseline replicates their results, setting the stage for answering our main research questions.

The first question is how a dismissal barrier institution affects contract enforcement behavior in a setting with incomeplete contracts and repeated interactions. We identify four main predictions regarding the impact of dismissal barriers. The first prediction is a *negative incentive effect:* in long-term relationships, the dismissal barrier institution removes the threat of firing as an incentive device; as a result, selfish workers are predicted to shirk in long-term relationships in T-EPL, leading to lower effort levels than in T-Baseline, controlling for wages and other factors that drive effort choices. The second prediction is a *probation effect*: dismissal bariers are predicted to change effort dynamics, such that effort drops sharply after the initial probation period due to the removal of firing threat as an incentive. In T-Baseline there should be no such drop moving from the first to second period of a relationship. The level of effort in the probation period is also predicted to be higher in T-EPL than in T-Baseline, reflecting a positive incentive effect, arising beccause workers have a greater incentive to enter long-term relationships in T-EPL. The third prediction concerns a *relationship formation effect:* anticipating negative consequences of being held up by workers under dismissal barriers, firms are predicted to be more reluctant to enter long-term relationships in T-EPL than in T-Baseline. The implications for the average length of a relationships are ambiguous. Relationship avoidance creates a larger number of one-shot relationships, but dismissal barriers imply that relationships that do form are likely to be long-lasting, because firms are unable to fire workers.

The next question is how the impact of dismissal barriers interacts with the addition of bonus pay. From previous work, we know that in the presence of fair firms, the payment of bonuses for performing workers, and denial of bonuses for shirkers, is credible in one-shot interactions (Fehr, Gächter, and Kirchsteiger (1997)), and thus that bonus pay can provide an effective incentive. These facts lead to several predictions for behavior in T-EPL-Bonus relative to T-EPL. Firms are predicted to pay bonuses for performing workers, creating a credible incentive for workers to perform even in the absence of firing threat. As a result, firms are predicted to circumvent the negative incentive effect of dismissal barriers by using bonus pay, so that effort in long-term relations is higher in T-EPL-Bonus than in T-EPL. Furthermore, because incentives are high powered even after the probation period, there will be a less pronounced probation effect in T-EPL-Bonus compared to to T-EPL. The prediction for relationship formation is ambiguous. On the one hand, firms should be less reluctant to enter relationships since the hold-up problem is mitigated. On the other hand they have another incentive tool at their disposal, and therefore may rely less on relational contracting in the first place.

This latter point raises the question how contract enforcement is affected by bonus pay in general, i.e., in the absence of dismissal barriers. Shorter relationships in T-EPL-Bonus could reflect a general tendency for bonus pay to lead firms to substitute away from relational incentives. This cannot be answered by T-EPL-Bonus, because of the confounding presence of dismissal barriers, and requires the fourth treatment T-Bonus. In the final results section we briefly discuss the impact of bonus pay per se on contract enforcement, compared to T-Baseline.

4. Results

4.1. **Contract Enforcement in the Baseline Condition.** To set the stage, we first study the contract enforcement policies of firms in T-Baseline. A first observation is that worker effort levels in T-Baseline are quite high. The modal effort level across all periods is 10, despite the fact that the sub-game perfect equilibrium for the stage game is an effort level of 1, due to the contract

enforcement problem. The average effort across sessions is 6.39, and median effort is 7, matching closely the values of 6.9 and 7 obtained in Brown, Falk, and Fehr (2004).

How do firms elicit relatively high worker effort levels? One clue is that high effort levels are mainly observed in long-term relationships. Long-term relationships form when a firm and worker endogenously choose to engage in a consecutive sequence of private offer contracts with each other. Long-term relationships are prevalent in the market. Of all contracts, 67 percent are formed using a private offer, and out of all private offer contracts roughly 64 percent end up being part of a relationship lasting at least 5 periods. For private offer contracts, the correlation between effort level and the ultimate length of the relationship is 0.64 (Spearman; $p<0.001$). The bottom panel of Figure 1 suggests why long-term relations are characterized by high effort levels and high efficiency: firms only renew a private contract if the worker performed well in the previous period. For low effort levels, the probability that the firm terminates the relationships is close to 1, and for the maximum effort level the probability of termination is close to zero. A probit regression, where the dependent variable is 1 in the case a worker is not rehired, shows that the effect of higher previous period effort on the probability of dismissal is negative (marginal effect of -0.099) and statistically significant ($p<0.001$; robust s.e., clustering on session). A similar result holds controlling for previous length of the relationship and a quadratic time trend.

[Figure 1 about here]

The threat of firing creates a material incentive for workers to perform if continuing the relationship offers a rent relative to the alternative. In fact, averaging over all market periods, worker earnings are 34.75 in contracts that are part of a long-term relationship, compared to earnings of 24.75 in one-shot public-offer or private-offer interactions, and earnings of 5 from being unemployed. The attractiveness of relationships can alternatively be seen in a forward-looking calculation of rents for each market period. We calculate the average current and future earnings, from t to $T = 18$, of all workers in a private offer contract in market period t. We compare this value of being in

a long-term relationship in a given period to the current and future earnings of workers who are unemployed in a given period. This difference is positive in every period, consistent with long-term relationships providing a rent relative to being unemployed.[7] Workers earn a sizeable rent even in the final period, which is important for sustaining an equilibrium with high effort levels in early periods. Workers earn rents in long-term relationships, despite putting in relatively high effort, because firms pay substantially higher wages than in one-shot interactions (median wages are 55 rather than 30). Long-term relationships are also profitable for firms, explaining why these bilateral "trading islands" emerge in equilibrium. Average firm profits are roughly 45 percent larger in long-term relationships than in one-shot interactions.

Worker behavior in the final market period confirms the importance of future rents, and threat of firing, for motivating high effort levels. 60 percent of workers in long-term relationships reduce effort when they reach period 18, and 24 percent of workers choose an effort level of 1, despite choosing effort of 10 in period 17. Firms reduce wages somewhat in the final period, perhaps anticipating this behavior, but even controlling for the lower wage in period 18, the (regression adjusted) average change in effort is -2.57, significant at the five percent level.[8]

Although it is true that on average worker effort levels drop when the threat of firing is removed, this conceals an important type of heterogeneity in worker motives. In particular, some workers are willing to put in high effort even in the absence of future rents: 10 percent of workers in long-term relationships put in an effort level of 10 in period 18. A clue as to the source of this behavior comes from the wage-effort relation: worker effort levels increase strongly in response to the wage, even in the final period. For example, regressing effort levels in the final period on wages yields a positive coefficient on wages of 0.185, significant at the one percent level (interval regression; robust s.e., clustering on session).[9] This non-strategic effort provision is consistent with a large body of previous evidence indicating that some individuals have reciprocal inclinations, such that

[7] Differences are also positive in every period when compared to current and future earnings of being in a one-shot interaction in a given period. Detailed results are available upon request.

[8] This result is based on an OLS regression of effort on the wage and a constant, for all contracts in period 18. Standard errors are robust, and adjusted for clustering on session.

[9] For a discussion of interval regression, see footnote 9 below.

they reward kind actions, or fair wages, with high effort (for a review see Fehr and Gächter (2000)). It suggests that some of the effort provision throughout the game may be driven by fairness, rather than strategic considerations, which is important for deriving the equilibrium described in Section 3, although there is clearly also a substantial fraction of workers who are strategic. Reciprocal workers are attractive types for firms, given that they work hard in response to a fair wage, independent of future considerations. Later in the analysis we investigate whether dismissal barriers affect the proportion of selfish versus reciprocal workers who enter long-term relationships.

In summary, T-Baseline establishes a benchmark for contract enforcement behavior in a setting with repeated interactions and incomplete contracts. The findings show that efficiency wages (rents), and threat of firing, are crucial tools used by firms to solve the contract enforcement problem, although there is also a subset of workers who respond to high wages with high effort even in the absence of future rents.

4.2. **Contract Enforcement and Dismissal Barriers.** We now turn to our first main research question, which is how dismissal barriers affect the strategic interactions of workers and firms, in a setting with incomplete contracts and endogenous repeated interactions. We answer this question by comparing behavior in T-EPL to T-Baseline, exploiting the exogenous variation in the presence or absence of a dismissal barrier institution across the two treatments.

The first way in which dismissal barriers are predicted to affect the equilibrium described in Section 3 is by creating a negative incentive effect, which leads to more pronounced worker shirking in long-term relationships. This change in behavior is predicted to arise because of the change in the strategic position of firms, once a long-term relationship is initiated and the threat of firing is removed as an incentive device. Indeed, results from T-Baseline provide empirical support for the central importance of firing threat in the contract enforcement strategies of firms.

Initial support for this prediction comes from a comparison of average and median effort levels in long-term relationships (relationships consisting of at least two consecutive private offers) across treatments. Average effort in long-term relationships is 8.4 in in T-Baseline but only 5.5 in T-EPL,

a difference that is highly statistically significant using each session as one independent observation (Mann-Whitney; $p<0.01$). Median efforts are also strikingly different, 10 and 5, respectively (Mann-Whitney; $p<0.012$). Figure 2 shows that the effort differences in long-term relationships are large and stable across market periods. In fact, effort levels are substantially lower in T-EPL than in T-Baseline in every market period.

[Figure 2 about here]

Table 3 reports regressions that assess whether effort levels are lower in T-EPL after controlling for potential differences across treatments in terms of wages and other factors that might determine effort choices. The dependent variable in each column is worker effort in trades occuring as part of a long-term relationship, and coefficients are interval regression estimates, to account for the fact that the dependent variable is measured in intervals and thus is left and right censored.[10] Standard errors are robust, and allow for arbitrary correlation of the error term within sessions. In Column (1), we regress effort on a treatment dummy and a constant. The coefficient on the dummy variable for T-EPL is negative and highly significant, indicating that effort levels are lower in T-EPL. The treatment effect remains negative and significant in Column (2) where we also control for wages, a time trend, and length of the relationship as of the previous period.

[Table 3 about here]

If the drop in effort levels in T-EPL reflects the removal of firing threat as an incentive device, we should observe less of a negative incentive effect in one-shot interactions, where the institution does not affect ability to dismiss poor performers. We estimate regressions similar to those in Table 3, but using worker effort decisions in one-shot interactions: public offer contracts, or private offers

[10] The procedure maximizes a likelihood function that is a natural generalization of a Tobit, treating each value as a left and right censored observation coming from an interval with known bounds. Error terms are assumed to be normally distributed. For more information, see the STATA reference manual on the intreg procedure listed under Tobit estimation. We find similar results if we instead estimate regressions using OLS.

contracts that are not renewed in the next period. In this case we do not observe a deficit in T-EPL effort levels relative to T-Baseline. In fact, effort levels are somewhat higher in T-EPL than in T-Baseline. Later in the analysis we turn to possible reasons for the even better performance of workers in one-shot interactions in T-EPL. For the issue at hand, the important point is that effort levels are lower in T-EPL precisely in situations where the insititution makes a difference for firing threat, consistent with the incentive effect prediction.

Result 1: *Dismissal barriers cause significantly lower worker effort levels in long-term relationships, consistent with a negative incentive effect.*

The dismissal barrier institution prevents firms from using the threat of firing only after a firm chooses to extend the relationship beyond the initial probation period has impor. This has important implications for the dynamics of worker effort provision. Specifically, workers are predicted to sharply reduce effort once they are offered and accept the second private offer in a row from a firm. This behavior would also underline the negaitve incentive effect of the dismissal institution, showing that the lower effort levels in long-term relationships in T-EPL reflect a within-individual moral hazard response, rather than other potential factors, for example a different composition of types who end up in long-term relationships in T-EPL.

A comparison of unconditional probabilities shows that individuals are much more likely to reduce effort in the second relationship period in T-EPL: the probability that a worker reduces effort in the second period of a relationship is 0.54, whereas in T-Baseline the probability is 0.23, about half as large. Furthermore, the average drop is equal to -1.57 in T-EPL, whereas the average change in effort is actually positive in T-Baseline, equal to 0.11. In order to shed further light on the within-individual dynamics in effort, Figure 3 shows how median effort levels and the distributions of effort change, comparing the probation period to all later relationship periods. Importantly, the sample is restricted to to individuals who are ultimately rehired after the probationary period, and thus reflects within-individual changes. The boxes indicate the interquartile ranges of the effort distributions, and the circuluar marker indicates the median effort level. Median effort levels increase

moving from probationary to all later periods in T-Baseline, and the effort variance decreases. In T-EPL, by contrast, median effort drops sharply relative to the probation period, and there is a substantial increase in the variance of effort. Results are very similar if we instead compare effort in the probation period to effort in the second period of relationships only; the drop in effort in T-EPL is immediate as soon as the probation period is passed, whereas effort increases in T-Baseline.

[Figure 3 about here]

Notably, although on the whole individuals exert much lower effort levels after the probation period in T-EPL, the distribution shows that there are still some who choose close to maximum effort. This is consistent with the presence of heterogeneous types, such that some workers are motivated by firing threat and material self-interest but others perform well even in the absence of a firing threat.

Table 4 investigates whether the probation effect is statistically significant. The sample comprises all private-offer contracts taking place in the second period of a relationship that lasts at least two (consecutive) periods. The dependent variable in each column is equal to 1 if effort dropped relative to the first period of the relationship, and zero otherwise. Coefficients are marginal effects. Column (1) indicates that the probability of effort dropping is significantly larger in T-EPL compared to T-Baseline, and Column (2) shows that this is still true conditioning on characteristics of the previous period interaction and current contract terms, as well as market period. Thus, dismissal barriers are observed to change the dynamics of effort levels and also effort variance.

[Table 4 about here]

Figure 3 also shows that median effort is actually higher in the probation period in T-EPL, compared to T-Baseline, for workers who are ultimately re-hired in the next period. An interval regression using only probation period contracts that lead to long-term relationships shows that the

effort level is higher by 0.709 points on average after controlling for wages, albeit only marginally significant ($p<0.095$; robust s.e., clustering on session). This tendency for workers to perform better in the probation period in T-EPL than in T-Baseline indicates the presence of a mild positive incentive effect of dismissal barriers, for worker performance in the probation period. This is understandable given that workers enjoy a stronger strategic position in T-EPL, once firms make the second private offer, in the form of job security and also the opportunity for selfish workers to exploit the firm. As noted above in our analysis of the negative incentive effect, effort levels in one-shot interactions are also higher in T-EPL than in T-Baseline, and significantly so. Except for the case of trades occuring in period 18, these interactions can also be interpreted as probation periods even though they were by definition not successful, because the firm could have chosen to rehire the worker with a private offer in the next period. We estimate an interval regression where the dependent variable is worker effort levels in one-shot interactions, excluding trades in period 18, and find that effort is higher in T-EPL than in T-Baseline: the difference in effort levels is 0.707, and is marginally significant ($p<0.095$). This is again consistent with a positive incentive effect of dismissal barriers for the probation period.

Selfish workers may have a greater incentive than fair workers to enter long-term relationships in T-EPL, because they do not feel bad about exploiting the firm to the fullest once firing threat is removed. If the especially good performance of workers in the probation period in T-EPL mainly reflects selfish types adopting this strategy, one would expect to observe evidence that long-term relationships in T-EPL involve a greater proportion of selfish types. One way to assess the proportion of selfish versus fair types is to look at the sensitivity of effort levels to wages in the final market period. The greater the fraction of selfish workers, the less sensitive effort should be to high wage offers. Using all private offer contracts in the final period, which were part of an on-going relationship in the previous period, we regressed effort on wages (interval regression; robust s.e. clustering on session). The impact of wages is positive but not significant in T-EPL ($p<0.124$), whereas the impact of wages on effort is positive and significant in T-Baseline ($p<0.001$). It turns out that in

T-EPL and T-Baseline, the number of private-offer contracts in long-term relationships in period 18 is exactly the same, so the difference in significance levels does not simply reflect different number of observations. Thus, there is suggestive evidence of adverse selection of selfish types into long-term relationships.[11] An increase in the number of selfish types tends to further worsen performance in long-term relationships in T-EPL relative to baseline, because it means that there are more types who respond to the negative incentive effect by dropping effort after the probation period.

Result 2: *Dismissal barriers lead to a probation period effect, such that worker effort is especially high in the probation period, and then drops sharply when the firm commits to a long-term relationship. Effort is even slightly higher in the probation period than in T-Baseline, consistent with an additional, positive incentive effect of the dismissal barrrier insititution for performance in probation periods.*

Given that average performance in long-term relationships suffers in T-EPL, we would expect firms to be more cautious about entering relationships than in T-Baseline. The prediction for average length of relationships is ambiguous, because the tendency for firms to engage in one-shot interactions may potentially be offset by a tendency for relationships that do form to stay intact, due to the inability of firms to dismiss workers.

Consistent with the prediction of relationship avoidance we find that 58 percent of all contracts were in one-shot interactions in T-EPL, compared to 48 percent in T-Baseline. Even more tellingly, we observe 23 percent of all firms in T-EPL pursuing a strategy of strict relationship-avoidance, never making two private offers in a row to the same worker, during the entire game. This contrasts with only 9 percent of firms exhibiting this strategy in T-Baseline. Put another way, the probability that a firm has never been in a long-term relationship as of market period t is consistently higher in T-EPL than in T-Baseline. We estimate a Cox proportional hazard model, and find that the survival

[11] Given an equal proportion of reciprocal types across treatments, adverse selection of selfish types into long-term relations would imply a greater proportion of non-selfish workers in one-shot interactions in the final period in T-EPL. In fact, the wage-effort relation is positive and significant in one-shot interactions in T-EPL, but is not significant in T-Baseline, consistent with this prediction.

probability of a firm never having been in a long-term relationship, as of market period t, is higher in T-EPL compared to T-Baseline. This difference is only marginally significant overall ($p < 0.07$), mainly because the survival probabilities are close to 1 in both treatments for the first few market periods. In general long-term relationships do not form until after the first few market periods, during which firms appear to engage in a process of search. Considering market periods beyond period 5, the survival probability decreases sharply in T-Baseline whereas the decline is slower in T-EPL, such that the difference is statistically significant at the five-percent level ($p < 0.043$).

Although there are more one-shot relationships in T-EPL, and the fraction of firms who strictly avoid relationships is larger, the average length of a relationship is essentially the same in T-EPL and T-Baseline: 5.99 periods versus 5.89. This reflects the fact that whereas long-term relationships frequently break-up in T-Baseline, due to firms firing poor performers, relationships essentially never break up in T-EPL, despite low effort levels. Firms cannot fire workers, and workers essentially never quit long-term relationships, doing so in only 3 out of 283 contracts. This is understandable given that worker earnings are about 48 percent higher on average in long-term relationships in T-EPL compared to one-shot interactions. Rather than affecting the average length of a relationship in the market, dismissal barriers affect the shape of the distribution. Figure 4 shows the distributions of relationship lengths for T-EPL and T-Baseline. The fractions of relationships in categories of intermediate lengths, 2 to 5 and 6 to 9, are significantly smaller in T-EPL than in T-Basline, using one session as an independent observation (ranksum; $p<0.05$; $p<0.07$). The fractions of one-shot relationships, and longer relationships, are always higher in T-EPL than in T-Baseline, although these differences are not statistically significant based on non-parametric tests. In summary, dismissal barriers create a tendency for the distribution of relationship lengths to become more bi-modal.

[Figure 4 about here]

Result 3*: Firms are more reluctant to enter long-term relationships in the presence of the dismissal barrier institution. The average length of relationships is unchanged, but the distribution of relationships lengths becomes more bi-modal.*

4.3. **Dismissal Barriers and Bonus Pay.** We have shown that dismissal barriers strongly affect the strategic interaction of workers and firms, in an efficiency wage setting, but it remains to be seen how dismissal barriers affect behavior when the institutional environment includes more flexible labor contract forms. In T-EPL-Bonus, we add the option for firms to pay bonuses. Bonus pay gives firms an additional contractual instrument, which can potentially substitute for threat of firing as an incentive device. Thus, we predict that the impact of dismissal barriers may be much less pronounced in such an insititutional setting.

For bonus pay to serve as an incentive device, firms must credibly reward worker effort with bonus payments. Figure 5 shows that bonus payments are in fact strongly increasing in worker performance, and thus that bonus payments are credible. We also regressed actual bonus payments in period t on worker effort levels in t (interval regression), and found that the relationship between effort and bonus payments is positive and highly statistically significant ($p<0.001$; robust s.e., clustering on session).

[Figure 5 about here]

With bonus pay serving as a credible incentive device, firms have a way to at least partially circumvent the negative incentive effect created by dismissal barriers. Thus, firms are predicted to use bonuses to prevent worker shirking in long-term relationships. Figure 2 shows that, indeed, worker effort levels in long-term relationships are consistently much higher in T-EPL-Bonus than in T-EPL (average effort is 8.2 rather than 5.5), and are in fact very similar to the levels observed in T-Baseline. Columns (3) and (4) of Table 3 indicate that the difference in effort levels is positive and statistically significant when comparing T-EPL-bonus to T-EPL, controlling for other relevant

variables. Columns (5) and (6) confirm that effort levels in T-EPL-Bonus are not significantly different from effort levels in T-Baseline. Thus, the option to pay bonuses allows firms to undo the negative effects of dismissal barriers.

With the negative incentive effect of dismissal barriers neutralized by bonus pay, effort dynamics are predicted to be more similar to T-Baseline. Figure 3 shows that there is no within-worker drop in effort moving from the probation period to later periods in T-EPL-Bonus. The median effort level increases after the probation period, and variance decreases, similar to in T-Baseline. Columns (3) and (4) of Table 4 shows that the probablity of a drop in effort is significantly lower in T-EPL-Bonus than in T-EPL, and Columns (5) and (6) show that the probability is not statistically different from in T-Baseline. Figure 3 also shows that the positive incentive effect for the probation period created by dismissal barriers in T-EPL is absent in T-EPL-Bonus, which is consistent with bonus pay reducing the incentive for selfish workers to enter long-term relationships. Verifying the extent of selection by worker behavior in the final period is problematic, in this case, however, given that workers are not the final mover. Selfish workers have an incentive not to reveal themselves even in period 18, given the possibility to earn a bonus, and thus cannot easily be distinguished from fair types.

The prediction for relationship formation in T-EPL-Bonus is ambiguous, because on the one hand firms have less reason to avoid relationships, but on the other hand bonus pay provides a substitute for relational incentives, and thus firms may be less interested in entering relationships for this reason. The fraction of firms who never enter a long-term relationship in T-EPL-Bonus is 19 percent, somewhat lower than in T-EPL but substantially above T-Baseline. The survival probability of never having entered a relationship also indicates that firms in T-EPL-Bonus are more prone to avoid relationships than firms in T-Baseline. A Cox mixed proportional hazard model shows that the survival probability is significantly higher than in T-Baseline ($p < 0.026$).[12] Compared to T-EPL, the survival probability is not significantly different ($p < 0.79$).

[12] The difference is also significant considering only market periods greater than 5 ($P < 0.036$).

On the other hand, those firms who do enter long-term relationships appear to engage in more experimentation first, compared to T-EPL or T-Baseline. This is shown by the fact that the frequency of one-shot interactions is 60 percent, higher than in either T-EPL or T-Baseline, and the fraction of firms who do not enter their first log-term relationship until after the ninth period is 35 percent compared to 24 percent in T-Baseline. As a consequence, the average length of a relationship in T-EPL-Bonus ends up being somewhat shorter than in T-Baseline or T-EPL, 4.84 as opposed to 5.89 or 5.99, despite the fact that workers quitting long-term relationships is just as rare as in T-EPL. As shown in Figure 4, the proportion of one-shot interactions is higher in T-EPL-Bonus than either T-EPL or T-Baseline, and the proportion of very long relationships is smaller, reflecting an overall tendency to have shorter relationships.

The change to shorter relationship lengths observed in T-EPL-Bonus is consistent with bonus pay changing the way that firms enforce contracts, such that they substitute away from relational incentives to one-shot interactions. To attitribute this change to the effect of bonus pay, however, requires a comparison of T-Baseline and T-Bonus.

Result 4: *The presence of bonus pay strongly affects the impact of the dismissal barrier institution, eliminating both the negative incentive effect and probation period effect. Relationship initiation is different than in T-Baseline, with firms experimenting more and being significantly less likely to enter long-term relationships.*

4.4. **Impact of Bonus Pay in the Absence of Dismissal Barriers.** In T-Bonus firms have the option to pay bonuses, but there is no dismissal institution in the market. This allows us to shed further light on results from T-EPL-Bonus, by isolating the impact of bonus pay on contract enforcement policies of firms.

In T-Bonus, we observe even stronger evidence of experimentation and short-lived relationships than in T-EPL-Bonus. The average length of a relationship in T-Bonus is only 2.2, lower than in any of the other treatments. Figure 4 shows that the proportion of one-shot interactions is higher

than in all other treatments, and the proportion of relationships that are very long is smaller than in all other treatments. Figure 1 provides further evidence that firms rely less on firing threat as an incentive device. The relationship between worker performance and the probability of firing is flatter, showing that firms are less prone to condition contract renewal on performance. This difference is statistically significant, based on a Probit regression where the independent variable is equal to 1 in the case a worker is not rehired, and explanatory variables include worker performance in the previous period, a dummy variable for T-Bonus, and an interaction term. The interaction term is positive and significant, indicating that the tendency for high previous effort to reduce the probability of firing is less strong in T-Bonus ($p<0.001$; robust s.e., clustering on session).

Although firms are able to use bonus pay in T-EPL-Bonus to achieve a level of performance comparable to in T-Baseline, they still have one fewer incentive device due to removal of firing threat. This would seem to weaken the strategic position of firms, such that they must pay more to elicit the same level of performance. Comparing T-EPL-Bonus and T-Bonus makes it possible to see whether dismissal barriers have this effect on bonus payments by firms. Figure 5 shows the average bonus paid as a function of effort in the two treatments, and it is suggestive that firms pay higher bonuses in T-EPL-Bonus in most effort categories, especially those for higher effort levels. A regression of actual bonus payment on worker effort, the wage, desired effort, and a dummy variable for T-EPL-Bonus tells a similar story. The treatment dummy is 2.45 and statistically significant ($p<0.059$; robust s.e., clustering on session), indicating that for a given wage and effort, firms pay a higher bonus. This shows that while bonus pay allows firms to offset the negative incentive effect of the dismissal barrier institution, the dismissal barrier still imposes a cost in terms of a higher price for eliciting worker performance.

Despite the strong contrast to T-Baseline in the way that contracts are enforced, it is striking that outcomes are quite similar. Worker shirking in long-term relationships is comparable to what is observed in T-Baseline, as shown by Figure 2, and effort dynamics show no indication of

a probation period effect, as seen in Figure 3. Thus, while bonus pay strongly affects contract enforcement strategies, the ultimate outcome is similar when compared to the case of wage contracts and relational incentives.

Recent studies have compared the performance of bonus versus wage contracts in one-shot interactions, and found that bonus contracts are superior (Fehr, Klein, and Schmidt (2007)), which raises the question how bonus contracts fare in a setting with repeated interactions. Figure 6 compares aggregate market efficiency across treatments, in terms of total economic surplus, as a fraction of maximum possible surplus.[13] Efficiency is somewhat higher in T-Bonus than in T-Baseline in early market periods, but once relationships have had time to form, T-Baseline catches up. Thus, bonus pay delivers efficiency gains relative to wage contracts in early market periods, but in the long run, however, wage contracts and relational incentives appear to do almost as well. Notably, Figure 6 also shows that aggregate efficiency in T-EPL is much lower than in other treatments, whereas the negative impact of dismissal barriers is substantially ameliorated in T-EPL-Bonus.

Result 5: *Bonus pay causes firms to substitute away from relational incentives in their contract enforcement policies. Although bonus pay allows firms to offset negative incentive effects of dismissal barriers, dismissal barriers still impose a cost on firms by requiring firms to pay a higher bonus for a given level of effort. Bonus pay per se does not have large benefits relative to wage contracts in the long-run.*

5. Conclusion

This paper shows that contract enforcement behavior interacts with the surrounding institutional environment in important and complex ways. We focus on two particularly important institutions – dismissal barriers, and bonus pay – and investigate how these affect contract enforcement behavior in a setting with incomplete contracts and repeated interactions. Dismissal barriers are shown

[13] The efficient effort is 10, producing a gain of 100. Subtracting the effort cost of 18, and 5 for the opportunity cost of a worker, the maximum possible net gain from trade is 77.)

to have a strong negative effect on worker performance, by interfering with firms' use of firing threat as an incentive device. Dismissal barriers also distort the dynamics of worker effort levels, leading to a sharp drop in effort levels once a firm chooses to retain the worker worker beyond the institutionalized probation period and activates dismissal protection. Firms shy away from long-term relationships, and rely more on the spot market for labor. The average rate of turnover is unaffected, but the distribution of relationship lengths becomes more bi-model. The impact of dismissal barriers changes dramatically when the option for firms to pay bonuses is introduced. Firms are observed to substitute bonus pay for threat of firing as an incentive device, almost entirely offsetting the negative incentive effects of dismissal barriers, and eliminating probation period effects, although they have to pay a higher bonus per unit of effort than if dismissal barriers wer absent. Contract enforcement behavior remains fundamentally changed, however, because the option to pay bonuses causes firms to rely less on relational incentives.

These findings further the understanding of the interplay between contract enforcement and institutions, but are also potentially informative for more applied literatures. For example, there is a large empirical literature investigating the impact of dismissal barriers, including those that arise from employment protection legislation. This literature has made substantial progress on understanding the implications of these policies for market outcomes (e.g., Lazear (1990); Nickell (1997); Kugler and Saint-Paul (2004); Autor, Donohue, and Schwab (2006)); we view this literature as complementary to our study, which has a very different approach and emphasis. On the one hand, the experimental approach is different in that it does not yield direct policy implications in terms of whether EPL is good or bad; the experiment studies important efficiency consequences of EPL, for example the negative incentive effect, but EPL institutions take many forms and affect efficiency in many other domains as well (flexibility in response to business cycles, match quality in terms of ability, etc.). On the other hand, the experiment has strengths in terms of ability to generate valuable qualitative insights. For example, the micro-level mechanisms underlying the impact of EPL are not fully understood. This is where an experiment is particularly useful, as it

allows an investigation of these mechanisms in great detail, as well as clearly exogenous variation in the institutional setting.

One way that the experiment contributes in this area is by providing supporting evidence for the classic Coasian prediction of Lazear (1990), that parties will be able to arrange side payments to circumvent the negative impacts of EPL, given sufficiently many contractual instruments. We find the resilience of the market striking, given that it takes only the addition of a single contractual instrument to largely undo the negative effects of EPL. Other aspects of firm behavior, such as the observed shift from relational incentives to the spot market for labor, also represent a Coasian response. Notably, this latter feature is in line with empirical evidence that strong EPL is associated with increased reliance of firms on temporary help agencies (Blanchard and Landier (2002); Cahuc and Postel-Vinay (2002); Autor (2003)). The probation period effect is also in line with field evidence; measuring worker effort levels in the field is difficult, but Ichino and Riphan (2005) provide supporting evidence for the probation effect, in the form of a sharp increase in absenteeism once workers make it past the probation period for EPL in Italy. For studing EPL in the field, the experiment suggests that the impact of EPL insititutions may be heterogeneous, varying strongly depending on details of the contract enforcement problem in a given employment relationship, In particular, the impact of EPL may vary depending on the presence or absence of bonus pay, or other forms of deferred compensation.

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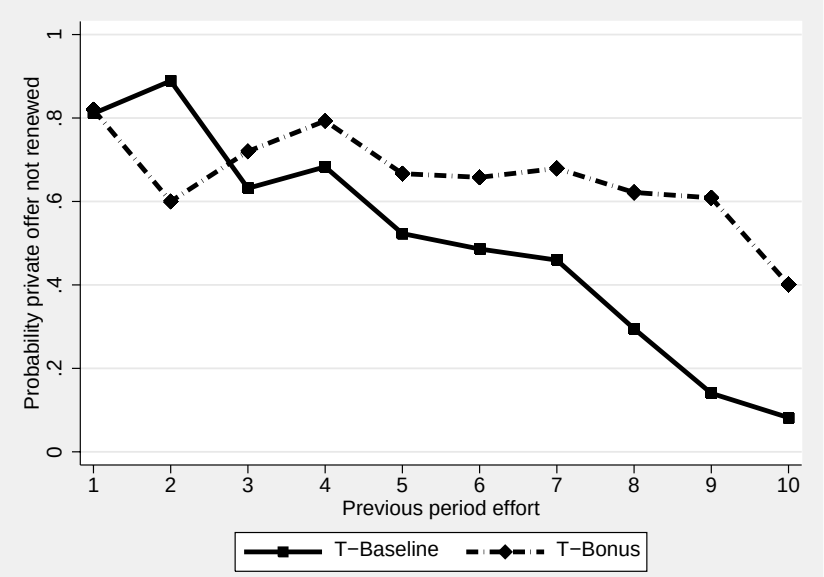

FIGURE 1

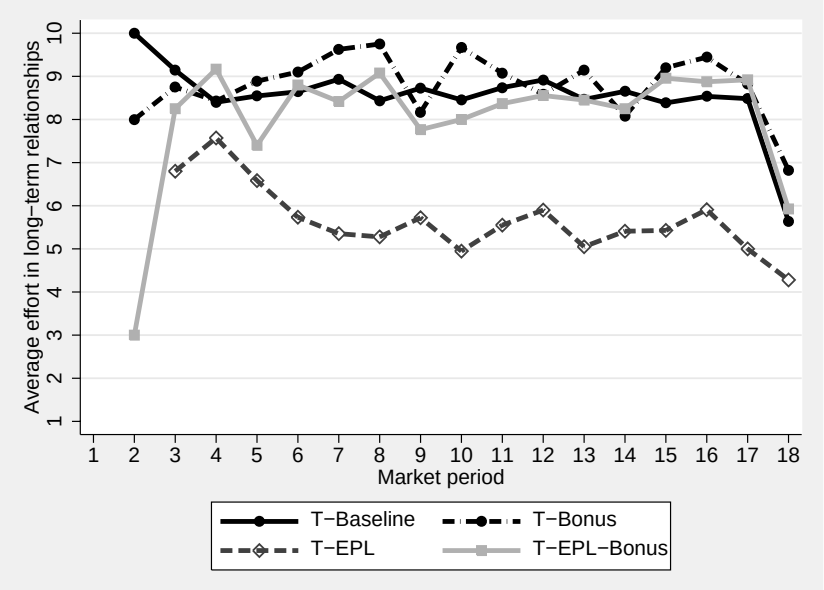

FIGURE 2

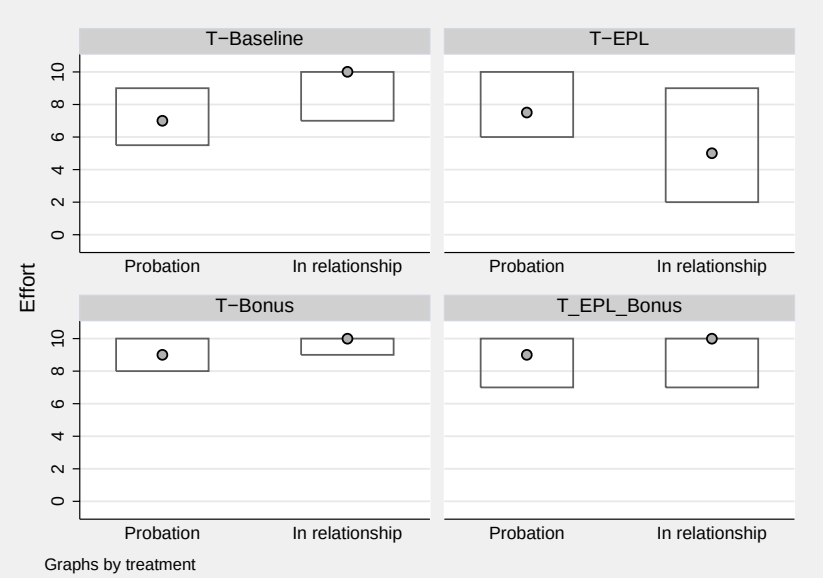

FIGURE 3

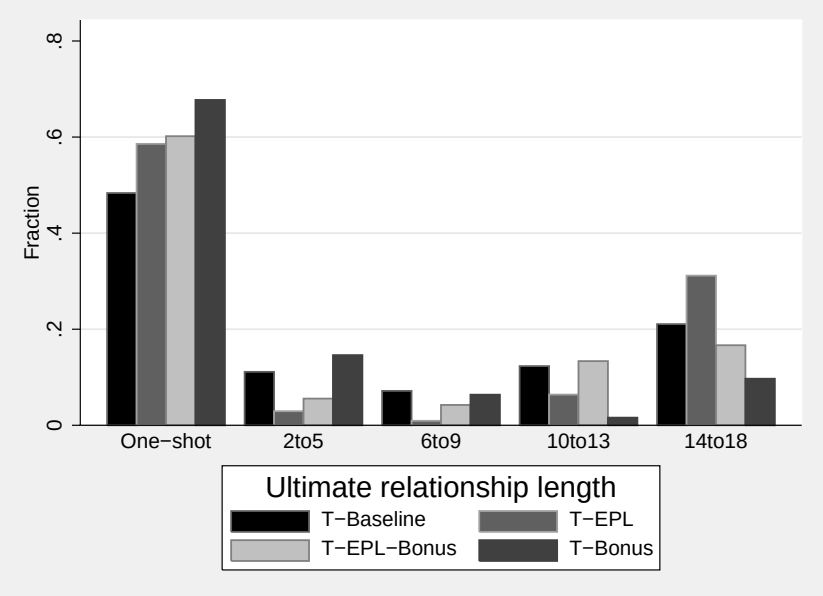

FIGURE 4

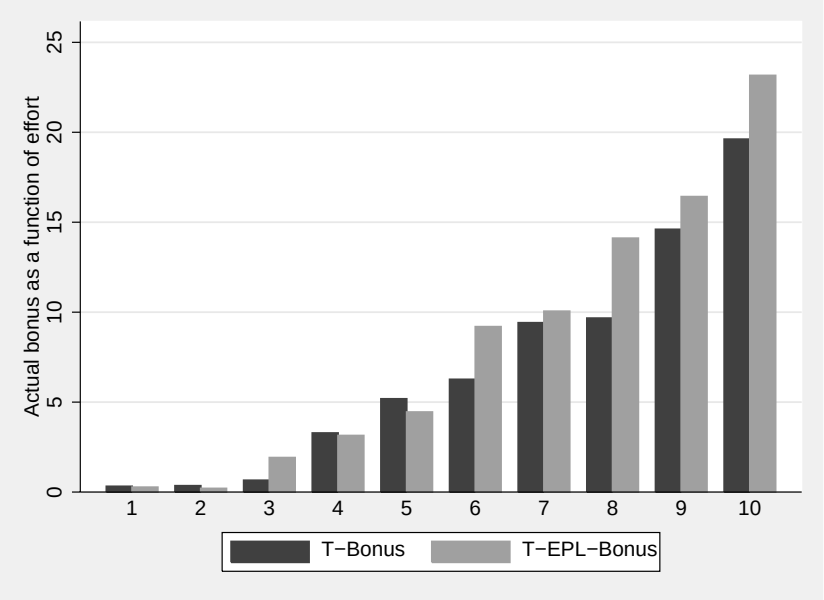

FIGURE 5

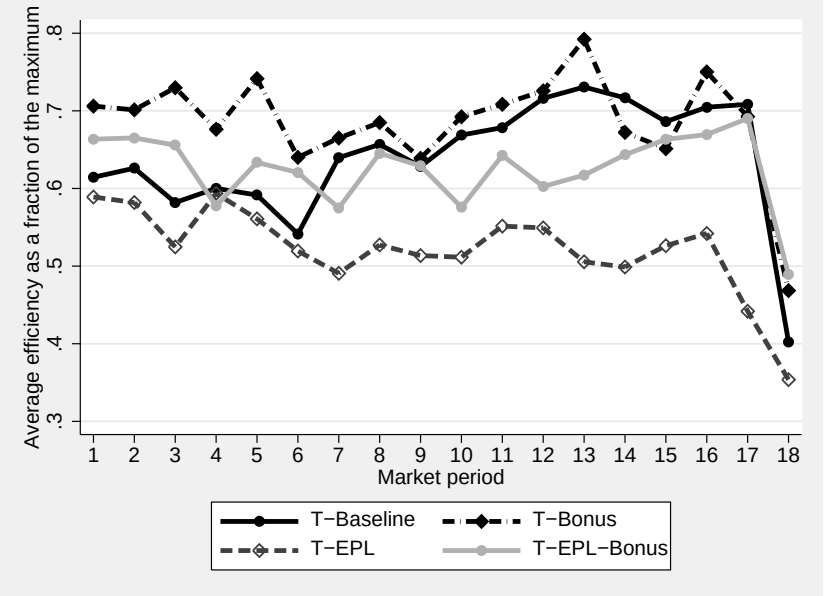

FIGURE 6

Dependent variable:	Effort in long-term relationships					
	T-EPL vs. T-Baseline		T-EPL-Bonus vs. T-EPL		T-EPL-Bonus vs T-Baseline	
	(1)	(2)	(3)	(4)	(5)	(6)
T-EPL	-4.794***	-2.989***				
	[1.248]	[0.876]				
T-EPL-Bonus			4.992***	3.569***	-0.17	-1.093
			[1.171]	[1.310]	[1.038]	[0.842]
Wage		0.224***				
		[0.024]				
Total offered compensation				0.1		0.117**
				[0.062]		[0.051]
Period		0.424		0.277		0.449**
		[0.264]		[0.340]		[0.222]
Period squared		-0.026**		-0.019		-0.026***
		[0.011]		[0.013]		[0.009]
Constant	9.607***	-2.493	4.778***	0.196	9.633***	2.584
	[0.939]	[1.976]	[0.804]	[2.521]	[0.994]	[2.773]
Log pseudo-likelihood	-1167	-982	-1046	-1023	-984	-932
Observations	618	618	551	551	603	603

Table 3

Dependent variable:	1 if worker reduces effort after first (probation) period of relationship					
	T-EPL vs. T-Baseline		T-EPL-Bonus vs. T-EPL		T-EPL-Bonus vs T-Baseline	
	(1)	(2)	(3)	(4)	(5)	(6)
T-EPL	0.304**	0.241**				
	[0.121]	[0.098]				
T-EPL-Bonus			-0.324**	-0.409***	-0.02	-0.078
			[0.129]	[0.141]	[0.105]	[0.091]
Wage		-0.032***				
		[0.012]				
Wage in previous period		0.008				
		[0.011]				
Desired effort		-0.016		0.032		-0.032
		[0.048]		[0.066]		[0.076]
Desired effort in previous period		-0.015		-0.191**		-0.041
		[0.039]		[0.083]		[0.046]
Total offered compensation				-0.052***		-0.024**
				[0.019]		[0.011]
Previous offered compensation				0.049***		0.021**
				[0.019]		[0.010]
Effort in previous period		0.196***		0.162		0.068
		[0.053]		[0.120]		[0.049]
Period		-0.03		-0.051		0.004
		[0.072]		[0.078]		[0.044]
Period squared		0.003		0.003		-0.001
		[0.004]		[0.004]		[0.002]
Pseudo R-squared	0.071	0.419	0.088	0.317	0	0.214
Observations	84	84	61	61	89	89

Table 4