

# Do Legal Standards Affect Ethical Concerns of Consumers? The Case of a Minimum Wage\*

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## Abstract

In order to address the impact of regulation on ethical concerns of consumers, we study the example of minimum wages. In our experimental market, consumers have monopsony power, firms engage in Bertrand competition, and workers are passive recipients of a wage payment. Two treatments are employed, one with no minimum wage in the first part but with a minimum wage in the second part, and one treatment with a minimum wage at the outset that is abolished in the second part. We find that the consumers exhibit considerable fairness towards the workers by buying from the firm with the higher price and the higher wage. We also find that consumers have a tendency to split their demand equally between firms which is a simple strategy to provide both workers with a minimal payoff. Introducing a minimum wage in a mature market crowds out consumers' fairness concerns and hence raises average

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wages only if the minimum wage is sufficiently high. Abolishing a minimum wage increases consumers' fairness concerns but not sufficiently to outweigh the losses of the workers due to lower initial wage levels.

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**JEL-Classification:** C91, J88, K31

# 1 Introduction

In the last decades, firm policy with regard to worker protection, climate change, or other ethical and environmental issues has received a lot of attention from the public. Firms can profit from fair behavior towards their workers or from environment-friendly production technologies if a sufficient number of consumers is willing to pay a higher price for its products than for products of other firms. Acting according to the consumers' views of proper conduct allows a firm to gain a reputation for being ethical. Thus, it is possible that fair behavior survives in a market environment. However, this depends crucially on the preferences of consumers.

Consumers' willingness to pay for ethical behavior of firms expresses itself not only in choosing to buy from firms that satisfy higher standards at higher prices, but also in agreeing to legal regulations that are likely to result in higher prices. Freeman (1996), for example, reports on an ABC/Washington Post poll from 1989 which posed two questions to the public. First, it asked whether the respondent's salary or the salary of someone in the immediate family would go up if the government increases the federal minimum wage in the US. Responses were as follows: Only in 8% of the cases the chief wage earner's salary would go up, in 12% of the cases the salary of someone else in the family would go up, and in 79% the salary of no-one in the family would go up. The same respondents were then asked whether they would still favor raising the minimum wage if business passed the increased salary costs on to the consumer in the form of higher prices. To this question, 82% answered with yes while only 16% said no. The fact that the vast majority of consumers accepts higher prices because of a raise in the minimum wage is striking as it suggests substantial willingness to pay for fair treatment of third parties. On the other hand, this was a hypothetical question, and it might well be that words are not followed by deeds. In contrast, we use an experiment with real monetary incentives to study consumers' willingness to pay for fair firm conduct in a controlled environment.

The main issue addressed by our experiment is whether regulation can undermine the consumers' willingness to pay for ethical firm behavior. Often governments want to ensure certain standards of behavior by legal regulations, such as minimum wages. But consumers may also be willing to pay higher prices if they know that the firm pays its workers a fair wage. The effects of government intervention on consumer behavior can be ambiguous. Apart from the direct effect of the regulation, e.g. forcing firms to pay a certain minimum wage, indirect effects can play a role if consumers' preferences are not purely selfish. On

the one hand, a minimum wage might undermine the reputation gain of a firm from paying workers a fair wage (above the minimum wage) and as a result actually lead to lower wages. Also, if consumers are willing to pay for a certain level of equality among market participants, a minimum wage can crowd out voluntary payments of high prices for high wages by consumers. On the other hand, a minimum wage might be interpreted by consumers as market wages being too low. If that is the case and in particular if the minimum wage is low, consumers will pay more attention to wages paid by firms and possibly condition their purchase decision on them.

In the experiment, we use a simple setup to study the relationship between fairness and regulation. Consumers have monopsony power in a Bertrand duopoly market. Workers have no bargaining power as they have no decision to take. They are employed by a firm and can neither be fired nor can they quit themselves. Their only source of income is the wage. In each duopolistic market, the consumer is informed about the prices and wages of both firms. He can then decide which firm to buy from, and he can also split his demand between firms. This gives the consumer the power to enforce higher wages by buying from the firm with the higher wage.

We compare two main treatments. In the first, there is no minimum wage initially, but it is introduced after the first half of the experiment. In the second treatment, there is a minimum wage at the beginning, but it is abolished after the first half of the experiment. This allows us to study the effect of a minimum wage at different stages of experience in a market, and the effect of changes in the minimum wage policy.

We find that the introduction of a minimum wage leads to a significant increase of the workers' rents only if it is sufficiently high. In contrast, abolishing a minimum wage always affects workers negatively. Furthermore, we find that consumers exhibit a considerable willingness to pay for a better treatment of workers as suggested in the poll quoted by Freeman (1996), but we also find that this is affected in important ways by the minimum wage policy. Consumers adjust their behavior to changes in the minimum wage regime. In particular, the consumers' willingness to buy from the firm with a higher price and a higher wage is increased when wages drop after the abolishment of a minimum wage. Moreover, the increase is larger than what can be explained by the decrease in prices. Furthermore, the consumers' strategy to split their demand equally between the two firms is increased when a minimum wage is abolished. This suggests that the initial presence of a minimum wage has partly crowded out fairness concerns. This also holds true when comparing treatments with

and without a minimum wage in the first part of the experiment. In the treatment with a minimum wage, consumers less often buy from the firm with higher wages and higher prices as well as less often spread purchases equally, even after taking differences in prices and wages into account. In the absence of a minimum wage consumers exhibit weaker fairness concerns when they have experienced a period with a minimum wage before than when they have not. These observations suggest that changes in economic policy not only change the set of actions, but also the perceptions of fairness in a market and that crowding out of fairness concerns is an issue.

Experimental evidence has shown repeatedly that many people's choices cannot be reconciled with purely selfish preferences. In the dictator game (e.g. Forsythe, Horowitz, Savin and Sefton 1994, Roth 1995) proposers often allocate positive amounts of money to another player, which is in line with other-regarding preferences. In the light of this literature it is not surprising that consumers care about the wage of the worker.

The game used here is more closely related to the three-person ultimatum game by Güth and van Damme (1998) where the proposer can allocate money to a responder and to a dummy. The responder can accept or reject the proposal and the dummy is passive although his payoff depends on the actions of the other players. Experimental tests of this game show that the responder earns more than the dummy on average, see Güth and van Damme (1998) and Güth, Schmidt and Sutter (2007). This suggests that the responders' willingness to punish proposers for the sake of the dummy player is limited. On the other hand, in a third-party punishment game (Fehr and Fischbacher, 2004), where a third player can punish the dictator in a two-person dictator game after he has made the choice, unequal splits are frequently punished and dictators frequently split the pie equally. In our experiment, since a consumer can choose between two firms he can use the competition to play them off against each other. In contrast to the three-person ultimatum game and the third-party punishment game, he can punish an unfair firm by switching to the less unfair firm. This makes punishment by the consumer quite effective.<sup>1</sup> On the other hand, the consumer might have to pay a higher price at the firm with the higher wage. In addition, we have two firms and two workers, making the fairness considerations more tricky.

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<sup>1</sup>All these experiments find evidence for an indirectly reciprocal motivation of participants, because they reward or punish friendly or unfriendly acts between two other participants, that do not affect them directly. See, for example, Nowak and Sigmund (1998), Nowak and Sigmund (2005), Seinen and Schram (2006), and Engelmann and Fischbacher (2009) for the literature on indirect reciprocity.

There is a growing literature on crowding out of intrinsic motivation with extrinsic or economic incentives.<sup>2</sup> Falk and Kosfeld (2006) study the interaction between intrinsic motivation and formal rules. They examine the impact of the principal's choice to restrict the possible choices of the agent on the effort level of the agent. They find that the intention of the principal matters, i.e. the crowding-out effect of restricting the agent's choice set critically depends on the principal actually taking this choice instead of an exogenous change in the choice set. By contrast, the minimum wage in our experiment is introduced or abolished exogenously, i.e. by the experimenter, but we find that it can nevertheless affect behavior adversely.

Little experimental work has been done on the effects of minimum wages yet. A notable exception is the study by Falk, Fehr and Zehnder (2006) which focuses on the impact of a minimum wage on the reservation wage of workers and on their fairness perceptions. Brandts and Charness (2004) investigate the effect of a minimum wage in a labor market characterized by gift exchange between workers and employers. Note that in contrast to these two studies, we focus on the consumers' reaction to a minimum wage, not the workers'.

A large portion of the empirical literature on minimum wages investigates the employment effect of raising the minimum wage. This has been rather controversial (Card 1992, Card and Krueger 1994, Dickens, Machin, and Manning 1999). In our experimental design, employment is exogenously fixed to keep the question of what a fair wage simpler for the consumers. Empirical studies on minimum wages have also observed so-called spillover effects. An increase in the minimum wage has been found to increase wages by more than the required amount (Card and Krueger 1995, Katz and Krueger 1992). We can study this issue with our experimental data and indeed observe that consumers and firms are willing to pay more than the minimum wage under certain conditions.

The rest of the paper is structured as follows. Section 2 describes the design in detail. In Section 3 we present and analyze the results. Section 4 concludes.

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<sup>2</sup>See Frey (1997), Frey and Jegen (2001), Gneezy and Rustichini (2000a) and (2000b). See also Ostrom (2000) for a discussion.

## 2 Experimental Design

We study a duopoly market with one consumer, who can buy up to 10 units of a fictitious homogeneous good. Each unit has a value of 25 points for the consumer. The two firms are represented by a manager who takes the decisions for the firm.<sup>3</sup> Each firm employs one worker. This worker is an actual participant in the experiment, even though he has no choice to make. The firm can produce up to 10 units of the good. The firm chooses a price (per unit)  $p \in [0, 50]$  and a wage  $w$  (per unit). If no minimum wage is in place, then  $w \in [0, 50]$ , otherwise  $w \in [\underline{w}, 50]$ , where  $\underline{w} \in \{1, 3, 6, 9\}$  denotes the minimum wage that is varied across treatments. The firms cannot price discriminate, i.e., the same price-wage combination holds for all 10 units, and the firms do not have an option to restrict supply. Wages are paid only for units actually sold and there are no other costs. Workers have no costs, no other source of income than the wage, and no outside option. If a consumer buys a unit from a firm that has chosen price  $p$  and wage  $w$ , the consumer earns  $25 - p$  for this unit, the firm makes a profit of  $p - w$  and the worker earns  $w$ . These earnings are multiplied by the purchased number of units in order to compute total earnings in a period.

The timing of the game is as follows. After the firms have made their choices, the consumer is informed about both firms' price-wage pairs  $(p_1, w_1)$  and  $(p_2, w_2)$ . He then decides how many units to buy from the firms. The consumer can buy any combination of integer amounts from the two firms up to a total quantity of 10, and he can also buy no units at all. At the end of each period the participants are informed about all decisions in their group, i.e., about both firms' price-wage combinations and about the decision of the consumer.

In the subgame-perfect Nash-equilibrium of the stage game with selfish agents, firms set  $w = 0$  if there is no minimum wage and  $w = \underline{w}$  if there is a minimum wage. The equilibrium price is  $p = w$ ,  $p = w + 1$  or  $p = w + 2$  (with  $p_1 = p_2$ ), and the consumer always buys 10 units from the cheaper firm, as long as  $\min(p_1, p_2) < 25$  for this firm, which always holds on the equilibrium path. (Off the equilibrium path, the consumer would buy nothing if  $\min(p_1, p_2) > 25$  for both firms and an arbitrary quantity if  $\min(p_1, p_2) = 25$ .) If both firms choose the same price, in equilibrium the consumer can split his demand in an arbitrary way between the two firms. Hence, in equilibrium almost the whole surplus goes to the

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<sup>3</sup>In the following, we refer to the manager as the “firm” since he is the player acting on behalf of it.

consumer.<sup>4</sup> By contrast, the payoffs are split equally among all five market participants if both firms choose  $p = 20$ ,  $w = 10$  and the consumer buys 5 units from each of the firms. In this case the payoff for all participants is  $\pi = 10 \cdot 5 = 50$ . Hence the minimum wage in all treatments is below the wage that would ensure equal payoffs.

Note that as long as the consumer buys 10 units, the total earnings in the market are constant. How a consumer spreads his purchases across the two firms does not affect the total earnings. This has the appealing property that we can study consumers' concerns for fairness that are not confounded with concerns for efficiency.<sup>5</sup>

Details of the implementation are as follows. We use a fixed-matching protocol, that is a group of five participants (one consumer and two firm-worker pairs) stays together for the whole course of the experiment. The main motivation for fixed groups is that we are interested in the degree to which consumer behavior drives firm behavior. This is obviously more relevant if the firms meet the same consumers many times. Participants keep their role for the whole experiment in order to enhance the possible inequalities and fairness concerns. The experiment lasts for 40 periods.

An interesting aspect of our setting is that in spite of the repeated interaction, consumers do not have an incentive to signal that they care about fairness if in fact they do not. This is in contrast to many other experiments that try to assess the fairness concerns of players such as ultimatum, trust and gift-exchange games. In these games, signalling typically increases the extent of fair behavior in early periods of repeated games, because the presence of a small share of fair players (or the mere possibility that they exist) makes it possible for selfish players to mimic them. In our experiment, since higher wages translate at least to some degree into higher prices, selfish consumers want to signal that they do not care about the worker but only about low prices.

We conducted two sets of treatments. In the NMF treatments (No Minimum wage First), there are initially no minimum wages, but they are introduced after the first 20 periods.

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<sup>4</sup>As the stage game has three equilibria with  $p = w$ ,  $p = w + 1$  or  $p = w + 2$ , collusive equilibria of the repeated game exist due to the possibility to punish deviations. While our main focus is on wages, we note that we do not find evidence of collusive firm behavior since most of the surplus does in fact go to the consumers (see below). All of these equilibria involve wages equal to the minimum wage. If the consumer is selfish, there is no reason to pay more for a higher wage and thus there is no reason for a (selfish but collusive) firm to pay higher wages.

<sup>5</sup>See Kritikos and Bolle (2001), Charness and Rabin (2002), Engelmann and Strobel (2004), and Harrison and Johnson (2006) for evidence that experimental subjects frequently exhibit preferences to maximize the total payoff. These papers show that the interpretation of many experimental results as evidence for fairness concerns is problematic since fairness concerns are frequently confounded with concerns for efficiency.

In the MF treatments (Minimum wage First), a minimum wage is in place initially, but it is abolished after 20 periods. At the beginning of the experiment, the participants are informed that there will be a change in the rules after 20 periods without mentioning that this change concerns the minimum wage. They are also informed that the group composition and the role assignment will not be changed. We implemented a market frame, that is in the instructions (for the full text see the Appendix), participants are called consumers, firms and workers and we use the terms “prices” and “wages”. The minimum wage is introduced as follows. In the MF treatments, it is stated that the wage has to equal at least  $\underline{w}$ , which is varied over  $\underline{w} \in \{1, 3, 6, 9\}$  between the sessions but is fixed within a session.<sup>6</sup> After the first 20 periods, participants in the NMF treatments are informed that from the next period on the wage has to be at least  $\underline{w}$ , and in the MF treatments instructions specify that from the next period on the wage only has to be non-negative.

The experiment was conducted at the Laboratory for Experimental Economics at the Technical University Berlin. The experiment has been programmed and run using z-Tree (Fischbacher, 2007). We had a total of 255 subjects, 102 of which were workers who did not take any decisions. Each of our subjects participated in one of 18 sessions, each consisting of two to four groups of five participants. Each group represents an independent observation. The number of groups per treatment are depicted in Table 1.

$\underline{w}$	1	3	6	9
<i>NMF</i>	4	10	4	0
<i>MF</i>	7	10	8	8

Table 1: Number of groups per treatment.

At the end of a session, earnings in points were converted at a rate of 200 points = 1€ and were paid out in cash. Participants received 5€ in points as an initial endowment. This serves to cover possible losses (if firms sell below the wage or consumers buy for a price above their valuation) and to ensure that workers get at least some non-trivial compensation.<sup>7</sup>

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<sup>6</sup>We did not conduct any sessions with a minimum wage of 9 in the second part (NMF9), because this would not differ from the other NMF treatments in the first part, and our other treatments suggest that a minimum wage of 9 in the second part would practically always be binding.

<sup>7</sup>Paying the workers a higher initial endowment was not feasible, because it would obviously have changed the egalitarian price-wage combination and more importantly would have reduced any fairness motivation to pay them a higher wage. We did observe some participants in the worker role who were clearly unhappy with the fact that they had no choice to make and also earned only marginally more than their initial endowment. This, however, was a necessary consequence of translating the situation of powerless workers

The sessions took between 60 and 80 minutes and average earnings were around 14.50 € (including the initial endowment).<sup>8</sup>

## 3 Results

In this section, we will first provide an overview of the prices and wages set by firms and the resulting distribution of rents (Section 3.1). In Section 3.2 we investigate the choices of consumers to understand to what extent firm behavior is driven by the fairness concerns of consumers. How the choices of consumers are affected by the minimum wage policy is addressed in Section 3.3. Finally, we are not just interested in how consumers react to changes in prices and wages that are due to the policy change, but also whether the behavior of consumers itself is affected by changes in the minimum wage policy. To test for such changes in the (revealed) preferences, we compare the estimates of the coefficients for fairness components in a model of consumer choice (Section 3.4).

### 3.1 Firm Behavior

#### 3.1.1 Wage and Price Dynamics

We start our analysis by looking at the wage offers over time as plotted in Figure 1. The wages reported here are those set by the firms, not only the wages that were actually paid.<sup>9</sup>

Interestingly in all treatments the starting values of the wage offers are very close to the fair wage of 10, independent of the minimum wage levels. In fact, using Fisher-Pitman permutation tests we cannot reject the hypothesis that the average wage offers in the first periods are equal to 10 both on an aggregate level and for each minimum wage level separately. This indicates that firms understand the game and are able to determine the fair outcome.

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into a laboratory setting.

<sup>8</sup>If the consumers buy ten units (all other decisions determine only the distribution among players), the average payoffs are 10 Euro plus 5 Euro initial capital. The slightly lower earnings that we observe result from consumers occasionally buying fewer than 10 units.

<sup>9</sup>We observe some cases where it appears that a participant in the role of the firm confused wage and price. We infer this from the fact that for one period they reverse a price-wage pattern that they have chosen before and afterwards. We generally excluded these observations of the corresponding groups from the analysis in the paper. Including them, however, neither affects any of our results quantitatively nor the significance of any of the treatment effects.

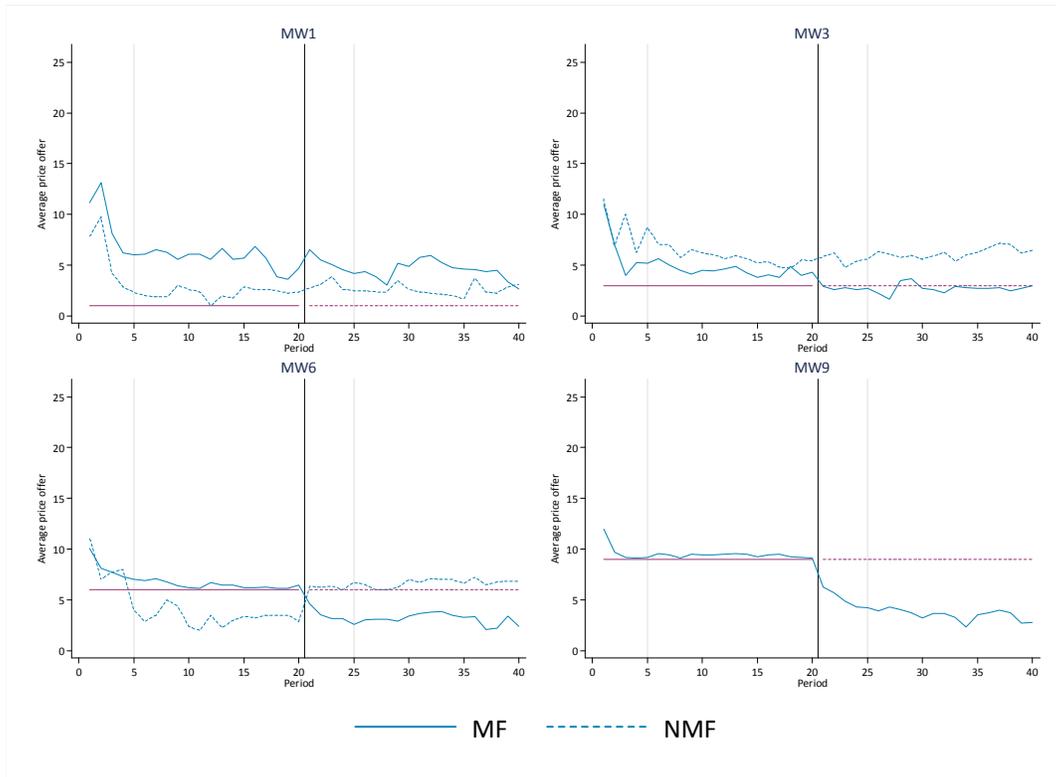


Figure 1: Average wage offers over time.

However, during the first periods the wages drop dramatically in all treatments. Indeed, if we focus on the first 5 periods, all treatments show a significantly negative time trend in the average wage offer.<sup>10</sup> The observed wage decrease in early periods of all treatments can be interpreted as some firms initially expecting consumers to be more concerned with fair wages than they actually are. When they discover that consumers mainly care about prices, they lower the wage and the price. In addition, firms might hold overly optimistic beliefs about the fairness of the competing firm. When they learn that the other firm does not pay a high wage (in combination with a high price), they reduce their wage and price as well in order to attract the consumer.

Similar to the analysis of the wage dynamics, Figure 2 depicts the development of the average price offers over time for each treatment. In the first period we observe that similar to the wages, the prices are very close to the fair level where each participant gets the same

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<sup>10</sup>We run hierarchical panel regressions with random individual and random group effects with the average price offer as the dependent and a time trend as the independent variable.

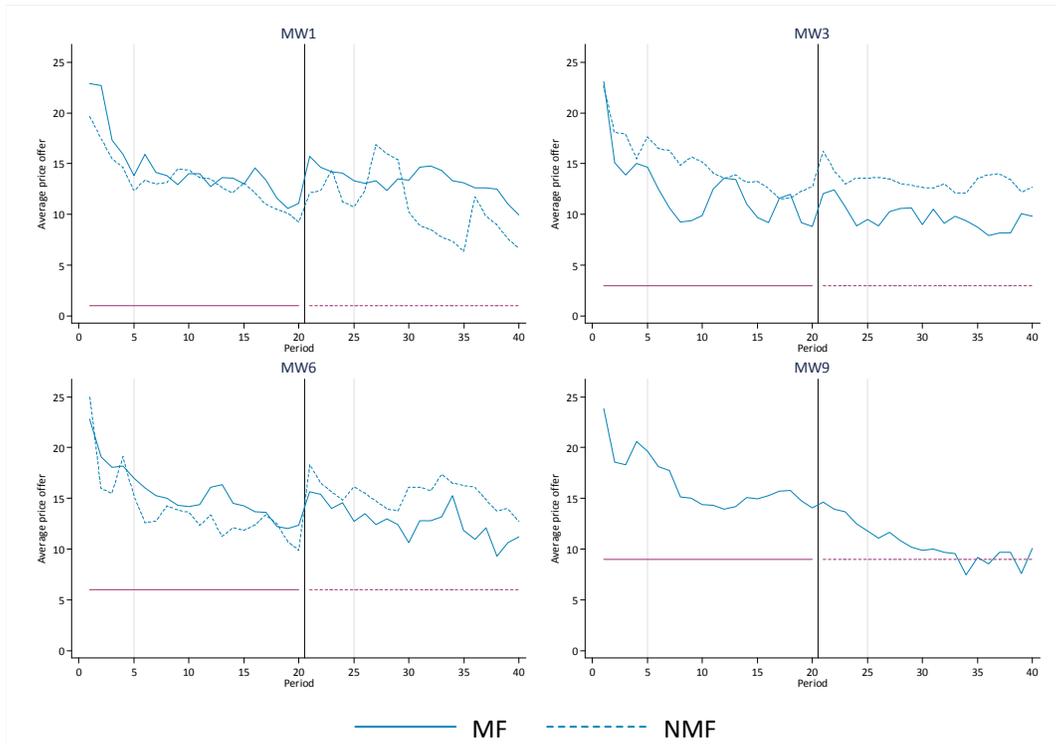


Figure 2: Average price offers over time.

profit. Indeed, using a Fisher-Pitman permutation test, the hypothesis that the average price in period one equals 20 is only rejected for treatment MF9. Furthermore, the prices drop rapidly during the first periods. Focusing again on periods 1-5 we observe a significant time trend in each of the treatments except MF9.<sup>11</sup> Also the first 5 periods of the second half show decreasing wages and prices while again wages and prices are much more stable in periods 26-40. In order to avoid confounds with these start and re-start effects we exclude the first 5 periods of each part of the experiment for the analysis in the remainder of the paper.

### 3.1.2 Wage and Price Levels

In order to analyze the effect of a minimum wage on the market outcome, Table 2 gives an overview of the averages of the wage offers, the price offers as well as the profits of each

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<sup>11</sup>For each data subset we run hierarchical panel regressions with random individual and random group effects with the average price offer as the dependent and a time trend as the independent variable.

market participant for each treatment and part.<sup>12</sup>

minimum wage level	average wages, prices and profits	no minimum wage first (NMF)			minimum wage first (MF)		
		Periods		change	Periods		change
		6-20 (1)	26-40 (2)		6-20 (4)	26-40 (5)	
1	wage offers	2.27	2.56	0.29	5.67	4.48	-1.18***
	price offers	12.41	10.34	-2.07***	13.27	12.97	-0.30
	worker profits	10.06	10.96	0.90	24.78	21.13	-3.65
	firm profits	39.59	27.75	-11.84**	35.56	41.04	5.48*
	consumer profits	124.85	161.81	36.96***	127.33	125.42	-1.91
3	wage offers	5.78	6.21	0.43**	4.46	2.71	-1.74***
	price offers	13.80	13.02	-0.77**	10.85	9.43	-1.42***
	worker profits	24.61	29.06	4.45**	19.49	12.02	-7.47***
	firm profits	33.00	30.36	-2.65	20.17	27.52	7.35***
	consumer profits	109.77	120.43	10.66**	159.38	166.34	6.97
6	wage offers	3.26	6.70	3.44***	6.43	3.16	-3.27***
	price offers	12.47	15.18	2.71***	14.33	12.18	-2.15***
	worker profits	11.00	30.58	19.58***	31.70	15.98	-15.72***
	firm profits	39.73	36.83	-2.90	34.64	40.36	5.72*
	consumer profits	136.87	111.00	-25.87***	115.57	136.67	21.09***
9	wage offers				9.39	3.56	-5.83***
	price offers				15.24	9.74	-5.50***
	worker profits				44.90	16.70	-28.19***
	firm profits				23.66	28.64	4.98*
	consumer profits				103.40	159.31	55.92***

Table 2: Average wage offers, price offers and profits by treatments.

First consider the effect of an introduction of a minimum wage. Columns (1) to (3) in the table contain results from the treatment groups that encounter no minimum wage in the first half (NMF). Although we do not expect any differences between these groups with respect to the level of the minimum wage introduced later (remember that the introduction of a minimum wage comes as a surprise for the subjects), comparing the average wage levels between NMF1 and NMF3 yields a significant difference in the wage offers. Since this difference can only be driven by group specific dynamics, we will rely on within-group comparisons for all tests reported in this paper.<sup>13</sup>

<sup>12</sup>We run hierarchical panel regressions with random individual and random group effects: \*\*\* p<0.01, \*\* p<0.05, \* p<0.10.

<sup>13</sup>The groups show a vast variation in their average wage offers that range from 0.1 to 11.3.

Regarding the effect of introducing a minimum wage, column (3) in Table 2 suggests that a minimum wage does not have an effect when it is too low. At a minimum wage of 1 there is no significant effect while minimum wages of 3 and 6 increase the wage offers significantly. On the other hand, column (6) reveals that the abolishment of a minimum wage decreases the wages in the markets considerably for all minimum wage levels ( $p < 0.001$ ). These observations are largely in line with rational profit-maximizing firms and consumers, except that the negative effect of abolishing a minimum wage seems to be larger than the positive effect of an introduction.

*Observation 1: (i) The introduction of a minimum wage leads to higher average wages if the minimum wage level is sufficiently high. (ii) The abolishment of a minimum wage leads to a reduction of average wages at all minimum wage levels.*

Turning to the average price offers, the effect of the minimum wage depends on its absolute value. Prices are declining when a low minimum wage is introduced (NMF1 and NMF3). Only if the minimum wage introduced is 6, prices increase with the average wage offers. In contrast, when the minimum wage is abolished, we observe a significant drop in the price level for all treatments but MF1.

*Observation 2: (i) If a minimum wage is introduced, prices increase only if the minimum wage level is high while prices decrease for low minimum wage levels. (ii) The abolishment of a minimum wage reduces the average prices at all minimum wage levels.*

Next we turn to the question how a minimum wage redistributes rents. The introduction of a binding minimum wage ( $\geq 6$ ) increases prices and wages while its abolishment decreases prices and wages. Thus, the introduction leaves workers better off at the disadvantage of the consumers while the firms' rents are not affected significantly. Exactly the opposite holds true when a minimum wage is abolished.

*Observation 3: High minimum wages redistribute money from the consumers to the workers while the firms are almost unaffected.*

## 3.2 Consumer behavior

The analysis in the previous section has demonstrated that wages are often above the level of the subgame-perfect equilibrium for selfish firms and consumers. In this section, we

investigate consumer behavior to understand whether it affects the wage setting by firms.<sup>14</sup>

Assuming that a consumer is purely self-interested, in periods where the price offers differ, we would expect that he buys 10 units from the cheaper firm. When price offers do not differ, self-interested consumers should buy 10 units with an arbitrary split between firms.

We observe two clear deviations of the consumers' choices from this prediction. First, consumers do not buy 10 units in total from both firms in 7.6% of the cases even though they can always buy for a price below 25.<sup>15</sup> The second notable deviation from the (selfish) game theoretic prediction is that the consumers do not buy exclusively from the (strictly) cheaper firm in 17.6% of the cases. In the following sections we will explore the driving forces of these choices and investigate how they are affected by policy changes.

### 3.2.1 Buying less than 10 units

Buying less than 10 units in total may either be motivated by self-interest if consumers try to break collusive behavior of the firms, or by social concerns for the workers when the consumers regard the overall wage level as too low. Although such a boycott is the most powerful tool to change the behavior of the firms, it is also the most costly for the consumers since the loss of buying less than 10 units is much higher than buying from a firm with a relatively high price.<sup>16</sup>

If the willingness to buy less than 10 units is driven by social concerns for the workers, we would expect to observe it more often when average wages  $\bar{w}$  are low. On the other hand, if the consumers buy less than 10 units out of self-interest, we would expect to observe it more often when the overall price level  $\bar{p}$  is high. Table 3 reports on regressions where we estimated the effect of the wage and price structure in the market on the consumers' propensity to reduce consumption below 10 units.<sup>17</sup>

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<sup>14</sup>As in the previous analysis we consistently drop the observations where one of the firms confused prices and wages since we are not interested in situations that we do not expect to observe outside the laboratory. Additionally, as in the preceding chapters, we focus on the last 15 rounds in each half of the experiment in order to avoid confounds with early-period dynamics in our results.

<sup>15</sup>In only 1.9% of the cases one of the prices exceeds 25 while there is not a single observation where both prices exceed 24.

<sup>16</sup>In 19% of the cases where the consumers bought less than 10 units in total, they boycott both firms completely and buy nothing.

<sup>17</sup>We run probit regressions with random individual effects for the NMF and MF treatments separately, where the dependent variable is a dummy indicating the total quantity being less than 10. Independent

	NMF	MF
$\bar{p}$	0.263*** (0.051)	0.287*** (0.076)
$\bar{w}$	-0.079 (0.074)	-0.098 (0.130)
$ \Delta p $	-0.101*** (0.034)	-0.148*** (0.042)
$ \Delta w $	-0.023 (0.050)	-0.031 (0.095)
$\chi^2_{(k-1)}$	45.81	41.26
$N$	531	948

Table 3: Consumers' propensity to buy less than 10 units.

The regressions show that the consumers' propensity to buy less than 10 units increases significantly with higher average price levels in both the NMF and MF treatments. However, this propensity decreases in the price difference, as for a given average price a larger price difference means a lower minimum price. Since wages do not show any effect, we conclude

*Observation 4: The consumers' willingness to buy less than 10 units is driven by self-interest only, with higher average prices decreasing the likelihood that all units are bought.*

### 3.2.2 Buying from the more expensive firm

We now turn to the cases in which the consumers do not buy exclusively from the (strictly) cheaper firm. Figure 3.A displays the number of units bought from the strictly more expensive firm.

The distribution has two peaks. First, consumers often buy an equal number of units at each firm even though the two prices differ.<sup>18</sup> Second, consumers occasionally buy all units from the firm with the higher price. Interestingly, both strategies are well separated from each other since there is only little mass on 7, 8, and 9 units. Furthermore, the consumers' propensity to buy less than 10 units is almost unrelated to their tendency to buy from

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variables are average prices and wages ( $\bar{p}$  and  $\bar{w}$ ), absolute price and wage differences ( $|\Delta p|$  and  $|\Delta w|$ ) and separate dummies for each part of the experiment and minimum wage level (the latter are omitted in the table). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ .

<sup>18</sup>When considering the whole data set, buying five units from each firm is the second most frequent choice of consumers (15.9%), which is only chosen less often than buying 10 units from one firm (63.6%).

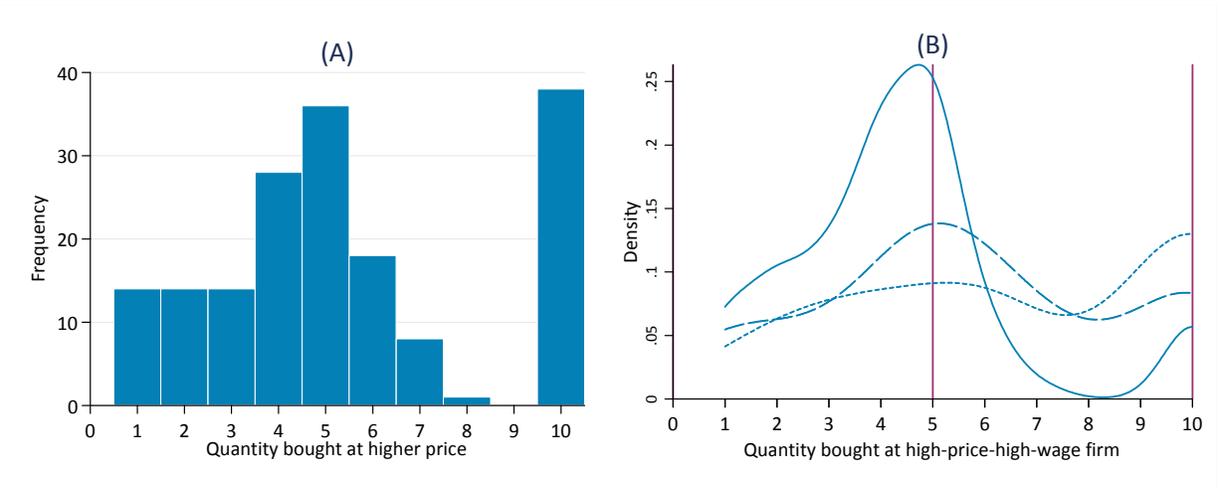


Figure 3: (A) Frequency of units bought at a strictly higher price. (B) Distributions of the number of units bought at the high-price-high-wage firm for high (solid line), intermediate (dashed line) and low average wages (dotted line).

the firm with the strictly higher price. Both actions together occur in only 1.7% of the cases and they are statistically independent (Fisher’s exact test:  $p = 0.155$ ).<sup>19</sup> This is not surprising as buying from firm with the higher price cannot be driven by self-interest while we find that buying less than 10 units is merely driven by self-interest.

Our main interest is in the question how wages affect the consumers’ purchasing decisions. To get a first impression of this effect of wages on consumer choices, Figure 3.B shows the density estimates for the number of units bought at the firm which has both the higher price and the higher wage (conditional on such a firm existing and at least one unit being bought at this firm) for different levels of average wage offers.<sup>20</sup> The graph suggests that the choice of the two strategies depends on the average wage level in the following manner. Moving from high to low average wage levels, we observe that the percentage of cases in which 5 units are bought from each firm declines from 29% (high  $\bar{w}$ ) to 27% (medium  $\bar{w}$ ) to

<sup>19</sup>Moreover, both strategies seem to be used by different consumer types since of the 30 consumers who buy any amount at the firm with the higher price only 4 ever do both, that is at least once they buy all 10 units from the more expensive firm and at least once they buy some but less than 10 units at the more expensive firm.

<sup>20</sup>The graph is based on the observations where the consumers bought at least one unit from the firm with the higher price and wage while excluding the cases where the consumers bought less than 10 units in total. A low wage level is defined as being at most three, an intermediate wage level as being above three and at most six, and a high wage level as being above six.

2% (low  $\bar{w}$ ). Similarly the fraction of purchases where all units are bought from the more expensive firm increases from 8% (high  $\bar{w}$ ) to 24% (medium  $\bar{w}$ ) to 43% (low  $\bar{w}$ ).

Splitting purchases equally or buying all 10 units from the more expensive firm might reflect short-term and long-term fairness considerations, respectively. A consumer who wants to split payoffs equally in the current period would buy equal (or almost equal) shares from both firms, even if prices and wages differ.<sup>21</sup> A consumer who finds that average wages are too low and wants to induce firms to increase wages could convey this by buying all 10 units from the firm with the higher wage (which mostly also asks for a higher price). Thus nearly equal splits of purchases appear to primarily reflect static fairness concerns, whereas purchases of all units from the firm with the higher price and the higher wage reflect long-term concerns for workers or indirect reciprocity.<sup>22</sup>

In order to investigate these hypotheses, we will analyze both strategies of consumers below.

**Buying the same number of units from both firms** Two explanations for the strategy to buy equal amounts at both firms are conceivable. On the one hand this behavior might reflect that consumers want to maximize the minimum payoff among the market participants, because (i) workers earn the least of all players in 93.5% of the cases and (ii) in case of identical wage offers (46.0% of the cases) attempts to maximize the lowest worker profit would lead a consumer with maximin preferences to buy five units from each firm. Alternatively, since the calculation of the optimal distribution given maximin preferences is computationally rather demanding, consumers might use a simple equipartition rule as a heuristic in order to support both workers equally. If the observed behavior of buying similar numbers of units from both firms is indeed driven by maximin preferences, we would

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<sup>21</sup>The precise split depends on the fairness motive that drives the consumer. For example, a consumer with maximin preferences would buy more units from the firm with the lower wage, such that the payoffs of both workers are equal. E.g. if  $w_1 = 2$  and  $w_2 = 3$ , buying six units from Firm 1 and four units from Firm 2 would lead to a total wage of 12 for both firms. This satisfies maximin preferences if  $p_i - w_i \geq w_i$  for  $i = 1, 2$ .

<sup>22</sup>Buying all units from the more expensive firm could also be a very blunt fairness instrument. If prices are overall low, then all other players are worse off than the consumer. If the latter is averse towards advantageous inequality without discriminating among the lower-payoff players (as in the inequality-aversion models of Bolton and Ockenfels, 2000, and Fehr and Schmidt, 1999), then she can minimize the inequality by buying all 10 units from the high-price firm. If that was the motivation, however, then this behavior should occur independent of whether the high-price firm also pays the high wage. As shown below, however, this is not the case and 10 units are bought from the high-price firm almost only if it also pays the higher wage.

expect consumers who face differing wage offers to buy more from the firm with the lower wage offer.

Indeed, Figure 3.A shows that substantial mass of the distribution is located between zero and five units. This could either indicate maximin preferences (if the high-price firm pays the higher wage) or that the consumers' interest in supporting both workers equally is reduced if the difference between prices or the average price level are very high.

	NMF	MF
$\bar{p}$	0.051* (0.026)	0.045* (0.024)
$\bar{w}$	0.101** (0.045)	0.091** (0.043)
$ \Delta p $	-0.213*** (0.049)	-0.504*** (0.063)
$ \Delta w $	0.041 (0.046)	-0.094** (0.046)
$\chi^2_{(k-1)}$	71.93	165.52
$N$	531	948

Table 4: Consumer' propensity to split units equally conditioned on price and wage structure.

In order to examine the validity of these potential explanations, Table 4 reports on regressions where we estimate the effects of the average price and wage offer as well as of the absolute price and wage difference on the consumers' propensity to split units equally.<sup>23</sup> The estimations reveal that the average wage level has a significantly positive effect on the consumers' propensity to split units equally. This is consistent with the view that consumers choose equal splits as a short-term policy to equalize earnings, but buying more units at the high-wage firm to ensure overall fair wages. If wages are relatively high, there is less need to encourage higher wages and the consumer can focus on short-term equality.

The results further show a negative influence of the absolute wage difference in MF, which indicates that the consumers behave at least partially in line with maximin preferences. Nevertheless, comparing the goodness of fit of the maximin predictions with the

<sup>23</sup>We run probit regressions with random individual effects for the NMF and MF treatments separately, where the dependent variable is a dummy indicating an equal split of the units bought at each firm. Independent variables are average prices and wages ( $\bar{p}$  and  $\bar{w}$ ), absolute price and wage differences ( $|\Delta p|$  and  $|\Delta w|$ ) and separate dummies for each experimental half and minimum wage level (the latter are omitted in the table). \*\*\* p<0.01, \*\* p<0.05, \* p<0.10.

equipartition heuristic shows that the latter outperforms the descriptive power of maximin preferences.<sup>24</sup> Finally, the absolute price difference (in contrast to the average price level) has a significantly negative effect on the consumers' taste for equality in the NMF and MF treatments, which corroborates the hypothesis that concerns for equality decrease when they get relatively more expensive.

*Observation 5: (i) The consumers' propensity to buy similar shares from both firms decreases the higher the average wage level and the more the two prices differ. (ii) Although there is evidence consistent with maximin preferences in MF, buying the same number of units from both firms reflects a simple equipartition heuristic rather than optimal choices with maximin preferences.*

**Buying more from the firm with the higher wage** The fact that consumers tend to buy more units (and then often all 10) from the firm with the higher price seems to be driven primarily by social concerns for the workers rather than by confusion since in 87.4% of these cases the firm with the higher price also offers a higher wage for its worker.

An explanation for this behavior might be that consumers who care for the workers' rents use this strategy to punish firms for an insufficient wage level, likely with the intention of achieving higher wages in the future periods. If this is indeed the case, we would expect the consumers' willingness to buy more from the high-price high-wage firm to depend negatively on the average wage level. Furthermore, we expect again that the consumers' willingness to buy from the more expensive firm is lower the higher the average price level or the higher the price of the firm offering the higher wage compared to the low-price firm.

In order to test these hypotheses, Table 5 reports regressions of the average price and wage level as well as the absolute price and the absolute wage difference on the consumers' willingness to buy more from the high-price high-wage firm.<sup>25</sup>

The estimations show that higher average wage levels tend to reduce the consumers' willingness to buy more from the high-price-high-wage firm (marginally significant in NMF

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<sup>24</sup>See supplemental material for a detailed analysis.

<sup>25</sup>We run probit regressions with random individual effects for the NMF and MF treatments separately, where the dependent variable is a dummy indicating that the consumer bought strictly more from the firm with a higher price and wage. Independent variables are average prices and wages ( $\bar{p}$  and  $\bar{w}$ ), absolute price and wage differences ( $|\Delta p|$  and  $|\Delta w|$ ) and separate dummies for each experimental half and minimum wage level (the latter are omitted in the table). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ .

	NMF	MF
$\bar{p}$	-0.049 (0.045)	-0.057 (0.061)
$\bar{w}$	-0.147* (0.083)	-0.191* (0.100)
$ \Delta p $	-0.013 (0.039)	-0.131** (0.061)
$ \Delta w $	0.119** (0.050)	0.327*** (0.080)
$\chi^2_{(k-1)}$	71.93	165.52
$N$	531	948

Table 5: Consumers’ propensity to buy more from the high-price high-wage firm.

and MF). Moreover, in the MF treatments the absolute price difference exerts a negative effect while the absolute wage difference exerts a positive effect on the consumers’ willingness to buy more from the high-price high-wage firm in both, NMF and MF. The average price level does not have any significant effect. These results are consistent with the hypothesis that buying more units from the high-price high-wage firm is a long-term strategy to encourage firms to pay higher wages. Therefore we conclude

*Observation 6: (i) A significant proportion of consumers are willing to buy more from the firm with the higher price as long as it offers a higher wage. (ii) The lower the the average wage level, or the higher the wage difference, the more consumers tend to pursue this strategy to buy more from the high-price high-wage firm.*

### 3.3 Policy changes and consumer behavior

In this section, we provide a general overview how the consumers’ fairness strategies are affected by changes in the minimum wage policy.

#### 3.3.1 Buying the same share from both firms

Table 6 depicts how a policy change affects the fraction of purchases where the consumers bought the same number of units from both firms given that such a behavior is costly, i.e., where the firms’ price offers differ.<sup>26</sup>

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<sup>26</sup>We run probit regressions with random individual effects for the NMF and MF treatments separately, where the dependent variable is a dummy indicating an equal split of the units bought at each firm and

	Periods 6-20	Periods 26-40	change in pp
NMF	10.3%	6.0%	-4.3
MF	3.6%	6.9%	3.3**

Table 6: Percentage of purchases where consumers buy same shares at different price offers.

When a minimum wage is introduced, the proportion of decisions where five units are bought from each firm is declining, albeit insignificantly.<sup>27</sup> The abolition of the minimum wage on the other hand significantly increases such purchases.

*Observation 7: (i) While the introduction of a minimum wage has an (insignificant) negative effect on the consumers' propensity to buy similar shares at both firms, the abolishment of a minimum wage has a (significant) positive effect. (ii) When initially a minimum wage is in place, the consumers' willingness to buy five units from both firms is less pronounced compared to an economy without a minimum wage initially.*

### 3.3.2 Buying more from the firm with the higher wage

Focusing on the periods where one firm offers both a higher price and wage, Table 7 depicts how changes in the minimum wage policy affect the consumers' willingness to buy more from the firm with the higher price and wage.<sup>28</sup>

	Periods 6-20	Periods 26-40	change in pp
NMF	19.7%	19.3%	-0.3
MF	3.1%	19.7%	16.6***

Table 7: Percentage of purchases where consumers buy more from the firm with the higher price and wage.

Note that buying more units from the firm with higher wage contradicts short-run maximin preferences and rather suggests a long-term fairness strategy. In the first half of

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the independent variable is a dummy indicating periods after a policy change. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . Deleting the MF9 treatment (which has no NMF equivalent) does not change the results.

<sup>27</sup>The insignificance of this decline is in part driven by the fact that the NMF treatments comprise fewer data compared to the MF treatments.

<sup>28</sup>We run probit regressions with random individual effects for the NMF and MF treatments separately, where the dependent variable is a dummy indicating that the consumer bought strictly more from the firm with the higher price and wage. The independent variable is a dummy indicating periods after a policy change. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . Deleting the MF9 treatment (which has no NWF equivalent) does not change the results.

the NMF treatments, consumers buy more units at the higher price in 19.7% of cases while the prevalence of this behavior does not change significantly when the minimum wage is introduced in the second half. In contrast, in the MF treatments the initial fraction of purchases predominantly at the high-price high-wage firm is considerably lower at 3.1%. Nevertheless, the abolishment of the minimum wage leads to a substantial increase of this fraction up to a level similar to that of the NMF treatments.<sup>29</sup> In line with these results, the percentage of consumers who buy at least once in all 15 periods from the more expensive and worker-friendly firm drops (insignificantly) from 8/18 to 5/18 when the minimum wage is introduced (Fisher’s exact test:  $p = 0.489$ ) while the abolishment of a minimum wage increases this fraction significantly from 2/33 to 12/33 (Fisher’s exact test:  $p = 0.005$ ).

*Observation 8: (i) Consumers reveal a substantial willingness to pay higher prices in exchange for higher wages when there is no minimum wage in place and the introduction of a minimum wage in such a market does not reduce this willingness. (ii) An initial minimum wage annihilates consumers’ willingness to buy more units from the high-price high-wage firm almost completely, while its abolishment significantly increases these choices to a level similar to a market where no minimum wage is present initially.*

It appears that consumers who are initially willing to buy from a high-price high-wage firm are not discouraged to do so by the introduction of a minimum wage. This is somewhat surprising and suggests that some kind of habit to be fair is established in the first part of the experiment that is not fully crowded out by the later introduction of a minimum wage. On the other hand, consumers starting the experiment with a minimum wage do not frequently choose to buy more from the high-price high-wage firm, but they start doing so after the abolition of the minimum wage. This suggests that with a minimum wage from the outset, consumers consider workers to be sufficiently protected so that they do not have to buy (more) from firms with high wages in order to support workers. After the abolition of the minimum wage, however, some consumers are willing to pay a higher price, apparently in order to prevent a further decline of wages.

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<sup>29</sup>The supplementary material contains an analysis on the level of the minimum wage treatments. The results are replicated on this level indicating that the effects are not due to differences in the number of sessions per treatment and that they are robust across groups.

### 3.4 A model of consumer choice

The above analysis has shown that the consumers' sense of fairness is expressed in two different ways, namely an inclination to split purchases equally across firms even if prices differ and an inclination to buy more units from the firm with higher wages and higher prices than from the other firm. In order to assess whether changes in the consumers' choices are merely driven by changes in wages and prices or whether the change in policy affects behavior directly, we have to model the preferences of consumers.

Inequality aversion models such as Fehr and Schmidt (1999) or Bolton and Ockenfels (2000) do not capture the two types of fairness behavior we observe. First, according to both models, subjects do not discriminate amongst others who all have a higher or all have a lower payoff than themselves (according to Bolton and Ockenfels, subjects are not even concerned with redistributing from those who have more than themselves to those who have less). Thus, according to these models, given that in our experiment the consumers almost always earns the highest payoff, they should not care how the remaining surplus is distributed among the firms and worker. The fairness behavior we observe, however, is only reasonable if they do care about the distribution among the other players. Expanding the inequality aversion models to incorporate preferences regarding the distribution of payoffs among other subjects would make them rather intractable. This aspect is better captured by Charness and Rabin (2002), which assigns a special weight to the subject with the lowest payoff (not though, that we have detected clear inconsistencies with such maximin preferences) or by Cox, Friedman, and Sadiraj (2008), where utility is concave in all subjects' payoffs. The second reason why none of these models captures the observed behavior well is that none of them addresses the tension between short-term and long-term considerations that is exhibited through the two different fairness strategies that we observe. Essentially, these are all static models that do not allow for a trade-off between current period utility and an attempt to "teach" firms to be fairer in the future.

Models of reciprocity such as Dufwenberg and Kichsteiger (2004) or Falk and Fischbacher (2006) are not very helpful in our setting, as reciprocity would suggest that the kind (low-price) firm is rewarded with more purchases, a behavior indistinguishable from selfishness. One could expand these models to incorporate indirect reciprocity, which would be consistent with rewarding firms that pay higher wages. However, this again would complicate these (already far from simple) models to a degree that they are probably untractable. One would need to consider how consumers trade off direct reciprocity (reaction

to prices) with indirect reciprocity (reaction to wages). Furthermore, beliefs are crucial in this approach and an extension to indirect reciprocity would require finding answers to questions such as whether the beliefs of the workers (and the second-order beliefs of the consumer and firms regarding the workers' beliefs) matter as well.

Therefore, instead of building on any of the established models of fair behavior from the literature, we present a stylized model that directly incorporates the social preferences of consumers that we observe, namely an equal split of purchases and buying more from the high-wage high-price firm. The model captures how consumers trade off these two motives and their self-interest. This allows us to estimate how the weight that the consumers assign to both motives relative to their self-interest changes with the minimum wage policy. Specifically, we assume that subjects maximize the following utility function:

$$u(r_1|p, w) = 25 - \left[ r_1 p_1^\beta + (1 - r_1) p_2^\beta \right] + \lambda_h [r_1 w_1^\alpha + (1 - r_1) w_2^\alpha] + \lambda_e [r_1(1 - r_1)]. \quad (1)$$

The first term captures self-interest, where  $r_1$  denotes the proportion of units the consumer buys from firm 1. The price and wage offers of the firms are denoted by  $p = (p_1, p_2)$  and  $w = (w_1, w_2)$  respectively. The parameter  $\beta$  captures the marginal disutility of prices. Hence, for  $\beta > 0$  higher prices decrease utility and a purely self-interested consumer ( $\lambda_h \rightarrow 0, \lambda_e \rightarrow 0$ ) always buys the maximum number of units from the cheapest firm as long as the corresponding price does not exceed 25.<sup>30</sup>

The second term in (1) captures the preference for sufficiently high wages if  $\alpha > 0$  and  $\lambda_h > 0$ . Both parameters are to be estimated from the data where  $\alpha$  determines the marginal utility of wages and  $\lambda_h$  determines the importance of the taste for sufficiently high wages compared to the other preference components. For  $\lambda_h \rightarrow \infty$  the consumer is exclusively interested in buying from the firm with the higher wage.

Finally, the third term reflects the consumer's taste for dividing the number of units equally between firms when  $\lambda_e > 0$ . For  $\lambda_e \rightarrow \infty$  the consumer is solely interested in buying five units at each firm ( $r_1^* \equiv \frac{1}{2}$ ).

In order to estimate the parameters of the model, we derive the best response of the consumers to a specific price-wage tuple which is given by

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<sup>30</sup>Since in our dataset the minimum price is always below 25, we do not have to allow for both prices at or above 25 in the model.

$$r_1^*(p, w) = \min \left\{ \max \left\{ \left( \frac{1}{2} + \frac{(p_2^\beta - p_1^\beta) + \lambda_h(w_1^\alpha - w_2^\alpha)}{2\lambda_e} \right), 0 \right\}, 1 \right\} \quad (2)$$

Since we want to capture policy effects on the consumer’s behavior that are beyond pure adjustment effects to different prices and wages, we will estimate the fairness parameters  $\lambda_h$  and  $\lambda_e$  for the NMF and MF treatments separately while we include a dummy for the second half of the experiment for both parameters.<sup>31</sup> In doing so we minimize the squared difference between the observed fraction of units bought from firm 1 and the predicted best response (2) with respect to the model parameters. Note that we do not put any restrictions on the parameters in the estimation procedure. For computational reasons, we replace the step link function in (2) by a logit link function.<sup>32</sup> We include the observations where the consumers bought less than ten units, but our main results are robust to excluding these observations.

Regarding the marginal utility of wages, the estimation yields  $\hat{\alpha} = 0.61$  which is significantly different from both 0 and 1. This suggests that for higher average wage levels, consumers become less sensitive to wage difference and decrease their willingness to buy more from the firm with the higher wage in favor of buying similar shares at both firms. Furthermore, the estimator for the marginal disutility of prices  $\hat{\beta} = 1.03$  is slightly but not significantly larger than 1, which suggests that the disutility of a marginal price increase is independent of the average price level, which thus does not affect the fairness considerations of consumers.<sup>33</sup> The fact that  $\hat{\beta}$  is significantly larger than 0 also shows that the fairness behavior of the consumers is price sensitive, that is, if the price difference becomes larger, they are *ceteris paribus* buying more from the cheaper firm. The estimation results with respect to the remaining fairness parameters are presented in Table 8.<sup>34</sup>

First note that in these estimations based on the whole data set, both dimensions of the consumers’ fairness concerns are relevant since the parameter estimates for  $\lambda_e$  and  $\lambda_h$  are significantly different from zero in each part of the experiment. Thus for the average

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<sup>31</sup>We use the nl routine in Stata 11 and computed robust standard errors with respect to within-subject correlations and individual heterogeneity.

<sup>32</sup>Using the normal distribution as an alternative link function gives a worse fit to the data.

<sup>33</sup>But as we have shown in section 3.2.1, the average price level affects the consumers’ propensity to buy less than 10 units in total. As stated above, excluding the periods where less than 10 units are consumed in total does not affect our main results.

<sup>34</sup>P-values are based on robust standard errors with respect to clustered consumer observations:\*\*\* p<0.01, \*\* p<0.05,\* p<0.10.

	NMF			MF		
	Periods 6-20	Periods 26-40	change	Periods 6-20	Periods 26-40	change
$\lambda_h$	1.1292***	1.1178***	-0.0114	0.5914***	0.8231***	0.2317
$\lambda_e$	0.3224***	0.2394***	-0.0830	0.2321***	0.3821***	0.1500***
$N$	264	267	.	466	482	.

Table 8: Estimates of social preference parameters.

consumer both motives matter whether there is a minimum wage in place or not. In particular, this means that splitting purchases equally is indeed a separate strategy of the consumers and not just one possible split when they decide to buy some units from the high-price high-wage firm.

Our main interest is in the effect of changes in the minimum wage regime on social preferences. We observe that the estimator for  $\lambda_h$  is not significantly affected by policy changes. Similarly, the introduction of a minimum wage decreases the consumers' taste for buying five units at each firm,  $\lambda_e$ , but this effect is not significant.<sup>35</sup> However,  $\lambda_e$  increases significantly when the minimum wage is abolished, suggesting that consumers choose more often to split their purchases equally. Note that this change is not simply an effect of changes in prices and wages, because the analysis controls for their level.

Of particular interest for the question how regulation affects the fairness concerns of consumers is the comparison of inexperienced consumers (i.e. those who have not yet experienced the other policy regime) in both treatments. Comparing the first part of both treatments shows that the presence of a minimum wage significantly reduces the fairness concerns of consumers. Both  $\lambda_h$  and  $\lambda_e$  are substantially and significantly smaller in MF than in NMF in periods 6-20 ( $p < 5\%$  and  $p < 10\%$ , respectively).<sup>36</sup> This suggests that for inexperienced consumers fairness concerns are crowded out by a minimum wage. Note again that this does not just mean that consumers buy less from the more expensive firm because wages are higher (as we control for the wage level), but rather that social preferences are affected.

Crowding out also has long-term effects. Comparing markets without a minimum wage that have experienced a minimum wage before (MF, periods 26-40) with those who have not

<sup>35</sup>It is significant at  $p < 5\%$  if we exclude the observations where the consumer buys less than 10 units.

<sup>36</sup>When we exclude treatment MF9, which has no corresponding NMF treatment, the difference in  $\lambda_h$  is even marginally larger but only significant at  $p < 10\%$ , and the difference in  $\lambda_e$  is not significant. However, when we also exclude MF6 and NMF6, that is we focus on the treatments where the minimum wage is not most of the time binding, the difference in NMF is substantially larger and significant at  $p < 5\%$ .

(NMF, periods 6-20) we find that  $\lambda_h$  is smaller in the former ( $p < 10\%$ ). Interestingly, the later introduction of a minimum wage has less of a detrimental effect. In NMF in periods 26-40, when consumers face a minimum wage but have experienced a phase without a minimum wage before,  $\lambda_h$  is significantly larger ( $p < 5\%$ ) than in MF in periods 6-20, but it is not significantly different than in NMF in periods 6-20.

We conclude

*Observation 9: (i) Both, the consumers' tendency to buy five units from both firms and to buy more at the high-price high-wage firm can be identified as separate strategies. (ii) Policy changes affect the consumers' willingness to buy the same amount from both firms for given prices and wages. In particular, the abolishment of a minimum wage significantly increases the propensity to buy the same number of units at both firms. (iii) A minimum wage that is in place from the beginning of the experiment leads to crowding out of the propensity to buy more from the high-price high-wage firm.*

## 4 Discussion and Concluding Remarks

We have studied an experimental market where consumers have to take complex decisions to achieve fair outcomes. In addition, we have introduced a policy change in order to investigate how this affects consumer choices and market outcomes.

Although the consumers act self-interestedly in most of the cases, we found that they reveal a substantial willingness to forgo own payoffs in order to support the workers. Specifically, we identified two strategies of the consumers to implement a fair market outcome. First, the consumers exhibit a preference for an equal split of the purchased quantities even if the prices of the firms differ. Second, if the average wage level is low, the consumers sometimes buy more units from the more expensive firm if it also offers a higher wage. Since consumers otherwise exhibit a clear preference for an equal distribution of the purchased units, this might be interpreted as an attempt to educate the firms. That is, buying equal numbers of units seems to satisfy their short-run fairness concerns if they are satisfied with the wage level, but if wages are too low, consumers shift purchases to the firm with higher wages, apparently to encourage higher wages in the long run. As could be expected from rational consumers, both strategies are chosen less often when they get too costly in a given period, i.e. when the difference in the prices is too high.

Do legal standards affect ethical concerns of consumers? We find evidence that the

introduction of a minimum wage in a mature market has only insignificant crowding-out effects on the consumers' fairness concerns.<sup>37</sup> Given these findings, introducing a minimum wage seems to have only limited negative effects on the welfare of workers and can have positive effects if the minimum wage level is sufficiently high and the direct effect (i.e., if the minimum wage is binding) overcompensates the negative indirect (crowding-out) effect.

On the other hand, the abolishment of a minimum wage clearly increases the consumers' willingness to forgo own income in order to support the workers. Consumers show an increased willingness to buy from the high-price high-wage firms. Furthermore, we observe an increased propensity to support both workers equally, and these effects are not just explained by changes in prices. Nevertheless, the increased social concerns of the consumers do not reach the same level as in a market that starts without a minimum wage and they are not sufficient to compensate for the drop in the average wages. Thus, the rents of workers decrease when the minimum wage is abolished.

Considering the effects of a minimum wage in an immature market, we find that this significantly crowds out consumers' fairness concerns. This effect is substantial, so that for the case of a minimum wage of 3, the average wage is even lower when a minimum wage is in place in the first part than when it is not. This demonstrates that a regulation that is not very stringent can under certain circumstances have the opposite effect than intended. It can crowd out fairness concerns that lead to an acceptable outcome, and these crowding-out effects remain partly present even after the abolishment of the regulation.

Obviously, since our study considers a very specific setting, one should be careful in judging what our results imply and what they do not. While we have provided a behavioral existence proof of crowding out through regulation, some abstractions from natural labor markets, in particular the restrictions to monopsonistic buyers, prevent drawing any general conclusions on the effects of minimum wages. What our behavioral existence proof implies, however, is that the possibility of such crowding out effects should not be ignored.

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<sup>37</sup>Though note that the preference for buying equal shares decreases significantly if we only consider the observation where the consumer buys all 10 units.

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