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, which can increase the productivity of effort but also provides more shirking opportunities. This development is difficult to understand in terms of standard moral hazard models. Here we show experimentally that complementarities between high effort discretion, rent-sharing, screening opportunities, and competition may be important driving forces behind these new forms of work organization. We document, in particular, the endogenous emergence of two fundamentally distinct types of jobs. Employers either implement a *control strategy*, which consists of limited effort discretion, low wages, low effort requests, and little or no rent-sharing, or they implement a *trust strategy*, which stipulates high effort discretion, high wages, high effort requests, 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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JEL: C91, D86

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? Standard principal-agent theory suggests that discretion should be limited as much as possible. Otherwise the agent will either exploit his freedom to shirk or he has to be offered expensive monetary incentives to choose actions that are in the interest of the principal.[1] Similarly, Taylorism, the dominant paradigm of scientific workplace organization in the first two thirds of the 20th century, is based on the assumption that workers will always work at the slowest rate that goes unpunished. It is therefore essential to standardize the production process such that the workers' efforts can be effectively monitored and controlled.

However, more recent human resource management theories stress the cost of control. A worker who has to follow strict and tightly controlled rules cannot use his private information and ingenuity to solve problems "on the floor" and his productivity is diminished because he cannot adapt his actions to changes in his environment. Modern "high-performance work systems" decentralize the gathering and processing of information and grant authority to employees to act on this information as they see fit to solve the problems that arise.[2] This strategy reduces the cost of control, but it makes the company vulnerable. It is in the discretion of the employee whether to use his authority to the benefit of his company or to shirk.

In this paper we ask under what conditions principals (should) grant discretion to their agents if no explicit monetary incentives can be given. We show experimentally that offering discretion to an agent is not profitable on its own. However, if offering discretion improves the

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[1] If the agent has fewer actions to choose from, there are fewer incentive compatibility constraints that have to be satisfied. Thus, the implementation of an action becomes cheaper if the agent has less discretion. Furthermore, Grossman and Hart (1983) show that having a more informative signal about the agent's action reduces the implementation cost. Thus, having additional information through monitoring and control is always beneficial.
[2] See, e.g., Osterman (1994a, 2000), Lawler, Mohrman and Ledford (1995), Appelbaum, Bailey, Berg, and Kalleberg (2000), and Shaw (2006), for an overview of the different forms that such work systems can take.

agent's flexibility and productivity, if offering discretion is combined with paying high fixed wages that offer a rent to the agent, 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. Complementarities imply that different components of a strategy reinforce each other and, therefore, they lead to a bundling or clustering of these components.

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.[3] In other words, the trust strategy is to offer "good" jobs while the control strategy is associated with "bad" jobs.[4] 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 risks that the employee shirks more. Thus, if the agent is not trustworthy, the employer makes a significant loss, which raises the question how the trust strategy can be viable 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 current trend towards greater effort discretion at the workplace. We show, in particular, that opportunities to

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[3] This finding accords to McGregor's (1960) theories "X" and "Y", describing two very different attitudes toward workforce motivation. He claimed that employers follow either one or the other approach.
[4] 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.

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 large majority of employees shirked and the employers predominantly implemented the control strategy, whereas in our screening treatment, in which an imperfect 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 cases while almost all employees with a low signal received bad job offers. The employers' screening behavior generated incentives for the employees to increase effort in order to improve their reputation, which led to a substantial increase in employees' average effort in the screening treatment compared to the base treatment.

It is, however, important to point out that the reputation formation opportunities in the screening treatment did not induce employees to provide high effort *per se*. Employees with a high performance signal tended to reciprocate reliably to high wages with a high level of effort, but they withdrew their effort if they received a low wage offer, even if this hurt their reputation and lowered their expected future payoffs. This behavior forced principals to pay high wages if they wanted to elicit high effort. However, by offering high wages to high reputation employees only, employers could limit the risk that is involved in paying the high wage upfront. 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 used the control strategy. These employers never learned that paying high wages to high reputation agents pays off because *all* employees respond to a low wage with low effort. Thus, these employers experienced that employees with a high reputation cannot be trusted which reinforced their use of the control strategy. There is also a

non-negligible minority of employees who *always* shirked even though it was 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.[5]

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 most 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 significantly increases while the fraction of bad jobs is reduced, 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

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[5] 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 documented 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.

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 with data that are representative for Germany (the Socio-Economic Panel; SOEP). Both correlations are supported at high significance levels, even if we control for a host of factors such as education, tenure, gender, occupation, and industry, suggesting that our experimental results may also capture relevant forces in the field.

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' actual and optimal strategies, the existence of suboptimal employers and employees in the screening treatment, and the resulting segmentation of the labor market. We also analyze the effects of competition. In Section 6 we compare our experimental results to field data. Section 7 concludes.

2 Related Literature

Our paper is related to the theoretical and empirical literature on reputation formation (e.g., Fama 1980, Holmström 1999, Kreps et al. (1982), Malcomson and MacLeod 1998, MacLeod 2007, Bolton, Katok and Ockenfels 2004, Brown, Falk and Fehr 2004, Cabral and Hortacsu 2006, Huck, Lünser and Tyran 2006, Brown and Zehnder 2007).[6] The empirical literature has documented the efficiency enhancing effect of reputational incentives in a variety of contexts such as labor, credit

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[6] Our data support, for example, the 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 his model, the key prediction of Holmström's model – reputational incentives enhance effort provision even in one-shot interactions – is corroborated by our data.

and goods markets. However, none of these papers investigated the role of screening and competition based on past performance signals for the employer's decision to give effort discretion to employees, that is, for the optimal solution to the fundamental trade-off between efficiency of effort and control of effort that underlies different forms of work organization such as Taylorist or high-performance work systems.

Our paper is also related to the literature on complementarities in the organization of the workplace. Milgrom and Roberts (1990, 1995), Kandel and Lazear (1992), Baker, Gibbons, and Murphy (1994), and Holmstrom and Milgrom (1994) have shown theoretically that important complementarities between technology, strategy, and incentive systems may exist. Ichniowski, Shaw and Prennushi (1997), MacLeod and Parent (1999), and the work summarized in Ichniowski and Shaw (2003) provide empirical evidence that complementarities between job characteristics, different human resource management practices, and the form of compensation exist.[7] These empirical studies did, however, 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, because in the cases that were studied this enhanced productivity (see MacDuffie 1995, Ichniowski et al. 1997, Appelbaum et al. 2000, Ichniowski and Shaw 2003). Our experiments provide additional useful insights because our data enable us to identify screening, reputation formation, and competition as key causal forces behind optimal job design.

Dohmen et al. (2009) have examined the impact of workers' propensity to reciprocate generous actions on wages in a representative German sample (SOEP). They report that workers with a higher inclination to reciprocate generosity are paid higher wages, and that these workers

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[7] For example, MacLeod and Parent (1999) show 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 are compensated with hourly wages and salaries.

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 our 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. This 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.

Finally, our paper is related to the literature on the impact of control and extrinsic incentives on intrinsic motivation and voluntary cooperation (for example, 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). In particular, 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 our data are consistent with the existence of hidden costs of control, in our setting these costs are not decisive for the optimal job design in the different treatments.

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 wants the employee to choose high effort levels, but the employee prefers low effort.

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 efficiency of effort and control of effort described in the human resource management literature.[8] Limiting discretion forces employees to obey some minimum standards, which is reflected in the higher minimum

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[8] 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,

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	$\Pi = U = 0$	$\Pi = U = 0$

effort level. But limiting discretion also restricts employees' ability "to work smarter," that is, to react in a flexible and efficient way to a changing environment. For example, the employer can establish strict production procedures to tightly govern the employee's actions, regulate working hours by using time cards to monitor attendance, or impose reporting obligations to better assess performance. 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.

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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 allocation higher productivity 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 systems (e.g., Ichniowski et al.1997, Appelbaum et al. 2000, Osterman 2006) confirms that not only technology and skill but also the organization of the workplace (e.g., information sharing, allocation of substantial decision rights, careful recruiting, training and development of people) affects employees' productivities. On the downside, high-performance work systems impede the effective control of employees; in the words of Osterman: "employees gain the capacity to, in a sense, hold the firm hostage" (2006, p. 190).

| | t = 1 | t = 2 | t = 3 |

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

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.[9] 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.

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

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[9] 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.

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 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 Ichniowski and Shaw 2003) stresses that careful screening activities are an important component of the cluster of job attributes that constitute high-performance work systems. 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 organizational 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.[10] Value laden terms

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[10] 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

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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 employers with attractive job offers. 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.[11] Subjects were students from the University of Zurich and the Swiss Federal Institute of Technology in Zurich. On average, subjects earned about CHF 46 (about $37), which includes a show-up fee of CHF 15 (about $12).

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

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rule out that spillover effects from one treatment to the other affect our results we use the data of the second treatment in each session only in Appendix A where we characterize the employees' types.

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

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.[12] 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

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[12] 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 (1993) 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.

and low wages are optimal in the base treatment.[13] 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).[14] 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 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.[15]

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

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[13] 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 (2008), where it yielded a relatively accurate description of the average patterns of behavior observed in these experiments.

[14] 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).

[15] 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.

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 experimentally 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 might be 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 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 not higher than the average effort under a full discretion contract, hidden costs of control exist. 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 contracts with full discretion may even prevail in the base treatment where the employers have no information about their employees.

5 Results

In Section 5.1 we first discuss the characteristics of actual and optimal jobs. In Section 5.2 we 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.

5.1 The Characteristics of Actual and Optimal Job Offers

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

Result 1 (dichotomy of job design): *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
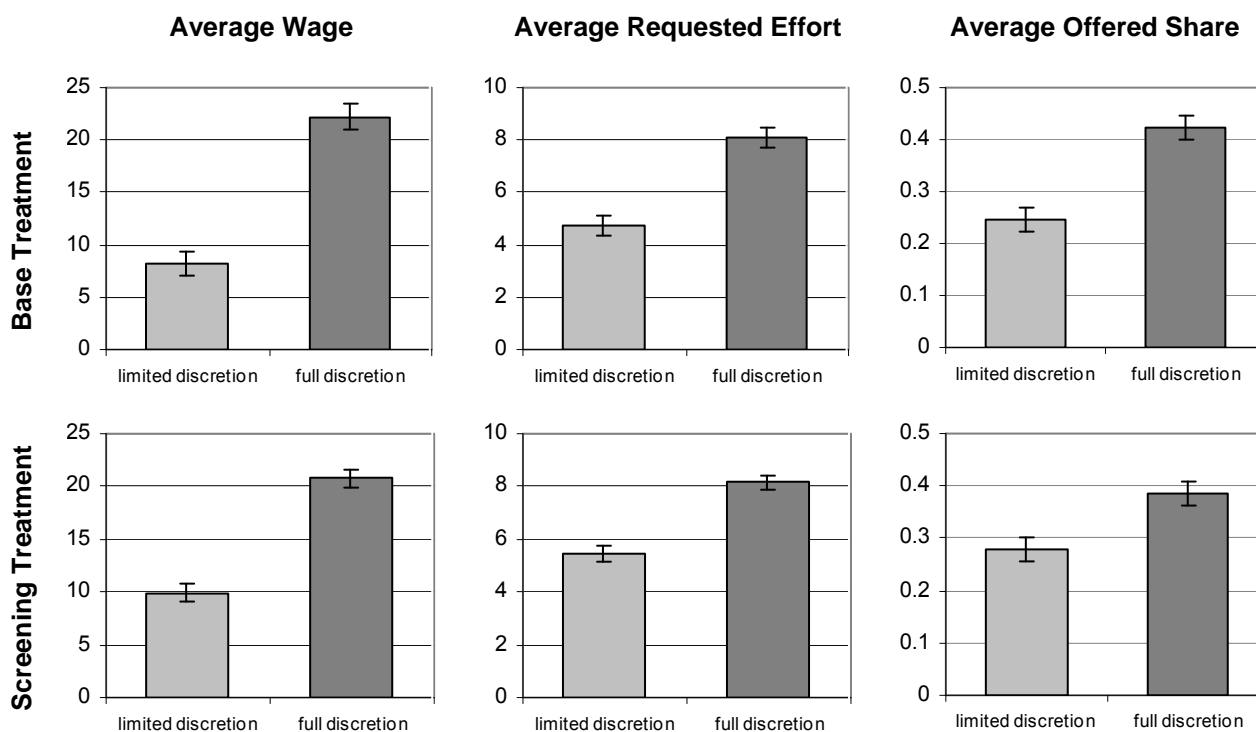
	Average Wage	Average Requested Effort	Average Offered Share

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.

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≤0.001 for each of the six tests implicit in Figure 2).[16]

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 limiting discretion 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.*

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[16] 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 full and limited discretion jobs. In the base treatment, e.g., 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 full discretion jobs about three quarters of them are at or above $\tilde{e} = 7$ while for limited discretion jobs 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.
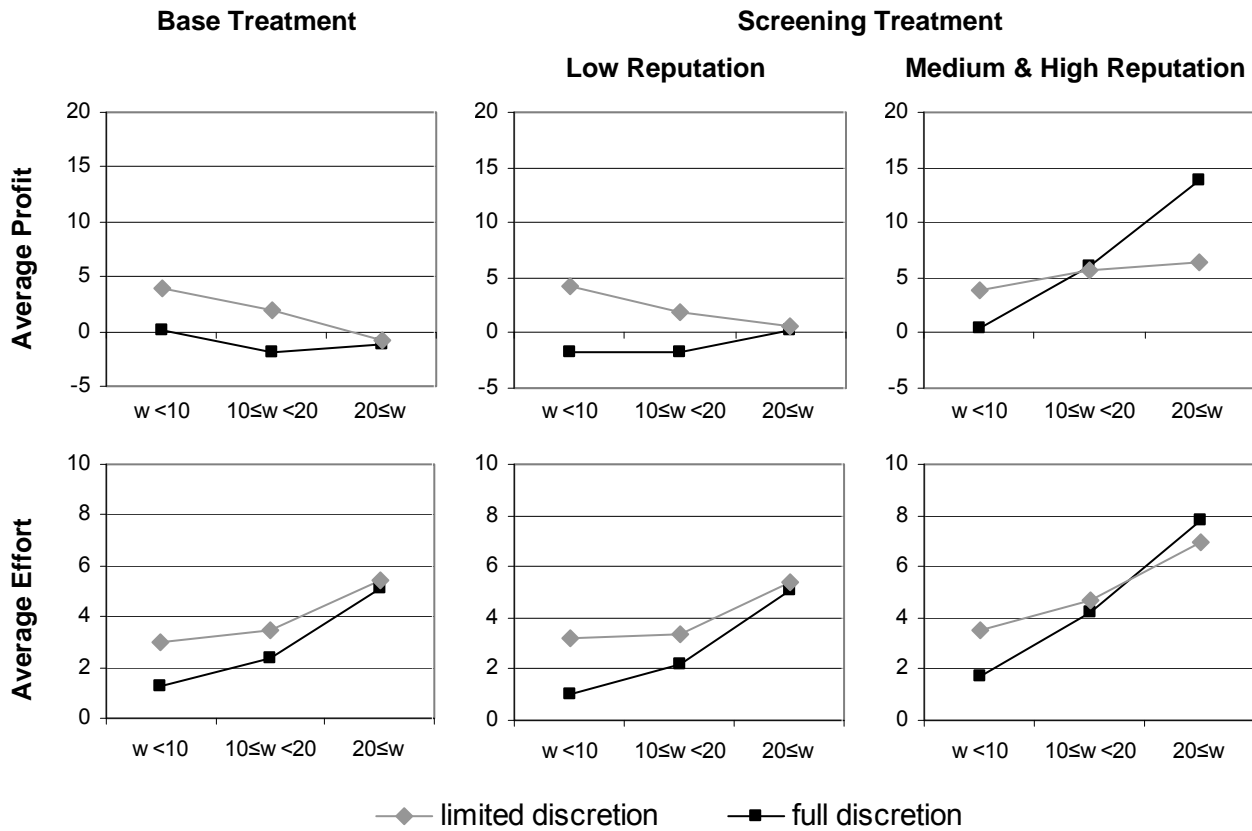
FIGURE 3.—**Optimal Job Offers and Wage-Effort Relation**. In the base treatment and in the screening treatment with low reputation employees, employers' profits are highest when they offer contracts with limited discretion and pay low wages. In these cases, the wage-effort relation is relatively flat 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.

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≤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≤w<20) strategy (two-sided t-test, p≤0.001).

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 ($20 \leq w$). 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, $p \leq 0.001$), 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, $p \leq 0.001$).[17]

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 ($20 \leq w$). 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, $p \leq 0.001$),

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[17] 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.

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).[18]

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 graphs in 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 on average higher wages are reciprocated with higher effort levels. However, this efficiency wage effect is too small to render a high wage policy 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.

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[18] 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.

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.[19]	—
constant	-0.517	-0.569	-0.879	-1.307
	(0.482)	(0.506)	(0.547)	(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.

Figure 3 and the regressions (1) – (3) of Table 2 show that in jobs with limited discretion effort is higher at low wages (w<10) but that the wage effort relation is significantly smaller. 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. Because 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

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

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.[20] A closer look at the low wage interval (w<10) reveals 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, 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

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[20] 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 and the regressions in Table 2 impose linearity by assumption.

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 high wages that elicit high effort levels profitable. Moreover, at high effort levels the higher efficiency of full discretion is particularly advantageous, inducing the employers to offer this kind of job.*

This result is supported by the corresponding 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	0.233	-0.032	1.442**	1.455*	1.369*	0.110
	(0.410)	(0.490)	(0.719)	(0.733)	(0.787)	(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.[21]

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

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[21] 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.

particular, is large and quantitatively important because it generates an incentive for the employers to pay high wages to these employees.[22]

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.[23] Employees with a good track record are unlikely to shirk, while employees with a low reputation receive only a low wage and are forced to provide at least an effort 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

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[22] 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 $5 \times 2.9 = 14.5$ 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 units generates a revenue increase by $5 \times 3.3 = 16.5$ 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.

[23] 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.

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.[24]

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. Figure 4

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[24] Hidden costs of control were decisive for the optimality of full discretion jobs if their absence rendered limited discretion jobs optimal. Our data however show that for medium/high reputation agents in the screening treatment, it would be optimal to offer full discretion jobs even in the absence of hidden costs. In the relevant wage interval $(20 \leq w)$, average effort under full discretion jobs is about 8, yielding revenue of $5 \times 8 = 40$. Consider now limited discretion jobs and assume that hidden costs of control are absent, implying that average effort increases: no agent reduces his effort while some agents must increase their effort levels (from 1 or 2 to $e=3$). Let us, for the sake of the argument, assume that by imposing control all agents increase their effort by 2 so that average effort rises to 10. Revenue would then be $4 \times 10 = 40$, which just matches revenue under full discretion. Clearly, average effort would not increase by 2 (e.g., in our data only some agents were below the threshold of $e=3$). Thus even if hidden costs of control were fully absent, jobs with limited discretion were still not more profitable than jobs with full discretion.
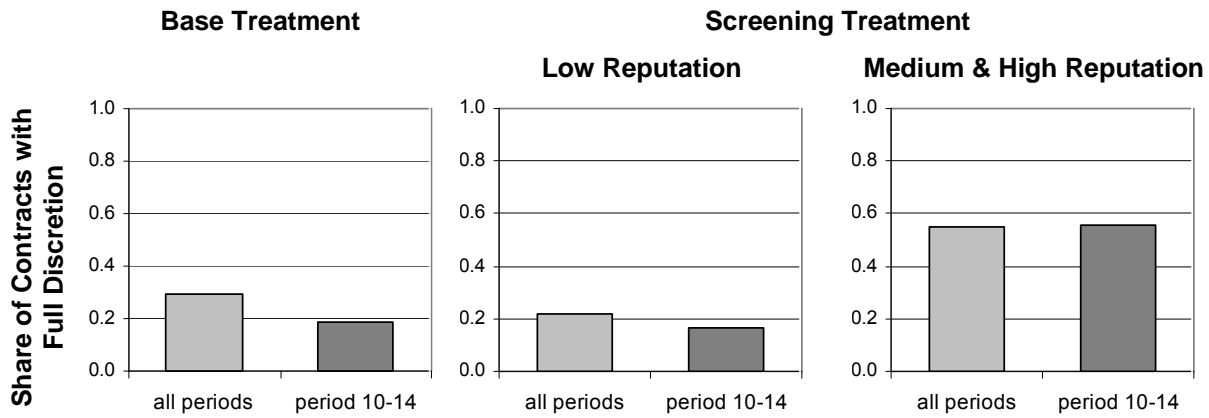
FIGURE 4.—**Employers' Actual Job Offers**. In the base treatment and in the screening treatment with low reputation employees, the employers offer optimal contracts in the vast majority of the cases. Looking at periods 10 to 14 separately, the fraction of contract offers with limited discretion further 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.

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.[25] 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 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

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[25] 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.

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≤0.001.[26]

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.*

    (b) *There is a significant share of narrowly self-interested employees who do not reciprocate high wages with high effort in the screening treatment, 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. 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

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[26] 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 observations in the screening treatment is only 525+172=697.

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. Nevertheless, we find that a significant fraction of roughly 20% of the employees always chose low effort levels in the screening treatment – even when they were offered high wages. In the Appendix 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.[27] 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

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[27] 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 in this paper where we use the second treatment within a session.

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 co-existence of good and bad jobs is reminiscent of the literature on dual labor markets (Doeringer and Piore 1971, Edwards, Reich and Gordon 1975) 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. 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, therefore, suggest that sub-optimal choices by the employers and individual characteristics of the employees (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 jobs with full discretion. This leads to

Result 7 (screening and 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
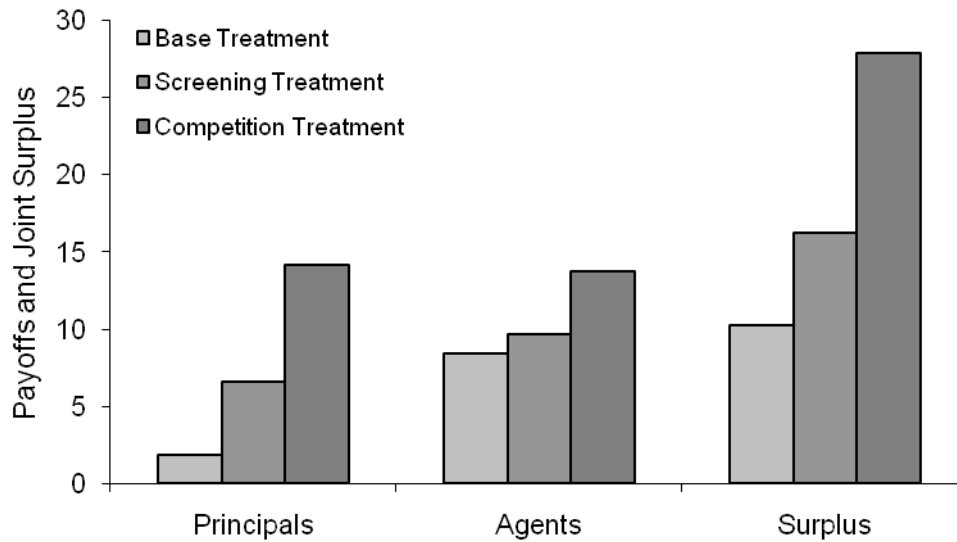
FIGURE 5.—Employees' income, employers' profit, and surplus in the different treatments.

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).[28]

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 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

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[28] In this test we assigned an effort of zero to rejected 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).

other and lead to the provision of high effort levels and a majority of good jobs with full discretion, both of which increases the total surplus.

5.4 Competition

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 behavior. 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
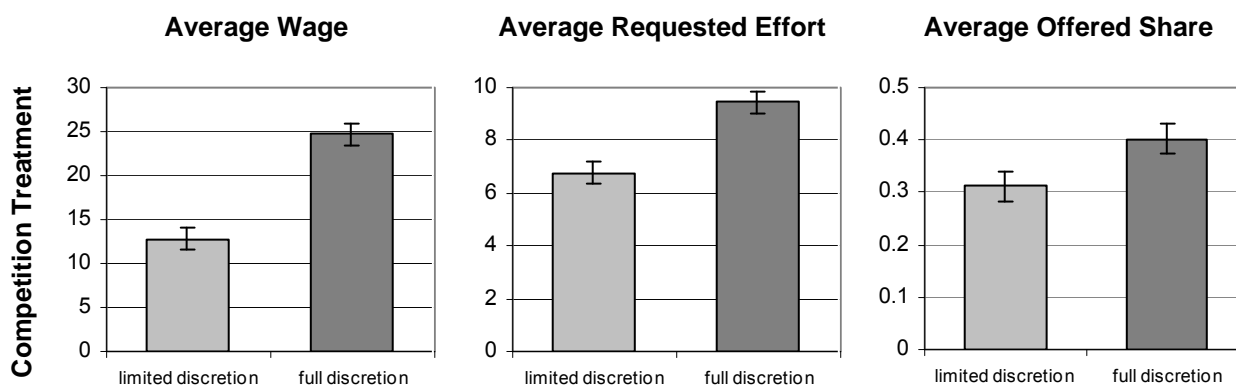
FIGURE 6.—**Dichotomy of Job Design in Competition Treatment**. As in the base and screening treatments, employers use two fundamentally different strategies in designing jobs. Either they offer contracts with full discretion, high wages, high requested effort, and a large offered share of the surplus, 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.

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.[29]

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

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[29] 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.

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 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).[30] The bundling of distinct job characteristics into good and bad jobs is thus a robust phenomenon that occurs under all treatment conditions.

Figure 6, however, does not inform us about the optimality of the different types of job 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.

To what extent did the employers' implement the optimal trust strategy in the competition treatment? Result 8a shows that this occurred to a much larger degree than in the screening treatment.

Result 8 (competition substantially increases the share of good jobs):

>   (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 large majority of employees works hard and acquires a high reputation.*

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[30] 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 full discretion jobs, e.g., 90 percent of all wages are higher than 15, while in limited discretion jobs roughly half of all wages are equal or less than 10. For requested effort levels a similar dichotomy is present. In full discretion jobs, 95 percent of the job offers involve a requested effort level of $\widetilde{e} \geq 7$, while in limited discretion jobs almost 50 percent of all job offers are associated with a requested effort of $\widetilde{e} < 7$.
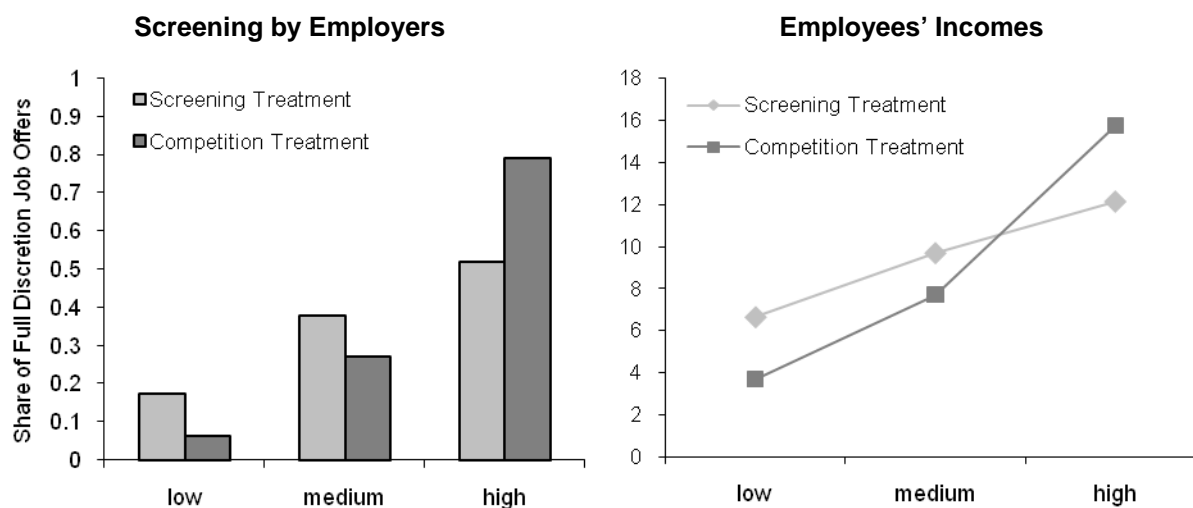
FIGURE 7.—Employers' sorting behavior across the reputation and competition treatment (left graph) and the consequences for employees' incentives for reputation formation (right graph).

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 the higher an employee's reputation in the screening treatment, the more often he faces a job offer with full discretion (in 17, 38, and 52 percent of the cases, respectively). This pattern is strongly reinforced in the competition treatment. Employees with a high reputation now face offers with full discretion much more often (in roughly 80 percent of the cases), while employees with a medium or low reputation receive such offers less often than in the screening treatment (only in 27 percent and 6 percent of the cases, respectively).[31] The treatment differences in shares of contract offers are significant in all three reputation classes (Fisher exact-tests, p=0.024 for low reputation and p≤0.001 for medium and high reputation).

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

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[31] 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.

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 because the increase in income from building a high instead of just a medium or low reputation is much larger in the competition treatment than in the screening treatment.

Did the employees' respond to these stronger incentives by acquiring higher reputation levels? Result 8b shows that this was indeed the case. 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.[32] 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 an average reputation index exceeding $r=6.5$ ("high reputation") while only 30 percent of the employees in the screening treatment acquire a high reputation. In addition, almost none of the employees in the competition treatment displays a low average 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 complements screening opportunities, the segmentation of the labor market greatly decreases. The overall share of jobs with full discretion is now 77 percent; in periods 10-14, when reputation incentives still exist and subjects had time to learn the mechanisms of reputation formation under competitive conditions, this share is even 82 percent.

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[32] Recall that the reputation level is given by the effort levels in the previous three periods. Thus, they closely reflect the employees' effort choices.
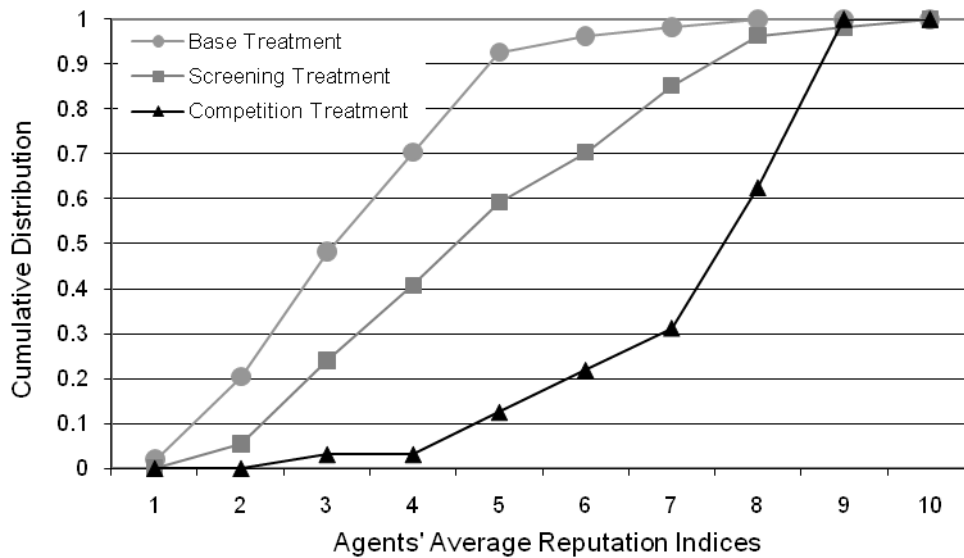
FIGURE 8.—Cumulate distribution of employees' reputation indices.

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 in addition to screening opportunities causes a substantial increase in total surplus. Moreover, both sides of the market, employers and employees, significantly benefit from competition.*

Evidence for the last result comes from Figure 5. In each of the four 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.[33] 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).

6 Field Evidence

One of our results concerns the endogenous clustering of job attributes in two distinct bundles of job characteristics. In particular, we observe a positive correlation between wages, job rents and effort discretion. This raises the question whether we can observe qualitatively similar correlations in field data. We examined this question on the basis of data from the German Socio-Economic Panel (SOEP). The SOEP is a representative annual panel survey for the resident population of Germany.[34] 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:[35] 1) "Can you decide yourself how to complete your work tasks?" 2) "Is your work performance strictly monitored?"

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 4 is the

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[33] If only accepted contracts are considered, average effort amounts to 8.02 in the competition treatment.
[34] 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.
[35] To date, these questions were not included in any wave after 2001.

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.[36] 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).[37]

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[36] 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.

[37] The existence of a positive correlation between wages and effort discretion has previously been documented by Osterman (1994b) for the US. He also used "levels of supervision" and "levels of discretion" as measures of high-performance work systems and 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 systems on employees' wages, Handel and Levine (2004) conclude that the "average effect is somewhere between 0 and 5 percent, although larger effects have been found in a small number of cases" (p. 35). In an empirical test of efficiency wage theory, Rebitzer (1995) analyzes wages of contract maintenance workers in the petrochemical industry and finds that high levels of supervision are associated with lower wage levels.

TABLE 4—The Impact of Job Discretion on Wages and Job Satisfaction in the SOEP

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.

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 employees for the cost of higher effort requirements. We consider *job satisfaction* as a proxy for the overall utility derived from the job. The SOEP measures job satisfaction with the following question: "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.

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 non-pecuniary or pecuniary characteristics. 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.

The dependent variable in the regressions in columns (4)–(6) of Table 4 is the normalized job satisfaction measure. 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. 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.

7 Conclusions

In recent decades many firms have replaced narrow job descriptions and tight control of employees' effort with broadly defined jobs that provide much leeway to their employees. On the one hand, employees can work more effectively if they have discretion how and when to complete a task, if they have the right to act on private information to solve a problem that arises in the production process, or if they can autonomously and swiftly react to a changing environment. On the other hand, the employer loses control when he grants discretion to his employees because they have more shirking opportunities. In this paper, we examine experimentally the economic forces that render broadly defined jobs and discretion profitable.

We show that 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 high effort discretion, or they offer a "bad" job with the opposite cluster of job characteristics – low wages, low effort requests, little rent-sharing, and limited effort discretion. Our experimental data show that the opportunity to screen employees on the basis of past performance is a necessary condition for the viability of good jobs. However, even if employers can

screen employees by past performance, not all of them offer good jobs. The reason is that a significant minority of employers and employees persist in making sub-optimal choices which lead to a segmented labor market. Competition fosters learning and promotes the emergence of good jobs which leads to large welfare gains for both employers and employees.

In the base treatment, the results are consistent with both the predictions of the self-interest model and models of social preferences. In the screening and competition treatment, where employers received a signal about the employees' past behavior, the results are consistent only with the predictions of models of social preferences. The data is also consistent with the existence of hidden costs of control, but in our context these costs are small and not decisive for the optimal job design.

To address the external validity of our experimental results, we examine whether the positive correlation between effort discretion and little supervision on the one hand and wages and job rents on the other hand is supported by field evidence. Detailed data on workplace characteristics, wages, and job satisfaction from the German Socio-economic panel confirm these associations with high significance.

Our experiment contributes to the solution of an enduring puzzle in the literature on innovative human resource management practices: why do not all firms implement "high-performance work systems" if this can result in higher overall 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, in the 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).

The results of this paper give rise to many new research questions. For example, in our experimental design employers received information about past performance signals for free, but in reality it is often costly to acquire this information. If an employer believes that all employees have poor reputations, he will not buy this information but rather restrict the employee's discretion, which will indeed induce the employee to shirk. Likewise, if an employer has to commit in advance (before observing the agent's reputation) on the type of job to offer, he may believe that most employees will shirk, so offering bad jobs with limited discretion is optimal, which again induces the employees to provide low effort. This could reinforce the segmentation of the labor market and make it more difficult for good jobs to emerge.

Appendix

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.

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

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.
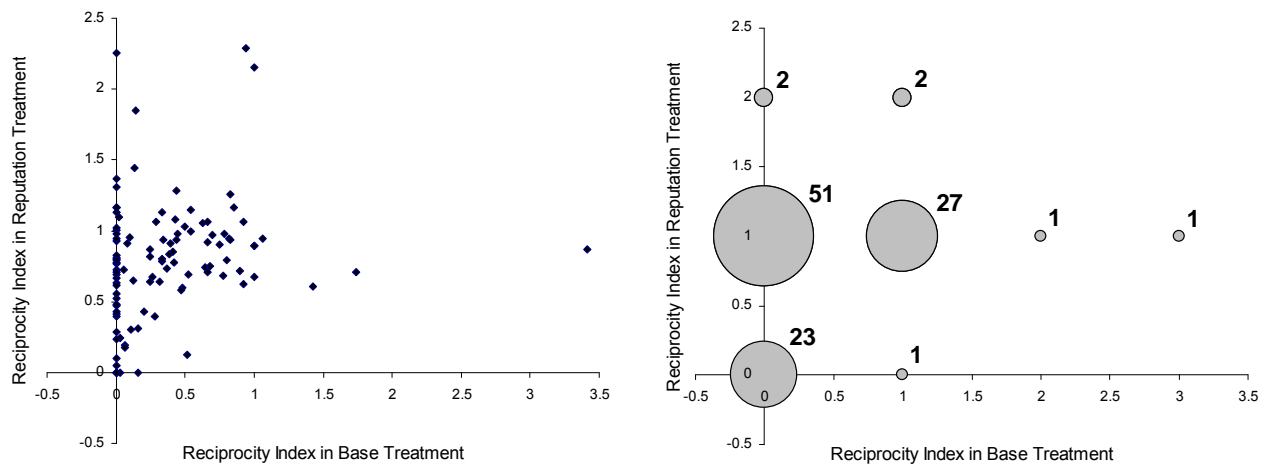
FIGURE A1.—Classification of employees' types. In the left panel, each dot represents one employee. In the right panel, the reciprocity indices are rounded to natural numbers illustrating our classification of employees' types. The size of the bubbles is proportional to the number of employees in each category.

The left panel of Figure A1 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. On the basis of the reciprocity index three large clusters of employees arise:[38]

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.[39] 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

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[38] 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.

[39] In the base (reputation) treatment they choose an average effort of only 2.78 (3.35, respectively).

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 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).

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