Screening, Competition and Job Design: Economic Origins of Good Jobs*

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Abstract: In recent decades many firms offered more discretion to their employees providing them with more opportunities to shirk. This development is difficult to understand in terms of standard moral hazard models. Here we show experimentally that complementarities between rent-sharing, high effort discretion, screening opportunities and competition may be an important driving force of such a development. We document, in particular, the endogenous emergence of two fundamentally distinct types of jobs. Employers either implement a control strategy – which consists of low wages, low effort requests, limited effort discretion and little or no rent-sharing – or they implement a trust strategy which stipulates high wages, high effort requests, high effort discretion and substantial rent-sharing. If employers cannot screen employees the control strategy prevails. The possibility of screening causes a substantial increase in the prevalence of the trust strategy. The introduction of competition further fosters the trust strategy and induces a substantial increase in welfare such that both employers and employees are better off.

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1 Introduction

"Trust is good, control is better". This famous quote attributed to Lenin refers to a fundamental question in any principal-agent relationship: To what extend should the principal leave discretion to the agent? An agent who is trusted may shirk. In fact, selfish agents will exploit every opportunity in which their effort cannot be observed to shirk, suggesting that control is always better than trust. However, this intuition contrasts with important developments in workplace organizations that took place over the past two to three decades.[1] Many companies have replaced narrow job descriptions – that enable employers to monitor and control their employees tightly – with broadly defined jobs that give much greater task and effort discretion to the employees but make it also much harder to control and monitor them.[2] Empirical evidence (e.g. Ichniowsky, Shaw, and Prennushi 1997, Ichniowsky and Shaw 2003) shows that such organizational strategies are associated with considerably higher productivity.

In this paper we show experimentally that offering discretion to an agent is not profitable on its own. However, if offering discretion is combined with paying high wages that offer a rent to the agent, if discretion allows an improved workplace organization that improves the agent's productivity, and if the principal can screen agents based on their past behavior, then this combined strategy is profitable and induces the agents to work much harder than if their discretion is restricted and they are paid low wages and low rents. Put differently, we show that offering discretion, paying high wages and screening are complements. Theoretical economists (Milgrom and Roberts 1990, 1995; Baker, Gibbons and Murphy 1994, Holmstrom and Milgrom 1994), empirical economists (Ichniowsky, Shaw and Prennushi 1997; Ichniowsky and Shaw 2003), industrial relations experts (Osterman 2000, 2006) and management scholars (Walton 1985), have emphasized the importance of complementarities in the organization of the firm. Complementarities imply that different components of a strategy reinforce each other and therefore, they lead to a bundling or clustering of these components.

[1] See, e.g., Lawler, Mohrman and Ledford (1995) and Osterman (1994, 2000).
[2] Appelbaum, Bailey, Berg, and Kalleberg (2000) and Shaw (2006), e.g,, give an overview of .the different forms that such" high-performance work organization" can take.

We document experimentally the endogenous emergence of two distinct clusters of job characteristics that are based on two fundamentally distinct strategies – a *control strategy* and a *trust strategy*. Under the control strategy, the experimental employers offered jobs characterized by limited effort discretion, low wages, a low requested effort, and a low rent. Under the trust strategy, the employers offered jobs with high effort discretion and high wages, they requested a high effort and the overall compensation package involved substantial rents. In other words, the trust strategy is to offer "good" jobs while the control strategy is associated with "bad" jobs.[3] While the trust strategy is clearly beneficial for employees it requires a considerable amount of trust on the employer's side: He pays a higher wage and he allows the employee to shirk more. Thus, if the agent is not trustworthy, the employer makes a significant loss, which raises the question why the trust strategy is employed at all.

Our experimental treatments identify key economic conditions under which the trust strategy is superior to the control strategy which may provide an explanation for the observed trend towards greater effort discretion at the workplace. We show, in particular, that opportunities to screen employees based on signals' about past performance is decisive for the viability of the trust strategy. In the absence of such screening opportunities – in our base treatment – the employers predominantly implement the control strategy, whereas in our screening treatment, in which a signal about employees' past performance was available, many employers conditioned their job offers on this signal. Employees with a signal indicating high past performance were offered good jobs in the majority of the cases while the vast majority of employees with a low signal received a bad job offer. The employers' screening behavior generated incentives for the employees to increase effort in order to improve their reputation. This change in incentives led to a substantial increase in employees' average effort in the screening treatment compared to the base treatment.

[3] The two distinct types of jobs can legitimately be termed "good" and "bad" jobs because the high wage offered under the trust strategy contained a large rent component, i.e. the higher wage *over*compensated the employees for their higher effort, implying that their total compensation exceeded their supply price. Under the control strategy, the experimental employers typically paid just enough to induce acceptance of the job offer.

It is, however, important to point out that the reputation formation opportunities in the screening treatment did not induce employees to provide higher effort per se. In fact, the data show that employees with a high reputation (i.e. a high performance signal) decreased their effort if they received a low wage offer, even if this hurt their reputation But most of them reliably reciprocated to high wage offers with a high effort level. By offering high wages to high reputation employees only, employers could limit the risk that is involved in the trust strategy. Thus, it is the screening possibility that rendered high wages and job rents profitable.

Despite the increase in the provision of good jobs and despite the higher average effort the possibility to screen employees is not sufficient to get the market to the efficiency frontier. The reason is that a significant fraction of employers always implement the control strategy, even when they are matched with an employee with a good past performance record. Note that these employers never learn that they could increase profits by implementing a trust strategy because *all* employees respond to a low wage with low effort. Thus, these employers experience that employees with a high reputation cannot be trusted which may reinforce their use of the control strategy. There is also a non-negligible minority of employees who *always* shirk even though it is profitable to invest in a good reputation. Similar to employers who never trust, these employees never learn that reciprocating to high wage offers by choosing high effort levels increases future income.

This interaction of heterogeneous employees and employers gives rise to a segmentation of the labor market. In the screening treatment, some employees work hard, acquire a good reputation, and are mostly offered good jobs. Other employees shirk, are left with a poor reputation, and get stuck with bad jobs. Our results show that in an environment in which screening and reputation building is possible, employees who only consider their narrow, short-term self-interest are more likely to end up in work environments that are tightly controlled and leave no rents on the table, while employees who behave reciprocally (for intrinsic or strategic reasons) are more likely to get good jobs that leave more discretion and offer higher rents.

The simultaneous existence of low paid jobs with limited effort discretion for the employees and well paid jobs with a high rent and a high discretion in effort choices is reminiscent of the literature on segmented labor markets (Doeringer and Piore 1971; Edwards, Reich and Gordon 1975). This literature postulated the existence of low and high paid segments of the labor market with little mobility between the segments. We find a similar segmentation pattern in our experimental labor market because the low reputation employees are trapped in the low paid segment of the market.

What determines the relative size of the two segments of the labor market? In a third treatment we implemented competition among employers and employees. We show that competition among employers for high reputation employees and among employees for generous job offers spurs the incentive and screening effect and fosters learning such that almost all market participants behave (close to) optimally. Employers realize that they do not get employees with good track records by offering bad jobs. Employees realize that they are left behind if they do not have a good reputation. As a result, the fraction of good jobs that are offered significantly increases while the the fraction of bad jobs is reduced. Overall, the market is associated with less inequality between employees, and both employers and employees gain from the introduction of competition.

A key result of our experiment is the bundling of job characteristics into good and bad jobs. This result suggests that one should observe a positive correlation between wages and effort discretion in naturally occurring field data if the forces present in the experiment generalize to the field. Likewise, there should be a positive correlation between job satisfaction and effort discretion in field data because higher effort discretion is predicted to be associated with higher job rents. We examine these questions (in the appendix) with data that are representative for Germany; both correlations are supported at high significance levels, even if we control for a host of factors such as education, tenure, occupation, and industry, suggesting that our results may also capture relevant forces in the field. The existence of a positive correlation between wages and effort discretion has also been documented by Osterman (1994) for the US; the data in his

study even suggest that the high wages associated with high effort discretion represent efficiency wages. In addition, Osterman (2006) reports that the productivity gains from innovative workplace organisations associated with higher effort discretion seem to be the main source of higher wages.[4]

The remainder of the paper is organized as follows. Section 2 discusses the related literature. Section 3 outlines the experimental design and procedural details. In Section 4 we discuss the behavioral implications for our set up if (i) all subjects are self-interested, (ii) a non-negligible share of the subjects also has a preference for fairness and (iii) if hidden costs of control exist. Section 5 presents and discusses the experimental results on the bundling of job attributes, the employers' optimal strategy, the existence of suboptimal employers and employees in the screening treatment, and the resulting segmentation of the labor market. We also analyse the effects of competition and compare our results to field data. Section 6 concludes.

2 Related Literature

Our paper is related to the literature on complementarities in the organization of the workplace. Milgrom and Roberts (1990, 1995), Baker, Gibbons, and Murphy (1994), and Holmstrom and Milgrom (1994) have shown theoretically that important complementarities between technology, strategy and incentive systems may exist, and MacLeod and Parent (1999) have shown empirically that job characteristics and the form of compensation are related.[5] The work by Ichniowsky, Shaw and Prennushi (1997) and the work summarized in Ichniowsky and Shaw (2003) documents strong complementarities between different human resource management practices. The previous empirical studies on complementarities in the workplace did, however,

[4] Our field data and the data in Osterman (1994, 2006) lend credibility to the potential generalizability of our results to the field (see also the meta study by Handel and Levine 2004). In contrast to our experimental data, however, these field data can only be used to establish *correlations* between wages and task discretion, and wages and productivity gains. They cannot be used to isolate the behavioral mechanisms (such as employees' reciprocation behavior) that render task discretion and high wages complementary factors, and they do not allow for the identification of the causal factors (such as screening and competition) behind the adoption of the trust strategy.

[5] MacLeod and Parent (1999) show, for example, that jobs with high-powered explicit incentives in the form of piece rate or commission rate contracts tend to be associated with more workplace autonomy. They show, however, that contracts with such explicit incentives are rare and that the vast majority of workers is compensated with hourly wages and salaries.

not explicitly identify the *causal* factors behind the actual implementation and behind the viability of a set of complementary job characteristics. In fact, one of the enduring puzzles in this literature is why not all firms implement innovative workplaces with higher effort discretion, if this enhances productivity. For this reason, we believe that our experiments provide additional useful insights. The experimental data enable us to identify screening, reputation formation, and competition as key causal forces: they show that in the absence of screening opportunities based on past performance good jobs with higher effort discretion are not viable; we document that competition greatly strengthens employers' screening and employees' reputation formation activities which fosters the creation of good jobs; and our data show that the bundling of distinct job characteristics into bad and good jobs is a robust phenomenon that occurs under all treatment conditions.

Dohmen et al. (2009) have examined the impact of workers' propensity to reciprocate generous actions on wages in a representative German sample (the socioeconomic panel, SOEP). They report that workers with a higher inclination to reciprocate generosity are paid higher wages, and that these workers tend to work harder in their jobs. Our data support this pattern only in some of the treatments and thus reveal the causalities behind these observations. Once behaviour in the base treatment has converged such that employers predominantly provide bad jobs to *all* employees the latter exert little effort regardless of whether they are reciprocal types or selfish types. Thus, workers with an inclination to reciprocate also receive low wages and provide low effort. Only if screening opportunities are available the reciprocal workers have a chance to acquire a good reputation which induces many employers to offer them high wages, which then elicits high effort levels. These findings also relate to a recent paper by Green (2008) who shows that British workers that are classified as loyal by their company enjoy higher effort discretion, a result that is consistent with the notion that employers screen their employees according to their loyalty (reputation) and offer the loyal employees good jobs.

Our paper is also related to the literature on crowding out of intrinsic motivation by extrinsic incentives based on monitoring and control (Frey 1997, Gneezy and Rustichini 2000,

Frey and Jegen 2001, Fehr and Rockenbach 2003, Benabou and Tirole 2006, Falk and Kosfeld 2006, Sliwka 2007, Ellingsen and Johannesson, 2008) and to theoretical and empirical studies of reputation formation (Fama 1980; Holmström 1999; Malcomson and MacLeod 1998; MacLeod 2007; Keser 2002; Bolton, Katok and Ockenfels 2004; Brown, Falk and Fehr 2004; Cabrales and Hortacsu 2006; Huck, Lünser and Tyran 2006).[6] However, none of these papers investigates the economic forces behind the bundling of job attributes into good and bad jobs, labor market segmentation, and the role of screening based on reputation signals for the employer's decision to give effort discretion to the employees.

The data in our paper have a bearing on one important aspect discussed in the literature on the role of extrinsic incentives on voluntary cooperation. Falk and Kosfeld (2006) show experimentally that fair-minded agents may reduce voluntary effort provision if the principal chooses to control them. Such "hidden costs of control" may, therefore, diminish the principals' incentive to control the agents even in the absence of screening opportunities. Although we will see that our data are consistent with the existence of hidden costs of control, they also suggest that (in our setting) these costs are not sufficiently high to induce the employers to forgo their control option: in the absence of screening opportunities, the vast majority of the employers converge towards the control strategy because it is more profitable.

3 Experimental Design and Procedures

Consider an employer who hires an employee to carry out production. The employee generates a monetary gross profit $b \cdot e$ if he expends effort e. The parameter $b > 1$ reflects the employee's efficiency. Gross profits accrue directly to the employer, while the employee incurs private effort costs $c(e) = e$, measured in monetary terms. Thus, the employer prefers the employee to choose high effort levels, but the employee prefers low effort.

[6] Our data support, for example, a prediction of Holmström's (1999) model that employees work hard in equilibrium if the market infers their productivity from past performance. Although our set-up differs in various ways from this model, the key prediction of Holmström's model – reputational incentives enhance effort provision even in one-shot interactions – is corroborated by our data.

The employer can offer an employment contract to the employee that specifies a fixed wage w and a requested, non-binding, effort level $\tilde{e}$. The wage has to cover at least the costs of the requested effort. The contract cannot be conditional on effort, nor on effort costs, nor on gross profits. These variables are observable by both parties, but they cannot be verified by the courts. If the employee rejects the contract offer, no wage is paid, no effort is exerted, and both parties receive their reservation utilities of 0. If the employee accepts, the employer must pay the offered wage, irrespective of the actual effort chosen by the employee. Payoffs are given by $\Pi = b \cdot e - w$ for the employer and $U = w - e$ for the employee.

There are two types of contracts that the employer can offer: a *contract with full discretion* and a *contract with limited discretion*. These contract types differ in two dimensions:

1. *Minimum effort level*: In a contract with full discretion the employee can choose any effort level between 1 and 10, whereas in a contract with limited discretion he must choose an effort level of at least 3, given he accepts the contract.
2. *Efficiency*: In a contract with full discretion the effort efficiency of the relationship is characterized by $b = 5$, whereas in a contract with limited discretion the efficiency parameter is only $b = 4$.

This experimental design captures the fundamental trade-off between control and effort efficiency described in the human resource management literature.[7] Limiting discretion forces employees to obey some minimum standards, but it also restricts their ability to react in a flexible

[7] The efficiency gains from higher task discretion and lower control are vividly described in Walton (1985, p. 77) who writes that "workers respond best – and most creatively – not when they are tightly controlled by management, placed in narrowly defined jobs, and treated like an unwelcome necessity, but, instead, when they are given broader responsibilities, encouraged to contribute, and helped to take satisfaction in their work". In broadly defined jobs, employees can play, in particular, "a significant role in solving problems and improving methods" which is thought to "boost in-plant quality, lower warranty cost, cut waste, raise machine utilization and total capacity with the same plant and equipment, reduce operating and support personnel, reduce turnover and absenteeism, and speed up implementation of change" (Walton 1985, p. 81). Note that many of the factors mentioned by Walton involve a more productive allocation of effort, i.e. a given effort level generates higher value for the firm if effort can be exerted in broadly defined jobs and employees are free to decide how they perform their tasks. The more recent literature on "high performance work organization" (HPWO) (e.g., Ichniowsky, Shaw and Prennushi 1997, Osterman 2006) shows that not only technology and skill but also the organization of the workplace (e.g., information sharing, allocation of substantial decision rights, investment in training and development of people) affects employees' productivities. On the downside, HPWO systems impede the effective control of employees; in the words of Osterman; "As a firm becomes more committed to the HPWO systems, employees gain the capacity to, in a sense, hold the firm hostage" (2006, p. 190).

and efficient way to a changing environment. For example, the employer can regulate working hours by using time cards to monitor attendance, impose reporting obligations to better assess performance, or establish strict production procedures to govern the employee's action directly. However, regulated working hours force the employee to work when he might not be most productive, reporting obligations absorb the employee's time and attention, and strict production procedures forfeit other possibly more efficient practices. The harder the employee works, the more costly it is to restrict his actions. This is reflected by the reduction of the efficiency parameter b.

Table 1 summarizes the differences between contracts with full and limited discretion, and the employer's and employee's payoff functions.

TABLE 1—CONTRACTS AND PAYOFF FUNCTIONS IN EACH PERIOD

	Contract with Full Discretion	**Contract with Limited Discretion**
feasible effort levels	$e \in \{1,...,10\}$	$e \in \{3,...,10\}$
efficiency parameter	$b = 5$	$b = 4$
payoffs if contract is accepted	$\Pi = 5 \cdot e - w$ $U = w - e$	$\Pi = 4 \cdot e - w$ $U = w - e$
payoffs if contract is rejected	$\Pi = U = 0$	$\Pi = U = 0$

We started out with two treatments, the *base treatment* and the *screening treatment*. Each treatment lasted for 15 periods and involved 18 employers and 18 employees per session. In each period, an employer was randomly matched with a new employee to eliminate repeated game effects. In the base treatment, the employer did not receive any information about his current employee. In the screening treatment, the employer received an imperfect signal about his current employee's track record: he was informed about his current employee's effort choices in the last

three periods.[8] Note that an employer did neither observe the contract types nor the wage offers, nor the requested effort levels that his current employee faced in the last three periods. The employers were thus not perfectly informed about their employees; a low effort choice, for example, could either indicate an untrustworthy employee who was potentially offered a high wage or a reciprocal employee who was offered a low wage. Employees knew that future employers would be able to observe their current effort choice. Apart from the information that was given to the employers in the screening treatment, the two treatments were identical. Figure 1 summarizes the sequence of events in each period.

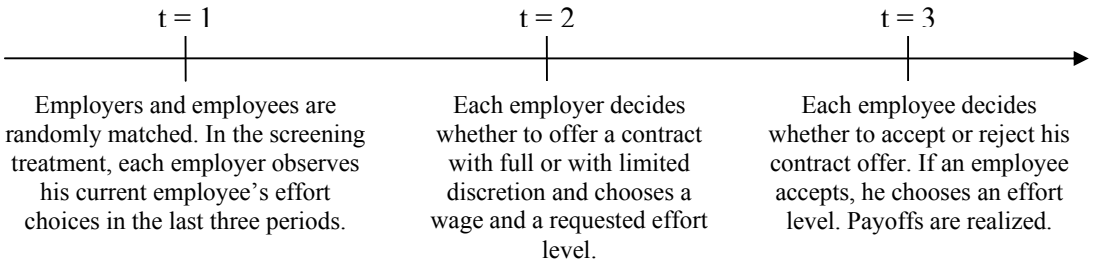


FIGURE 1.—Sequence of events in base and screening treatment.

The screening treatment reflects the fact that employers sometimes have the opportunity to receive information about an employee's past performance before hiring him. For example, the employer may see letters of reference, he may have talked to a previous employer about the employee, or he may have observed the employee directly in his previous position. However, typically, this information is incomplete. Even if the employer receives an accurate signal about the employee's previous performance, he does not observe which contract induced the observed behavior and how well the employee was treated. This is reflected in our experimental design where the employer observes the employee's actions but not the contracts he was offered. Note that the baseline treatment and the screening treatment can be considered as treatments with two extreme versions of screening costs. In the baseline treatment screening costs can be thought of as being infinite, rendering any screening unprofitable while in the screening treatment the

[8] If the employee did not choose an effort level in one of the past three periods because he rejected a contract, the principal received this information. In periods 1-3 a principal could only be informed about the effort levels that were available so far.

screening costs are zero because the employers do not have to pay for the information about past performance. The human resource management literature (as summarized, e.g., in Ichniowsky and Shaw 2003) stresses that careful screening activities are an important component of the cluster of job attributes that constitute "high performance work organization " (HPWO). However, it has been extremely difficult to pin down the causal role of this factor with field data. To our knowledge, there is no study showing the causal role of screening opportunities for job attributes. The comparison between the baseline treatment and the screening treatment enables us to do exactly this and to identify the extent to which screening is an indispensable feature of HPWO practices associated with high effort discretion.

We conducted three sessions of the base treatment and three sessions of the screening treatment with 36 participants in each session. In each session we implemented two matching groups, so we had six matching groups for each treatment. Upon arrival at the lab, half of the subjects were randomly and anonymously assigned the role of an employer, the other half the role of an employee. The experiment was framed as an employment relationship.[9] Value laden terms like full or limited discretion, control, trust, or efficiency were not used. We also conducted two sessions with 32 participants each of a *competition treatment*, in which we implemented, in addition to the screening opportunity, competition between employers for employees and between employees for jobs. The competition treatment is described in more detail and analyzed in Section 5.4.

Sessions lasted about 2½ hours and took place at the Institute for Empirical Research in Economics at the University of Zurich.[10] Subjects were students from the University of Zurich and the Swiss Federal Institute of Technology. On average, subjects earned about CHF 46 (about $37), which includes a show-up fee of CHF 15 (about $12).

[9] In each experimental session we implemented both treatments. After the subjects had participated in the base or the screening treatment for 15 periods, we conducted the respective other treatment with the same subjects. There was no role reversal, i.e. subjects in the role of an employer (employee) remained in that role throughout the session. In order to rule out that spillover effects from one treatment to the other affect our results we use the data of the second treatment is each session only in Appendix A where we characterize the employees' types.

[10] All experiments were computerized with the software z-Tree (Fischbacher 2007). The recruitment was done with the software ORSEE (Greiner 2004).

4 Behavioral Predictions

A central question addressed by the experiments is whether there are complementarities between different attributes of a job such as the wage level, requested effort, effort discretion and job rents, whether this leads to distinct bundles of job attributes, and if so, which attributes are bundled together. In addition, we want to isolate the causal forces that render one or the other bundle profit-maximizing and compare them with the bundles actually chosen by the employers. Different behavioral approaches suggest different answers to these questions.

4.1. Self-interest model

The standard neoclassical approach assumes that all people are fully rational and only interested in maximizing their own material payoff. In this case the (second best) optimal contract is straightforward. In the base treatment, the employee always chooses the effort level that minimizes his cost, which is $e = 1$ in a contract with full discretion and $e = 3$ in a contract with limited discretion. Furthermore, he accepts all contract offers that yield a non-negative payoff. Therefore, the employer offers a wage that holds the employee down to his reservation payoff of *0*. The contract that maximizes the employer's profit is thus a contract with limited discretion and a wage of $w = 3$. This yields profit $\Pi = 4 \cdot 3 - 3 = 9$. Offering a contract with full discretion and a wage of $w = 1$ yields a profit of only $\Pi = 5 \cdot 1 - 1 = 4$. This prediction holds for both the base and the screening treatment. In the last period of the screening treatment, employees have no reputation to lose and will thus choose the minimum effort level. Employers anticipate this and offer a contract with limited discretion and with wage $w = 3$. By backward induction, this outcome is the unique prediction also for all previous periods.

Thus, according to the self-interest model the control strategy prevails in both the base and the screening treatment. Employers will always offer a low wage job with limited discretion that

just covers the effort cost of the requested low effort level, and employees always choose the minimal effort level of $e = 3$.

4.2 Social preferences

Models of social preferences (e.g. Rabin 1993, Fehr and Schmidt 1999, Dufwenberg and Kirchsteiger 2004, Falk and Fischbacher, 2006) predict that some employees are "fair" and reciprocate to high wages with high effort levels, while other employees are mainly self-interested. These models also predict that controlling an employee does not reduce his effort as long as he is offered a fair wage.[11] If the employer cannot observe the employee's past record, her optimal contract offer depends on the share of "fair" employees in the population. If we assume that about 60 percent of the population is selfish and 40 percent is fair, then contracts with limited discretion and low wages are optimal in the base treatment.[12] However, wages have to be sufficiently high to induce employees to accept them. A contract with limited discretion and a wage of 7 splits the surplus (almost) equally if the employee chooses the minimum effort of 3. Thus wages above 7 should always be accepted.

How is this prediction affected by the possibility to build a reputation? With reputation there exists an efficient equilibrium along the lines of Kreps, Milgrom, Roberts and Wilson (1982).[13] In this equilibrium, all employers offer generous contracts with full discretion in all but the last few periods to employees with a high reputation, and contracts with limited discretion and

[11] The reason is that in all of these models fairness (or kindness) is evaluated by payoff consequences only. Also in models of intention based reciprocity such as Rabin's the fairness of certain actions is evaluated by the payoff actually given to the other player relative to the set of feasible payoffs. Thus, if the wage is fair, controlling the employee has no impact on the perceived fairness of the situation. In the Fehr and Schmidt (1999) model a contract with limited discretion would even increase effort of the fair-minded employees: due to the smaller productivity parameter *b* they have to work harder to equalize payoffs.

[12] The assumption of 60 percent selfish and 40 percent fair types is a simplification of the distribution in Fehr and Schmidt (1999). The same simplified distribution was used in the gift exchange games of Fehr and Schmidt (2004), Fehr, Klein and Schmidt (2007) and Fehr, Kremhelmer and Schmidt (2009), where it yielded a relatively accurate description of the average patterns of behavior observed in these experiments.

[13] This game differs in several respects from KMRW (1982). First, in our game each employee interacts with each principal only once. If an employee deviates he is punished by the next employers. Second, the contract offered by a principal is observed only by his current employee. Thus, the principal could offer a low wage hoping that the employee will work hard nevertheless in order to keep his good reputation. This deviation is deterred in equilibrium because fair minded employees will reject such a contract, and a rejection does not affect their reputation. Third, there is not a small probability of a "commitment type" but rather a distribution of types whose concerns for fairness differ. Nevertheless, the construction of the equilibrium follows similar lines as KMRW (1982).

low wages to employees with a low reputation. Fair employees with a high reputation (or, in period 1, with no reputation yet) accept generous contracts with full discretion and work hard for them in all periods. They reject contracts with limited discretion and contracts with full discretion combined with low wages. Selfish employees mimic fair employees in all but the last few periods where they start to randomize between spending a high effort of 10 and a low effort of 1. Once they have lost their good reputation selfish employees shirk forever.[14]

To summarize, we expect employers in the base treatment to predominantly implement the control strategy, i.e. they offer contracts with limited discretion and low wages, which induces employees to choose an effort level close to e=3. In the screening treatment, employers will condition their job offers on the available signal about past performance: for employees with a high signal they use the trust strategy, i.e. offer contracts with full discretion and high wages while for employees with a low signal they use the control strategy, i.e. offer contracts with limited discretion and low wages. The resulting incentive for reputation formation will induce employees to choose higher effort levels than in the base treatment. The joint effect of high performance signals and the conditioning of job offers on high performance signals are expected to lead to a prevalence of the trust strategy in the screening treatment.

4.3 Hidden costs of control

Fehr and Rockenbach (2003) and Falk and Kosfeld (2006) show that controlling agents may crowd out voluntary effort provision. Falk and Kosfeld (2006) called this the 'hidden costs of control' and Ellingsen and Johannesson (2008) provide a formal model that rationalizes this behavioral pattern. In our set-up there are two forces at work. On the one hand, fair-minded employees are willing to provide effort above the minimally enforceable level if they are offered

[14] This equilibrium is, of course, only one of many possible equilibria in the screening treatment. The multiplicity of equilibria is a typical feature of games in which reputation matters and renders unique predictions impossible. However, the beliefs and behaviors associated with the equilibrium we considered seem plausible; they are based on the intuition that employers benefit from the screening opportunity by conditioning their job offers on the available performance signal which then generates reputational incentives for the employees to provide high effort levels in response to generous job offers. Therefore, we use this equilibrium as a heuristic tool for the generation of behavioral conjectures.

high wages and full discretion, but they reduce their voluntary effort provision if they are controlled. On the other hand, control reduces the shirking of the selfish employees who are forced to work harder. Note that if there are no hidden costs of control the average effort must be higher under limited discretion. Thus, we can identify the existence of hidden costs of control in our experiment by comparing the average effort levels across discretion regimes for given wages: if – conditional on wages – the average effort under a limited discretion contract is lower than the average effort under a full discretion contract, hidden costs of control exist.

The hidden costs of control could be amplified in the screening treatment relative to the base treatment. If the employer controls an employee who worked hard in the past, the employee knows that the employer knows that he has been trustworthy. Such an employee might be especially offended by being controlled.

In summary, the existence of sufficiently high hidden costs of control may render the full discretion contract more profitable than contracts with limited discretion because the latter inhibits high effort levels of reciprocal employees. In this case, the trust strategy may even prevail in the base treatment. However, hidden costs of control are likely to be stronger in the screening treatment than in the base treatment; in the screening treatment it is therefore more likely that – conditional on the payment of generous wages –full discretion contracts cause higher average effort and higher profitability than limited discretion contracts.

5 Results

In Section 5.1 we first discuss the characteristics of actual and optimal jobs. In Section 5.2 we then explain the pattern of profit-maximizing (i.e. optimal) job offers in terms of employees' effort behavior and discuss the question whether hidden costs of control affect optimal job design. In Section 5.3 we examine whether employers do design their job offers optimally and how the deviations from optimality are associated with labor market segmentation. In Section 5.4 we study the impact of competition on the employees' effort choices and the employers'

strategies. In Section 5.5 we report field evidence on the relationship between wages, effort discretion and job satisfaction that is consistent with our experimental results.

5.1 The Characteristics of Actual and Optimal Job Offers

Our experimental design allows for a large number of combinations of wages, requested effort levels, job rents, and effort discretion levels. However, in the experiment we observe two very distinct clusters of job characteristics, which we summarize as

Result 1 (dichotomous job offers): *Both in the base treatment and the screening treatment the employers predominantly rely on two fundamentally distinct strategies, i.e. they offer two types of jobs that differ in all dimensions. They offer either a job with full discretion, high wages, a high requested effort level and a large share of the surplus (trust strategy) or they offer a job with limited discretion, low wages, a low requested effort level and a small share of the surplus (control strategy).*

Support for Result 1 is provided by Figure 2, which shows average wages, average requested effort levels, and the average offered share of the surplus for both treatments. The average offered surplus share is defined as the employee's income in case that he obeys the requested effort level that was stipulated by the employer as a share of the total surplus in this case. The figure shows for both treatments the same clustering of job characteristics. For example, if the employer offers a job with full discretion average wages are in both treatments higher than 20 while in case of a job offer with limited discretion average wages are below 10. Likewise, in case of a job with full discretion the average requested effort level is roughly $\tilde{e} = 8$ while under limited discretion the employer stipulates in the contract about $\tilde{e} = 5$ only. Note also that despite the higher requested effort levels under full discretion, the employees are offered a higher share of the surplus in these jobs because the higher wage over-compensates the higher (requested) effort cost. We also depicted the standard errors in Figure 2; they indicate that the

differences in job characteristics across full discretion and limited discretion jobs are highly significant in all cases (two-sided t-tests, controlling for individual fixed effects and clustering on employers, $p \leq 0.001$ for each of the six tests implicit in Figure 2).

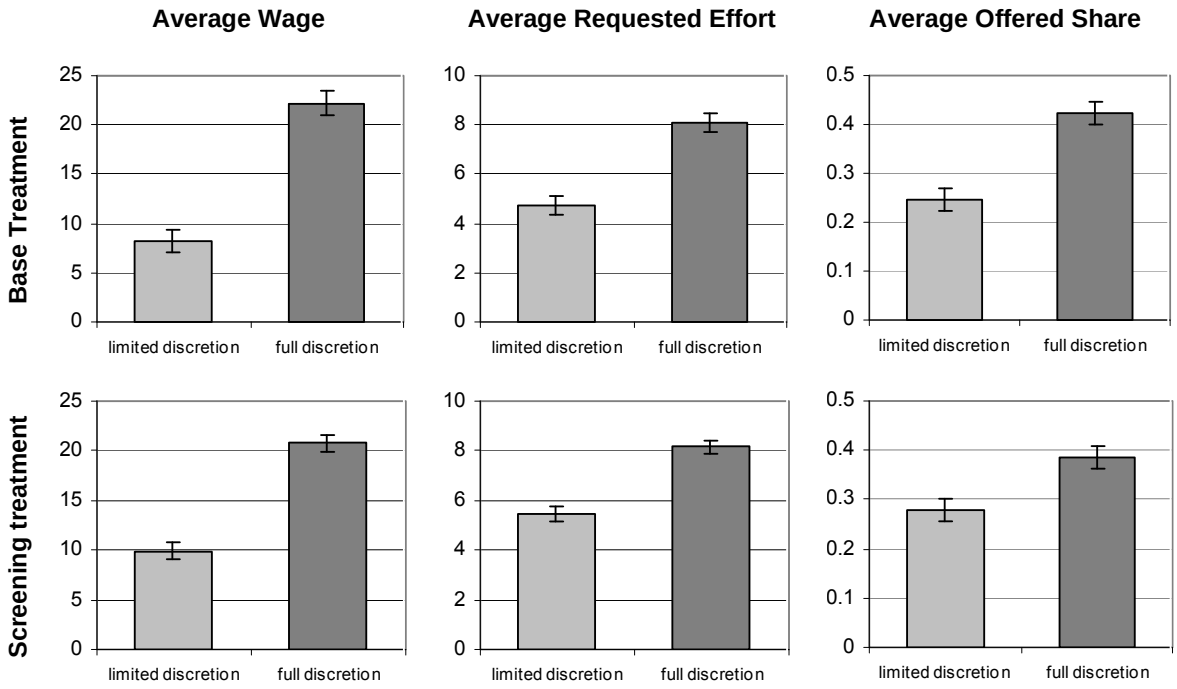


FIGURE 2.—**Dichotomy of Job Design**. In both the base and the screening treatment, employers use two fundamentally different strategies in designing jobs. Either they offer contracts with full discretion, high wages, high requested effort, and a large share of the surplus, or they offer contracts with limited discretion, low wages, low requested effort, and a low share of surplus. The standard errors control for individual fixed effects and clustering on individual employers.

The observed differences in job characteristics are not a phenomenon that is just observed at the level of averages. Rather the whole distribution of job characteristics is fundamentally different across jobs with full discretion and jobs with limited discretion. In the base treatment, for example, about three quarters of the wages under full discretion are above w=15 while about three quarters of the wages under limited discretion are below w=10. A similar picture emerges for the requested effort levels in the base treatment: for jobs with full discretion about three quarters of them are at or above $\tilde{e} = 7$ while for jobs with limited discretion, about three quarters obey the inequality $\tilde{e} \leq 5$. In the screening treatment the distributions of job characteristics is similarly distinct across the different types of jobs.

Result 1 suggests that job offers with full discretion are based on a *trust strategy* that attempts to appeal to the employees' fairness while jobs offering limited discretion implement a *control strategy* that limits the employee's shirking opportunities and the losses the employer can make. By offering a relatively high share of the surplus and by demanding a high effort level the employers seem to appeal to the employee's fairness and reciprocity. As Figure 2 shows, the offered share of the surplus in jobs with full discretion is roughly 40 percent. The modal offer in both treatments is exactly 50 percent of the surplus.

Result 1 provides no information about the frequency with which the employers rely on the two different strategies, nor does it tell us which strategy is optimal. However, a main purpose of our study is to identify the conditions under which one strategy or the other is optimal for the employer. The next result provides this information.

Result 2 (optimal job offers): *In the base treatment the control strategy is optimal for the employer even though control reduces efficiency while in the screening treatment it is optimal to condition the strategy on the employees' reputation. In particular, if the employee has a medium or high reputation it is optimal to implement the trust strategy while if the employee has a low reputation the control strategy is better.*

Figure 3 provides support for Result 2. The figure shows the employers' average profits conditional on wages and the discretion level of the job and thus enables us to identify the optimal job characteristics. In the base treatment the highest profit level is achieved if the employer offers a job with limited discretion and pays wages below w=10. For wages in this interval (w<10) the employer earns significantly more compared to a job that implements full discretion (two-sided t-test, $p \leq 0.001$). In fact, for job offers with full discretion the employer makes losses on average. For jobs with limited discretion a low wage (w<10) strategy is also significantly more profitable than a medium wage ($10 \leq w < 20$) strategy (two-sided t-test, $p \leq 0.001$).

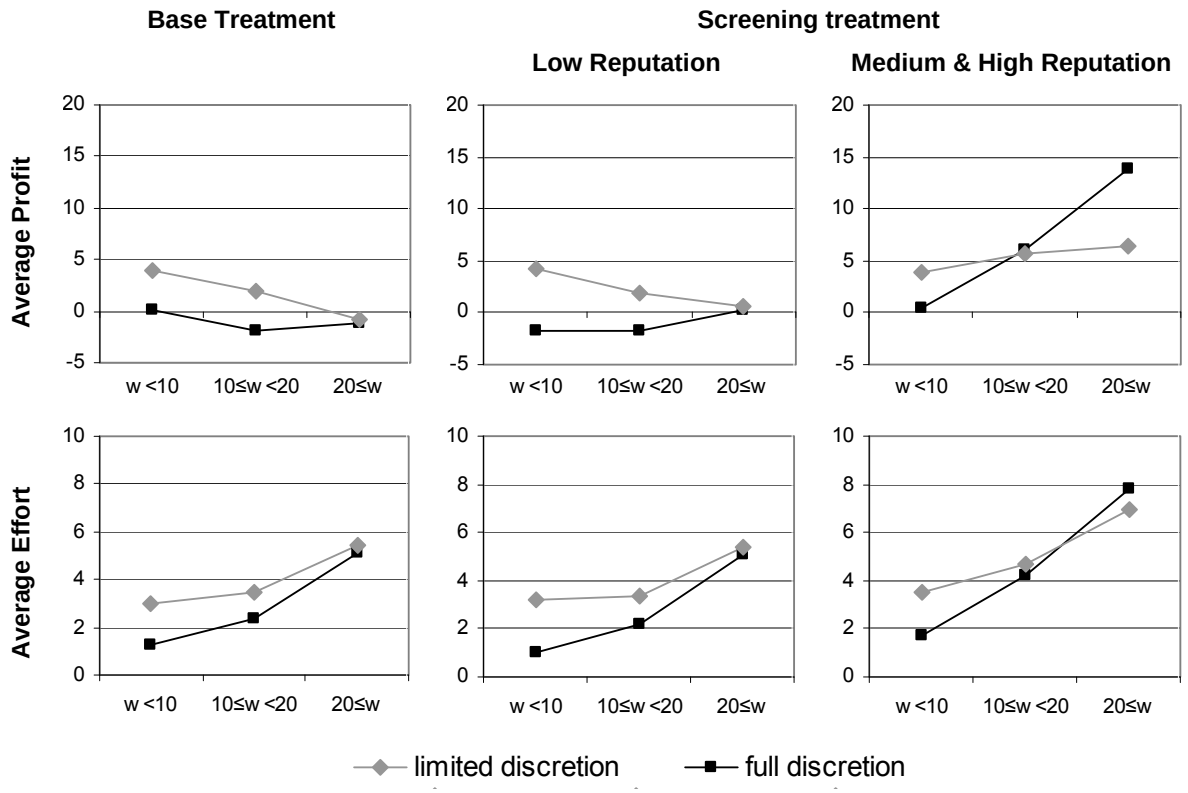


FIGURE 3.—**Optimal Job Offers and Wage-Effort Relation**. In the base treatment and in the screening treatment with low reputation employees, employers' profits are highest when they offer contracts with limited discretion and pay low wages. In these cases the wage-effort relation is relatively flat or even negatively sloped. In the screening treatment with medium and high reputation employees, employers' profits are highest when they offer contracts with full discretion and pay high wages. In these cases, the wage-effort relation is much steeper, rendering the payment of efficiency wages profitable.

In the screening treatment we observe very different profit patterns depending on whether the employer faces an employee with a low reputation (i.e. one whose average effort in accepted contract offers in the previous three periods, denoted by r, is below 3.5) or an employee with a medium ($3.5 \leq r < 6.5$) or high reputation ($r \geq 6.5$). Interestingly, the profit pattern in case of a low reputation employee is very similar to the pattern in the base treatment. Job offers involving full discretion are associated with negative profits or profits close to zero while low wage offers involving limited discretion generate the highest profits. Thus, if the employer offers a job with limited discretion and pays low wages profits are significantly higher compared to a low wage offer with full discretion (two-sided t-test, $p \leq 0.001$). For jobs with limited discretion a low wage strategy is also significantly more profitable than a medium wage strategy (two-sided t-test, $p \leq 0.001$).

However, if the employer faces an employee with a medium or a high reputation the profit pattern is radically different. For jobs with limited discretion profits are on average steeply increasing in wage levels and the highest profits can be achieved by offering wages in the highest wage interval (20≤w). In fact, if the employers pay high wages they earn significantly higher profits if they offer a job with full discretion than a job with limited discretion (two sided t-test, p≤0.001), and within the class of jobs with full discretion it is significantly more profitable to pay high wages than wages in the medium interval (two sided t-test, p≤0.001). [15]

5.2 The Employees' Effort Choices

Result 2 raises the question why it is optimal to rely on the control strategy in the base treatment and in the screening treatment when employees have a low reputation, whereas the trust strategy is optimal in the screening treatment when employees have a medium or high reputation. Since the profit pattern observed in Figure 3 is shaped by the employees' effort choices we examine the employees' behavior next:

Result 3a (employees' effort responses in the base treatment): *In the base treatment the employees respond to higher wages with higher average effort levels but the slope of the wage-effort relation is too small to render a high wage policy profitable. In addition, employees provide considerably higher effort at low wages when they are offered a job with limited discretion than a job with full discretion, which renders the control strategy optimal.*

Support for Result 3a is provided by the corresponding effort graph of Figure 3 and in the regressions in Table 2. The effort graph for the base treatment shows that both for jobs with limited and for jobs with full discretion the average effort increases with wage. The positively sloped wage-effort relation indicates that on average higher wages are reciprocated with higher effort levels. However, this efficiency wage effect is too small to render a high wage policy

[15] Tables 2 and 3 below provide regression analyses of employers' profits in the base and the screening treatment confirming the results on optimal contract choices.

optimal. This claim can be inferred from the profit graph for the base treatment in Figure 3 which shows that average profits are declining with wages in jobs with limited discretion. In jobs with full discretion the wage-profit relation is fairly flat and always results in negative profits.

Comparing the wage-effort relation in jobs with limited discretion and with full discretion we find that in jobs with limited discretion the effort is significantly higher at low wages (w< 10) and the slope of the wage-effort relation is significantly lower than in jobs with full discretion. This result is illustrated in Figure 3 and shown in regressions (1) – (3) of Table 2. In all three regression models we control for individual fixed effects and cluster on individual employees. In all cases the wage coefficient for a full discretion job – which is the omitted category in the regressions – is around 0.2.

TABLE 2—Determinants of Effort and Employers' Profits in Base Treatment

	(1) effort	(2) effort	(3) effort	(4) profit
wage	0.207***	0.203***	0.202***	-0.07
	(0.030)	(0.026)	(0.033)	(0.105)
limited × wage	-0.072**	-0.074**	-0.071**	-0.263**
	(0.032)	(0.030)	(0.032)	(0.127)
limited	2.731***	2.748***	2.722***	6.535***
	(0.432)	(0.439)	(0.446)	(1.766)
requested effort	—	0.017	0.022	—
		(0.052)	(0.056)	
period dummies	—	—	insig.[16]	—
constant	—	—	—	-1.307
				(1.691)
observations	658	658	658	810
adj. R^2	0.474	0.473	0.470	0.063

Notes: The table reports coefficients of OLS regressions. Robust standard errors are reported in parentheses. The effort regressions cluster at 54 employees and allow for individual fixed effects. Accepted contracts only are considered in the effort regressions because no effort is chosen if a contract is rejected. In the profit regression all contracts are included; at low wages a contract may be rejected, which reduces the average profitability of low wage offers. "Limited" is a dummy variable that takes on value 1 if the contract with limited discretion is offered.
*** denotes significance at 1 percent, ** at 5 percent, and * at 10 percent.

[16] Only periods 3 and 7 and are significant at the 10 and 5 percent level, respectively.

Since the productivity of effort is b=5 this coefficient implies that a wage increase by 10 units raises effort by roughly 2 units which in turn increase revenue by 5×2=10 units, implying a flat wage-profit relation for jobs with full discretion. However, since the interaction between limited discretion and the wage is significantly negative in all regressions, the wage coefficient for jobs with limited discretion is lower; it is just around 0.14. Thus a wage increase by 10 units increases effort only by 1.4 units which – in combination with the lower effort productivity of b=4 – increases revenue only by 4×1.4=5.6 units, implying that the wage-profit relation is negative. Moreover, in all regressions the dummy for limited discretion ("limited") is significantly positive indicating that in jobs with limited discretion the effort is significantly higher at low wage levels than in jobs with full discretion. This effort advantage at low wage levels reflects the fact that under limited discretion an employee is forced to provide at least an effort of 3, which outweighs the lower efficiency of these jobs. The higher profit for low wage jobs with limited discretion is also indicated by the coefficient on "limited" in regression (4) where the employers' profit is the dependent variable.

Taken together, the data indicate that for both types of jobs a high wage policy is not profitable in the base treatment. In addition, the effect that employees are forced to provide more effort under limited discretion outweighs the productivity disadvantage of limited discretion, thus rendering a control strategy optimal in the base treatment.

Figure 3 and Table 2 raise the question whether employers' expected profits are maximized by offering the lowest possible wage or whether they should rather leave some positive share of the surplus to employees. This question cannot be answered on the basis of the previously presented evidence because Figure 3 does not show what happens within the class of low wages (i.e. for wages below 10) and the regressions in Table 2 impose linearity by assumption. A closer look at the low wage interval reveals, however, that it is not optimal to hold employees down to their reservation utility because such offers are rejected with a very high probability. In particular, wages of 3, 4, 5 and 6 are rejected in 88, 83, 39 and 30 percent of the cases, respectively, while offers of 7 are only rejected in 13 percent of the cases. Job offers with

higher wages are almost never rejected. Thus, as suggested by fairness models, it is not optimal to offer wages below 7.

The next question is how the employees' effort pattern in the screening treatment shaped the optimal job offers described in Result 2, which brings us directly to

Result 3b (employees' effort responses in the screening treatment):

> **(i)** *In the screening treatment, the effort response of the employees with a low reputation is very similar to the response in the base treatment which renders the control strategy optimal for these employees.*
>
> **(ii)** *For employees with a medium or high reputation the wage-effort relation is steep enough to render the payment of efficiency wages that elicit a high effort level profitable. Moreover, at high effort levels the higher efficiency of a job with full discretion is particularly advantageous, inducing the employers to offer this kind of job.*

This result is supported by the corresponding effort graphs in Figure 3 and by the regressions displayed in Table 3. A first salient characteristic of the effort pattern of employees with a low reputation is that it resembles very closely the effort pattern in the base treatment; that is, employees with a low reputation in the screening treatment act as if there were no reputational incentives. Both for job offers involving full and for those involving limited discretion the wage-effort relation is positively sloped. However, this slope is insufficiently steep to render a high wage policy profitable for employers. As can be seen from the respective profit graph in Figure 3, the effort pattern generates a negatively sloped wage-profit relation in the case of jobs with limited discretion and a rather flat slope for jobs with full discretion. This result is also supported by the regressions in Table 3. As in Table 2, the effort regressions in Table 3 control for individual fixed effects and cluster on individuals. Regressions (1) – (2) in Table 3 display a relatively large coefficient on "wage" but regressions (3) – (5) show that the size of the wage

coefficient decreases considerably if we control for the employees' reputations and the interaction between reputation levels and wage. Note that the omitted category in regressions (3) – (5) is a job with full discretion that has been offered to an employee with a low reputation.

TABLE 3—Determinants of Effort and Employers' Profits in Screening treatment

	(1) effort	(2) effort	(3) effort	(4) effort	(5) effort	(6) profit
wage	0.273***	0.295***	0.187***	0.188***	0.187***	0.065
	(0.021)	(0.022)	(0.049)	(0.051)	(0.051)	(0.185)
limited × wage	-0.147***	-0.157***	-0.105***	-0.105***	-0.101**	-0.478***
	(0.039)	(0.033)	(0.038)	(0.039)	(0.038)	(0.112)
limited	2.894***	3.230***	2.478***	2.474***	2.417***	6.870***
	(0.562)	(0.522)	(0.571)	(0.576)	(0.559)	(1.772)
medium-reputation	—	-0.233	-1.560***	-1.559***	-1.515***	-1.048
		(0.216)	(0.537)	(0.537)	(0.540)	(1.800)
high-reputation	—	-0.272	-2.493***	-2.488***	-2.468***	-4.725**
		(0.323)	(0.737)	(0.751)	(0.761)	(1.928)
medium-reputation × wage	—	—	0.102**	0.102**	0.099**	0.424**
			(0.043)	(0.043)	(0.044)	(.1767)
high-reputation × wage	—	—	0.143***	0.143***	0.142***	0.722***
			(0.050)	(0.050)	(0.051)	(.1769)
requested effort	—	—	—	-0.004	-0.004	—
				(0.058)	(0.058)	
other period dummies	—	—	—	—	insig.	—
last period	-1.959***	-2.025***	-1.933***	-1.933***	-1.829***	-7.038***
	(0.404)	(0.414)	(0.419)	(0.418)	(0.510)	(1.839)
constant	—	—	—	—	—	0.110
						(2.230)
observations	711	655	655	655	655	745
adj. R^2	0.649	0.661	0.676	0.675	0.671	0.301

Notes: The table reports coefficients of OLS regressions. Robust standard errors are reported in parentheses. The effort regressions cluster at 54 employees and control for individual fixed effects. Accepted contracts only are considered in the effort regressions because no effort is chosen if a contract is rejected. In the profit regression all contracts are included; at low wages a contract may be rejected, which has a clear effect on profits. In columns (2) - (6) we only consider observations with at least one previous effort choice because otherwise an employee's reputation cannot be classified. "Limited" is a dummy variable that takes on value 1 if the contract with limited discretion is offered. "Medium-reputation" and "high-reputation" are dummy variables that take on value 1 if r is in [3.5,6.5) or [6.5,10], respectively. "Last period" is a dummy variable that takes on value 1 for observations in period 15.
*** denotes significance at 1 percent, ** at 5 percent, and * at 10 percent.

Thus, the wage coefficient in these regressions captures the wage-effort relation of employees with a low reputation that have been offered a job with full discretion. In these cases the wage coefficient is about 0.19, which is very similar to the wage coefficient in the base treatment and implies a flat wage-profit relation. Moreover, the profit regression (6) in Table 3 reveals that the interaction between limited discretion and wages is significantly negative while the dummy for "limited discretion" is high and significantly positive. Thus, as in the base treatment, the employers can make the highest profits if they pay low wages and offer a job with limited discretion if they face an employee with a low reputation.[17]

Figure 3 further shows that employees with a medium or high reputation display a much steeper wage-effort relation than employees with a low reputation. The steeper slope translates into a steep wage-profit relation, providing the highest profits for wages of w=20 or higher. This effort and profit pattern is statistically supported by the regressions in Table 3. A particularly interesting aspect concerns the specific role of employees with a medium or high reputation. Regression (2) shows that on average the employees with a medium and high reputation do not provide a higher effort level – the coefficient on medium and high reputation is very small and insignificant in this regression. Rather, these employees tend to supply less effort if offered a low wage and a much higher effort if offered a high wage than the low reputation employees. This fact is revealed by regressions (3) – (5) which show that the medium/high reputation employees display a smaller intercept (because the coefficient on medium and high reputation is significantly negative) and a larger slope in the wage-effort space than the low reputation employees (because the interaction between wages and medium/high reputation is significantly positive). The slope effect, in particular, is large and quantitatively important because it generates an incentive for the employers to pay high wages to these employees[18].[19]

[17] Similar to the base treatment, we may ask which of the wages in the low wage interval maximizes the employers' profits. Rejection rates for wages offers of 3, 4, 5, 6 and 7 are 100, 59, 50, 39 and 4 percent, respectively, while wages above 7 are basically never rejected. Hence, wage offers between 7 and 9 were most profitable for the employers.

[18] For an employee with a medium reputation, the slope of the wage-effort relation in a job with full discretion is roughly 0.19+0.10=0.29, implying that a wage increase by 10 units causes a revenue increase by 5×2.9=14.5 units. Likewise, for an employee with a high reputation, the slope is 0.19+0.14=0.33, implying that a wage increase by 10

Taken together, the evidence unambiguously indicates that conditioning the job offer on the employees' reputation is profit maximizing. By offering high wages and full discretion to employees with a good reputation only, employers can elicit high effort in highly productive jobs with a limited risk of shirking. Employees with a good track record are unlikely to shirk, while employees with a low reputation receive only a low wage and are forded to provide at least an offerot level of 3.

In Section 4 we discussed the potential role of hidden costs of control in our setting. The previous results on the employees' effort behavior also shed light on the extent to which hidden costs of control affected optimal job offers. Therefore, we turn to this issue next.

Result 4 (insufficient hidden costs of control): Neither in the base treatment nor for the low reputation employees in the screening treatment are hidden costs of control sufficiently large to render a job offer with full discretion optimal. In addition, for the employees with medium and high reputation hidden costs of control are not a necessary prerequisite for the optimality of job offers with full discretion.

Result 4 is supported by Figure 3 and the regressions of Table 2. Note that it does not say that there are no hidden costs of control. In fact, the lower slope of the wage effort relation in jobs with limited discretion indicates that at least for some subjects control crowds out voluntary effort provision. However, the existence of hidden costs is counterbalanced by the positive effects of control (shirkers are forced to work at least 3). Thus, in our experiment they are not decisive for the choice of discretion.

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units generates a revenue increase by 5×3.3=16.5 units. The profit regression (6) corroborates these findings and indicates that the effort behavior of medium and high reputation employees causes a sizeable efficiency wage effect that renders the trust strategy optimal.

[19] There remains the question of which wage above 20 is optimal for the employers if they face an employee with a medium or high reputation? It turns out that the average effort of these employees is at 6.2 units if offered w = 20, 8.8 units in case of a wage of 25, and 9.0 units if they are offered a wage of 30 in a job with full discretion. Thus, on average it does not pay to offer wages above 25 because of the ceiling effects that occurs at high effort levels.

5.3 Actual Job Offers, Labor Market Segmentation and Total Surplus

The previous results inform us about the conditions under which the trust and the control strategy are optimal and about the reasons for their optimality, but so far we did not report whether the employers made optimal contract offers. The next result addresses this question.

Result 5 (employers' actual job offers):

(a) In the base treatment, the large majority of employers converges towards optimal behavior and implements the control strategy.

(b) In the screening treatment, employers behave optimally in the majority of cases and condition their strategy on the employees' reputation, i.e. if they face low reputation employees they employ the control strategy in most cases, while if they face medium and high reputation employees they predominantly employ the trust strategy.

Result 5 is supported by Figure 4 showing the share of jobs with full discretion in the different conditions. From Result 1 we know that a job with full discretion is associated with the trust strategy while a job with limited discretion is associated with the control strategy. Therefore, Figure 4 provides information about the relative frequency of the two strategies. In the base treatment the overall share of the trust strategy is about 30 percent but this share declines to 19 percent in periods 10-14, indicating that employers needed some time to learn the optimal strategy. A similar picture emerges in the screening treatment if the employer faces an employee with a low reputation. In this case the overall share of the trust strategy is 22 percent and in periods 10-14 the percentage declines to 16 percent.[20] A Fisher exact test indicates that the employers choose the same strategy in the base treatment (239 out of 810 cases) and in the screening treatment with low reputation employees (48 out of 172 cases; p=0.791). However, for the employees with a medium or high reputation the employers implement the trust strategy much

[20] We choose periods 10-14 and excluded period 15 because in the final period the incentive for reputation formation is completely absent while in period 14 this incentive still exists.

more frequently. The overall share of trust strategies is 55 percent and remains the same in periods 10-14. The share of trust strategies is significantly higher for medium and high reputation employees (290 out of 525 cases) compared to the low reputation employees, and compared to the base treatment; Fischer exact texts, $p \leq 0.001$.[21]

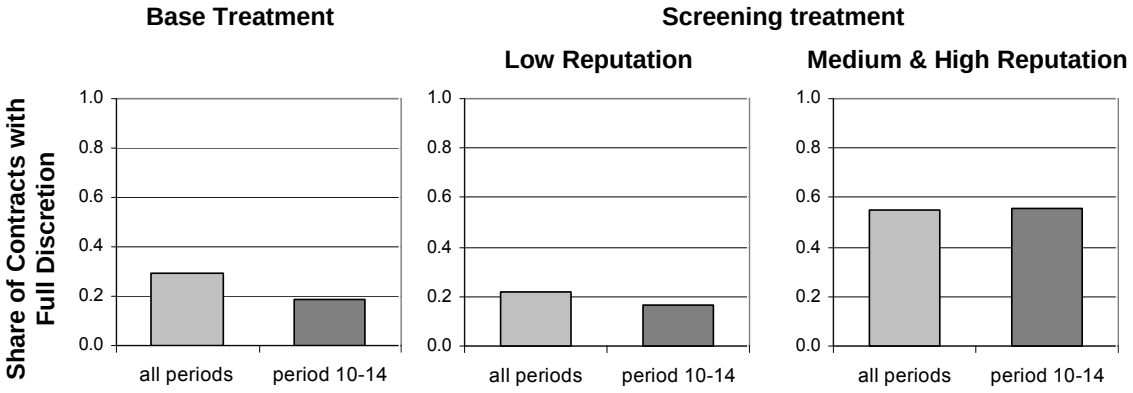


FIGURE 4.—**Employers' Actual Job Offers**. In the base treatment and in the screening treatment with low reputation employees, the employers offer optimal contracts in the vast majority of the cases. Looking at periods 10 to 14 separately, the fraction of contract offers with limited discretion further increases. In the screening treatment with medium or high reputation employees we find that while the employers choose the optimal contract design in the majority of the cases, contracts with limited discretion are also offered to medium and high reputation employees in a large number of cases. Looking at periods 10 to 14 separately shows that the fraction of optimal contract offers does not increase over time.

Although employees with a medium or high reputation faced a trust strategy in the majority of cases, they also faced non-optimal job offers with limited discretion in 45 percent of the cases. This raises the question about the sources of this sub-optimality, a topic to which we turn next.

Result 6 (suboptimal behavior and labor market segmentation):

(a) In the screening treatment the frequency of optimal behavior is lower than in the base treatment because there is a significant minority of employers who do not condition the job offer on the employees' reputation.

[21] We have three sessions with 18 employers each that offer contracts in 15 periods, so there are 810 observations in each treatment. Since we can classify the employees' reputation only if there is at least one previous effort choice, the number of relevant observation in the screening treatment is with 525+172=697 less than 810.

(b) There is a significant share of narrowly self-interested employees who do not reciprocate high wages with high effort in the reputation condition, implying that they are permanently stuck with bad jobs with limited discretion.

We observe that the incidence of optimal job offers is higher in the base treatment than in the screening treatment. In the base treatment, 65 percent of the employers made optimal choices in more than 70 percent of the cases, while in the screening treatment only 48 percent of the employers reach this level of optimality. The main reason for this difference is the existence of a sizable share of employers who did not condition their strategies on the employees' reputation. Almost 17 percent of employers (9 out of 54) always chose the control strategy in the screening treatment. Another 4 percent (2 out of 54) chooses the trust strategy only once. A closer look at the data shows the non-responsive employers did not face a worse distribution of employees than the responsive employers: those who always chose the control strategy had employees with an average reputation index of 5.25 while the overall average of the reputation index was 5.24. These non-responsive employers might have had very pessimistic beliefs about their employees' effort choices or they might have been highly risk or betrayal averse. Because they did not condition their strategy on employees' reputation they made substantially lower average profits (4.13) than employers who responded to their employees' past behavior (7.17).

Employers who never trust and always implement the control strategy induce employees who would have worked hard for a generous wage to provide low effort. Also, since not all employers condition their job offers on reputation, the incentives for employees to acquire a good reputation are diminished. However, acquiring a good reputation is still profitable: employees with a low reputation have an average income of 6.66 while employees with a high reputation have an income of 12.14 (see Figure 5 below). Nevertheless, we find that a significant fraction of roughly 20% of the employees always chose low effort levels in the screening treatment, i.e. even when they were offered high wages. In Appendix A we show that these employees also chose low effort levels in the base treatment regardless of the offered wage; they can therefore be

classified as narrowly self-interested employees.[22] In this appendix we also report that roughly 30 percent of the subjects are reciprocal types because they respond to generous wages with high effort levels both in the screening treatment and the base treatment. The remaining 50 percent of the individuals can be classified as strategic types because they reciprocate generous wages with high effort levels only in the reputation treatment but not in the base treatment.

Result 6 explains why both good and bad jobs co-exist in the screening treatment each with a substantial fraction. A sizeable group of employers only offers bad jobs regardless of the employees' reputation and an equally large group of employees does not respond to the prevailing incentives for reputation formation. These employees only consider their narrow, short-term self-interest and are thus more likely to end up in jobs that are tightly controlled and leave no rents on the table, while employees who behave reciprocally are more likely to get better jobs that leave more discretion and offer higher rents. In addition, the non-responsive employers dilute the incentives for reputation formation and the narrowly self-interested employees reduce the opportunity for employers to offer good jobs.

The existence of a stable distribution of good and bad jobs is reminiscent of the literature on dual labor markets (Doeringer and Piore 1971, Piore 1980) that provides a stylized description of actual labor markets in terms of a primary and a secondary market. In the primary market, employees enjoy higher wages and job security while in the secondary sector low wages, high turnover, and low job security prevail. Furthermore, jobs in the primary market tend to give much more discretion to employees than jobs in the secondary sector that are often tightly controlled and monitored. Piore (1980) stressed that dual labor markets often arise *within* firms. Bulow and Summers (1986) and Saint-Paul (1997) link the description of dual labor markets with efficiency wage theories that are based on differences in monitoring costs or employment adjustment costs across the two sectors. In these models technological factors are the source of dual labor markets. In our experiment all employers have the same job creation technology available. Our findings,

[22] To derive the behavioral types we use the fact that all subjects participated in the base treatment and the screening treatment. This is the only instance where we use the second treatment within a session for this paper.

therefore, suggest that sub-optimal choices by the employers and employees' individual characteristics (their reciprocal or narrowly self-interested behavior) may also contribute to the segmentation of the labor market.

However, despite the existence of substantial minority of sub-optimal employers and employees the screening treatment causes incentives for higher effort and the provision of more efficient jobs with full discretion. This leads to

Result 7 (Total Surplus): The screening opportunity causes a strong increase in the total surplus which is primarily reaped by the employers.

The impact of the screening treatment on the employers' and employees' average income can be inferred from Figure 5. The figure shows that both the employers and the employees benefit on average from the screening opportunities. For the employers, the increase in average income is significant (Mann-Whitney test based on matching group averages, p=0.004), while for the employees the null hypothesis of equal incomes across treatments cannot be rejected (Mann-Whitney test on matching group averages, p=0.200). Overall, the total surplus is 58 percent higher in the screening treatment – a difference that is highly significant (Mann-Whitney test on matching group averages, p=0.007). This increase in the total surplus has two sources – the higher share of jobs with full discretion (documented in Result 5) and the higher average effort of the employees. In fact, we observe a significant increase in average effort from 3.00 in the base treatment to 4.48 in the screening treatment (Mann-Whitney test on matching group averages, p=0.007).[23]

This effort increase represents the joint effect of employers' and employees' behavior in the screening treatment. Because the employers condition their strategy on the performance signals the employees have an incentive to provide high effort in response to high wages. And because a good reputation is a reliable signal for the willingness to reciprocate generous wages

[23] In this test we assigned an effort of zero to rejeced contracts. If only accepted contracts are considered, average effort increases from 3.70 in the base treatment to 5.10 in the screening treatment; the difference is significant (Mann-Whitney test on matching group averages, p=0.004).

with high effort the employers need not fear shirking if they pay high wages and offer full discretion jobs. Thus, the actions of the responsive employers' and the reciprocating employees' mutually reinforce each other and lead to the provision of high effort levels and a majority of jobs with full discretion, both of which increases the total surplus.

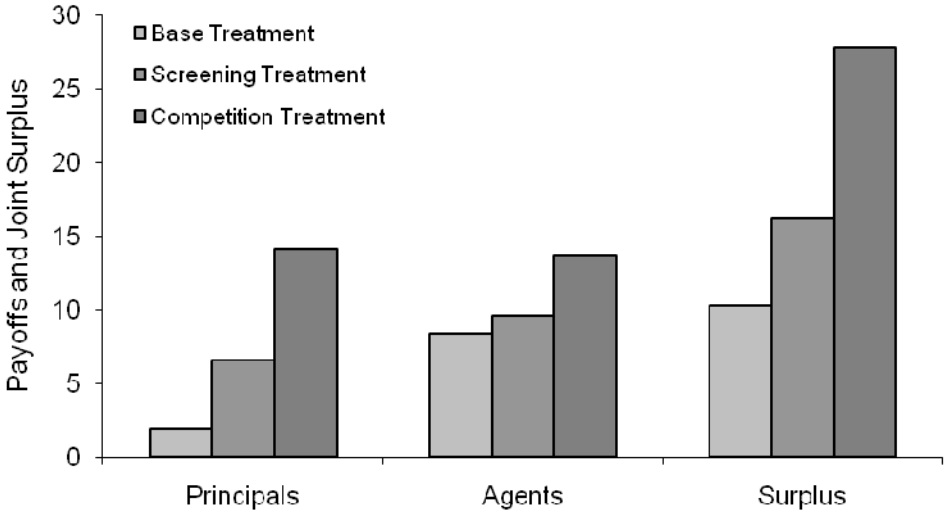


FIGURE 5.—Employees' income, employers' profit, and surplus in the different treatments.

5.4 Competition and Reputation

Our screening treatment identifies the causal impact of screening opportunities in a bilateral bargaining environment. In most labor markets competition and screening interact in intricate ways but since they exist almost always simultaneously it is extremely difficult to identify in field data how competition shapes the employers' screening activities and employees' reputation formation behaviour. Our laboratory set-up enables us to study this question in a clean way by introducing competition among the employees for good job offers and among employers for good employees. The competition treatment also allows us to answer the question whether competition renders the control strategy or the trust strategy more efficient.

Our competition treatment has the following features. At the beginning of each of the 15 periods, groups with four randomly selected employers and four randomly selected employees

are matched. Each employer observes the performance signals of all four employees, and has to make a contract offer to each of the four employees. Because an employer can only employ one employee, the employers also specify the order in which the 4 employees receive their respective offers. To match the employers to the employees there are 4 matching rounds in every period. In the first round each employer's most preferred employee receives the offer. Thus, in this round it may happen that an employee receives several offers (up to four), just one offer, or none. The employees who received offers in this round then decide whether to accept any of these offers, but not more than one. An employee who accepts an offer is then matched with the corresponding employer and both players are not involved in the subsequent rounds. Employers whose offers are rejected and employees who did not receive or accept an offer enter the second round. In this round the remaining employers' second preferred employees receive an offer if they are still available. This process continues in rounds 3 and 4, and it guarantees that each employee receives at least one job offer.

As in the previous treatments, employees do not observe the offers received by the other employees. However, an employee may have to wait until the second, third, or even fourth round of offers before he gets his first offer, in which case he may conclude that he is not the first choice of any employer. Similarly, like in the previous treatments, employers do not observe the contract offers made by other employers. However, if an employer's offers are frequently rejected he may conclude that other employers offered more attractive contracts. Both effects foster learning. Note that this learning opportunity captures a feature of most labor markets in the field because employees with a low reputation presumably also have more difficulties to find a job in these markets and employers who offer less attractive jobs have to wait longer to fill their vacancies.[24]

[24] We introduced competition only in the screening treatment and not in the base treatment because in the latter competition cannot make any difference. Without performance signals all employees look identical and employers cannot discriminate between them. Thus, competition can neither change the incentives for sorting employees to jobs according to their reputation nor can it change the reputation formation incentives among the employees.

In Section 5.1 we have shown that the employers offer two very distinct bundles of job characteristics both in the base and in the screening treatment. Figure 6 shows the same dichotomy of job characteristics in the competition treatment. Contracts with full discretion are associated with much higher wages, higher requested effort levels, and a significantly higher job rent. Figure 6 also depicts standard errors; they indicate that the differences in job characteristics across contracts with full discretion and limited discretion are significant in all cases (two-sided t-tests, controlling for individual fixed effects and clustering on employers, $p \leq 0.002$ for each of the three tests implicit in Figure 6). As in the base and the screening treatment the dichotomy of job characteristics is not just a phenomenon at the level of averages but the whole distribution of job characteristics is fundamentally different across jobs with full and limited discretion. In jobs with full discretion, for example, 90 percent of all wages are higher than 15 while in jobs with limited discretion roughly half of all wages are equal or less than 10. For requested effort levels a similar dichotomy is present. In jobs with full discretion, 95 percent of the job offers involve a requested effort level of $\tilde{e} \geq 7$, while in jobs with limited discretion almost 50 percent of all job offers are associated with a requested effort of $\tilde{e} < 7$.

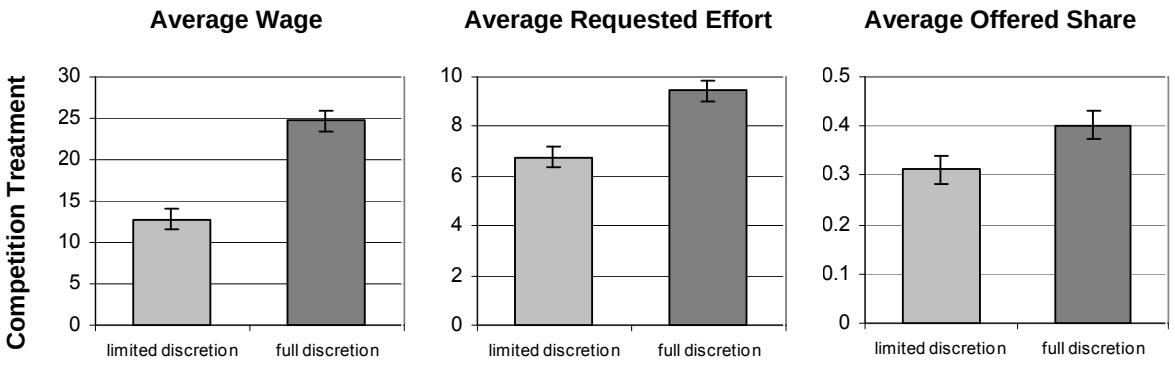


FIGURE 6.—**Dichotomy of Job Design in Competition Treatment**. As in the base and screening treatments, employers use two fundamentally different strategies in designing jobs. Either they offer contracts with full discretion, high wages, high requested effort, and a large offered share of the surplus, or they offer contracts with limited discretion, low wages, low requested effort, and a low offered share of surplus. The standard errors control for individual fixed effects and clustering on individual employers.

Figure 6 documents that if the employers offer a job with limited discretion the whole bundle of job characteristics is very different compared to when they offer a job with full

discretion. This result suggests that some basic economic forces are present across all three treatments that lead to very distinct job offers. However, it does not inform us about the optimality of the different offers. It turns out that the qualitative pattern of payoffs is very similar to the screening treatment. Profits are declining in wages for the low reputation employees, while for the employees with a medium and high reputation the profit is maximized if the employee receives a high wage and faces a job with full discretion. Employees with a medium and high reputation generate again an upward-sloping wage-effort relation that renders the payment of high efficiency wages for jobs with full discretion the optimal choice. In particular, for the employees with a medium and high reputation the employers' profits from a high wage strategy are significantly higher if the employee has full discretion compared to limited discretion (two sided t-test, $p \leq 0.001$).

To what extent did the employers' implement this optimal efficiency wage strategy in the competition treatment? Our next result shows that this occurred to a much larger degree than in the screening treatment.

Result 8 (Competition in the screening treatment removes suboptimal behavior):

(a) In the competition treatment, almost all employees with a high reputation face good job offers and almost all employees with a low reputation face bad job offers.

(b) The segmentation of the labor market disappears and the large majority of employees works hard and acquires a high reputation.

Result 8a is supported by the left graph of Figure 7 which illustrates the share of job offers with full discretion that employees with different reputations face in the reputation and the competition treatment. The figure shows that in the screening treatment employees with a medium or high reputation face job offers with full discretion with a much higher frequency than employees with a low reputation. This pattern contrasts sharply with the competition treatment in

which employees with a high reputation face offers with full discretion in the vast majority of the cases (roughly 80 percent), while employees with a medium reputation receive such offers only in 27 percent of the cases. Moreover, employees with a low reputation very rarely receive a job offer involving full discretion (6 percent).[25] These treatment differences are significant in all three reputation classes (Fisher exact-tests, $p=0.024$ for low reputation and $p\leq 0.001$ for medium and high reputation).

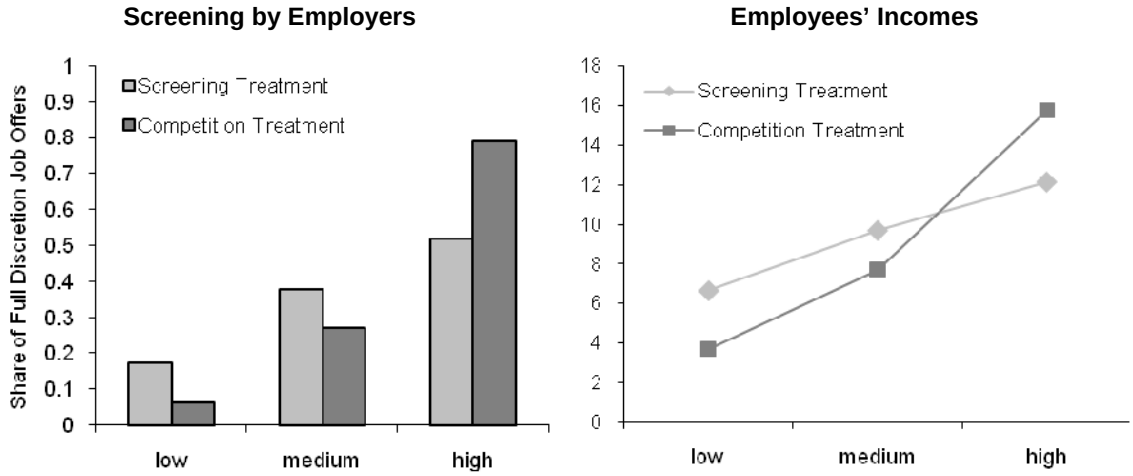


FIGURE 7.—Employers' sorting behavior across the reputation and competition treatment (left graph) and the consequences for employees' incentives for reputation formation (right graph).

The stronger conditioning of job offers on employees' reputation has important consequences for the employees' incentives to form a good reputation. Because jobs with full discretion are associated with higher wages and higher shares of the surplus, the employees in the competition treatment have a stronger incentive to form a good reputation. This effect is indicated in the right graph of Figure 7 which depicts the employees' income from a trade as a function of their reputation. This graph mimics the qualitative pattern of the left graph in Figure 7 because the increase in income from building a high instead of just a medium reputation is much larger in the competition treatment than in the screening treatment.

[25] The figure accounts only for those contract offers that were actually made. In contrast to the screening treatment, in the competition treatment each principal makes four contract offers but some of these offers are not shown to the respective employees: when a principal has a match in an early matching round then his remaining offers (for the later matching rounds) are not made. The figure thus accounts not only for the type of contract that are offered to employees of different reputations but also for the order in which the offers are scheduled.

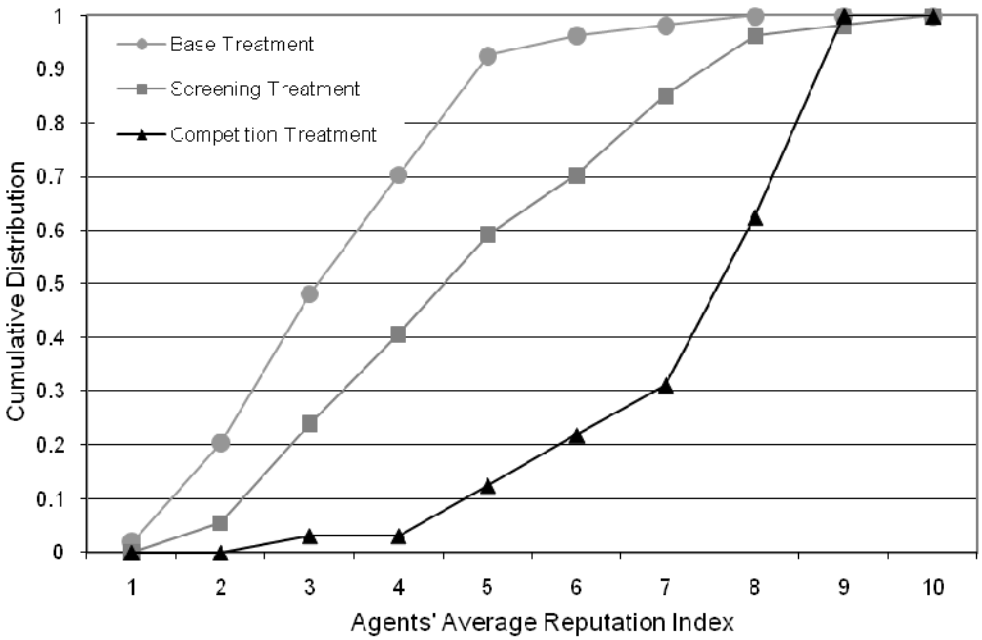


FIGURE 8.—Cumulate distribution of employees' reputation indices.

Did the employees' respond to these stronger incentives by acquiring higher reputation levels? In Figure 8 we display the cumulative distribution of individual employees' reputation levels across the all three treatments. For completeness we also include the employees' individual "reputations" in the base treatment in this figure.[26] The figure shows that the reputation levels in the competition treatment are very different from those in the screening treatment – a difference that is highly significant according to a Kolmogorov-Smirnov test ($p \leq 0.001$). For example, roughly 80 percent of the employees in the competition treatment have a reputation index of $r = 7$ or larger while only 30 percent of the employees in the screening treatment acquire such high reputation levels. In addition, almost none of the employees in the competition treatment displays a low reputation (i.e. $r \leq 3$) while about a quarter of the employees in the screening treatment fall into this category. This finding also indicates that the competition treatment almost completely removes narrowly self-interested strategies among the employees. Therefore, if competition is added to the screening opportunities, the segmentation of the labour market greatly diminishes. The overall share of jobs with full discretion is 77 percent; in periods 10-14, when reputation

[26] Recall that the reputation level is given by the effort levels in the previous three periods. Thus, they closely reflect the employees' effort choices.

incentives still exist and subjects had time to learn the mechanisms of reputation formation under competitive conditions, this share is even 82 percent.

The increased sorting and the steeper reputational incentives in the screening treatment have a strong impact on the employers' and the employees' average income and total surplus. This is summarized in

Result 9 (Competition and Total Surplus): The introduction of competition causes a substantial increase in total surplus. Moreover, competition yields a Pareto-improvement because both sides of the market, employers and employees, benefit from it.

Evidence for the last result comes from Figure 5. In each of the for matching groups of the competition treatment, the employers' average profit and the employee's average income is higher than in all six matching groups of the screening treatment (Mann-Whitney tests on matching group averages thus yield p=0.011). Overall, the total surplus is 72 percent higher in the competition treatment than in screening treatment and 172 percent higher than in the base treatment; the differences are again significant (Mann-Whitney tests on matching group averages, p=0.011). The increase in total surplus is also driven by a significant increase in average effort which amounts to 7.27 in the competition treatment.[27] The differences to the base (3.00) and the screening treatment (4.48) are again significant (Mann-Whitney tests on matching group averages, p=0.011).

5.5 Corroborating field evidence

One of our results concerns the endogenous clustering of job attributes in two distinct bundles of job attributes. In particular, we observe a positive correlation between wages, job rents and effort discretion. This raises the question whether we can observe a qualitatively similar correlation in

[27] If only accepted contracts are considered, average effort amounts to 8.02 in the competition treatment.

field data. We examined this question on the basis of data from the German Socio-Economic Panel (SOEP) which provides information on individual earnings, job satisfaction, measures of effort discretion on the job, together with a large number of individual level characteristics. In the 2001 wave of the SOEP workers were asked "Can you decide yourself how to complete your work tasks?" and "Is your work performance strictly monitored?" The answer categories were "applies completely", "applies partly" or "does not apply at all". It seems obvious that if workers are free to decide how they complete their tasks they have more effort discretion. In addition, performance monitoring can also be viewed as a measure of shirking opportunities. If workers are strictly monitored their shirking opportunities are very restricted which limits their effort discretion.

In Table B1 of Appendix B we regress gross monthly wages on the level of task discretion and monitoring while controlling for a host of variables such as education, tenure, labor market experience, hours of work, occupation (390 categories), industry (62 categories), etc.. The details of this regression are given in the appendix. The main result of this regression is that both more autonomy and less monitoring is positively associated with the wage level in an economically substantial way. Workers who can decide themselves how to complete a task earn roughly 6 percent higher wages compared to those who have no task discretion, and workers who say that their performance is not at all strictly monitored earn roughly 5 percent more compared to those who are strictly monitored.

Table B1 of Appendix B also presents a regression of overall job satisfaction on the task discretion and monitoring variable, again controlling for the same large set of variables. We consider job satisfaction as a proxy for the overall utility derived from the job. A well known theoretical results says that in the equilibrium of a competitive labor market job rents are absent because the wage compensates workers for all non-pecuniary job characteristics (Rosen 1987). Thus, if performance monitoring or task discretion have non-pecuniary attributes (or pecuniary correlates that cannot be controlled by the econometrician) that affect workers' utilities, wages will vary in such a way that job satisfaction (utility) is kept constant at the equilibrium utility

level. This means that if the data from the SOEP reflect competitive labor market outcomes, task discretion and monitoring should have no effect on job satisfaction *if one does not control for individuals wages'*, i.e., if wages can adjust to compensate for the uncontrolled nonpecuniary or pecuniary characteristics.[28] In contrast, if higher task discretion and less monitoring exhibit a positive correlation with job satisfaction, we can take this as evidence that wages do not compensate fully for the utility relevant characteristics of the job. Therefore, the higher job satisfaction that is associated with more task discretion and less monitoring can be taken as an indication of a job rent. In the regressions in Table B1 we find indeed that workers who can decide themselves how to complete a task have a 0.28 standard deviations higher job satisfaction than those who have no task discretion, and workers who say that their performance is not at all strictly monitored have a 0.3 standard deviation higher job satisfaction than those who are strictly monitored. Thus, the job satisfaction data also lend support to the generalizability of our results to the field. Of course, our field data do not finally settle the issue but they are evidence that the forces we identified in the laboratory may also play a role in the field.

Osterman (1994) also used "levels of supervision" and "levels of discretion" as measures that indicate flexible high-performance work practices: "One would expect that establishments whose employees have low levels of supervision and high levels of discretion would be more likely to have high involvement in these flexible work practices" (p. 381). He showed that both measures are significantly correlated with employers' policies to play "above-market" wages. In their meta study of 26 papers that analyze the effect of different forms of high-performance work practices – in their terminology: employee involvement (EI) – on employees' wages, Handel and Levine (2004) conclude that "A reasonable reading of the evidence suggest that EI's average effect is somewhere between 0 and 5 percent, although larger effects have been found in a small number of cases" (p. 35).

[28] For a similar test of the theory of compensating wage differential see Lalive (2007).

6 Conclusions

In recent decades firms in many different countries have replaced narrow job descriptions and tight control of employees' time and effort with broadly defined jobs that provide much leeway to their employees. However, if employees are free to choose how much to work and how to allocate effort across different tasks they have much better shirking opportunities. In this paper we examined the economic forces that rationalize a development towards greater discretion at the workplace. We show, in particular, that in the presence of a trade off between effort efficiency (due to high effort discretion) and minimum effort levels (due to monitoring and control) two types of jobs with fundamentally distinct job attributes emerge. Either employers offer a good job, consisting of high wages, high effort requests, substantial rent-sharing and full effort discretion or they offer the opposite bundle – low wages, low effort requests, little rent-sharing and limited effort discretion. The positive correlation between wages, effort discretion and job rents is also supported by field evidence provided in the paper. In addition, our experimental data show that the opportunity to screen employees on the basis of past performance signals is a decisive causal force that facilitates the viability of good jobs. However, in the absence of labor market competition screening opportunities alone do not allow to exhaust the available gains from the provision of good jobs. The reason is that without competition a significant minority of employers and employees persist in making sub-optimal choices which lead to a segmented labor market. Competition largely removes these sub-optimal behaviors and leads to large welfare gains for both employers and employees.

Our experiment also contributes to the solution of an enduring puzzle in the literature on innovative human resource management practices: why do not all firms implement higher effort discretion if it is associated with higher productivity. Our results point to the importance of screening costs and the degree of competition in the labor market. If screening costs are high or competition is weak, fewer employers will tend to offer jobs with high effort discretion. Furthermore, it deserves mentioning that in the environment of our screening treatment multiple

equilibria exist, implying that both the provision of good and bad jobs may be a stable outcome. Finally, the efficiency advantage of higher effort discretion may not be uniform across industries. Some industries (e.g. those engaged in software development) may have higher efficiency gains from effort discretion than others (e.g. those in fast food services).

Although we believe that this paper provides novel answers to relevant questions, the range of interesting question that can be answered with variations of the basic design is not yet exhausted. In the paper, the employers received information about past performance signals for free but in reality it is often costly to provide this information. Thus, different employers may exhibit different propensities to buy or produce this information which may be a further causal reason for persistent labor market segmentation. Likewise, it would be interesting to examine what happens if jobs are not as malleable as in the experiment. For example, what happens if the employers' have to make a decision about effort discretion before they enter the market for the next x periods, i.e. before they know the performance signals of the employees they will face? In this case, if employers believe that most employees will shirk they will offer bad jobs with limited discretion which will indeed induce the employees to provide low effort. Employers' expectations are thus confirmed, making it difficult for the actors in this market to reach an equilibrium with primarily good jobs. Thus, there are many interesting and important questions that may be pursued by modifying the current experimental design appropriately.

Appendix A: Behavioral Types among the Employees

In result 6b we claim that there were narrowly self-interested types among the employees who did not reciprocate generous wages with high effort levels. In this appendix we document the different types among the employees. Note that except for this appendix we never use the data of the second treatment within a session but in order to characterize the prevailing types we need individual observations from both the base treatment and the screening treatment. To determine the different types we compute the following reciprocity index for each employee in the base and in the screening treatment.

$$\alpha_i = \sum_{t=1}^{N_i} \frac{e_i^t - e_0^t}{e^{*t} - e_0^t} \Big/ N_i$$

The actual effort in period t is denoted by e_i^t, the minimum effort employee i could choose in period t is denoted by e_0^t (which is 1 if a trust contract was offered and 3 if a control contract was offered), and e^{*t} denotes the fair effort for employee i in period t. The fair effort is the effort level that equalizes the payoffs of the employee and the employer given the contract offered by the employer, i.e., $b \cdot e^{*t} - w = w - e^{*t}$, rounded to the next integer (since only integer values were allowed as effort choices). We only consider cases where the wage was high enough so that e^{*t} exceeded e_0^t; N_i denotes the number of such periods for employee i (we have at least one such period for each employee in each treatment). Thus, an employee who always chooses the fair effort level e^{*t} has a reciprocity index of 1, while an employee who always chooses the minimum effort has a reciprocity index of 0. For each employee we have a reciprocity index both in the base and in the screening treatment.

The left panel of Figure 5 plots the reciprocity indices for each employee in the base and the screening treatment against each other. In the right panel, these indices are rounded to natural numbers.

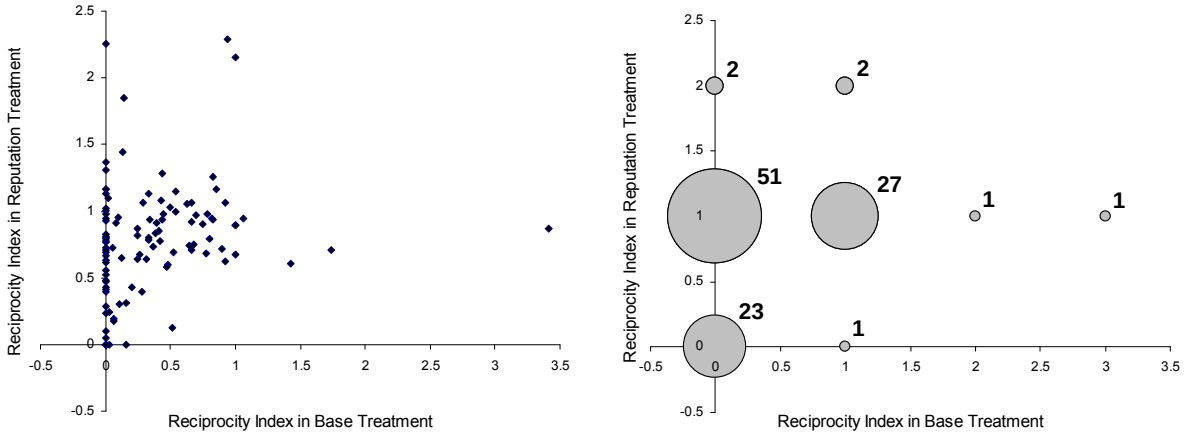


FIGURE 5.—Classification of employees' types. In the left panel, each dot represents one employee. In the right panel, the reciprocity indices are rounded to natural numbers illustrating our classification of employees' types. The size of the bubbles is proportional to the number of employees in each category.

On the basis of the reciprocity index three large clusters of employees arise:[29]

- *Narrowly self-interested types:* About 20 percent of the employees (23 out of 108) have a reciprocity index close to zero in both, the screening and the base treatment. These employees do not reciprocate to high wages with high effort in both treatments even though this would be profitable in the screening treatment.[30] In the base treatment their average payoff is 7.37, a little above the overall average of 6.95. In the screening treatment, however, these employees are stuck with a low reputation because they are offered few jobs with full discretion (only in 25 percent of the cases); as a consequence, their average income is only 7.35, considerably less than the overall average income of 9.45.
- *Reciprocal types:* About 30 percent of the employees (31 out of 108) have a reciprocity index close to one (or larger) in both treatments. These employees always reciprocate to high wages with high effort. In the base treatment they choose an average effort of 4.71 and get an average payoff of only 6.70. This is a little less than the overall average, but these employees voluntarily choose to sacrifice some of their own payoff in order to reciprocate high wage offers. In the screening treatment they spend an average effort of 5.96 and they acquire a

[29] Note that there is only one employee with an index of one in the base treatment and of zero in the screening treatment, i.e. we do not find a type that acts reciprocally in the base but selfishly in the screening treatment.
[30] In the base (reputation) treatment they choose an average effort of only 2.78 (3.35, respectively).

medium or high reputation. Therefore, they are offered more job offers with full discretion (in 46 percent of the cases) and achieve a higher average income of 9.33.

- *Strategic types:* About 50 percent of the employees (53 out of 108) have a reciprocity index close to zero in the base treatment and close to one (or larger) in the screening treatment. These employees act strategically and reciprocate if their performance record is observed, but do not reciprocate if low effort goes undetected by future employers. In the base treatment they look like the narrowly self-interested types: They choose an average effort of 3.08 and their average income is 6.85. In the screening treatment, however, they look very similar to the reciprocal types. They choose an average effort of 5.97, acquire a medium or high reputation and are offered jobs with full discretion in the majority of the cases (52 percent). As a result, they receive a high average income (10.60).

Appendix B: Field Evidence on the relationship between wages, job discretion and job rents

In this appendix, we examine the relation between wages, employee discretion on the job and job satisfaction with data from the German Socio-Economic Panel (GSOEP). The SOEP is a representative annual panel survey for the resident population of Germany.[31] The survey collects information on a wide range of personal and household characteristics, including earnings, job satisfaction, education, work experience, and occupation. The 2001 wave of the survey, which covers 22,351 individuals from 11,947 households, also contains a set of questions on work conditions, two of which have a direct bearing on the level of discretion at the workplace:[32]

1. "Can you decide yourself how to complete your work tasks?"
2. "Is your work performance strictly monitored?"

[31] The initial wave of the survey was conducted in 1984, and from 1990 on also covers the territory of the former German Democratic Republic. For more detailed information, see http://www.diw.de/en/soep.
[32] To date, these questions were not included in any wave after 2001.

Respondents (those who were employed at the time of the survey) could answer each question by indicating either "applies completely" or "applies partly" or "does not apply at all." The answers to these questions provide a measure of effort discretion because granting discretion on how to complete tasks obviously influences how employees allocate their effort, and strict performance monitoring reduces the shirking opportunities.

Using these two measures, we find a positive, highly significant correlation between job discretion and wages. The dependent variable in the regressions in columns (1)–(3) of Table B1 is the log of gross monthly wages (in Euro). "Some Autonomy" ("Full Autonomy") is a dummy variable indicating that a respondent answered "applies partly" ("applies completely") to the task discretion question; "Some Monitoring" ("No Monitoring") is a dummy variable indicating the answer "applies partly" ("does not apply at all") to the performance monitoring question. Respondents who stated the respective third options serve as baseline. Our sample consists of all individuals who are in full or part time employment at the time of the interview; apprentices, those who serve a military or civil service, and the self-employed are excluded. Columns (1) and (2) show raw correlations: absent any controls both job discretion measures are highly significantly associated with higher earnings. For example, a job with full autonomy pays 35 percent higher wages than a job without autonomy on task completion. Similarly, employees who are not monitored at all earn 12 percent more than employees whose work performance is strictly monitored. In the regression in column (3) we account for a large number of control variables because we want to analyze whether *ceteris paribus* wages are higher in jobs with more discretion. To control for worker heterogeneity and differences in occupations and industries, we account for occupation (390 categories), industry (62 categories), education (5 categories), labor market experience, tenure at current employer, gender, firm size, region, hours of work, and temporary or permanent employment. Controlling for these factors reduces the size of the coefficients of the job discretion measures but both remain highly significant. The regression reveals that jobs with full discretion (full autonomy and no monitoring) are associated with more

than 10 percent higher wages than jobs in the base line category with no discretion (no autonomy and full monitoring).

In our experimental data, jobs with full discretion are not only associated with higher wages but also with higher job rents, i.e. higher wages overcompensate the agents for the cost of higher effort requirements. To address the question whether higher job discretion is associated with higher job rents in the SOEP data, we use two empirical strategies. First, we use the widely supported fact that higher task discretion is a positively valued attribute of jobs (XXX, Green 2008).[33] In a competitive labor market higher task discretion should (ceteris paribus), therefore, be associated with *lower* wages but in fact it is positively correlated with wages. This may be taken as a first indication that higher task discretion is associated with higher job rents. Second, we explicitly use job satisfaction data as a proxy for the overall utility of a job in order to study the relation between task discretion and job rents more explicitly.

The following question in the SOEP measures job satisfaction: "How satisfied are you with your job (if applicable)?" Respondents can answer on a scale from 0 to 10, where 0 means totally unhappy and 10 means totally happy. We regress this job satisfaction measure on a large number of control variables *but we exclude the wage level as a regressor*. This regression then enables us to make inferences on whether task discretion and monitoring are associated with job rents. The idea behind this research strategy is that in a competitive labor market equilibrium workers are offered a competitive utility level. Profit-maximizing firms never will offer utility levels above the competitive level. If task discretion (or monitoring) are intrinsically positively (negatively) valued job attributes then the hedonic equilibrium wage will adjust such that the worker just earns the competitive utility level. Excluding the wage level from the job satisfaction regression should thus leave job satisfaction (i.e. utility) unaffected if wages adjust such that workers are just paid their competitive utility level (it's a movement along a given indifference curve). In contrast, if higher task discretion and lower monitoring are associated with a higher

[33] In the experiment, we deliberately did not implement this feature to keep the experiment tractable. However, in field data we have to take this utility implication of task discretion into account.

level of job satisfaction then this moves the worker beyond the competitive utility level because wages did not adjust appropriately. Higher task discretion and lower monitoring are then associated with higher job rents.

In the job satisfaction regression we find a positive and highly significant correlation between job satisfaction and effort discretion. The dependent variable in the regressions in columns (4)–(6) of Table B1 is the normalized job satisfaction measure (with mean 0 and standard deviation 1). Columns (4) and (5) show raw correlations: absent any controls both effort discretion measures are highly significantly associated with higher job satisfaction. Jobs with full autonomy or without any monitoring are associated with levels of job satisfaction that are about a third of a standard deviation higher than the satisfaction of the comparison groups. In the regression in column (6) we account for same set of personal and labor market characteristics as in the regression in column (3) and find that both effort discretion measures remain highly significant. The regression shows that jobs with full discretion (full autonomy and no monitoring) are associated with more than half of a standard deviation higher job satisfaction than jobs in the base line category with no discretion (no autonomy and full monitoring).

TABLE B1—The Impact of Job Discretion on Wages and Job Satisfaction

(Field data based on the German Socio-Economic Panel)

dependent variable:	Log Gross Monthly Wage			Standardized Job Satisfaction		
	(1)	(2)	(3)	(4)	(5)	(5)
Some Autonomy	0.235***		0.042***	0.095***		0.071**
	(0.019)		(0.012)	(0.033)		(0.036)
Full Autonomy	0.353***		0.057***	0.336***		0.281***
	(0.019)		(0.012)	(0.034)		(0.038)
Some Monitoring		0.083***	0.033***		0.160***	0.142***
		(0.019)	(0.011)		(0.033)	(0.034)
No Monitoring		0.125***	0.047***		0.352***	0.295***
		(0.019)	(0.012)		(0.034)	(0.036)
Experience			0.038***			-0.010
			(0.004)			(0.011)
$Experience^2/100$			-0.127***			0.041
			(0.016)			(0.051)
$Experience^3/1000$			0.012***			-0.006
			(0.002)			(0.007)
Tenure			0.015***			-0.025***
			(0.001)			(0.004)
$Tenure^2/100$			-0.025***			0.058***
			(0.004)			(0.012)
Lower Secondary			0.046***			0.074*
			(0.012)			(0.034)
Upper Secondary			0.106***			0.003
			(0.020)			(0.061)
Higher Vocational			0.131***			-0.061
			(0.017)			(0.054)
Higher Education			0.221***			0.009
			(0.017)			(0.052)
Male			0.192***			0.033
			(0.010)			(0.032)
Firm Size			0.060***			0.006
			(0.003)			(0.009)
East Germany			-0.241***			-0.084***
			(0.009)			(0.029)
Hours of Work			0.026***			-0.004***
			(0.000)			(0.001)
Temporary Job			-0.096***			-0.207***
			(0.015)			(0.048)
Constant	7.340***	7.496***	5.445***	-0.169***	-0.209***	-1.603
	(0.016)	(0.016)	(0.414)	(0.028)	(0.028)	(1.271)
Occupation Dummies	no	no	yes	no	no	yes
Industry Dummies	no	no	yes	no	no	yes
observations	7770	7770	7770	7710	7710	7710
adj. R^2	0.041	0.005	0.695	0.017	0.016	0.049

Notes: OLS estimates. Standard errors in parentheses; ***, **, * indicates significance at 1-, 5-, and 10-percent level, respectively. Some Autonomy, Full Autonomy, Some Monitoring, and No Monitoring are dummy variables indicating the degree of job discretion. Experience indicates years in labor market, measured as years elapsed since completion of education. Tenure indicates years with current employer. Education dummies correspond to levels 3 to 6 of the International Standard Classification of Education (ISCED); level 2 and school drop outs serve as baseline. Firm size is measured in six categories (<5, 5-19, 20-99, 100-199, 200-1999, >2000). Job categories correspond to the International Standard Classification of Occupations (4-digit ISCO-88 code; 390 categories). Industry categories correspond to the classification of economic activities of the European Community (NACE code; 62 categories). East Germany is a dummy indicating employment in the territory of the former GDR. Hours of Work are actual work hours per week including overtime. Temporary Job is a dummy variable indicating temporary employment.

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