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Do Legal Standards Affect Ethical Concerns of Consumers?*

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Abstract

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 set prices and wages, and workers are passive recipients of a wage payment. We find that the majority of consumers occasionally deviate from their self-interest and that markets with such consumers exhibit substantially higher wages. Consumers implement fair allocations using two distinct strategies: they split their demand equally between firms, or they buy all units from the firm with the higher price and higher wage. The two strategies can be captured by maximin preferences and indirect reciprocity in Charness and Rabin's (2002) reciprocal fairness model. Introducing a minimum wage in a market raises average wages despite its significant crowding out effects on consumers' fairness concerns. Abolishing a minimum wage crowds in consumer fairness concerns, but crowding in is not sufficient to avoid overall negative effects on workers' wages.

JEL classification: C72, C92, D83, D84

Keywords: Fairness, Consumer Behavior, Minimum Wage, Crowding Out, Experimental Economics

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1 Introduction

In the last decade, the behavior of firms with regard to worker protection, climate change, and other ethically relevant issues has received public attention. Firms can profit from fair behavior toward their workers or from environment-friendly production technologies if a sufficient number of consumers are willing to pay a higher price for their products than for products of other firms. Moreover, publicity of firms using child labor or engaging in other unfair or ecologically harmful practices can decrease firm profits substantially.

While some consumers buy fair trade products or sign up for electricity from renewable sources, these products have relatively small market shares.[1] This suggests that regulation might be necessary to achieve the desired levels of environmental protection, wages, worker rights, etc. However, it is an open question how such regulation affects consumer behavior. Market experiments that study the interaction of consumers and firms in markets have found that consumers exhibit non-selfish behavior and that this depends on the exact market conditions.[2] To tightly control the regulatory changes and their sequencing, we run a laboratory experiment.

The effects of government interventions 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 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 and as a result lead to lower wages. Also, if consumers are willing to pay for a fair treatment of workers, a minimum wage can crowd out such fair behavior by consumers. On the other hand, a minimum wage can be interpreted by consumers as an

[1] For example, in Germany where fair trade is relatively important compared to other countries, fair trade cocoa achieved a market share of 8% in 2017 and fair trade coffee 4.1% (TransFair e.V. 2018). Globally, the market share of fair trade cocoa is less than 1% (International Cocoa Organization 2019).

[2] For example, Bartling, Weber, and Yao (2015) and Rode et al. (2008) show that fairness of firms and consumers can survive in a market context. By contrast, Falk and Szech (2013) suggest that markets erode fairness while Pigors and Rockenbach (2016) demonstrate that whether fair behavior pays for firms depends on the market structure.

indication that market wages are too low. If that is the case and in particular if the minimum wage is low, consumers will pay more attention to the wages paid by firms and possibly condition their purchase decision on fair wages.

We ask in a controlled setting how regulations that target the externalities of interest interact with the willingness of consumers to pay higher prices for fair behavior of firms. Our study differs from existing experimental work on crowding out in that our setting is characterized by a tradeoff between short-term and long-term fairness. Consumers can provide incentives for firms to increase wages in the future by buying from firms that pay high wages. This, however, harms the workers of low-wage firms in the short run. Thus, strategies that help workers in the short run are in conflict with strategies that can help them in the long run, rendering the decision complex.

In the experiment, we use a setup where consumers are monopsonists in a 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 quit themselves. Their only source of income is the wage. 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. The market lasts for 20 periods, which gives the consumer the possibility to enforce higher wages by buying from the firm with the higher wage.

Our two-by-two design serves to investigate the effects of the introduction and removal of two different minimum wages. In two treatments, there is no minimum wage initially, but it is introduced after the first half of the experiment. These treatments differ only with regard to the level of the minimum wage. In the other two treatments, there is a minimum wage at the beginning, but it is removed after the first half of the experiment, again for both minimum wage levels. 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 for different levels of the minimum wage.

We observe that in all treatments the majority of consumers occasionally deviate from their own self-interest by buying some or even all units from the more expensive firm.There are two complementary strategies the consumers

use to achieve fair outcomes for the workers. First, consumers often split purchases equally between firms even when prices differ. Second, they sometimes buy all units at the more expensive firm that also pays a higher wage. These strategies reflect the complex fairness problem that consumers face. Buying from both firms secures an income for both workers. Alternatively, punishing the low-wage firm by not buying from it can be an attempt to encourage the firm to pay a higher wage in the future.

Regarding the effects of a minimum wage, we find that its introduction leads to a significant increase in the workers' rents. Removing a minimum wage always affects the workers negatively. Furthermore, consumers adjust their behavior to changes in the minimum wage, and these adjustments are larger than what can be explained by changes in prices and wages. We show this with the help of simple regressions as well as a structural estimation of the model by Charness and Rabin (2002). The model captures short- and long-term fairness concerns through its components of maximin social preferences and negative reciprocity. While maximin equalizes payoffs in the short term, punishing unfair firms can lead to higher wages in the long term. Overall, we find crowding out of fairness concerns in response to the introduction of a minimum wage and crowding in when the minimum wage is removed.

In line with the idea that achieving fairness in markets can be a complex task involving multiple strategies, existing experimental studies detect various determinants of such fairness. Pigors and Rockenbach (2016) demonstrate that socially responsible production is profitable in an oligopoly but not in a monopoly setting. Irlenbusch and Saxler (2019) find that two properties of markets, namely social information and buyer-seller framing, affect the fairness of subjects whereas diffusion of responsibility does not. Sutter et al. (2020) focus on fairness in double auction markets, and Kirchler et al. (2016) show that individual decisions and decisions in markets react to factors such as anonymity and incentives in a similar way. Moreover, it emerges that certification can be useful for internalizing externalities in markets; see Etilé and Teyssier (2016). Addressing the external validity of fairness in market experiments, Engelmann, Friedrichsen, and Kübler (2018) show that

fair consumer behavior in a market experiment significantly correlates with preferences for fair trade products.

Our experiment also relates to the literature on crowding out of intrinsic motivation with extrinsic or economic incentives, see Frey (1997), Frey and Jegen (2001), Gneezy and Rustichini (2000a), (2000b), Falk and Kosfeld (2006) as well as Ostrom (2000). In contrast to some of these studies (e.g., Gneezy and Rustichini 2000b, and Falk and Kosfeld 2006) where an affected party limits the freedom of choice of the participant, the minimum wage in our experiment is introduced or abolished exogenously, i.e., by the experimenter. One could expect this to have a weaker negative effect, because the restriction cannot be interpreted as a lack of trust. Nevertheless, we find that the regulation crowds out fair behavior.

Falk, Fehr, and Zehnder (2006) study 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. In contrast to this experimental work on minimum wages, we focus on the consumer reaction to a minimum wage, not the workers'.

We study minimum wages as an example of a legal regulation that protects third parties. Because of this focus, we abstract from many other aspects that are relevant in the discussion of minimum wages, such as employment effects. In our experimental design, employment is exogenously fixed to keep the question of what is a fair wage simpler for the consumers.[3]

Our experiment is related to the literature on indirect reciprocity because consumers can punish firms for unfair treatment of the workers. Sub-

[3] A large portion of the empirical literature on minimum wages investigates the employment effect of raising the minimum wage. This has been controversial (Card 1992, Card and Krueger 1994, Dickens, Machin, and Manning 1999). 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). In line with this research, we observe in our experimental data set that consumers and firms are willing to pay more than the minimum wage. In particular, depending on the treatment the average wage is 12%–64% above the minimum wage. Note that efficiency-wage reasons cannot play a role in our experiment as the effort of the worker is fixed.

stantial evidence of indirect reciprocity has been observed in helping games (see Seinen and Schram 2006, and Engelmann and Fischbacher 2009) and in third-party punishment (Fehr and Fischbacher 2004). There is experimental evidence from a three-person ultimatum game (Güth and van Damme 1998, and Güth, Schmidt and Sutter 2007) 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. This evidence suggests that the responders' willingness to punish proposers for the sake of the dummy player is quite limited. An important difference to our and similar market experiments is that a consumer can choose between two firms and can hence play them off against each other. Switching to the fairer firm is a relatively effective and cheap punishment in contrast to rejections in the three-player ultimatum game, particularly if the price difference is small. Note, however, that punishing a firm also punishes its worker, which renders it difficult to achieve a fair outcome in the short run.[4]

The rest of the paper is structured as follows. Section 2 describes the design in detail. In Section 3 we analyze the choices of firms and consumers. Section 4 presents the estimation of the Charness-Rabin (2002) model, and Section 5 concludes.

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. Both firms are run by a manager, and we will refer to them as firms in the following. Each firm employs one worker. The workers are actual participants in the experiment, even though they have no choice to make. By each firm having one worker without a decision right, we capture a situation with strong competition among workers and where tasks are easily

[4]Achieving a fair market outcome is simpler in Engelmann, Friedrichsen, and Kübler (2018), where we use a similar design but with one worker who is hired by both firms. In this case, buying at the firm with the higher wage unambiguously helps the worker in the short run and, as long as firms react to this action by raising wages, also in the long run.

enforceable. 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 $\underline{w} \in \{3, 6\}$ denotes the minimum wage that is varied across treatments.[5] 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 except by raising the price to a prohibitively high level. 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 two 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 each of the two 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.

The stage game with selfish agents has three subgame-perfect equilibria. In each of these, firms set $w = 0$ if there is no minimum wage and $w = \underline{w}$ if there is a minimum wage. The equilibrium prices are $p = w$, $p = w + 1$ or $p = w + 2$ (with $p_1 = p_2$), and the consumer always buys 10 units from the cheaper firm, as long as $\min(p_1, p_2) < 25$, which always holds on the equilibrium path. Off the equilibrium path, the consumer buys 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. Note that in equilibrium

[5] We also conducted a few sessions for $\underline{w} = 1$ and $\underline{w} = 9$, but decided to focus on $\underline{w} = 3$ and $\underline{w} = 6$ in later sessions. With $\underline{w} = 1$, the minimum wage has hardly any effect while it is almost always binding in the case of $\underline{w} = 9$.

almost the whole surplus goes to the consumer.[6] In contrast, the payoffs are split equally among all five market participants if both firms choose $p = 20$, $w = 10$ and the consumer buys five units from each of the firms. In this case the payoff for all participants is $\pi = 10 \cdot 5 = 50$. Hence, the minimum wage of three or six that we implemented 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 of allowing us to study consumer concerns for fairness that are not confounded with concerns for efficiency. [7]

Details of the implementation are as follows. We used a fixed-matching protocol where a group of five participants (one consumer and two firm-worker pairs) stayed together during the entire experiment. The main motivation for fixed groups is that we are interested in a situation where consumer behavior can drive firm behavior. Participants kept their role for the whole experiment in order to enhance possible inequalities and fairness concerns. The experiment lasted for 40 periods.

An important aspect of our design is that in spite of the repeated interaction, consumers do not have a strategic incentive to signal that they care about fairness if in fact they do not. There is no reason to pretend to be fair in order to change other subjects' behavior (though consumers may still pretend to be fair to preserve a positive (self-)image). This is in contrast to many other experiments that try to assess the fairness concerns of players,

[6] 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 (see Table 1 below). In addition, all equilibria involve wages equal to the minimum wage. If the consumer is selfish, he does not want to pay more for a higher wage and thus a (selfish but collusive) firm has no reason to pay higher wages.

[7] 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 of fairness concerns is problematic since fairness concerns are frequently confounded with concerns for efficiency.

such as ultimatum, trust, and gift-exchange games. In these games, signaling 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.[8] 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.

To study the effects of changes in the minimum wage policy, we conducted two sets of treatments. In the NMF treatments (No Minimum wage First), there was no minimum wage initially, but it was introduced after the first 20 periods. In the MF treatments (Minimum wage First), a minimum wage was in place initially, but it was abolished after 20 periods. At the beginning of the experiment, the participants were informed that there would be a change in the rules after 20 periods without mentioning that this change concerned the minimum wage. They were also informed that the group composition and the role assignment would not be changed. We implemented a market frame. In the instructions (for the full text see the appendix), participants are called consumers, firms, and workers, and we used the terms "prices" and "wages."[9] The minimum wage was introduced as follows. In the MF treatments, it was stated that the wage had to equal at least $\underline{w}$. The minimum wage $\underline{w} \in \{3, 6\}$ was varied between the sessions but kept fixed within a session. After the first 20 periods, participants in the NMF treatments were informed that from the next period on the wage had to be at least $\underline{w}$, and in the MF treatments it was specified after 20 periods that from the next period on the wage had to be non-negative.

[8] For example, Anderhub, Engelmann, and Güth (2002), find that behavior in a repeated trust game with some computer-generated players who are programmed to reward trust follows quite closely a signalling-equilibrium where second movers reward trust early on but stop to do so near the end of the supergame.

[9] In line with most other experiments investigating fairness in markets, we did not opt for a neutral frame. First, describing transactions between buyers and sellers avoiding terms like prices becomes rather convoluted and participants probably understand the setting once they understand it as a transaction between the buyer and seller. Second, we wanted to investigate the effects of regulation and it makes sense to frame it as such.

The experiment was conducted at the experimental economics laboratory at the Technical University Berlin. The experiment was programmed and run using z-Tree (Fischbacher 2007). We had a total of 640 subjects, 256 of which were in the role of workers who did not take any decisions. Each subject participated only once in one of the 38 sessions, each consisting of two to four groups of five participants. Each group represents one independent observation. Overall, we collected data from 32 groups for each of our treatments NMF3, NMF6, MF3, and MF6.

At the end of a session, earnings in points were converted at a rate of 200 points = 1 Euro and were paid out in cash. Participants received 5 Euro in points as an initial endowment. This served to cover possible losses which can occur if firms sell at a price below the wage or consumers buy for a price above their valuation, and to ensure that workers get at least some non-trivial compensation.[10] The sessions took between 60 and 90 minutes and average earnings were around 14.54 Euro (including the initial endowment).[11]

3 Results

We start with an overview of the prices and wages set by firms and the resulting distribution of earnings (Section 3.1). In Section 3.2 we investigate the choices of consumers and identify two different strategies of fair consumers. The main focus is on how these fair choices are affected by the minimum wage.

[10] Paying the workers a higher initial endowment was not feasible because it would 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 role of a worker who were clearly unhappy with the fact that they could not make any choices and also earned only slightly more than their initial endowment.

[11] If the consumers buy 10 units (all other decisions only determine the distribution of rents among players), the average payoffs are 10 Euro plus a 5 Euro initial endowment. The slightly lower earnings that we observe result from consumers occasionally buying fewer than 10 units.

3.1 Firm behavior

3.1.1 Wage and price dynamics

Figure 1 shows the wage and price offers by the firms over time. The values reported are those set by the firms, not only the wages and prices that were actually paid.[12]

We first note that in all treatments, the initial wage and price offers are close to the fair allocation, independent of the minimum wage levels. We cannot reject the hypothesis that the median wage offer in the first period is equal to 10 (both at the aggregate level as well as for each treatment separately; sign tests). Similarly, the first-period median price offers are not significantly different from 20 in any treatment (at the 5% level). These findings suggest that participants in the role of firms understand the game and are able to determine the fair outcome.

During the first periods the wages and prices drop quickly in all treatments. In the first six periods, all treatments show a significantly negative time trend. In contrast, in periods 7–20 there are almost no significant time trends.[13] The observed dynamics in the early periods of all treatments might be driven by firms initially expecting the consumer and the other firm to be primarily concerned with a fair outcome. When they discover that the consumer also cares about low prices and that the other firm does not set a high wage (in combination with a high price), they lower their wage and price.

In the second half of the experiment we observe a similar but weaker pattern as in the first half. Wages in the MF treatments and prices in all treatments decrease in the first six periods after policy changes and are fairly stable in the following periods 27–40.

[12] 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 the participant reversed a price-wage pattern that he had chosen before and afterwards. We generally excluded these observations from the analysis in the paper (2.96% of the data).

[13] We run OLS regressions of the average wage (price) offer on a constant and the period number (standard errors were clustered at the market level). Only the prices in NMF3 show a significant but moderate time trend in periods 7–20.

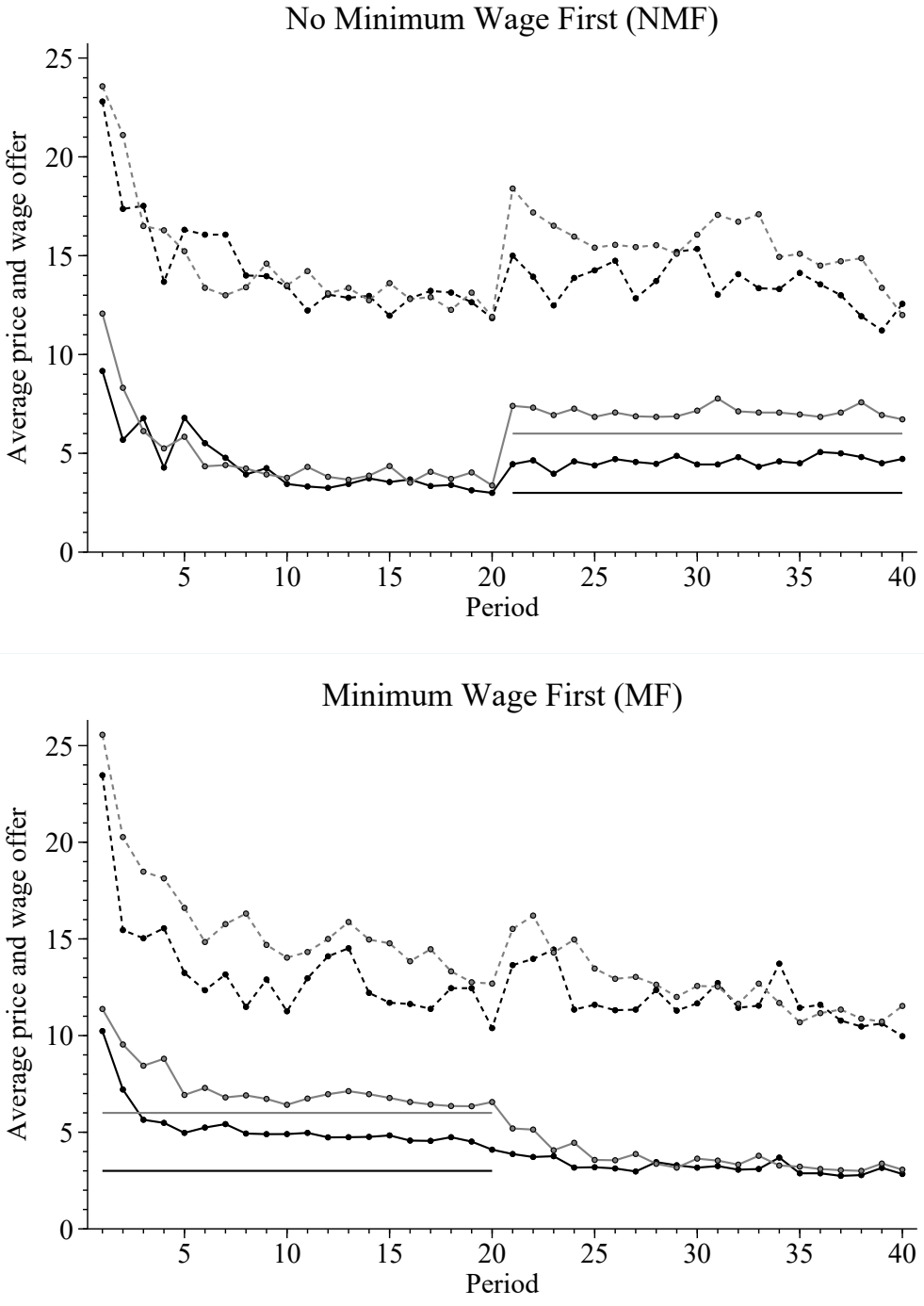

Figure 1: Average price offers (dotted lines) and wage offers (solid lines) over time in no-minimum-wage-first treatments (NMF, upper panel) and the minimum-wage-first treatments (MF, lower panel) and for $\underline{w} = 3$ (black) and $\underline{w} = 6$ (gray).

In the focus of this paper are the medium- and long run effects of policy changes on consumer behavior. We therefore exclude the first six periods of each part of the experiment for the remainder of the analysis.

3.1.2 Wage and price levels

We first explore the aggregate effect of a minimum wage on the market outcome. Table 1 shows the average wage and price offer together with the average earnings of the participants in each treatment and part of the experiment.

Table 1: Average wage and price offer and payoff of the consumer, firms, and workers per treatment and minimum wage policy.

	Minimum	No minimum wage first (NMF)			Minimum wage first (MF)		
	wage	First half	Second half	*Change*	First half	Second half	*Change*
Wage	3	3.51	4.72	*1.20****	4.92	3.33	*−1.59****
offer $\overline{w}$	6	3.74	6.92	*3.18****	6.69	3.20	*−3.50****
Price	3	12.95	13.32	*0.38*	12.35	11.47	*−0.88*
offer $\overline{p}$	6	13.07	15.13	*2.06***	14.93	12.14	*−2.79****
Consumer	3	127.10	122.52	*−4.58*	140.94	148.58	*7.64*
payoff π_c	6	124.16	107.07	*−17.08***	115.56	142.06	*26.49****
Firm	3	77.52	70.92	*−6.60*	58.49	67.17	*8.67***
payoffs π_f	6	77.90	68.07	*−9.83**	66.49	76.25	*9.76***
Worker	3	30.13	43.10	*12.98****	45.36	29.26	*−16.10****
payoffs π_w	6	30.38	64.51	*34.14****	64.13	30.00	*−34.13****

Note: The data from the first six periods in each half are excluded. Tests are based on OLS regressions per treatment with the average wage offer, price offer, and profits as dependent variables and a constant and a dummy for the minimum wage regime (experiment half) as independent variables (standard errors were clustered at the market level). Stars represent p-values from tests of the experiment half against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We first note that without a minimum wage, the majority of wage offers (80%) and the majority of price offers (95.7%) are above the levels predicted in equilibrium with selfish players. Accordingly, the average wage offers are always higher than the predicted wage of 0, and also the average prices are always higher than the predicted price of at most 2. For example, in the parts of MF3 and NMF3 without a minimum wage, the average wage is 3.51 and 3.33, respectively.

Even when a minimum wage is in place, wage offers are often above the predicted level. Specifically, 37.6% of wage offers are above the minimum

wage, and 89.9% of price offers exceed the imposed minimum wage by more than two units. Accordingly, also the average wage and price offers are above the predicted level. For example, in the parts of treatments MF3 and NMF3 where a minimum wage of three is in place, the average wage offer is 4.92 and 4.72, respectively, i.e., 64% and 57% above the predicted level.

From Table 1 it can also be taken that the average wage offers, and hence the workers' earnings, significantly increase when a minimum wage is introduced and significantly decrease when a minimum wage is abolished. On the other hand, the price level and the consumers' profits (rows 3–6 in the table) are only affected significantly when the minimum wage is sufficiently high (NMF6 and MF6). In the two treatments with a minimum wage of six, the introduction of a minimum wage increases average price offers and decreases consumer profits while its abolishment decreases average price offers and increases consumer profits. Finally, we observe that prices tend to be more sticky than wages in the sense that changes in prices over time are always smaller than respective wage changes. Therefore, the firms tend to lose from the introduction of a minimum wage (marginally significant in NMF6) while the abolishment of a minimum wage significantly increases firm profits (MF3 and MF6).

3.2 Consumer behavior

The analysis in the previous section has shown that wages are often above the level of the subgame-perfect equilibrium with selfish firms and consumers. In this section, we investigate how consumers respond to the wages and prices set by the firms. We show that most consumers occasionally act non-selfishly and that markets with occasionally non-selfish consumers exhibit higher wages. Further, we show that deviating from selfish behavior is to a large part driven by two strategies that are in line with short-term and long-term fairness concerns. We then investigate how a minimum wage crowds out these strategies.

If a consumer is purely self-interested, we expect her to buy 10 units from the cheaper firm in periods where the price offers differ. When price offers

do not differ, self-interested consumers should buy 10 units with an arbitrary split between firms. We observe two deviations from this benchmark. First, in 7.5% of all cases, the consumer buys less than 10 units in total from both firms although the price offers of both firms are equal to or above the consumer valuation of 25 only in 0.5% of cases. We do not explore these choices further since they are relatively rare and, more importantly, are not driven by social concerns for the workers (or firms). Rather, they constitute attempts to break the collusive behavior of firms (see Appendix A.2.1 for more details).[14]

The second deviation from the benchmark prediction is that in 23% of all cases where the price offers of the two firms differ, the consumer does not buy exclusively from the cheaper firm. Consumers do this particularly often, in 35% of cases, when the firm charging the higher price also pays a higher wage. The average share of units bought from the high-price, high-wage firm in these cases is 50.3%.

In the following we will use the term "non-selfish" to refer to all cases where the consumer buys at least one unit from the more expensive firm. Non-selfish consumer choices are relevant in our setting. First, although only a minority of consumer choices clearly contradict self-interest, it is the majority of consumers who do so at least once (66% in NMF3, 75% in NMF6, 66% in MF3, and 72% in MF6).[15] Second, even occasional deviations from self-interest can have a large impact in markets with repeated interactions. To see this, we look at the first half of the NMF treatments, where the market participants have not yet experienced and are unaware of any minimum wage regulation. We can divide these markets according to whether the consumer

[14]The consumers' tendency to buy less than 10 units in total is also not significantly related to the other deviations from the self-interested benchmark prediction (see Appendix A.2.1).

[15] These fractions reflect consumers who deviate at least once during the entire experiment. We also find that when we examine each part of the experiment separately (by the minimum wage policy) at least half of the consumers deviate at least once in each part of the experiment, except for the second half in NMF3. The shares in each part before and after the minimum wage change are 63% and 41% in NMF3, 69% and 56% in NMF6, 53% and 56% in MF3, and 50% and 63% in MF6.

deviated from her self-interest at least once (65.6% of consumers, pooled over NMF3 and NMF6) or whether she always acted self-interestedly (34.4%).

We first note that the wages between the two sets of markets are substantially different. While the firms in markets with selfish consumers offer a wage of \$2.16, on average, the average wage offer is about twice as high (\$4.38) in markets where the consumer does not always act selfishly ($p < 0.001$, rank-sum test). These differences in market outcomes are not driven by a few consumers who are particularly fairness concerned and deviate frequently. Focusing on markets where consumers act non-selfishly only *once or twice* yields an average wage offer of \$3.90, which is significantly higher than the \$2.16 for markets with purely self-interested consumers ($p = 0.017$). Focusing on the lower of the two wages naturally yields an even starker difference. In markets where the consumer acts non-selfishly at least once, the average lower wage offer is \$3.44 compared to \$1.13 (i.e., 205% higher) in markets with selfish consumers ($p < 0.001$).[16]

We cannot show a causal effect of consumer choices on firms due to endogeneity issues in our setting. However, a reverse causality of firm behavior on consumers seems unlikely given the patterns that we observe. In the first period, firms do not act differently between the two market clusters with selfish and non-selfish consumers: in all four treatments, the wage and price offers are the same whether or not the firms face a selfish or non-selfish consumer.[17] Moreover, given the limited market power of the firms, it is unclear how a single firm who wants to implement fair wages can force the consumer

[16]We find similar effects of the consumer types when we look at the second half of markets that abolished a minimum wage (MF3 and MF6). Here, the average [lower] wage offer is \$1.88 [\$1.29] with selfish consumers and \$4.23 [\$3.16] with consumers who buy at least once from the firm with the higher price. We also find effects for the parts of the experiment where a minimum wage is in place (second half of NMF and first half of MF) but these are only significant when the minimum wage is not too high, i.e., with a minimum wage of 3 but not 6 (at the 5% level). Figure 3 in the appendix shows the outcome of all markets by consumer type.

[17]Rank-sum tests of the average wage offer [price offer] in the first period between markets with selfish and non-selfish consumers yield $p = 0.196$, $p = 0.533$, $p = 0.799$, and $p = 0.516$ [$p = 0.849$, $p = 0.480$, $p = 0.839$, and $p = 0.385$] for the NMF3, NMF6, MF3, and MF6 treatment, respectively. Pooling over the NMF treatments yield $p = 0.222$ and $p = 0.855$ for wage and price offers, respectively.

to buy from her, in particular in the cases where she also charges a higher price.[18] Finally, if differences in firm behavior drove consumer reactions, we would observe more fair consumer behavior when the lower of the two wages is low, contrary to what we find (see analysis with Table 2 below).

Overall, the comparisons of the two sets of markets suggest that consumers are able to affect the market outcome even with only occasional deviations from self-interest. We add that the two sets of markets do not differ with respect to the average price offer ($p = 0.260$) or the lower of the two price offers ($p = 0.130$), which is a first indication that consumers care primarily about the workers who have no agency in our setting, and not the firms.

Observation 1. *The majority of consumers deviate at least once from the self-interested prediction. Markets with such consumers exhibit significantly higher wages than markets with consumers who always act according to their self-interest.*

We move on to explore how minimum wage changes affect consumer behavior, taking into account wage and price offers. Table 2 shows regressions of the consumers' propensity to act non-selfishly by buying at least one unit from the firm with the strictly higher price on a dummy for the time after the policy change, the lower of the two wage offers, the lower of the two price offers, and the wage and price spread in each period. The regressions use only those observations where the price offers of the two firms differ (and thus allow identification of non-selfish behavior). Table 7 in the appendix shows that the results are qualitatively the same if we use all observations, including those where the firms offer the same price.[19]

[18] Note that the consumers buys from the expensive firm in 23% of the cases where price offers differ, and in 35% of the cases where the firm with the higher price also offers a higher wage. The argument also applies if both firms are equally concerned about the workers. In addition, if most firms cared equally for the workers and managed to coordinate to break the consumer's market power we would expect to see plenty of periods where the firms offer the same price and wage which, however, is only observed in 16.6% of all periods.

[19] Given our definition of non-selfish behavior (buying at the strictly more expensive firm), including observations where the price offers are identical means that we underes-

Table 2: Effect of minimum wage change on non-selfish consumer behavior conditional on wage and price offers.

	Non-selfish consumer choice			
	No minimum wage first (NMF)		Minimum wage first (MF)	
	NMF3	NMF6	MF3	MF6
2nd half	-0.106^{***}	-0.251^{***}	0.110^{**}	0.241^{***}
	(0.034)	(0.088)	(0.049)	(0.063)
Lower wage offer	0.043^{***}	0.039	0.028	0.050^{***}
	(0.010)	(0.025)	(0.018)	(0.018)
Wage difference	0.027^{***}	-0.002	0.026^{*}	0.044^{***}
(Higher−lower)	(0.010)	(0.011)	(0.014)	(0.012)
Lower price offer	-0.004	-0.005	-0.004	0.002
	(0.009)	(0.008)	(0.009)	(0.008)
Price difference	-0.023^{***}	-0.003	-0.039^{***}	-0.037^{***}
(Higher−lower)	(0.009)	(0.005)	(0.013)	(0.012)
Constant	-0.925	-0.772	-0.920	-1.770
	(0.392)	(0.367)	(0.363)	(0.505)
N	622	615	631	655
$\log L$	-277.187	-290.826	-288.725	-314.767

Note: A non-selfish consumer choice is defined as an observation where a consumer buys one or more units at the firm with the strictly higher price. Coefficients are estimated marginal effects (except for the constant) from probit regressions. The regressions include only observations where the price offers of the two firms differ; the first six periods in each half are excluded. Standard errors were clustered at the market level; stars represent p-values from tests against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The first observation from Table 2 is that the introduction of a minimum wage (columns 1–2) significantly lowers the consumers' propensity to act non-selfishly (first row). The abolishment of a minimum wage (columns 3–4) has the opposite effect and significantly increases the consumers' propensity to act non-selfishly. We also see that the effects of the minimum wage are increasing in its magnitude. A change in the minimum wage of three changes

timate the true rate of fairness-motivated choices and the effect of policy changes since consumer choices under identical price offers are often consistent with any behavior (selfish and fair) but always counted as selfish.

the consumers' propensity to act non-selfishly by 10 to 11 percentage points, and the effect is 24 to 25 percentage points for a minimum wage of six.

Regarding the controls for the wage and price levels, we see that consumers act selflessly more often when the lower of the two wage offers is high and when the wage gap is large (significant in NMF3 and MF6). These findings suggest that the consumers' deviation from self-interest is at least partially motivated by a desire to help low-income workers. In contrast, the lower of the two price offers has no effect on consumer behavior, which suggests that the consumers' deviation from self-interest is aimed at helping the workers but not the firms. Finally, larger price differences reduce the consumers' tendency to act non-selfishly (significant in all treatments except NMF6), which suggests that consumers trade off their desire to help the workers with their own self-interest: the higher the cost to help the workers, the less likely the consumers do so.

Observation 2. *The consumers' propensity to act non-selfishly by buying from the more expensive firm, is crowded out when a minimum wage is introduced and crowded in when a minimum wage is abolished. Thus, changes in consumer choices cannot be explained by differences in wage and price levels alone.*

3.2.1 Fairness strategies

In this section, we investigate non-selfish purchasing behavior in more detail. For example, how many units do consumers buy from the firm that offers the higher wage? For expositional purposes, we restrict the analysis in the first part of the section to observations where one firm sets a strictly higher price and also a strictly higher wage. Figure 2 shows distributions of the number of units bought from the high-price, high-wage firm, given that the consumer bought at least one unit at that firm (35.0% of cases). The left panel shows a histogram over all these cases. The distribution has three peaks. First, consumers often buy one or two units at the high-price, high-wage firm, which is close to the self-interested choice of zero. Second, consumers often

buy an equal number of units at each firm even though the two prices differ.[20] Third, consumers occasionally buy all units from the high-price, high-wage firm. These observations are unlikely to be due to confusion since in 84.7% of all cases where consumers bought more units from the firm with the higher price, this firm also offered a higher wage. Interestingly, both strategies that differ substantially from selfishness (buying five units from each firm and buying 10 units from the more expensive firm) are well separated from each other since there is little mass on $7, 8$, and 9 units.

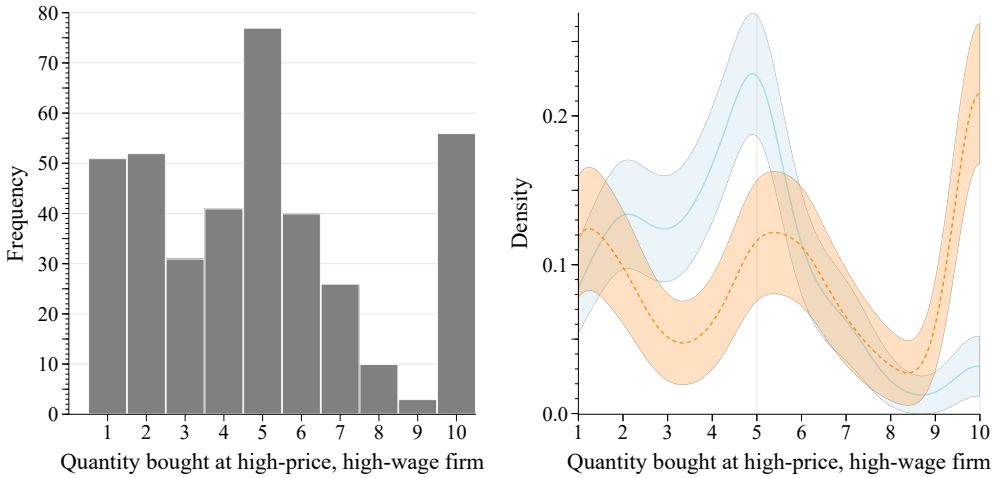

Figure 2: Distributions of the number of units the consumers bought from the firm with the higher price and the higher wage, conditional on buying at least one unit at that firm. *Left panel:* Histogram over all applicable cases (high-price, high-wage firm exists and at least one unit is acquired from that firm). *Right panel:* Kernel density estimates for the same data but restricted to cases where the lower of the two wage offers is above 5 (solid line) and below 2 (dotted line). Shaded areas represent 95% confidence intervals.

The histogram in the left panel of Figure 2 does not condition on the wage level. By contrast, the right panel of Figure 2 shows the kernel density

[20]When considering the whole data set (i.e., including observations where prices are equal and wages have any level), buying the same number of units from each firm is the second most frequent choice of consumers (18.5%), which is only chosen less often than buying all units from one firm (66.9%).

estimates for the number of units bought at the high-price, high-wage firm (conditional on such a firm existing and at least one unit being bought from that firm) for different levels of the lower of the two wage offers in each round.

The graph shows that when the lower of the two wage levels is fairly high (above five; solid line), consumers most often buy equal amounts from both firms (27%, conditional on buying at least one unit from the high-price, high-wage firm) and rarely all units from the high-price, high-wage firm (4%). In contrast, when the lower wage offer is below two (dotted line), consumers most often buy all units from the high-price, high-wage firm (31%) and less often the same amount from both firms (13%).[21] These results suggest that consumers tend to support both firms and workers even if this is costly, unless one of the firms offers a wage that is too low. In these cases consumers mostly buy all units from the firm with the higher wage.

Splitting purchases equally or buying all 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. The precise split depends on the fairness motives of the consumer as well as wages and prices.[22] On the other hand, a consumer who wants to induce firms to increase wages, e.g., due to maximin preferences over the entire game, can buy all 10 units from the firm with the higher wage and the higher price. Thus, 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 may reflect long-term concerns for workers or indirect reciprocity.

Buying the same number of units from both firms The strategy to buy equal amounts at both firms might reflect the consumers' wish to

[21] For ease of exposition, the figure does not include the cases with intermediate levels of the lower wage offer (between 2 and 5). This distribution lies well between the other two (see Figure 4 in the appendix).

[22] For example, if $w_1 = 2$ and $w_2 = 3$, buying six units from Firm 1 and four units from Firm 2 would lead to total earnings of 12 for both workers. This satisfies maximin preferences if $p_i - w_i \geq w_i$ for $i = 1, 2$.

maximize the minimum payoff among market participants. The reason is that a worker is among the least earning market participants in 92.3% of all observations and in the case of identical wage offers that are above zero (44.8% of the observations) attempts to maximize the lowest worker profit would lead a consumer with maximin preferences to buy about five units from each firm. If the observed behavior of buying similar numbers of units from both firms is indeed driven by maximin preferences, we would expect consumers who face differing wage offers to buy more from the firm with the lower wage offer. However, since the calculation of the optimal distribution given maximin preferences is not trivial to compute, consumers might use a simple equipartition rule as a heuristic in order to support both workers roughly equally.

Figure 2 shows that a substantial mass of the distribution is located between zero and five units. This could either indicate that consumers have maximin preferences or that the consumers' willingness to support both workers equally is reduced if the difference between prices or the price level are very high. In order to examine the validity of these potential explanations, Table 3 reports on regressions where we estimate the effects of a change in the minimum wage policy and the price and wage structure on the consumers' propensity to split purchases equally. The dependent variable is the negative absolute distance between the quantities the consumers bought at each firm, which tends to capture both simple 50-50 splits and allocations from sufficiently strong maximin considerations. The estimations reveal that the consumers' propensity to buy equal shares is increasing in the lower of both wage offers w_l (significant in NMF3 and MF6 and marginally significant in NMF6 and MF3). This is consistent with the view that fair consumers choose an equal split to equalize earnings if they find that wages are at a satisfactory level. Furthermore, the absolute price difference (in contrast to the price level) has a negative effect on the consumers' propensity to split units equally (though this is significant only in the MF6 treatment), which corroborates the hypothesis that concerns for equality decrease when it is relatively more expensive.

Table 3: Effect of minimum wage changes on consumers' tendency to split units equally among firms.

	Consumers' tendency to split units equally			
	No minimum wage first (NMF)		Minimum wage first (MF)	
	NMF3	NMF6	MF3	MF6
2nd half	-0.685^{**}	-2.415^{***}	1.064^{**}	2.491^{***}
	(0.298)	(0.762)	(0.466)	(0.663)
Lower wage offer	0.333^{***}	0.362^{*}	0.253^{*}	0.470^{***}
	(0.096)	(0.202)	(0.147)	(0.160)
Wage difference	0.118^{*}	-0.037	-0.041	0.177
(Higher−lower)	(0.065)	(0.073)	(0.055)	(0.113)
Lower price offer	0.075	0.094	0.096	0.071
	(0.057)	(0.058)	(0.068)	(0.048)
Price difference	-0.025	-0.040	-0.038	-0.086^{***}
(Higher−lower)	(0.020)	(0.029)	(0.025)	(0.024)
Constant	-9.930^{***}	-9.781^{***}	-10.786^{***}	-12.425^{***}
	(0.578)	(0.734)	(0.717)	(0.706)
N	622	615	631	655
$\log L$	−1588.679	−1476.006	−1529.296	−1579.315

Note: The table shows estimated coefficients of OLS regressions. The dependent variable is the negative absolute difference between the quantities bought at both firms. The regressions include only observations where the price offers of the two firms differed; the data from the first six periods in each half are excluded. Standard errors (in parentheses) corrected for clusters at the market level. Stars represent p-values: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Finally, reflecting the previous findings on the crowding out and crowding in of consumers' non-selfish behavior through minimum wage policies, we observe that consumers are less likely to distribute their purchases equally among firms if a minimum wage is in place.

Observation 3. *The consumers' propensity to buy similar shares from both firms (i) increases in the wage level and decreases the more the two prices differ, and (ii) is crowded out when a minimum wage is introduced and crowded in when a minimum wage is abolished.*

Buying all units from the firm with the higher wage As Figure 2 reveals, a non-negligible share of consumer choices is to buy all units from the firm with the higher price and wage. One possible explanation is that consumers who care for the workers use this strategy to punish a firm for paying too low wages. If this is the case, we expect the consumers' willingness to buy all units from the high-price, high-wage firm to depend negatively on the lower of both wage offers. Furthermore, due to the price sensitivity of fairness concerns, we expect that the consumers' willingness to buy from the more expensive firm is lower the higher the difference in the price offers.

Table 4: Effect of minimum-wage changes on consumers' tendency to buy all units from the high-price, high-wage firm.

	Consumer buys all units from the high-price high-wage firm			
	No minimum wage first (NMF)		Minimum wage first (MF)	
	NMF3	NMF6	MF3	MF6
2nd half	−0.017	−0.450	0.840***	0.967**
	(0.226)	(0.383)	(0.253)	(0.465)
Lower wage offer	−0.001	−0.141*	−0.227**	−0.022
	(0.063)	(0.073)	(0.115)	(0.071)
Wage difference	0.071**	−0.022	0.340**	−0.024
(Higher−lower)	(0.036)	(0.055)	(0.146)	(0.059)
Lower price offer	0.039	0.114***	−0.044	0.024
	(0.032)	(0.042)	(0.087)	(0.045)
Price difference	−0.002	0.012	−0.572***	0.020
(Higher−lower)	(0.021)	(0.053)	(0.137)	(0.019)
Constant	−2.081***	−2.457***	−0.977	−2.533***
	(0.330)	(0.397)	(0.690)	(0.792)
N	284	271	315	237
$\log L$	−76.772	−51.712	−51.103	−48.930

Note: The table shows estimated coefficients of probit regressions. The dependent variable is a dummy for observations where the consumer bought all units at the high-price, high-wage firm. The regressions include only cases where one firm offered both a strictly higher price and a strictly higher wage; the data from the first six periods in each half are excluded. Standard errors (in parentheses) corrected for clusters at the market level. Stars represent p-values: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

In order to test these hypotheses, Table 4 reports the regression results of the consumers' willingness to buy all units from the high-price, high-wage firm on a dummy for the change in the minimum wage policy and the price and wage structure. The estimations show that this propensity of consumers is indeed decreasing in the lower of both wage offers, though this effect is significant only in MF3 and marginally significant in NMF6. Moreover, the absolute wage difference has a significant positive effect on the consumers' willingness to buy all units from the high-price, high-wage firm in NMF3 and MF3. Thus, consumers are more willing to pay a high price the higher the wage at the high-price, high-wage firm in these treatments. These results are consistent with the hypothesis that buying all units from the high-price, high-wage firm is a long-term strategy to encourage firms to pay higher wages, which is especially important when the minimum wage is low. Moreover, we again find evidence of the price sensitivity of fairness concerns. In MF3 the absolute price difference exerts a significant negative effect and in NMF6 the price of the other (low-price, low-wage) firm has a significant positive effect. Finally, we find significant crowding in of the long run strategy when the minimum wage is abolished but only mild (and insignificant) crowding out effects after a minimum wage is introduced.

Observation 4. *(i) Some consumers are willing to buy all units from the firm with the higher price as long as it offers a higher wage. (ii) Consumers more often buy all units from the high-price, high-wage firm, the lower the wage offer of the low-wage firm and the higher the wage difference between firms. (iii) Abolishing the minimum wage crowds in the consumers' tendency to buy all units from the high-price, high-wage firm. There are no significant crowding out effects from introducing a minimum wage.*

4 Structural estimation of consumer preferences

In this section, we use structural estimation to assess how consumers behavior is affected by minimum wage interventions. The analysis in the previous sec-

tion addressed the effects on the prevalence of two specific fairness strategies separately. The structural estimation presented in this section also allows us to estimate how the weights that consumers assign to these strategies changes with changes in the minimum wage policy when both strategies are considered simultaneously. We use the social welfare model by Charness and Rabin (2002).

In the static game, a consumer with maximin preferences would buy nearly equal shares at both firms, but would buy more from the firm paying the lower wage. In the repeated game, a consumer with maximin preferences might buy more from the firm with higher wages (as long as the workers earn less than the firms) if she believes that firms will react by raising wages. An alternative way to interpret the consumers' tendency to buy all units from the high-price, high-wage firm is indirect negative reciprocity. Consumers "retaliate" on behalf of the worker if the wage is unfairly low. The model by Charness and Rabin (2002) combines maximin preferences with reciprocity concerns (besides self-interest and total welfare concerns), and is therefore well suited to capture the consumers' fairness strategies in our setting.

The general multi-agent model of Charness and Rabin (2002) (in their appendix 1) combines concerns for the agent with the lowest income (maximin), negative reciprocity, and social welfare. In a game with n players who pick strategies $s = (s_1, \ldots, s_n)$ that yield material payoffs $\pi = (\pi_1, \ldots, \pi_n)$, the CR-utility of player i is given by

$$\begin{aligned} U_i(s,d) = (1-\lambda)\pi_i + \lambda \Bigg[& \delta \min[\pi_i, \min_{m \neq i}\{\pi_m + b d_m\}] \\ & + (1-\delta)\left(\pi_i + \sum_{m \neq i} \max[1 - k d_m, 0]\pi_m\right) - f \sum_{m \neq i} d_m \pi_m \Bigg]. \end{aligned} \tag{1}$$

The most interesting parameter is $\lambda \in [0,1]$, which is the weight player i assigns to social concerns relative to her own material payoff. With $\lambda = 0$ the model collapses to the benchmark of a purely self-interested (and risk-neutral) consumer. With $\lambda = 1$ the consumer does not care differently about herself than about others and acts based only on social concerns.

Social concerns consist of three distinct components that are all affected by the "demerit" of the other players. Individual demerit $d_j \in [0, 1]$ reflects how much any player $i \neq j$ thinks player j "deserves". The larger d_j, (i) the less player i considers j in her maximin and social welfare considerations and (ii) the more disutility player i derives from j's material payoff.

Social concerns consist of (i) a δ-weighted combination of demerit-adjusted maximin preferences (first term in the square brackets) and demerit-adjusted social welfare concerns (second term) and (ii) demerit-based negative reciprocity (third term) that drive social concerns with intensity $f \geq 0$.

4.1 Applying the model

For the application to our specific setting, we can simplify the general model by Charness and Rabin (2002) in several ways. We first note that only the firms' demerit matters for the consumer's utility since the workers have no agency and, therefore, cannot acquire demerit.

Second, in our setting there is no genuine tradeoff between total material welfare and other motives since the sum of the material payoffs is constant as long as the consumer buys 10 units. The only way social welfare (the second term) differs from the constant material welfare is through the demerit adjustment that lowers a firm's weight in the consumer's welfare consideration if the firm misbehaved. The same logic is already captured by the negative reciprocity component (third term) with the only difference that the effect of the latter is unbounded and weighted differently relative to the maximin component (first term). To facilitate the estimation and interpretation of the results, we ignore social welfare concerns in our application and reweight the remaining components such that social concerns are a convex combination of maximin preferences and negative reciprocity.

We next note that the demerit adjustment for the maximin preferences is of minor relevance in our setting since in the vast majority of the cases a worker has the lowest income (in 92.3% of cases). That is, maximin preferences are very close to concerns for a sufficiently high wage. We therefore ignore the firm-specific demerit adjustment for the maximin preferences and

reserve the role of demerit for negative reciprocity.[23] Together with the assumptions above, the consumer's CR-utility now reduces to

$$U_c(s,d) = (1-\lambda)\pi_c + \lambda\left[\delta \min[\pi_c, \pi_{w_1}, \pi_{w_2}, \pi_{f_1}, \pi_{f_2}] + (1-\delta)(-d_{f_1}\pi_{f_1} - d_{f_2}\pi_{f_2})\right]. \tag{2}$$

Our final assumption concerns the demerit of the players that we model directly as a function of their actions.[24] As in Charness and Rabin (2002), we have to specify an exogenous fairness standard to pin down the predictions of the model.[25] A natural candidate is a wage of 10 and a price of 20 that lead to the fair allocation.[26] To ease interpretation of the results we restrict demerit to deviations from the fair wage.[27] Specifically, we assume that the demerit d_{f_i} of firm f_i is given by

$$d_{f_i} = I_{(w_i<w^*)}(w^* - w_i)/w^*, \tag{3}$$

where $I_{(w_i<w^*)}$ is equal to one if a wage offer is below the fair wage, and zero otherwise. That is, a firm's demerit is the extent to which her wage w_i undercuts the fair wage of $w^* = 10$, normalized to be in $[0, 1]$.

[23]This also greatly facilitates the estimation of the model. Attempts to include the parameter b in the estimations yielded either convergence of b to zero or (for other variations of the model) no convergence at all.

[24]Charness and Rabin (2002) are not dogmatic about the way demerit is specified in applications and explicitly leave it "underspecified." It is only in their appendix 1 that demerit is fully specified for the definition of the reciprocal-fairness equilibrium. In the main applications in their paper, demerit is assumed to be 1 if player A chooses to enter in some of the games, and 0 otherwise.

[25]In reciprocal-fairness equilibrium, demerit is determined endogenously through what each player's strategy reveals about her social concerns λ. Players are pessimistic about each other in the sense that they always take the lowest λ that is consistent with someone else's behavior, and compare this value with some exogenous fairness standard λ^*. In equilibrium, a player's demerit is the difference between the two.

[26]Since this price-wage combination that equalizes earnings is independent of the choices of the other firm, we can base our assessment of demerit directly on the firm's behavior rather than on estimates of their λ. The exact values of the fairness reference should not be the ultimate driver of the results in our setting since, for reasonable bounds of f, it is the relative demerit of the two firms, and not the absolute demerit, that primarily matters for the consumer choice.

[27] We also estimated an extended model where both unfairly low wages and unfairly high prices evoke demerit. The results are qualitatively the same and the estimated parameters are very similar (see Table 8 in the appendix).

4.2 Estimation

We estimate the parameters λ and δ in equation (2) with Maximum Likelihood. To this end we assume that the consumer always buys 10 units and chooses each possible allocation $(q_1, 10 - q_1), q_1 = 0, \ldots, 10$ with probability $\exp(U_c(q_1, d))/\sum_{x=0}^{10} \exp(U_c(x, d))$.

Since we are primarily interested in the effects of changes in the minimum wage on the consumer's social concerns as a whole—relative to her self-interest—we test for a structural break in λ by allowing it to differ between the first and the second half of the experiment. That is, we augment the consumer's CR utility by letting $\lambda = \lambda_1 + I_{(\text{second half})}\Delta\lambda$.

Table 5 shows the estimation results for each treatment. The first row shows that fairness matters in all markets before the policy change. The weight consumers assign to social concerns is between 0.21 and 0.40, significantly larger than zero and, on average, about 12 percentage points higher when the market starts without a minimum wage in place (NMF) than when a minimum wage is present initially (MF).

Table 5: Estimates of consumers' weights λ on the disinterested social-welfare criterion across minimum wage policies.

	No minimum wage first (NMF)		Minimum wage first (MF)	
Parameter	NMF3	NMF6	MF3	MF6
λ_1 (1st half)	0.396^{***}	0.274^{***}	0.209^{***}	0.224^{***}
	(0.014)	(0.012)	(0.017)	(0.016)
$\Delta\lambda$ (change 2nd half)	-0.064^{***}	-0.094^{***}	0.102^{***}	0.157^{***}
	(0.020)	(0.028)	(0.021)	(0.021)
δ (over all periods)	0.355^{***}	0.487^{***}	0.332^{***}	0.420^{***}
	(0.016)	(0.042)	(0.025)	(0.024)
N	875	876	864	863
$\log L$	−2603.681	−2768.683	−1639.954	−2096.164

Note: In the CR model, δ is the weight the consumers put on the minimum payoff of all market participants relative to their (negative) reciprocity concerns toward the firms. The data from the first six periods in each half are omitted. Standard errors were clustered at the market level; stars represent p-values from tests of parameters against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The main result is given in the second row that shows how the weight on social fairness concerns changes with minimum wage changes. In line with our previous findings, the estimations show that the introduction of a minimum wage leads to significant crowding out of the consumers' fairness concerns. The abolishment of a minimum wage, on the other hand, leads to significant crowding in of consumers' fairness concerns.

The last row in the table shows how consumers weight reciprocity concerns relative to maximin considerations. For example, in the NMF3 treatment, a \$1 increase in the payoff of the market participant with the lowest income is exactly offset by the disutility of observing a \$0.55 increase in the profit of a fully misbehaving firm (demerit $d_f = 1$ by setting a wage of 0).[28] The demerit of a maximally misbehaving firm therefore plays a larger role for the consumer than the minimum payoff. While this interpretation and the exact size of the weights rely on the modeling assumptions we made, the results clearly show that both fairness motives—maximin considerations and reciprocity—are important to describe consumer behavior.[29]

Finally, we test how the relative weights of the fairness components change with minimum wage interventions. Table 9 in the appendix shows the results of estimations of the CR model where we also allow for a structural break of δ (in addition to the structural break in λ as in Table 5). We first note that the results confirm that the overall weight on fairness concerns λ significantly decreases when a minimum wage is introduced and significantly increases when a minimum wage is abolished. Regarding the total impact each fairness strategy has on consumer behavior (i.e., $\lambda \cdot \delta$ for maximin preferences and $\lambda \cdot (1 - \delta)$ for reciprocity concerns), we find that policy changes significantly affect consumers' maximin concerns but not their reciprocity concerns. The total weight on maximin preferences ($\lambda \cdot \delta$) significantly decreases with minimum wage introductions and significantly increases with

[28] With the estimated δ in NMF3 we get $= 0.355/(1 - 0.355) = 0.55$.

[29] With our simplifying assumptions for equation (2) both maximin considerations and reciprocity concerns are measured in terms of payoff. With the full model in (1) the interpretation is less clear due to the additional parameters b, k, and f that govern the demerit adjustments for the maximin and social welfare concerns and the intensity of direct disutility from others' demerit (reciprocity term), respectively.

minimum wage abolishments. These findings match the regressions in Table 3 on the consumers' inclination to support both firms and workers. The net effect of reciprocity is not significantly affected by policy changes, which is partially in line with the regressions in Table 4, which showed a significant effect of policy changes on the consumers' tendency to buy all units at the high-price, high-wage firm only for the MF but not the NMF treatments. With a minimum wage, the relative weight on reciprocity is larger (since δ is smaller), and therefore long-term considerations appear to take a larger role.

We conclude that minimum wages change the overall fairness behavior of consumers beyond what can be explained by changes in wage and price levels. We have shown this with simple regressions and with a structural model that is able to capture all salient aspects of consumer behavior in our setting: self-interest, short run concerns for equality, and long run concerns for sufficiently fair wages. In an earlier version of this paper (Danz, Engelmann, Kübler 2012) we also employed a semi-structural model of consumer choice aimed at maximizing descriptive accuracy in our setting by capturing the two fairness strategies of consumers in the most direct manner. Estimations of this model further corroborate our finding that the changes in consumer behavior through policy interventions cannot be fully captured by smooth reactions to wage and price changes. While we are not taking a stance on whether these changes in consumer behavior reflect genuine changes in preferences that may or may not be rationalized,[30] our results clearly show that they are not predicted with standard models and must be explicitly taken into account.

5 Conclusions

Over the last decades, experimental research has provided important insights regarding fair behavior in markets. Much of this research investigates situations where it is obvious what constitutes fair behavior and how fair outcomes

[30] Generalized models could make the weights on social concerns depend on the presence of regulation, which would make crowding out and crowding in be aspects of preferences rather than evidence of preference changes.

can be achieved. Outside the laboratory, it is often complicated to achieve fair outcomes or even to decide what is a fair outcome. We have studied an experimental market where consumers have to take complex decisions to achieve fair outcomes. We introduced a policy change in this market in order to investigate how it affects consumer choices and market outcomes.

We have found that although consumers act self-interestedly in a majority of cases, they also reveal a non-negligible willingness to forgo own payoffs in order to support the workers. Specifically, we have identified two strategies of consumers to implement a fair market outcome. First, in a number of cases 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 all units from the more expensive firm if it offers a higher wage. Buying an equal number of units can be interpreted as implementing a fair outcome in the short run if the wage level is high enough. But if wages are too low, fair-minded consumers shift purchases to the firm with the higher wage, presumably to encourage higher wages in later rounds. As can be expected from rational consumers, both strategies are chosen less often when they are too costly, i.e., when the difference in prices is too high. We thus observe that although achieving fair outcomes for all participants is far from trivial in our markets, a number of participants in the role of consumers make an effort to do so. The behavior of consumers encourages firms to raise wages above the minimum level.

Do legal standards affect the ethical concerns of consumers? We observe that introducing a minimum wage has a positive effect on the welfare of workers because the direct effect (i.e., the minimum wage is frequently binding) overcompensates the negative indirect (crowding-out) effect. The abolishment of a minimum wage clearly increases the consumers' willingness to forgo own income in order to support the workers. However, this crowding-in effect is overcompensated by the direct effect of the abolishment of the minimum wage such that workers in sum suffer from the abolishment. Furthermore, consumers act as if they care less about the equal distribution of purchases if a minimum wage is in place initially. Therefore, both comparing across treatments for the same phase of the experiment and within

treatments across time, we find that the presence of a minimum wage weakens fairness concerns of consumers but that this effect is dominated by the direct effect of the minimum wage.

We have provided a behavioral existence proof of crowding out and crowding in of relatively complex fair choices in markets. However, the abstractions from natural labor markets (such as the restriction to monopsonistic buyers) preclude drawing general lessons regarding the effects of minimum wages or other regulations. Specifically, our finding that the direct effect of a binding minimum wage dominates the indirect crowding effect certainly depends on the exact conditions of the market and on the level of the minimum wage. Moreover, our design excludes any possible impact of minimum wages on employment levels as well as on the workers' motivation, which would both be important determinants of the overall welfare effects of minimum wages. What our behavioral existence proof implies, however, is that crowding effects should not be ignored in the context of fair consumer behavior.

References

Anderhub, V., Engelmann, D., and Güth, W. (2002). An Experimental Study of the Repeated Trust Game with Incomplete Information. *Journal of Economic Behavior and Organization* 48, 197–216.

Bartling, B., Weber, R.A., and Yao, L. (2015). Do Markets Erode Social Responsibility? *Quarterly Journal of Economics* 130(1), 219–266.

Brandts, J. and Charness, G. (2004). Do Labour Market Conditions Affect Gift Exchange? Some Experimental Evidence. *Economic Journal* 114, 684–708.

Card, D. (1992). Do Minimum Wages Reduce Employment? A Case Study of California 1987-89. *Industrial and Labor Relations Review* 46(1), 38–54.

Card, D. and Krueger, A. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review* 84(4), 772–793.

Card, D. and Krueger, A. (1995). Myth and Measurement. The New Economics of the Minimum Wage. Princeton University Press, Princeton, New Jersey.

Charness, G. and Rabin, M. (2002). Understanding Social Preferences with Simple Tests. *Quarterly Journal of Economics* 117(3), 817–869.

Danz, D., Engelmann, D., and Kübler, D. (2012): Do Legal Standards Affect Ethical Concerns of Consumers? An Experiment on Minimum Wages, Working Paper Series, No. 12-3, University of Mannheim, Department of Economics, Mannheim, http://nbn-resolving.de/urn:nbn:de:bsz:180-madoc-301466

Dickens, R., Machin, S., and Manning, A. (1999). The Effects of Minimum Wages on Employment: Theory and Evidence from Britain. *Journal of Labor Economics* 17(1), 1–23.

Engelmann, D. and Fischbacher, U. (2009). Indirect Reciprocity and Strategic Reputation Building in an Experimental Helping Game. *Games and Economic Behavior* 67(2), 399–407.

Engelmann, D., Friedrichsen, J., and Kübler, D. (2018). Fairness in Markets and Market Experiments. *CRC TRR 190 Discussion Paper No.* 64.

Engelmann, D. and Strobel, M. (2004). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments. *American Economic Review,* 94(4), 857–869.

Etilé, F. and Teyssier, S. (2016). Signaling Corporate Social Responsibility: Third-Party Certification versus Brands. *Scandinavian Journal of Economics* 118(3), 397–432.

Falk, A., Fehr, E., and Zehnder, C. (2006). Fairness Perceptions and Reservation Wages - The Behavioral Effects of Minimum Wage Laws. *Quarterly Journal of Economics*, 121 (4), 1347–1381.

Falk, A. and Kosfeld, M. (2006). The Hidden Costs of Control, *American Economic Review*, 96, 1611–1630.

Falk, A. and Szech, N. (2013). Morals and Markets. *Science* 340, 707–711.

Fehr, E., and Fischbacher, U. (2004). Third-Party Punishment and Social Norms. *Evolution and Human Behavior*, 25, 63–87.

Fischbacher, U., (2007). Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics* 10(2), 171–178.

Frey, B.S. (1997). *Not Just for the Money.* Edward Elgar, Cheltenham.

Frey, B.S. and Jegen, R. (2001). Motivation Crowding Theory. *Journal of Economic Surveys* 15, 589–611.

Gneezy, U. and Rustichini, A. (2000a). Pay Enough or Don't Pay at All. *Quarterly Journal of Economics* 115(2), 791–810.

Gneezy, U. and Rustichini, A. (2000b). A Fine Is a Price. *Journal of Legal Studies* 29, 1–17.

Güth, W. and van Damme, E. (1998). Information, Strategic Behavior and Fairness in Ultimatum Bargaining - An Experimental Study. *J. Math. Psychology* 42, 227–247.

Güth, W., Schmidt, C., and Sutter, M. (2007). Bargaining Outside the Lab - A Newspaper Experiment of a Three Person-Ultimatum Game. *Economic Journal* 117, 422–448.

Harrison, G.W. and Johnson, L.T. (2006). Identifying Altruism in the Laboratory. In: D. Davis (Ed.) *Experiments in Fundraising and Charitable Contributions*. Research in Experimental Economics, Volume 11. JAI Press, Greenwich, Connecticut.

International Cocoa Organization (2019). The Chocolate Industry. https://www.icco.org/ about-cocoa/chocolate-industry.html (last accessed: Feb 3, 2020).

Irlenbusch, B. and Saxler, D.J. (2019). The Role of Social Information, Market Framing, and Diffusion of Responsibility as Determinants of Socially Responsible Behavior. *Journal of Behavioral and Experimental Economics* 80, 141–161.

Katz, L. and Krueger, A. (1992). The Effect of the Minimum Wage on the Fast Food Industry. *Industrial and Labor Relations Review* 46(1), 6–21.

Kirchler, M., Huber, J., Stefan, M., and Sutter, M. (2016). Market Design and Moral Behavior. *Management Science* 62(9), 2615–2625.

Kritikos, A. and Bolle, F. (2001). Distributional Concerns: Equity- or Efficiency-oriented? *Economics Letters* 73, 333–338.

Ostrom, E. (2000). Collective Action and the Evolution of Social Norms. *Journal of Economic Perspectives* 14(3), 137–158.

Pigors, M. and Rockenbach, B. (2016). Consumer Social Responsibility. *Management Science* 62(11), 3123–3137.

Rode, J., Hogarth, R.M., and LeMenestrel, M. (2008). Ethical Differentiation and Market Behavior: An Experimental Approach. *Journal of Economic Behavior & Organization* 66(2), 265–280.

Seinen, I. and Schram, A. (2006). Social Status and Group Norms: Indirect Reciprocity in a Helping Experiment. *European Economic Review* 50, 581–602.

Sutter, M., Huber, J., Kirchler, M., Stefan, M., and Walzl, M. (2020). Where to Look for the Morals in Markets? *Experimental Economics* 23, 30-–52.

TransFair e.V. (2018). TransFair e.V. Jahres- und Wirkungsbericht 2017. TransFair e.V.

Appendices

A Additional Analysis

A.1 Firm behavior by consumer type

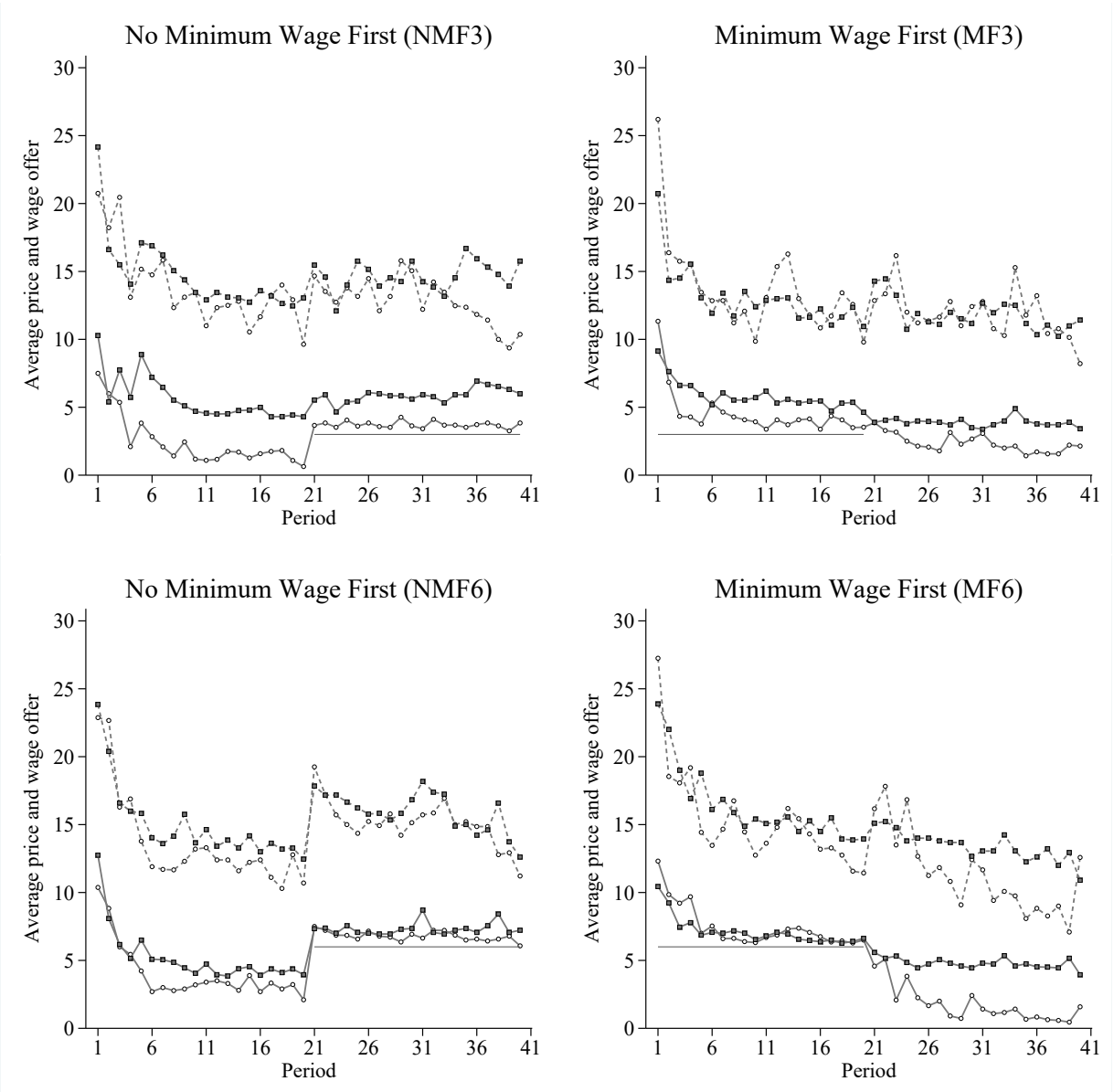

Figure 3: Market outcomes by consumer types. Circle markers are markets with consumers who always act in line with self-interest. Square markers are markets with consumers who deviate at least once from self-interest. Dashed and solid lines are average price and wage offers, respectively.

A.2 Consumer behavior

A.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 demand withholding is the most powerful tool for changing the behavior of the firms, it is 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.[31]

If the willingness to buy less than 10 units is driven by social concerns for the workers, we should observe this behavior more often when wage offers 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 lower of both price offers p_l is high. Table 6 reports regressions where we estimated the effect of the wage and price structure in the market on consumers' propensity to reduce consumption below 10 units.

The regressions show that the consumers' propensity to buy less than 10 units is significantly increasing in the lower of both prices in all treatments, except in MF3 with only marginal significance. Thus, buying less than 10 units does not appear to be the result of confusion of the consumers. Since wages do not have any significant effect, we conclude:

Observation 5. *The consumers' willingness to buy less than 10 units is driven by self-interest only, with higher prices decreasing the likelihood that all 10 units are bought.*

We add that the consumers' propensity to buy less than 10 unit is unrelated to the consumers' propensity to buy from the firm with the strictly higher price. Both actions together occur in only 1.3% of the cases and

[31] Nevertheless,we observe that demand withholding is sometimes quite extreme. In 19.8% of the cases where the consumers bought less than 10 units in total (and at least one price offer is below 25), they buy nothing at all.

Table 6: Effect of minimum-wage changes on consumers' tendency to buy less than 10 units in total.

	Consumer buys less than 10 units in total			
	No minimum wage first (NMF)		Minimum wage first (MF)	
	NMF3	NMF6	MF3	MF6
2nd half	−0.016	−0.413	−0.187	0.123
	(0.133)	(0.298)	(0.230)	(0.342)
Lower wage offer	−0.036	−0.040	−0.055	0.036
	(0.044)	(0.061)	(0.047)	(0.050)
Wage difference	0.047	−0.038	−0.040	−0.009
(Higher−lower)	(0.036)	(0.046)	(0.037)	(0.032)
Lower price offer	0.068***	0.094***	0.065*	0.156***
	(0.026)	(0.027)	(0.035)	(0.042)
Price difference	0.003	−0.005	0.007	0.000
(Higher−lower)	(0.013)	(0.019)	(0.013)	(0.016)
Constant	−1.994***	−1.975***	−2.177***	−4.710***
	(0.285)	(0.548)	(0.477)	(0.811)
N	875	876	864	863
$\log L$	−295.711	−300.470	−134.051	−55.980

Note: The table shows estimated coefficients of probit regressions. The dependent variable is a dummy for observations where the consumer bought less than 10 units in total from both firms. The data from the first six periods in each half are excluded. Standard errors (in parentheses) corrected for clusters at the market level. Stars represent p-values: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

they are statistically independent.[32] This result is not surprising given that both behavioral patterns are motivated differently (social concerns motivate purchases from the firm with the higher price while self-interest motivates buying less than 10 units).

[32] A probit regression of a dummy variable for consumers buying less than 10 units on a dummy variable for consumers buying at the firm with the strictly higher price as the independent variable yields $p = 0.860$ (standard errors clustered at the market level).

A.2.2 Non-selfish consumer choices

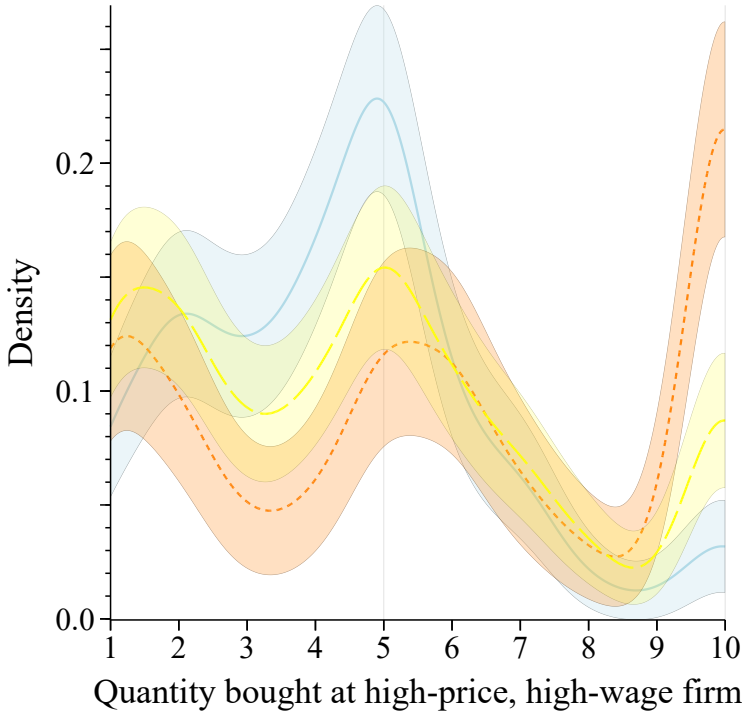

Figure 4: Kernel density estimates of units the consumers bought from the firm with the higher price and the higher wage, conditional on buying at least one unit at that firm: Cases where the lower of the two wage offers is below 2 (dotted line), between 2 and 5, inclusive (dashed line), and above 5 (solid line). Shaded areas represent 95% confidence intervals.

Table 7: Regressions of non-selfish consumer choice on minimum wage policies (including observations where price offers do not differ and choices motivated by fairness considerations cannot be identified).

	Non-selfish consumer choice			
	No minimum wage first (NMF)		Minimum wage first (MF)	
	NMF3	NMF6	MF3	MF6
2nd half	-0.069^{**}	-0.170^{***}	0.079^{**}	0.151^{***}
	(0.028)	(0.058)	(0.034)	(0.051)
Lower wage offer	-0.006	-0.007	-0.002	0.001
	(0.007)	(0.007)	(0.005)	(0.005)
Wage difference	0.022^{***}	0.002	0.019^{*}	0.037^{***}
(Higher−lower)	(0.009)	(0.008)	(0.010)	(0.011)
Lower wage offer	0.026^{***}	0.025	0.016^{*}	0.032^{**}
	(0.008)	(0.017)	(0.009)	(0.014)
Price difference	-0.006	0.004	-0.015^{**}	-0.016^{***}
(Higher−lower)	(0.004)	(0.003)	(0.007)	(0.004)
N	875	876	864	863
$\log L$	-343.933	-340.030	-356.700	-391.687

Note: Coefficients are estimated marginal effects from probit regressions (constant omitted). Non-selfish consumer choice is defined as a consumer buying one or more units at the (strictly) more expensive firm. The data from the first six periods in each half are omitted. Standard errors were clustered at the market level; stars represent p-values from tests against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

A.2.3 Reciprocial fairness estimations

Table 8: Estimates of consumers' weights on the disinterested social-welfare criterion λ across minimum wage policies. Same specifications as in Table 5 but reciprocity toward firms includes wages and prices.

	No minimum wage first (NMF)		Minimum wage first (MF)	
Parameter	NMF3	NMF6	MF3	MF6
λ (1st half)	0.388^{***}	0.263^{***}	0.205^{***}	0.190^{***}
	(0.014)	(0.011)	(0.017)	(0.014)
$\Delta\lambda$ (change 2nd half)	-0.056^{***}	-0.169^{***}	0.105^{***}	0.176^{***}
	(0.020)	(0.013)	(0.021)	(0.019)
δ (over all periods)	0.366^{***}	0.750^{***}	0.341^{***}	0.506^{***}
	(0.016)	(0.031)	(0.025)	(0.024)
N	875	876	864	863
$\log L$	-2623.386	-2861.795	-1647.164	-2187.463

Note: The firm's demerit is defined as $d_{f_i} = I_{(w_i<w^*)}(w^* - w_i)/w^* + I_{(p_i>p^*)}(p_i - p^*)/(50 - p^*)$, where $w^* = 10$ and $p^* = 20$. Within the disinterested social-welfare criterion, δ is the weight the consumers put on the minimum payoff of all market participants relative to their (negative) reciprocity concerns toward the firms (reciprocity toward firms includes wages and prices). The data from the first six periods in each half are omitted. Standard errors were clustered at the market level; stars represent p-values from tests of parameters against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 9: Estimates of consumers' weights on the disinterested social-welfare criterion λ across minimum wage policies. Same specifications as in Table 5 but (i) reciprocity toward firms includes wages and prices and (ii) allows for structural break in δ (in addition to λ).

	No minimum wage first (NMF)		Minimum wage first (MF)	
Parameter	NMF3	NMF6	MF3	MF6
λ (1st half)	0.386^{***}	0.262^{***}	0.221^{***}	0.286^{***}
	(0.014)	(0.011)	(0.018)	(0.022)
δ (1st half)	0.383^{***}	0.757^{***}	0.260^{***}	0.264^{***}
	(0.023)	(0.031)	(0.040)	(0.034)
$\Delta\lambda$ (change 2nd half)	-0.051^{**}	-0.135^{***}	0.089^{***}	0.083^{***}
	(0.020)	(0.026)	(0.022)	(0.025)
$\Delta\delta$ (change 2nd half)	-0.033	-0.229^{**}	0.114^{**}	0.273^{***}
	(0.032)	(0.114)	(0.049)	(0.041)
N	875	876	864	863
$\log L$	-2622.856	-2860.703	-1644.704	-2175.936
Test of nonlinear combinations of parameters after estimation				
Maxmin 1st half: $\lambda \cdot \delta$	0.148^{***}	0.198^{***}	0.057^{***}	0.076^{***}
Maxmin 2nd half: $(\lambda + \Delta\lambda) \cdot (\delta + \Delta\delta)$	0.117^{***}	0.067^{***}	0.116^{***}	0.198^{***}
Change maxmin	-0.031^{**}	-0.131^{***}	0.059^{***}	0.123^{***}
Reciprocity 1st half: $\lambda \cdot (1 - \delta)$	0.238^{***}	0.064^{***}	0.163^{***}	0.211^{***}
Reciprocity 2nd half: $(\lambda + \Delta\lambda) \cdot (1 - \delta - \Delta\delta)$	0.217^{***}	0.060^{**}	0.194^{***}	0.171^{***}
Change reciprocity	-0.020	-0.004	0.031	-0.040

Note: The firm's demerit is defined as $d_{f_i} = I_{(w_i < w^*)}(w^* - w_i)/w^* + I_{(p_i > p^*)}(p_i - p^*)/(50 - p^*)$, where $w^* = 10$ and $p^* = 20$. Within the disinterested social-welfare criterion, δ is the weight the consumers put on the minimum payoff of all market participants relative to their (negative) reciprocity concerns toward the firms (reciprocity toward firms includes wages and prices). The data from the first six periods in each half are omitted. Standard errors were clustered at the market level; stars represent p-values from tests of parameters against zero: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

B Instructions (translated from German)[33]

Welcome to this experiment. You can earn money during this experiment and your earnings depend on your decisions and the decisions of other participants.

Please read the instructions carefully. If you have a question, please raise your hand. We will answer your questions in private. The instructions are the same for all participants.

The experiment consists of several periods. At the beginning of the experiment, each participant is randomly assigned to a role that remains the same throughout the experiment. You know your own role but not the roles of the other participants. Of course, your anonymity will be kept during the entire experiment. This means that your identity is not revealed to other participants. The same applies to all participants.

In the experiment, there are firms, workers, and consumers. There are two firms, and each firm is matched with a worker who can produce a maximum of ten units of a good. The number of units the worker produces is determined by the number of units the consumer buys from the firm. The firm sets the wage the worker receives per unit sold. Throughout the experiment, a worker is assigned to the same firm. Both firms produce the same good. Both firms offer the good to the same consumer. The consumer can buy a maximum of ten units of the good and can choose how many units to buy from each firm.

At the beginning of the experiment, two firms, two workers, and one consumer—that is, five participants—are grouped together. Throughout the experiment this group assignment remains the same. This means that the firms, workers, and the consumer you deal with are the same in each period.

The payoffs of the participants are measured in points and depend on their role:

- The worker receives a wage that is paid by their firm. The wage is paid per unit, that is, the worker receives a fixed payment per unit sold which is set by the firm. [MF Treatments: The wage must be at least three [six] points.] The worker does not have a decision to make. If the

[33] Treatment differences and annotations are provided in square brackets.

consumer does not buy anything from the firm, the worker receives no wage, and thus has a payoff of zero.

- The firm receives the price multiplied by the number of units the consumer buys from this firm, minus the wage payment to the worker. If the consumer does not buy anything from the firm, the firm does not have to pay wages and hence gets a payoff of zero.

- The value the consumer attaches to each unit of the good is 25 points. They can buy a maximum of 10 units, but they can also buy less. This means that they get 250 points, minus the total price if he buys 10 units of the good. If the consumer buys fewer than 10 units, they receive the number of units multiplied by 25 minus the sum of the prices they must pay for the units. The consumer can distribute the number of purchased units between the two firms in an arbitrary way, and the consumer is not forced to buy from any of the two firms. If a consumer buys nothing, they receive a payoff of zero in this period.

The timeline of the experiment is as follows:

1. First, the two firms choose the wage for their worker and the price at which they want to sell each unit of the good. [NMF Treatments: The wage and the price must be between 0 and 50 points.] [MF Treatments: The wage must be between 3 [6] and 50 points and the price between 0 and 50 points.]

2. The consumer learns the price set by each firm, and the wage they pay their workers. The consumer then decides how many units they want to buy from each firm.

3. The purchases are completed.

4. The decisions and payoffs of all participants are displayed on the screen.

This situation is repeated 20 times. Then another 20 periods follow, before which we will inform you of a change in the rules. However, the roles of all participants in the second part remain the same as in the first part, and also the group assignments remain the same as before.

Your total payoff is the sum of the payoffs in all periods. The exchange rate for the points you can earn during the experiment is 200 points = 1 Euro.

At the beginning of the experiment you receive a fixed payment of 5 Euro. If you make losses during the experiment, they will be covered by the fixed amount.

Please raise your hand if you have any questions. We will then answer your questions in private.

[Change after the 20th period announced on computer screen:]

There is now a change in the market rules. [NMF Treatments: The wage that a firm sets for its workers must be at least three [six] per unit.] [MF Treatments: The wage that a firm sets for its workers, must be no longer at least three [six] per unit. However, it cannot be less than 0.] Everything else remains the same. In particular, the wages are still paid only if the firm is selling something.