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ABSTRACT

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The prevailing labor market models assume that minimum wages do not affect the labor supply schedule. We challenge this view in this paper by showing experimentally that minimum wages have significant and lasting effects on subjects' reservation wages. The temporary introduction of a minimum wage leads to a rise in subjects' reservation wages which persists even after the minimum wage has been removed. Firms are therefore forced to pay higher wages after the removal of the minimum wage than before its introduction. As a consequence, the employment effects of removing the minimum wage are significantly smaller than are the effects of its introduction. The impact of minimum wages on reservation wages may also explain the anomalously low utilization of subminimum wages if employers are given the opportunity of paying less than a minimum wage previously introduced. It may further explain why employers often increase workers' wages after an increase in the minimum wage by an amount exceeding that necessary for compliance with the higher minimum. At a more general level, our results suggest that economic policy may affect people's behavior by shaping the perception of what is a fair transaction and by creating entitlement effects.

JEL Classification: C91, D63, E64, J38, J42, J58, J68

Keywords: minimum wages, labor market, monopsony, fairness, reservation wages, entitlement

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1 Introduction

For decades, economists have been interested in the economic and social consequences of minimum wage laws. Important puzzles remain, however, despite much progress in both labor market theory and empirical analysis. First, several studies report anomalously low utilization of subminimum wages in situations where employers actually could pay workers less than the minimum (Freeman, Wayne and Ichniowski 1981; Katz and Krueger 1991, 1992; Manning and Dickens 2002). Katz and Krueger (1992) found, for example, that the introduction of the opportunity to pay subminimum wages to youth had no discernible effect on teenage workers' wages. This underutilization of the opportunity to pay less than the prevailing minimum occurred even though the vast majority of firms paid a starting wage below the new hourly minimum immediately before it became effective. Second, there is evidence (e.g. Card and Krueger 1995, Katz and Krueger 1992) that minimum wage laws have so-called spillover effects. After an increase in the minimum wage, fast food restaurants increased wages for workers by an amount exceeding that necessary to comply with the higher minimum wage. Third, the new minimum wage research in the 1990s (Card 1992; Card and Krueger 1994, Katz and Krueger 1992, Machin and Manning 1994; Dolado, Kramarz, Machin, Manning Margolis and Teulings 1996) questioned the conventional wisdom that increases in the legal minimum wage *always* cause a decrease in employment. Although these results remain contested (see, e.g., Neumark and Wascher 1992 and 2000; Card, Katz and Krueger 1994; Card and Krueger 2000) it is probably fair to say that they constitute a considerable challenge to the conventional view of the employment effects of minimum wages.

Why do profit maximizing employers not take advantage of the possibility of reducing wages below the legal minimum, and why do they pay more than the required minimum for those workers who earned less than the new minimum wage before it was introduced? We report the results of laboratory experiments that examine the driving forces behind these phenomena in this paper. We provide, in particular, evidence showing why profit maximizing employers may find it profitable to pay workers much higher wages after the removal of a legal minimum wage than before its introduction.[1] This result provides an explanation for the anomalously low utilization of subminimum wage opportunities because these opportunities were typically introduced after a previous increase in the minimum wage. In addition, our data

[1] Throughout the paper we use the term "employer" or "firm" for subjects who are in the role of an employer in the experiment. The term "worker" is used for subjects who are in the role of a worker in the experiment.

show why profit maximizing employers may find it optimal to pay wages above the minimum wage even if they paid wages much lower than the minimum wage before its introduction. This result provides an explanation for the second puzzle, i.e. why there are wage spillover effects. Finally, we report evidence indicating that profit-maximizing employers may find it optimal to *raise* employment after the introduction of a binding minimum wage whereas it is not optimal to reduce employment after the removal of the minimum wage. These patterns provide an explanation for the possibility of positive employment effects of minimum wage increases and they suggest an important asymmetry between the introduction and the removal of minimum wages.

We identify the observed pattern of reservation wages as the driving force behind all these phenomena. One of the advantages of laboratory experiments is the possibility of measuring variables that are hard or impossible to measure in the field. We measure workers' reservation wages in our experiments, enabling us to compute employers' profit maximizing responses to the introduction and the removal of minimum wages. In this context, an important finding is that workers' fairness concerns strongly shape individual reservation wages. The material payoff of not working in our experiment is identical across workers and far below the marginal revenue of a worker at full employment. Thus, if all workers were completely selfish, firms would face an infinitely elastic labor supply schedule up to the point where they employ all workers. However, workers do not accept any wage offer that is above a purely selfish individual's reservation wage. Instead, they exhibit considerably higher reservation wages, i.e. they reject wages offers they perceive to be unfairly low. This finding has the important consequence that – on average – individual firms face an upward sloping labor supply schedule.

Moreover, individual workers' reservation wages are affected by the minimum wage, suggesting that the minimum wage affects what is perceived as a fair wage. After the introduction of a minimum wage, workers' reservation wages increase and a substantial share of the workers even exhibits reservation wages above the legal minimum. Profit-maximizing firms are thus forced to pay wages above the minimum, which explains the spillover effect. After the removal of the minimum wage, workers' reservation wages decrease somewhat; however, their reservation wages still substantially exceed those before the introduction of the minimum wage. It seems that the minimum wage leads to a kind of ratchet effect in workers' perception of what constitutes a fair wage. This means that individual firms face a tighter labor supply schedule after the removal of the minimum wage than before its introduction. Therefore, it is a profit maximizing strategy to pay substantially higher wages after the removal of the

minimum wage than before the introduction. This finding explains why firms may find it unprofitable to utilize subminimum wage opportunities.

Our finding that the firms' labor supply constraint after the removal of a minimum wage is tighter than before its introduction echoes results reported in Katz and Krueger (1992). They report that 62 percent of fast food restaurant managers who were not using the subminimum opportunity for youth believed they could not "attract qualified teenage workers at the subminimum wage" although the vast majority of these restaurants hired workers at less than the new minimum wage prior to its increase. In this context, it is important to stress that in our experiments, the mere experience of a minimum wage regime increases reservation wages relative to a situation where subjects did not have this experience. Relative comparisons between different categories of workers did not play any role in the experiment because either all workers or none of them were subject to the minimum wage. In reality, however, the introduction of subminimum wage opportunities is typically restricted to certain subcategories of workers. Therefore, firms who pay subminimum wages to these workers may face an even stronger resistance to accept subminimum wages.

The pattern of reservation wages also shapes the employment effect of the minimum wage. Since workers' fairness concerns impose an upward sloping labor supply constraint on individual firms, firms can increase employment if they pay higher wages. Theoretical analyses (Rebitzer and Taylor 1991, Manning 1995 and 2003, Burdett and Mortensen 1998, Bhaskar and To 1999) indicate that a minimum wage may actually increase employment under these circumstances. However, this is not obvious in our context for two reasons. First, as we will show below, the employment response depends on the concrete slope of the labor supply schedule; profit-maximizing firms will only increase employment if this slope is sufficiently steep. Second, the rise in reservation wages due to the introduction of the minimum wage could, in principle, induce firms to reduce employment. We observe, however, that the increase in reservation wages is not strong enough, i.e., the profit-maximizing wage response to the introduction of the minimum wage implies an increase in employment. Our subjects seem to have understood this quite well because on average, the actual wage and employment changes are rather close to the profit-maximizing wage and employment changes.

The asymmetric response of reservation wages to the introduction and the removal of the minimum wage is associated with asymmetric employment effects. Actual wages do not decrease to pre-minimum wage levels after the removal of the minimum wage because workers' reservation wages remain high. As firms pay higher actual wages in the post-

minimum wage situation than in the pre-minimum wage situation, more workers accept the firms' wage offers and employment decreases less after the removal of the minimum wage than it increased after the introduction of the minimum wage. In fact, we can show that if one takes the asymmetric response of reservation wages into account, the asymmetric employment effect is a consequence of employers' profit-maximizing behavior.

Although the introduction of a minimum wage led to a positive employment effect in our experiment, one should not conclude from this that a positive employment effect will also prevail in the real world because the number of firms was fixed in our experiment. If we had allowed for entry and exit of firms, the employment effects might well have been negative because the minimum wage decreased profits substantially. In addition, if we had allowed for endogenous investment choices, the profit-decreasing effect of minimum wages would probably have reduced the capital stock and hence employment. Finally, much depends on the concrete quantitative details in both reality as well as in our experiments, such as the slope of the labor supply schedule. Thus, minimum wages may have negative employment effects, depending on the specific quantitative features of the labor market under consideration.

Since the driving force behind our results is the impact of the minimum wage on reservation wages, it is natural to ask why minimum wages have this effect. As fairness concerns are likely to be the decisive motive behind workers' willingness to reject low wage offers, we believe that the peculiarities of preferences for fairness and reciprocity play a role here. The behavioral relevance of fairness intentions could be a reason why the minimum wage raises reservations wages. For example, paying a wage of x may reveal a fair intention before the introduction of the minimum wage because the firm may have the opportunity of paying even less; after the introduction of a minimum wage of $y \approx x$, however, the same wage x may be considered less generous because the firm has to pay y anyway. Evidence from other experiments (e.g., Blount 1995, Falk et al. 2003, Brandts and Charness 2004) also lends support to the idea that fairness intentions matter.

For our purposes, the study of Brandts and Charness (2004) is particularly interesting because they introduced a minimum wage in the context of a labor market with worker moral hazard where workers' fairness concerns drive effort. They show that workers provide less effort for the same wage level in the presence of the minimum wage, lending support to the view that workers' effort responses are partly shaped by fairness attributions. However, intention based fairness preferences cannot explain the asymmetric response in workers' reservation wages in our context. Therefore, we speculate that minimum wages may create a kind of entitlement effect or status quo effect which shapes workers' fairness preferences. If the

minimum wage establishes a status quo, where payment below the minimum wage is experienced as a loss, loss aversion may play a role and the resistance to wage cuts may be particularly high. While this idea seems plausible to us, we do not know of any fairness model with endogenous reference points that could rationalize the impact of minimum wages on reservation wages. Although several fairness approaches explicitly formalize the notion of intention based fairness preferences (Rabin 1993, Dufwenberg and Kirchsteiger 2004, Falk and Fischbacher, forthcoming), these fairness models cannot explain the asymmetric impact of minimum wages on reservation wages.

At a more general level, our results suggest that economic policies may not only affect the incentives for private agents, but also change the perception of what is fair and create entitlement or status quo effects. In the past, economists have concentrated their efforts on understanding the incentive effects of government policies. However, our results – in combination with other recent evidence (Madrian and Shea 2001; Ariely, Loewenstein and Prelec 2003) that seemingly innocuous situational details can have powerful behavioral effects – suggest that economists may gain a lot by focusing their research also on these other effects of government policies. Public policies affect behavior not only through changing incentives.

In addition, the result that reservation wages and, hence, actual wages remain high after the removal of the minimum wage may also inform us about the forces behind the adjustment of reservation wages over time. Our result suggests that reservation wages may be strongly shaped by actual wage payments which were previously experienced. This finding may have important consequences for the debate regarding the compatibility of the "wage curve", as documented by Blanchflower and Oswald (1994), and the Phillips curve. In particular, one condition for the compatibility of the wage curve approach with the Phillips curve approach is that past increases in real wages be fully reflected in current increases in reservation wages (Blanchard and Katz 1997, 1999).

In the following we first present our experimental design. Then we present our results in Section 3. In Section 4, we examine the extent to which the impact of minimum wages is due to the fact that minimum wages are necessarily a kind of wage guideline. Therefore, we study the impact of *nonbinding* wage guidelines on actual wages and reservation wages in this section. Section 5 summarizes and concludes the paper.

2 Experimental Design

In this section, we present the experimental design. We first describe the experimental game, followed by a description of the treatments and procedures. Finally we discuss the behavioral predictions.

2.1 The Experimental Game

Workers are randomly matched to firms in each period of the experiment, and can only conclude a contract with the firm with which they are matched. There are 6 firms and 18 workers in each experimental session, i.e., each of the 6 firms is randomly matched with three workers in each period. Firms have identical revenue functions with labor as the only variable input and a decreasing marginal revenue product of labor. To hire workers, firms can submit a unitary wage offer *w* to the matched workers, i.e. wage discrimination is ruled out. Firms can make wage offers to all matched workers or to fewer workers. Workers do not know how many wage offers the firm makes; each individual worker only knows whether he or she received a wage offer.

A worker can accept or reject *w*. If the worker rejects *w*, he or she is unemployed and earns nothing in this period. If a worker accepts the offer, a binding contract is concluded; the worker receives *w* and the firms' revenue increases according to the marginal revenue the worker generates. Each firm's revenue function is shown in Table 1.

Table 1: Firms' revenue function

Employed workers	Total revenue	Marginal revenue
0	0	-
1	390	390
2	740	350
3	1000	260

Firms' profits are given by total revenue minus wages. Thus an individual firm's profit function is as follows:

$$\Pi_{\text{Firm}} = \begin{cases} 0, & \text{if no worker is employed} \\ 390 - w, & \text{if one worker is employed} \\ 740 - 2w, & \text{if two workers are employed} \\ 1000 - 3w, & \text{if three workers are employed} \end{cases}$$

Workers' payoffs depend on the wage offer and on whether the offer is accepted or rejected. Thus payoffs for workers are:

$$\Pi_{\text{Worker}} = \begin{cases} 0, & \text{if no wage offer is received} \\ 0, & \text{if a wage offer is rejected} \\ w, & \text{if a wage offers is accepted} \end{cases}$$

Both workers' and firms' payoff functions are common knowledge among the participants. After all decisions in a period are made, payoffs are calculated and displayed on the subjects' computer screens: firms are informed both about their own payoffs and those of the workers with whom they have been matched; workers, too, are informed both about their own payoffs and that of their firm. The next period begins after all subjects have received this payoff information.

Since we were particularly interested in workers' individual reservation wages, we used the strategy method to elicit workers' acceptance decisions. To this end, workers were asked to indicate the lowest wage they would in fact be willing to accept before they knew which wage offer they actually received. If the wage offer actually received was lower than the worker's acceptance threshold, the offer was automatically rejected, otherwise it was accepted. Note that the specification of an acceptance threshold determined a worker's complete strategy, because the worker implicitly stated his accept/reject response to every possible wage offer. Neither the firms nor the other workers were informed about an individual workers' acceptance threshold. The firm was only informed about how many workers accepted its wage offer.

The acceptance threshold represents a worker's reservation wage. This information about reservation wages will prove useful for understanding the firms' behavioral responses to the introduction and the removal of minimum wages. In addition, the information about reservation wages enables us to implement a useful matching procedure. A large body of evidence now indicates that a significant share of experimental subjects exhibit a preference for fairness and reciprocity (Camerer 2003, Fehr and Schmidt 2003). In addition, the strength of fairness motives differs among those subjects who care for fairness. Therefore, we expected both a significant share of the workers to exhibit positive reservation wages as well as heterogeneity in these reservation wages. This means that – on average – firms face an upward sloping labor supply schedule. Thus, if we play the experiment for a very large number of periods, firms are likely to learn the distribution of reservation wages, enabling them to respond appropriately to this distribution.

However, repeating the same experiments for very many periods has also the drawback that subjects become bored or that their concentration diminishes over time, increasing the randomness of their behavior. Therefore, we only repeated each treatment condition for 15 periods and increased the probability of a firm receiving a representative draw of matched workers by implementing the following matching protocol. We partitioned workers according to their reservation wage into three groups of equal size in each period such that there was a group with high, a group with intermediate and a group with low reservation wages. The random matching ensured that each firm faces one worker from each group. We conjectured that, regardless of the behavioral equilibrium (i.e., the stable behavioral pattern) in our setting, this matching protocol would speed up adjustment towards this stable pattern.

2.2 Treatments and treatment orders

To study the economic effects of a legally binding minimum wage, each session contains two treatments: a treatment without a minimum wage (NO) and a treatment with a minimum wage (MW). Both treatments are played for 15 periods. The minimum wage is set at a level of 220, i.e., firms cannot offer wages below 220 in the MW treatment. Therefore, the range for admitted wage offers for firms is defined as follows: the constraint $0 \leq w \leq 1000$ prevails in the NO treatment, while wage offers have to obey $220 \leq w \leq 1000$ in the MW treatment. We implemented two treatment sequences to control for potential sequence effects. Subjects first completed the NO and then the MW treatment in the NO_MW sequence, while this order was reversed in the MW_NO treatment.

2.3 Subjects, payments and procedures

All subjects were students of the University of Zurich or the Swiss Federal Institute of Technology Zurich (ETH). Each subject participated in only one session. Subjects were randomly subdivided into two groups before the start of the experiment; some were assigned the role of a firm and others the role of workers. The assigned roles remained fixed for the whole session. All interactions were anonymous, i.e., the subjects did not know the personal identities of their trading partners.

To make sure that subjects fully understood the procedures and the payoff consequences of the available actions, each subject had to read a detailed set of instructions before the session started. After reading the instructions, participants had to answer several questions regarding the feasible actions and the payoff consequences of different actions. We only started a session

after all subjects had correctly answered all questions. The exchange rate between experimental currency units ("points") and real money was 150 Points = 1 Swiss Franc (~US $ 0.80).

The computerized experiment was programmed and conducted with the experimental software z-Tree (Fischbacher 1999). We conducted a total of five sessions with the NO_MW sequence and five sessions with the MW_NO sequence. We had 24 subjects (six firms and eighteen workers) in each session, yielding a total of 240 participants in the experiment. A session lasted approximately two hours and subjects earned on average 49 Swiss Francs (CHF 49 ~ US $ 40).

2.4 Behavioral conjectures

If we assume common knowledge of rationality and money-maximizing behavior, the prediction for this experiment is straightforward. Since the outside option is zero, selfish workers accept every positive (or non-negative) wage offer, which the firms anticipate. Thus, in a subgame perfect equilibrium of the NO treatment, firms offer a wage of one (or zero) to all three workers and the workers accept.[2] Full employment thus results, and firms reap almost all gains from trade. Firms cannot offer wages below the minimum wage of 220 in the MW treatment. Since the minimum wage is less than the third worker's marginal product, profit-maximizing firms offer the minimum wage to all three workers. As in the NO treatment, all workers are employed. A further implication of common knowledge of rationality and selfishness is that the treatment order does not affect the predicted behavior in any treatment.

However, as already mentioned, there is considerable evidence for the existence of heterogeneous preferences for fairness and reciprocity (see, e.g., the surveys of Camerer 2003, and Fehr and Schmidt 2003). These preferences imply that a person is willing to sacrifice material payoff in order to punish either unfair behavior or unfair people, or to move payoffs closer to equality. In our context, for example, a worker could punish a firm for offering a low wage by rejecting the latter's offer. If firms anticipate that some workers reject low offers, they may have an incentive to increase their wages beyond those predicted by the self-interest model. Moreover, the existence of heterogeneous fairness preferences also means that firms do not face a flat, but an upward sloping labor supply schedule. We believe that this feature of our experiment is externally valid in view of the many frictions that are present in real world labor

[2] Every strategy combination of the following form is a subgame-perfect Nash-equilibrium: The firm offers a wage of one to all three workers, at least one worker accepts only positive wage offers and the other workers accept all non-negative wage offers. Additionally, there is also another subgame-perfect Nash equilibrium, in which every worker accepts all non-negative wage offers and therefore the firm offers a wage of zero.

markets. Mobility costs and search costs in a world of imperfect information may well generate upward sloping labor supply schedules for individual firms. Manning (2003), for example, provides substantial evidence in favor of this view. In addition, a simple thought experiment suggests that the labor supply schedule individual firms face is not completely flat: Do we expect all employees to quit if a firm cuts all wages by one percent? The likely answer to this question is NO and, therefore, the labor supply schedule is likely to be upward sloping. The real question, therefore, is how strongly individual firms' labor supply schedules are upward sloping. Empirical evidence alone, and not assumption, can answer this question.

It is well known (see, e.g., Bhaskar and To 1998 or Boal and Ransom 1997) that if firms face an upward sloping labor supply schedule, increases in the minimum wage may not reduce but instead even increase employment because the hiring of additional workers can only be accomplished in the absence of a minimum wage if all workers' wages increase. Minimum wages may also have this effect in our experimental setting. Depending on the level and the degree of heterogeneity in reservation wages, it may be profit maximizing to hire less than three workers. For example, if reservation wages of the three matched workers are (0, 10 and 100), hiring three instead of two workers produces marginal costs of $3\times100 - 2\times10 = 280$, which exceeds the marginal revenue of the third worker, which is only 260. It is therefore optimal for the firm to hire two instead of three workers in this case. The introduction of a minimum of 220 reduces the marginal cost of labor from 280 to 220, which is less than the marginal revenue of the third worker. Thus, hiring all three workers is profitable in the presence of the minimum wage.

However, it is also easy to see that minimum wages need not have such an effect. If, for example, the distribution of reservation wages is (30, 60, 100), the marginal cost of employing the third worker is given by $3\times100 - 2\times60 = 180$ which is below the third worker's marginal revenue. Therefore, a profit maximizing firm employs all three workers regardless of whether there is a minimum wage or not. These examples illustrate that much depends on the concrete distribution of reservation wages. No concrete quantitative predictions are possible in the absence of knowledge about this distribution. For this reason, we postpone a more detailed analysis of the effects of fairness preferences on experimental outcomes to Section 3.1. In this section, we calculate profit maximizing wages for the observed distribution of reservation wages and discuss their employment consequences.

3 Results

In this section we present our main results. We concentrate on the economic effects of introducing a minimum wage (the NO_MW sequence) in Section 3.1. We start by reporting how the minimum wage regime affects wages. These results are subsequently explained in the light of workers' reservation wages. Next we investigate and explain the employment effects of introducing a minimum wage. We analyze the effects of a removal of minimum wages on wages and employment (the MW_NO sequence) in Section 3.2. Special emphasis is given to potential asymmetries in this context, i.e., we explore whether the treatment effects (NO vs. MW) are affected by the treatment sequence (NO_MW vs. MW_NO).

3.1 Introducing the minimum wage – effects on wages, reservation wages, and employment

Our first result concerns the wages paid to workers in the NO and the MW treatments of the NO_MW sequence. The main findings can be summarized as follows:

Result 1 (wages): *In the absence of a minimum wage law, actual wages are much higher than predicted by the self-interest model; however, the vast majority of wages is below the minimum wage level of 220. Nevertheless, in the presence of a minimum wage law, the majority of actual wages is not just raised to the level of the minimum wage but above that level.*

Support for Result 1 comes from Figure 1 and Table 2. Figure 1 shows a histogram of all wages paid to workers, both in the NO and the MW conditions, with wage intervals in steps of 10. As is obvious from this figure, wages in the NO condition (grey bars) are much higher than the self-interest model predicts. On average, firms pay wages of 188 and the standard deviation is 32.1. The lowest wage paid in the NO condition is 25 and more than 94 percent of all wage payments are equal to or above 150.

Figure 1 also shows that wages increase substantially after the introduction of the minimum wage (black bars). The average wage in the MW condition is 237.7 with a standard deviation of 11.1. The treatment differences in wages are highly significant, as can be inferred from Table 2. In this table, we report results from a regression. We regress wages on a MW dummy, which takes the value one if the observation comes from the MW treatment and a zero

otherwise.[3] The coefficient of the MW dummy is positive and significant on any conventional level.

Figure 1: Histogram of wages in the NO and the MW conditions (NO_MW sequence)

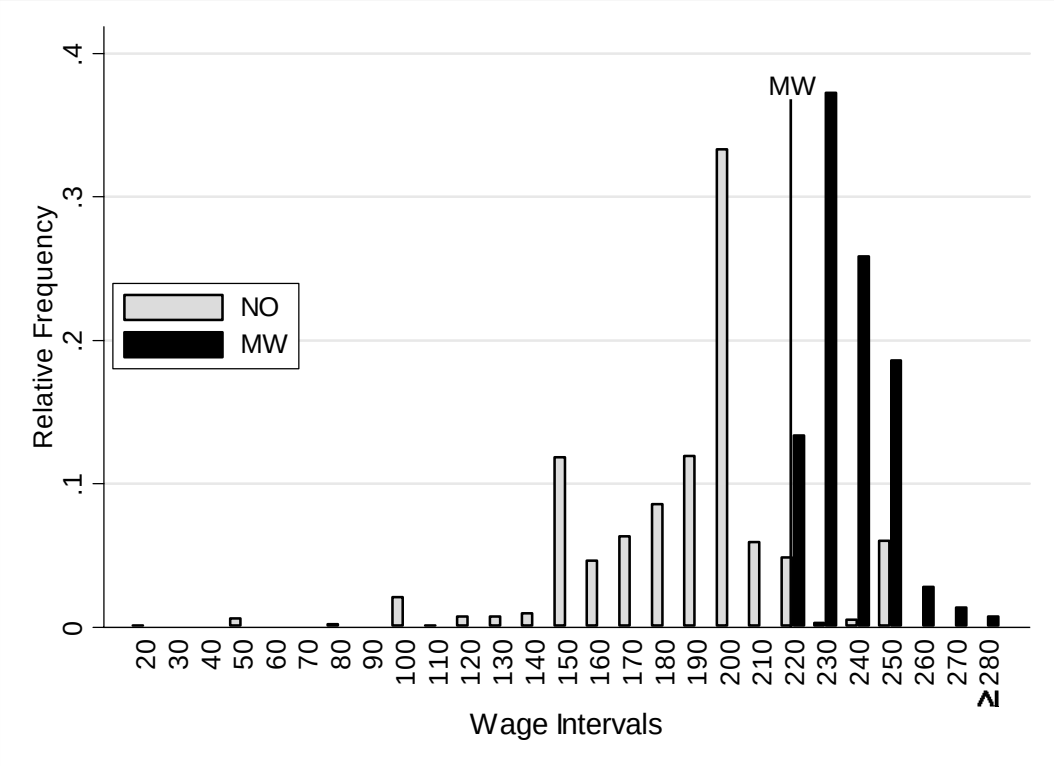


Table 2: Effects of introducing a minimum wage on wages

	Dependent variable: wage
MW dummy	50.11***
	(7.46)
Constant	187.58***
	(8.38)
Number of observations	2021
Prob > F	.003
R-squared	.533

Note: OLS estimation with robust standard errors clustered on sessions in parentheses, *** indicates significance at the 1-percent level.

[3] Since observations within a session may be dependent, all reported robust standard errors are clustered on sessions. This holds for all regressions in this paper.

Figure 1 illustrates a further interesting observation. Note that many wages in the MW condition exceed 220, the level of the minimum wage. Only seven percent of all wages are exactly at the level of the minimum wage, all other wages are higher than 220. This "spillover" effect of minimum wages is remarkable, since the minimum wage was *binding* in the sense that without the minimum wage, only 8 percent of the wages were above 220. Put differently, while 92 percent of the wages were *below* 220 before the introduction of the minimum wage, firms subject to the minimum wage regime pay wages *above* 220 in 93 percent of the cases.

Result 1 raises two important questions: 1) Why do wages attain their high level in the absence of a MW law? 2) Why do wages exceed the MW in the presence of the MW law? To answer these questions we need to take a closer look at reservation wages.

Result 2 (reservation wages): *In the absence of the minimum wage law, individual reservation wages are much higher than the self-interest model predicts, but almost all of them are below the minimum wage level of 220. However, in the presence of the minimum wage law, a large share of the subjects exhibit reservation wages above the minimum wage level.*

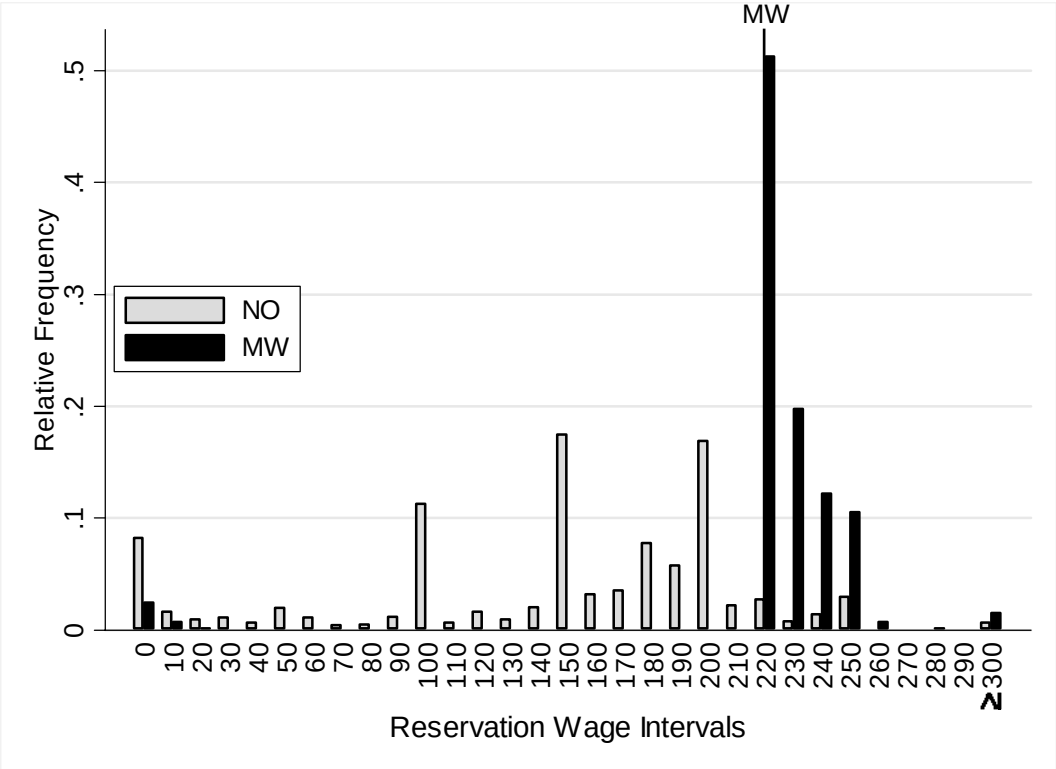
Support for Result 2 comes from Figure 2 which shows a histogram of stated reservation wages in the NO condition (grey bars) and the MW condition (black bars) of the NO_MW sequence. Reservation wage intervals are in steps of 10. Figure 2 reveals that only about 8 percent of all reservation wages are between 0 and 10 in the NO condition, i.e., only a small minority of workers chooses reservation wages close to the level the self-interest model predicts. In contrast, more than 82 percent of the chosen reservation wages are at least 100, 66 percent are at least 150 and 28 percent are 200 or higher. However, only 9 percent are equal to or higher than the later minimum wage of 220. The resulting mean reservation wage is 145.

The distribution of reservation wages in the NO condition is consistent with the view that preferences for fairness and reciprocity shape workers' acceptance thresholds. Workers with high acceptance thresholds could earn much more if they were willing to reduce their thresholds. This can be shown empirically by regressing the workers' earnings on their reservation wages. This results in a strongly negative relationship in the NO condition, with a "reservation wage coefficient" of -.499 and a t-statistic of -15.6 (OLS regression with robust standard errors, clustering on sessions). Apparently, many workers are willing to accept the costs of rejecting low offers.

Figure 2 also shows that the introduction of the minimum wage affects reservation wages. While 91 percent of the reservation wages are below the minimum wage level in the NO condition, 49 percent of reservation wages exceed the minimum wage in the MW condition.

This result suggests that minimum wages systematically affect what is considered to be a fair wage. Many workers seem to perceive a wage of 220, which would have been considered as fair and quite generous in the NO treatment, as unfairly low.

Figure 2: Histogram of reservation wages in the NO and the MW condition (NO_MW sequence)



A plausible explanation for this finding can be given in terms of fairness intentions. Several experiments have shown that the same payoff distribution is perceived differently depending on the underlying fairness intentions (e.g., Blount 1995, Falk et al. 2003). In Falk et al. (2003), for example, the rejection rate of an unfair offer depends on the set of available offers: the proposer could make an offer of 8:2 (8 for the proposer and 2 for the responder) or 5:5 in the main treatment of their $10 ultimatum game, while the proposer's offers were limited to 8:2 or 10:0 in a control treatment. The rejection rate for 8:2 was very high (44%) in the main treatment, contrasting with the low rejection rate in the control treatment (9%). Thus, subjects in this experiment behaved as if they perceived the same offer (i.e., 8:2) as less fair when the equal split (5:5) was the available alternative. A similar psychological mechanism may explain the shift in reservation wages after the introduction of the minimum wage. In our context, offering a wage of 220 is likely to be perceived as generous as long as the firm has the option of offering less. However, offering a wage of 220 does not signal similar fairness intentions if this

is the lowest offer a firm can make. In other words, 220 may be perceived as fair if the minimum is zero but not if the minimum is 220.

Intuitively, Result 2 provides the basis for answering the two questions raised by Result 1. Fairness preferences may make it profitable for the firms to pay relatively high wages in the NO treatment, while the change in reservation wages due to the minimum wage law may make the payment of wages above the minimum wage in the MW treatment profitable. To check this conjecture, we computed the firms' profit maximizing wage across treatments and for each session, given the workers' observed reservation wage schedule. Remember that three workers are assigned randomly to each firm at the beginning of a period. After indicating their reservation wages, the workers are subdivided into three groups: a low (l), a medium (m), and a high (h) reservation wage group. Subsequently, each firm is randomly matched with one worker out of each of these three groups. Assuming that firms know the distribution of reservation wages, they choose their wage offers in order to maximize the following expected payoff:[4]

$$E[\pi_F(w)] = p_l(w)\cdot 390 + p_m(w)\cdot 350 + p_h(w)\cdot 260 - [p_l(w) + p_m(w) + p_h(w)]\cdot w \qquad (1)$$

where p_i is the probability that a worker in the reservation wage group $i \in \{l, m, h\}$ accepts the offered wage. Accordingly, the first order condition is:

$$\begin{aligned}\frac{\partial E[\pi_F(w)]}{\partial w} = {} & \frac{\partial p_l(w)}{\partial w}\cdot 390 + \frac{\partial p_m(w)}{\partial w}\cdot 350 + \frac{\partial p_h(w)}{\partial w}\cdot 260 \\ & - \left[\frac{\partial p_l(w)}{\partial w} + \frac{\partial p_m(w)}{\partial w} + \frac{\partial p_h(w)}{\partial w}\right]\cdot w - [p_l(w) + p_m(w) + p_h(w)] = 0.\end{aligned} \qquad (2)$$

The optimal wage w^* equalizes the marginal revenue of a higher offer with its marginal cost. As in a standard monopsony problem, the marginal cost of a wage increase not only consists of the wage multiplied by the expected change in employment, but also includes the additional wage costs for the expected employment realized at the previous wage level.

[4] To a first approximation, the proposers in the ultimatum game typically make offers that maximize their expected monetary earnings. For example, the modal offer was close to the offer that maximized the proposers' expected earnings in each of the 4 countries in which Roth et al. (1991) conducted ultimatum games. Therefore, we assume that firms in our setting maximize their expected monetary payoff.

Given the actual distribution of reservation wages in the experiment, it is possible to calculate the optimal wage and employment for each firm in each period.[5] Table 3 shows the average of the resulting optimal wage offers together with average wages actually realized for each session in the NO and the MW treatment.

Table 3: Optimal wages and those actually chosen in the NO and the MW conditions (session averages in the NO_MW sequence)

	NO condition						MW condition					
Session number	S1	S2	S3	S4	S5	S1-5	S1	S2	S3	S4	S5	S1-5
Optimal wage	177	183	151	189	184	177	233	227	237	238	232	233
Actual wage	165	172	154	189	200	176	234	228	237	238	243	236

This table reveals several interesting findings. First, the optimal wage across sessions in the NO condition lies between 151 and 189. This explains our finding that wages greatly exceed the low level the self-interest model predicts. Second, on average firms pay wages that closely approximate optimal wages. The relative differences between optimal and actual average wages per session are between 0.29 percent (Session 4) and 8.7 percent (Session 5). This suggests that firms well understood the monopsonistic profit-maximization problem. Third, the correlation between the means of optimal and realized wages in sessions is positive and highly significant (Spearman's rho = .900, p=.0374). This shows that firms not only understood the maximization problem but also responded to the session specific distribution of reservation wages. This is quite remarkable, given that firms were not informed about the distribution of reservation wages but had to discover it in a trial and error process. Fourth, Table 3 shows that, as a consequence of the increase in reservation wages in the MW condition, optimal wages in fact exceed 220. This provides an explanation for the spillover effect reported in Result 1, i.e., the fact that firms pay wages in the MW condition that are not only higher than those in the NO condition, but also in excess of 220. Moreover, the difference between optimal and actual wages is rather small, as it is in the NO condition, indicating that firms well understood the

[5] We calculate the wage that maximizes expected profits in each period of every session, given the matching procedure described above and assuming that firms have perfect knowledge about the distribution of workers' reservation wages.

optimization problem. The relative difference between optimal and actual wages is in most sessions below one percent in the MW treatment.

In Section 2, we argued that firms may not be willing to employ all three matched workers when reservation wages are heterogeneous. Figure 2 shows that workers exhibit a considerable degree of heterogeneity with respect to their reservation wages in the NO condition. As firms' wage offers are close to optimal (see Table 3), it is therefore likely that employment is lower than predicted by the self-interest model. In principle, the introduction of a minimum wage could therefore lead to an increase in employment, because firms in the MW condition are exogenously forced to pay a minimum wage far above the observed average wage level in the NO condition. However, we also know that minimum wages lead to a considerable increase in reservation wages so that workers reject wage offers under a minimum wage regime that they would have accepted in the absence of a minimum wage law. Depending on the strength of each effect, the minimum wage law can therefore increase or decrease employment. Result 3 summarizes our findings concerning the employment effects of the introduction of a minimum wage:

Result 3 (employment): *Employment in the absence of the minimum wage is much lower than the self-interest model predicts. The introduction of minimum wages causes a significant increase in employment. However, due to the increase in workers' reservation wages, the employment effect of the minimum wage is smaller than it would have been had workers' reservation wages remained stable.*

Support for Result 3 comes from Table 4 and Table 5. Table 4 shows employment per firm for the NO and the MW sessions. The table reveals that employment is clearly below the level predicted by standard theory in the NO condition. Instead of three workers, 2.1 workers are employed on average and employment per firm does not exceed 2.4 in any single session. The reason for why firms employ less than three workers has to do with the level and the heterogeneity of workers' reservation wages. The reason for the low employment level is not that firms submit too few job offers. In fact, firms submit three job offers in 96.2 percent of the cases. However, 28.9 percent of the offers are turned down on average.

Table 4 also shows that the introduction of the minimum wage increases employment in our experiment. Average employment increased from 2.1 workers per firm in the NO treatment to 2.4 workers per firm in the MW treatment, an increase of about 14 percent (see final column in Table 4). Importantly, this positive employment effect of minimum wages occurs in each of

the five sessions. In Table 5, we report results of a regression where firm level employment is regressed on a MW dummy. The coefficient of the MW dummy is positive and significant at any conventional level.

Table 4: Employment per firm in the NO and MW sessions (NO_MW sequence)

Session number	S1	S2	S3	S4	S5	S1-5
NO condition	2.0	2.0	1.9	2.1	2.4	2.1
MW condition	2.4	2.5	2.2	2.4	2.5	2.4

Interestingly, profit maximizing behavior by firms implies an increase in employment after the introduction of the minimum wage. In Table 6, we report the profit-maximizing employment levels in the NO and the MW condition, given the distribution of reservation wages in each session, in comparison to actually realized employment levels. Table 6 shows that it was not profit maximizing for firms to hire three workers in the NO condition. Instead, profit-maximizing employment ranges from 2.01 to 2.49. Firms responded accordingly by choosing wages that resulted in an average employment between 1.91 and 2.38 workers per firm.

Table 5: Effects of introducing a minimum wage on employment

	Dependent variable: employment
MW dummy	.291***
	(.048)
Constant	2.10***
	(.078)
Number of obs	900
Prob > F	.0038
R-squared	.0357

Note: OLS estimation with robust standard errors clustered on sessions in parentheses, *** indicates significance at the 1 percent level.

Table 6 indicates that the increase in reservation wages in the MW condition offsets the potential positive employment effect to a considerable extent, but not completely. Remember that only 9 percent of all stated reservation wages were above the minimum wage level of 220

in the NO condition. This implies that, without a shift in reservation wages, the minimum wage would have increased the employment level to almost the maximum of three workers per firm. However, Table 6 shows that the profit-maximizing employment level in the MW condition, given the change in the distribution of reservation wages, is below three in each session but above the respective profit-maximizing level in the NO condition. This increase in the profit-maximizing employment level provides an explanation for the higher actual employment level after the introduction of the minimum wage.

Table 6: Optimal and actual employment levels in the NO and the MW conditions (session averages in the NO_MW sequence)

	NO condition						MW condition					
Session number	S1	S2	S3	S4	S5	S1-5	S1	S2	S3	S4	S5	S1-5
Optimal employment	2.30	2.49	2.01	2.47	2.28	2.31	2.61	2.61	2.31	2.51	2.30	2.47
Actual employment	2.03	2.04	1.91	2.13	2.38	2.10	2.36	2.49	2.19	2.40	2.52	2.39

3.2 Removing the minimum wage – economic effects and asymmetries

Up to this point, we have studied the economic effects of introducing a minimum wage. In the following we explore the minimum wage effects on wages and employment when the minimum wage is removed rather than introduced. In particular, we will focus on the question whether the economic effects are symmetrical, i.e., whether the treatment order (NO_MW vs. MW_NO) affects the nature of the treatment effects (NO vs. MW). Since the treatments (NO and MW) are exactly the same regardless of the treatment order, one would expect that removing the minimum wage lowers both wages and employment significantly. Moreover one would expect that the effects are similar in size to those resulting from the introduction of a minimum wage. Result 4 shows that this conjecture is not borne out by the data.

Result 4 (asymmetry in wages): *The temporary introduction of the minimum wage has permanent effects on actual wages, i.e., even after the removal of the minimum wage, actual wages remain close to the previous minimum wage level. Thus, pre- and post-minimum wage*

economies exhibit significantly different wages, although the two economies are identical in all exogenous parameters.

Support for Result 4 comes from Figures 3 and 4 and from Table 7. Figure 3 shows employed workers' average wages over time for both treatments in both sequences. Wages in the MW treatments of both the MW_NO and NO_MW sequences are very similar. In the MW_NO (NO_MW) sequence, 11 (7) percent of the paid wages are exactly at the level of the minimum wage, while 89 (93) percent of the wages are higher. This shows that the spillover effect described in Result 1 appears, regardless of whether we introduce the minimum wage at the beginning of the experiment or after subjects experienced an economy without the MW. In addition, the mean wage is exactly 237.7 in both sequences.

Figure 3: Average wages of employed workers in the NO_MW and MW_NO sequences

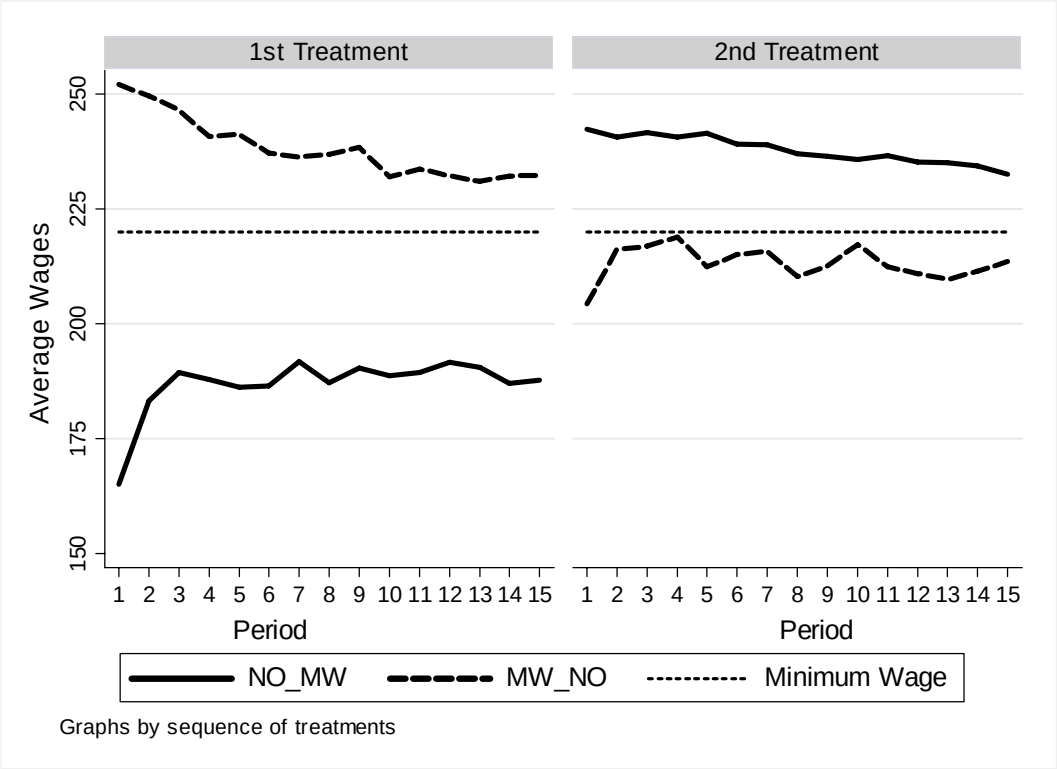
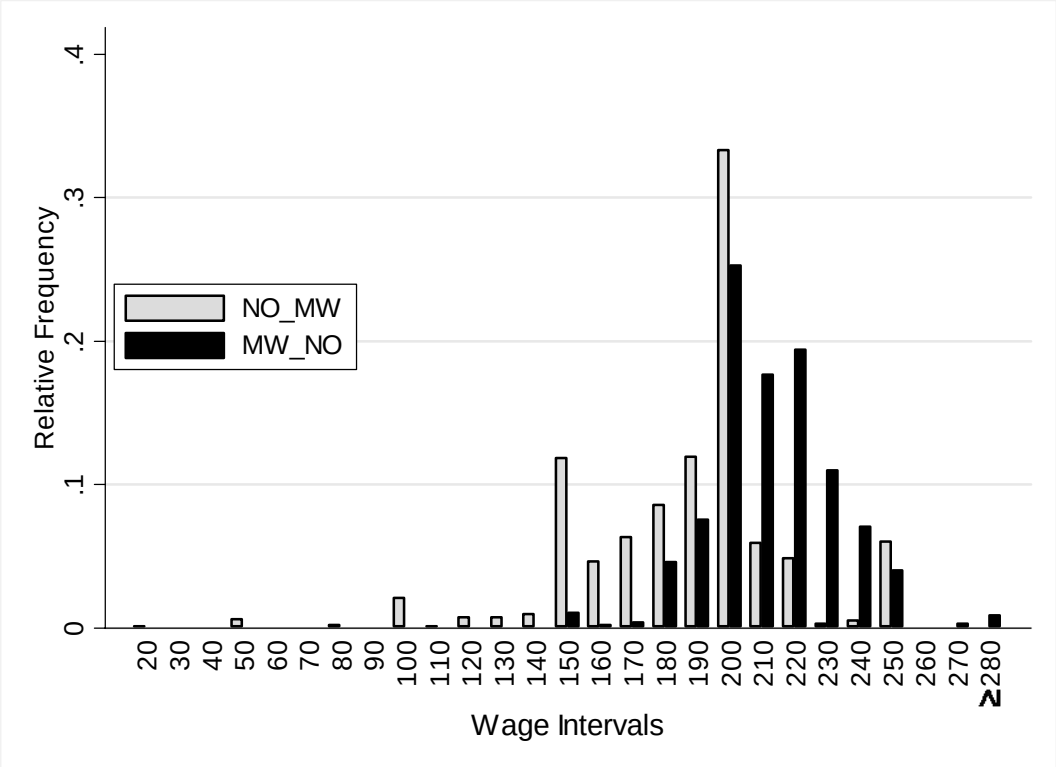


Figure 4: Distribution of wages in the NO conditions of the NO_MW and the MW_NO sequences



While wages in the MW conditions are identical, wages in the NO conditions differ substantially. While the mean wage in the NO treatment (see section 3.1) of the NO_MW sequence amounts to 188, it remains at 213 in the MW_NO sequence after removal of the minimum wage. Thus the previous minimum wage strongly affects wages in the NO condition of the MW_NO sequence. Further evidence for this result is found in Figure 4, which displays the distribution of wages in the NO conditions of both treatment sequences. Our results show clearly that high wages (above 200) are chosen much more frequently in the NO treatment after the removal of the minimum wage than before its introduction. The results of Table 7 further support this, showing that the wage difference between the NO_MW and the MW_NO sequence is highly significant. Wages are regressed on a MW dummy, a MW_NO-dummy and the interaction of the two. The MW dummy takes the value one if the observation comes from the MW treatment and zero otherwise. Likewise the MW_NO dummy takes the value 1 if the observation comes from the MW_NO sequence and zero otherwise. Finally, the interaction variable MW dummy*MW_NO dummy is an interaction term of these two dummy variables. Since we omitted the dummy for the NO_MW sequence, the constant in this regression measures the average wage in the NO treatment of the NO_MW sequence. The MW dummy measures the wage increase due to the MW treatment in the NO_MW sequence. It is positive

and significant. The MW_NO dummy measures the difference in actual wages in the NO condition across treatment sequences. The coefficient of this dummy indicates that wages in the NO condition are 25.7 units higher after the removal of the minimum wage law than before its introduction. The interaction term measures the difference in the MW effect across sequences. The coefficient of the interaction term is significantly negative, indicating that the impact of the minimum wage on actual wages is smaller in the MW_NO sequence than in the NO_MW sequence. Thus, the results of the regression indicate that a minimum wage law has lasting effects on actual wages even after the removal of the law.

Table 7: The effects of an introduction vs. a removal of the minimum wage on actual wages

	Dependent variable: Wage
MW dummy	50.11***
	(7.03)
MW_NO dummy	25.70***
	(8.85)
MW-dummy*MW_NO dummy	-25.70***
	(7.53)
Constant	187.58***
	(7.91)
Number of obs.	4076
Prob > F	.0000
R-squared	. 472

Note: Robust standard errors clustered on sessions in parentheses, *** indicates significance at the 1-percent level.

Why do firms pay higher wages after the removal of the minimum wage than before its introduction? A key factor in answering this question is again the impact of minimum wages on reservation wages.

Result 5 (asymmetry in reservation wages): *Reservation wages are higher after the removal of the minimum wage than before its introduction.*

Support for Result 5 comes from Figure 5. It shows a histogram of reservation wages in the two NO conditions, i.e., in the NO_MW and the MW_NO sequences. The figure reveals that the relative frequency of high reservation wages is much higher after the removal of the minimum

wage than before its introduction. While only 28 percent of the reservation wages are 200 or higher in the NO_MW sequence, this number is 52 percent in the MW_NO sequence. For wages above or equal to 220, the respective numbers are 9 and 23 percent.

Figure 5: Histogram of reservation wages in the NO conditions of the NO_MW and MW_NO sequences

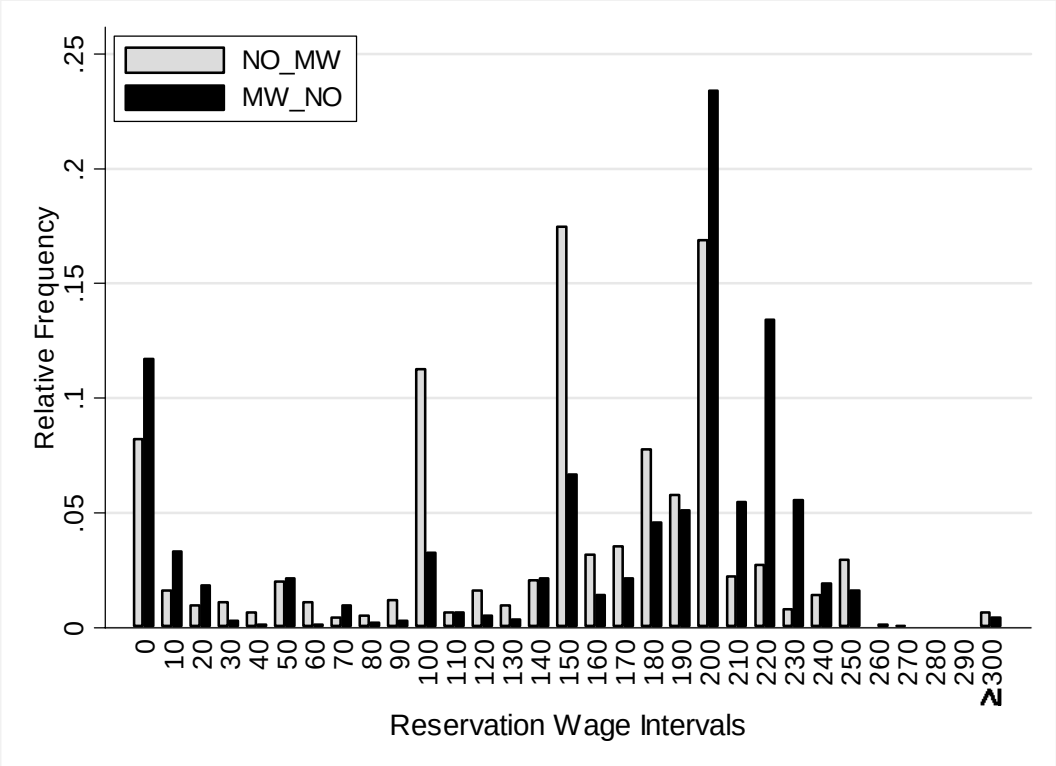


Figure 5 also shows that very low reservation wages are chosen more frequently after the removal of the minimum wage. While in the NO_MW sequence only 10 percent of the stated reservation wages are below 30, this is the case for 17 percent of the reservation wages in the MW_NO sequence. Taken together, these observations lead to the following aggregate picture: The average reservation wage is 145 before the minimum wage is introduced and 157 after its removal. The respective median values are 150 and 200. The big difference between median and average values comes from the shift at the lower end of the reservation wage distribution. While the small increase in very low reservation wages strongly influences the average reservation wage in the MW_NO sequence, this change does not affect the median. However, the probability of being assigned a worker with a very low reservation wage remains rather small for firms; thus, the data on average reservation wages is likely to underestimate the economic impact of the former minimum wage on actual wages in the NO condition of the MW_NO sequence. The change in medians, therefore, better captures the likely economic

relevance of the increase in reservation wages for the formation of actual wages; the medians suggest that reservation wages are strongly influenced by the previous minimum wage law.

The results of Table 8 further support the finding that the previous minimum wage law affects reservation wages in the NO condition. In the first column, reservation wages are regressed on a MW dummy, a MW_NO-dummy, and the interaction of the two. The same regression model is employed in the second column for medians of reservation wages per period, session, and treatment. The constant measures the reservation wage in the NO treatment of the NO_MW sequence. The MW_NO-dummy measures the difference between the reservation wages in the NO treatments across sequences. The coefficient of this dummy is positive in both regressions, but only significant in the second column: median reservation wages are thus significantly higher in the post minimum wage economy than in the pre minimum wage economy.

Table 8: Effects of an introduction vs. removal of a minimum wage on reservation wages

	Dependent variable:	
	Average reservation wage	Median reservation wage
MW dummy	78.31***	64.01***
	(3.52)	(4.44)
MW_NO dummy	11.70	26.67**
	(9.57)	(8.84)
MW-dummy*MW_NO dummy	-11.75	-27.47**
	(9.83)	(8.89)
Constant	145.16***	161.69***
	(4.71)	(4.04)
Number of obs.	5400	300
Prob > F	.0000	.0000
R-squared	.256	.761

Note: Robust standard errors clustered on sessions in parentheses, *** indicates significance at the 1-percent level., ** indicates significance at the 5-percent level. Median reservation wages are calculated per period, session and treatment.

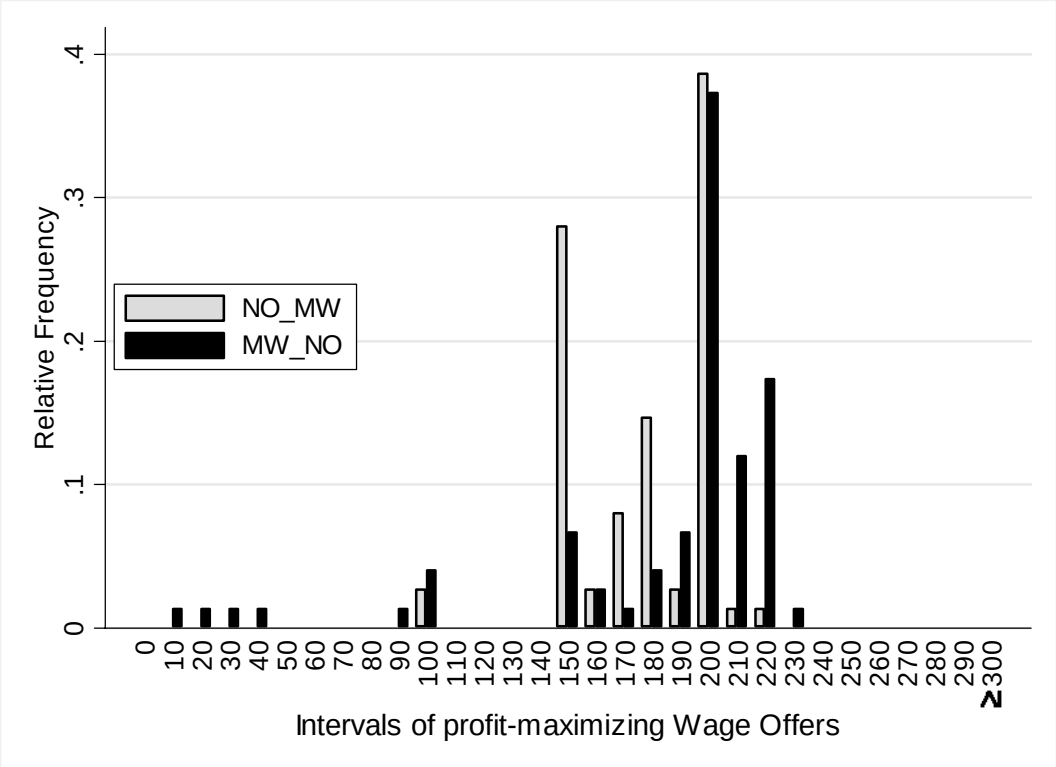
The sum of the MW_NO dummy and the interaction term measures the difference in the two MW conditions.[6] In both regressions, the effect is basically zero (11.70 – 11.75 = -0.05 respectively 26.67 – 27.47 = – 0.8) and insignificant (F-Test: MW_NO dummy + MW dummy*MW_NO dummy = 0, p = 0.709 and p = 0.713, respectively), which indicates that the treatment sequence does not affect reservation wages in the MW conditions.

Why do minimum wages exert asymmetric effects on reservation wages? One reason may be that the minimum wage, or the high wages associated with its existence, generate feelings of entitlement which persist after the removal of a binding minimum wage. Schlicht (1984) defines entitlements as "rights, as perceived by the individual. They are not, however, legal rights. Rather they denote the subjectively perceived rights that go along with a motivational disposition to defend them" (p. 24). Important sources for the formation of entitlements are past allocations, which results in a "sense of ownership in the status quo" Zajac (1995, p. 121). Applied to our context, we speculate that once workers have been exposed to a minimum wage, they become used to receiving a relatively high wage. This experience may create entitlements, i.e., workers think they have a right to receive high wages and are willing to defend them. As a consequence, they set relatively high reservation wages even after the elimination of the minimum wage.

So far we have shown that the minimum wage continues to affect the distribution of reservation wages after its elimination. However, the question remains open whether this effect should change the wage setting behavior of profit-maximizing firms. The calculation of profit-maximizing wages given the different distributions of reservation wages can provide an answer. Figure 6 shows the distributions of optimal wages for the two NO conditions. When we aggregate, we get an optimal mean (median) wage of 184 (200) for all NO sessions of the MW_NO sequence compared to 177 (180) for all NO sessions in the NO_MW sequence, respectively. The calculations and the figure show that it was optimal for firms to pay higher wages after the removal of the minimum wage than before its introduction.

[6] Intuitively, this claim holds for the following reason. The MW dummy takes on a value of one in the MW condition of the NO_MW sequence, while all three dummy variables in the regression take on a value of one in the MW condition of the MW_NO sequence. Thus, the difference between the MW conditions in the two different sequences is represented in the regression by the situation where the MW_NO dummy and the interaction term take on a value of one.

Figure 6: Histogram of profit-maximizing wages in the NO conditions of the NO_MW and MW_NO sequences



The same calculations for the MW treatments reveal that there are no differences between the two sequences. Optimal mean (median) wages are 233 (230) for the MW sessions in the NO_MW sequence and 231 (230) for the MW sessions in the MW_NO sequence. These calculations are in line with the fact that wages in the MW treatments are practically identical, regardless of the sequence of treatments.

Due to the long lasting effects of a temporary minimum wage on actual wages, the introduction and the removal of the minimum wage have asymmetric wage effects. This wage pattern may, therefore, be associated with asymmetric employment effects. Result 6 shows that this is indeed the case.

Result 6 (asymmetry in employment): *The introduction of the minimum wage causes significantly larger employment changes than its removal. In particular, the introduction causes a significant increase in employment, whereas the removal leaves employment unchanged.*

Table 9 provides support for Result 6. Similar to Table 4 it shows average employment in the NO and the MW condition for every session of the MW_NO sequence. The figures indicate that average employment levels are very similar in the MW and the NO conditions of the

MW_NO sequence. In fact, the difference in employment for all sessions is only 1.5 percent. In contrast, in the NO_MW sequence the overall employment difference is 13.9 percent.

Table 9: Employment per firm in the NO and MW sessions (MW_NO sequence)

Session number	S1	S2	S3	S4	S5	S1-5
NO condition	2.2	2.2	2.4	2.5	2.2	2.3
MW condition	2.2	2.3	2.5	2.3	2.2	2.3

The regression in Table 10 shows that the employment effects of the minimum wage differ significantly between the NO_MW and the MW_NO sequences. The significantly positive coefficient of the MW dummy indicates that employment increases after the introduction of the minimum wage. Recall that the interaction term measures the difference in the effect of minimum wages across sequences. Thus, the negative coefficient of this term indicates that the employment effect of the minimum wage is smaller in the MW_NO sequence than in the NO_MW sequence. Finally the regression also shows that there is no significant difference in employment between the NO and the MW treatments in the MW_NO sequence because the sum of the MW dummy and the interaction term are close to zero and insignificant (0.291 – 0.258 = 0.033, F-Test: MW dummy + MW dummy*MW_NO-dummy = 0, p = 0.464).[7]

[7] The sum of the MW dummy and the interaction term give us the difference between the NO condition and the MW condition of the MW_NO sequence for the following reason: all three dummy variables in the regression take on a value of one in the MW condition of the MW_NO sequence, while only the MW_NO dummy takes on a value of one in the NO condition of this sequence.

Table 10: Effects of an introduction vs. removal of a minimum wage on employment

	Dependent variable: employment
MW dummy	.291***
	(.046)
MW_NO dummy	.167
	(.095)
MW-dummy*MW_NO dummy	-.258***
	(.063)
Constant	2.10***
	(.074)
Number of obs.	1800
Prob > F	.0008
R-squared	.020

Note: Robust standard errors clustered on sessions in parentheses, *** indicates significance at the 1-percent level.

4 Sources of the minimum wage effect

One of our most important findings concerns the impact of the minimum wage on workers' reservation wages. Workers behaved as if they perceived the same wage to be less fair after the introduction of the minimum wage because they rejected wage offers that they previously had accepted. Therefore, the minimum wage seems to affect workers' views of what constitutes a fair wage. If this conjecture is true, then other interventions that change workers' fairness perceptions may have similar effects. In particular, *nonbinding* wage guidelines may also raise workers' reservation wages if they are set above the wage which previously prevailed. In reality, employer or employee organizations or government institutions sometimes propose wage guidelines. To examine the conjecture regarding the effects of wage guidelines, we conducted further control sessions. Subjects in these sessions first experienced the situation without a wage guideline (and without minimum wages) for 15 periods, after which we introduced the guideline. The level of the wage guideline was set at 220 – the level of the minimum wage in the previous sessions. Like the minimum wage, the guideline was common knowledge among the subjects and it was made clear that the guideline only constituted a nonbinding rule about the lower bounnd of firms' wage offers. We conducted a total of two sessions with wage guidelines. The results of these sessions are depicted in Figures 7 and 8. Figure 7 shows that the introduction of the wage guideline led to a considerable increase in

reservation wages. The average reservation wage without the guideline is 115 whereas the reservation wage with the guideline is 154 on average. The share of observations at 200 and 220 is much higher with the wage guideline. However, we observe almost no reservation wages above 220 in the presence of the wage guideline. Thus, although the guideline raises reservation wages, the increase is smaller than after the introduction of a binding minimum wage because 49 percent of the stated reservation wages were even above 220 in the latter case (see Figure 2).

Figure 7: Histogram of reservation wages in the NO and the WG conditions

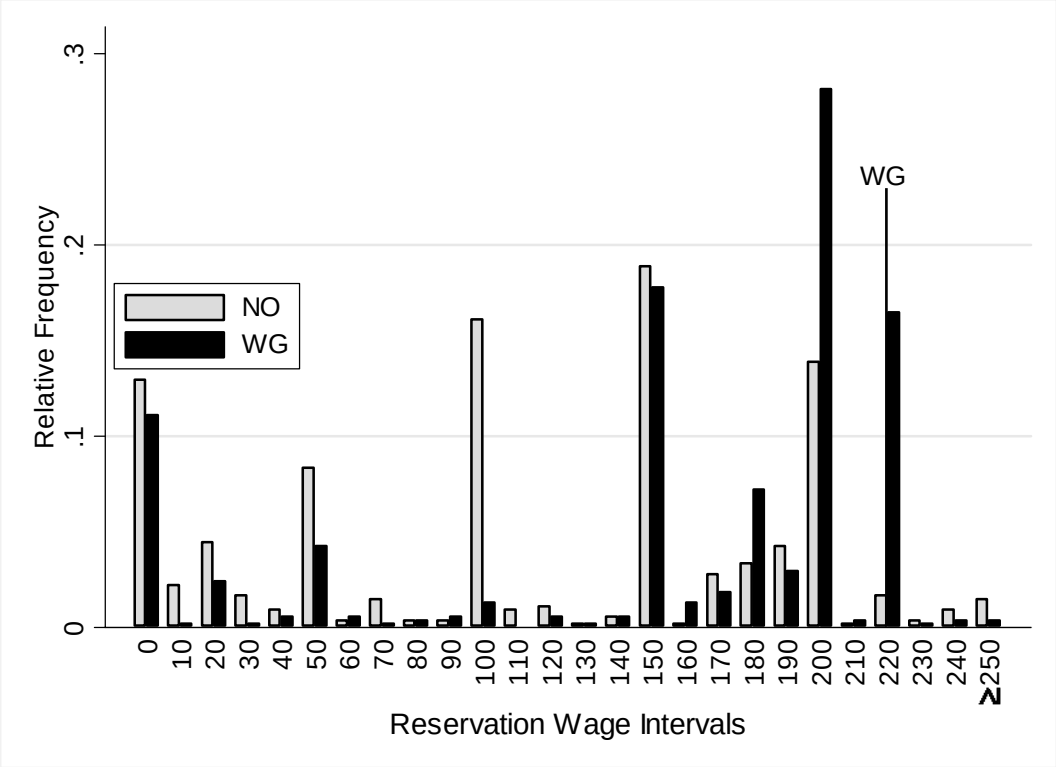
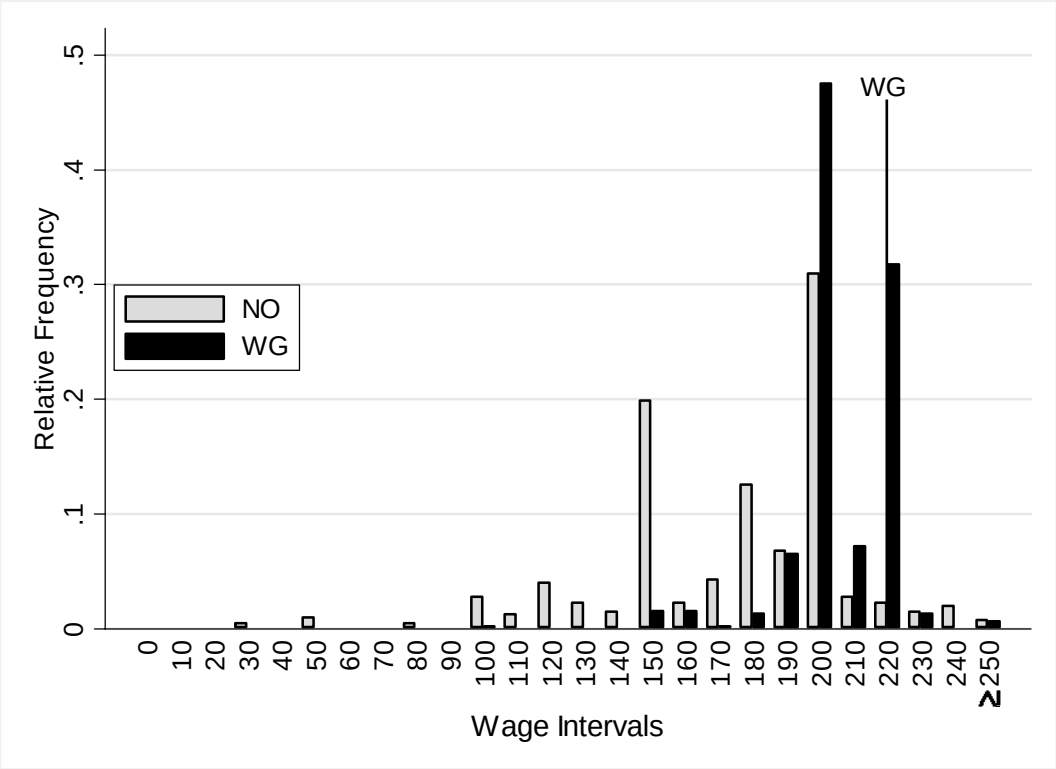


Figure 8 shows that the increase in reservation wages is also associated with an increase in actual wages. The average wage in the treatment without the guideline is 175, while average wages are 206 in the guideline treatment – a rise of 26 units. Interestingly, as in the case of reservation wages, there is a strong rise in the share of paid wages at 200 and 220. Recall from Section 3.1 that the introduction of a minimum wage increased wages by roughly 50 units. Thus, roughly half of the wage increase legally binding minimum wages cause may be attributed to the guideline effects of minimum wages whereas the other half of the wage increase is due to the legally binding character of the minimum wage.

Figure 8: Average wages of employed workers in the NO and the WG condition



The change in employment rounds up the effects of wage guidelines. Average employment per firm is 2.21 without the guideline whereas average employment increases to 2.47 in the presence of the guideline. Thus, as in the case of a legally binding minimum wage, the wage increase the guidelines cause seems to ease firms' labor supply constraint and contributes to a higher employment level.

5 Concluding remarks

Almost all economic reasoning is based on the assumption that behavioral changes are predominantly or even exclusively caused by changes in the incentives people face. Therefore, economic policy analysis is focused on how policy shapes incentives. However, the results of this paper suggest that economic policies have deeper effects. Subjects in our experiments exhibited higher reservation wages after the introduction of the minimum wage. This suggests that minimum wages affect subjects' fairness perceptions. A wage that is considered fair may no longer be perceived as such after the introduction of the minimum wage. Moreover, reservation wages are higher after the removal of the minimum wage than before its introduction. This suggests that minimum wages may generate entitlement or status quo effects. We believe that similar effects may also shape the impact of economic policies in other domains. In our context, these effects help us understand why a minimum wage increase may

cause a rise in actual wages that exceeds the increase in the minimum wage. The impact of minimum wages on reservation wages also provides a plausible explanation for the employers' hesitation to use opportunities to pay subminimum wages. This indicates that considering how economic policies shape the perceived fairness of the interactions between private agents and the perceived entitlements may enable researchers to explain hitherto puzzling phenomena.

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