What is a fair wage?

Reference points, Entitlements and Gift Exchange

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Abstract: We look at the effect of endogenous and exogenous wage setting institutions on wage offers and effort in the classic gift exchange experiments (Fehr, Kirchsteiger and Riedl, 1993). An exogenously imposed minimum wage at the competitive outcome lowers average wage offers. Workers do not negatively reciprocate and continue to offer high effort. In the endogenous wage setting institution, where workers first make wage proposals, wage offers increase marginally and average effort decreases relative to the baseline when wage proposals are not matched. Relative to the baseline, efficiency decreases in the minimum wage treatment while it marginally increases in the endogenous treatment. We find evidence that the institutional structure has important implications towards wage offers, effort and efficiency.

JEL Codes: J2, J3.

1 Introduction

In this paper we study stylized versions of two types of wage setting institutions. In the first one, the endogenous wage proposal institution, employers are presented an average wage proposal[2] on the part of the workers. We find that such wage proposals crowd out worker reciprocity if (proposed) wage offers are not met, workers reciprocate negatively decreasing effort levels. In the second institution, we study the effect of an exogenously imposed minimum wage at the competitive market wage. We find support for the crowding out of fairness with average wage offers declining across all periods. Even though wage offers decline, effort levels do not. We show that reciprocity in the gift exchange institution can be impacted differentially depending upon the nature of the intervention.

From the experimental literature we know that changes in institutional rules, can alter reference points, or entitlements, for the economic agents and alter behavior in subsequent periods (see for example the literature on price and quantity controls[3]). One such area that has been of recent interest for experimental economists is the labor market institution. The classic gift exchange experiments (Fehr, Kirchsteiger and Riedl, 1993) have been followed by recent research where several authors have looked at how exogenous and endogenous interventions in the gift-exchange experiments alter effort or wages levels. For example, wages may be set randomly (Charness, 2004) or above the competitive level by the experimenter (Charness (2004), Brandts and Charness (2004), Falk, Fehr and Zehnder (2006) and Owen and Kagel (2010)). A scenario where wages are endogenously set is studied by Charness et al (2012) where the wage decision is delegated to employees.

Charness (2004) looks at exogenously imposed versus employer determined wages where the wage is either determined randomly or set by the experimenter. He finds that under exogenous determination effort levels are significantly higher at lower wage levels. He attributes lower effort to employer determined wages where employees provide close to minimum effort. In another paper Brandts and Charness (2004) study the effect of competitive imbalance (both, an excess of supply (workers) and an excess of demand (employers)). They introduce a binding minimum wage and still find evidence of gift exchange. An imposed minimum wage lowers effort provision at all wages and decreases the likelihood that a high wage is paid. Finally, Owen and Kagel (2010) find that average wages are significantly higher with the minimum wage than without, as are average overall effort levels. Interestingly, employees provide greater effort in the neighborhood of the minimum

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[2] The average wage proposal is the average of all individual wage proposals.
[3] See for example, Isaac and Plott (1981), Coursey, and Smith (1983), Kujal (1994) among others.

wage relative to comparable wages prior to the imposition of the minimum wage. Finally, any decrease in effort levels, relative to pre-minimum wages, is restricted to wages in the neighborhood of the minimum wage.

Falk, Fehr and Zehnder (2006) study the effect of imposing a competitive minimum wage on worker preferences and how it affects perceptions of entitlements. They elicit reservation wages from workers using the strategy method. Any wage offer above (below) the reservation wage is automatically accepted (rejected). The temporary introduction of a minimum wage leads to a rise in subjects' reservation wages (and in turn what is perceived as a fair wage) which persists even after the minimum wage has been removed. They argue that public policies can affect behavior not only through directly changing it but by also shaping perceptions of entitlements and thus, reservation values (p 1351). As in their paper we also show that institutional arrangements can also shape wage expectations (entitlements) and hence effort.

Charness et al. (2012), meanwhile, study the effect of delegating the wage decision to employees on employee performance. Delegating the wage decision implies that wages are endogenously determined in their structure. They find that delegation significantly increases employee effort with performance increasing for the same wage levels. Finally, earnings of both employers and employees increase under this setup.

Endogenous wage setting institutions may either have wages set by the employees (Charness et al 2012) or employers may entertain offers from unions or employees regarding wages. Such proposals are common in the workplace, for example, workers can ask for a wage increase, have a perception of a fair wage and communicate it to their employers, or make a wage proposal through a union. This may result in some form of wage entitlements that if not met may subsequently impact gift exchange.

There are no generally well defined and clear cut wage setting institutions and most are very complex due to their rules and procedures. Wage proposals from a single worker, or a collective of workers, are common in the workplace. In the latter case the workers may have stronger feelings towards a wage entitlement. Our implementation is weaker than direct wage proposals, or centralized wage bargaining. Clearly the elicitations are not binding for the employers, however, they create certain expectations for the workers (or entitlements) with regard to their future expected wage. In the first institution we study the effect on gift

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exchange of wage proposals made by workers. This may create entitlements to a certain wage level and if not met it may affect gift exchange[4].

The second institution we study is where the minimum wage is set at the competitive level. Our predecessors have studied minimum wage above the competitive level (see Charness (2004), Brandts and Charness (2004), Kagel and Owen (2010) and Falk, Fehr and Zehnder (2006)). One can argue that it is not interesting to study a minimum wage at the competitive level[5]. However, we argue that such an exercise is useful. If a minimal intervention can impact gift exchange then more invasive policies will most likely have a stronger effect on labor market outcomes. We expect that the wage announcement creates a wage entitlement for the employers that can then impact effort.

We first replicate the findings in Fehr, Kirchsteiger and Riedl (1993)[6]. We find that in the endogenous wage proposal institution average wage offers increase, however, effort levels decrease. Our main contribution is the endogenous wage proposal institution. We find that endogenous wage proposals crowd out worker reciprocity when wage proposals are not met by the employers. If proposed wage offers are not met, workers reciprocate negatively decreasing effort levels. To our knowledge this is the first paper that presents such a result. Meanwhile, in the case of exogenously imposed minimum wage we find support for the crowding out of private fairness with average wage offers declining across all periods. Interestingly a higher proportion of the wage offers are made around the minimum wage. Even though wage offers decline, effort levels do not. This result goes against other experiments with minimum wages (Charness (2004), Brandts and Charness (2004) and Owen and Kagel (2010)). However, none of these papers studies a minimum wage at the competitive level.

It might be that the gains are indeed evaluated relative to a reference point or worker expectations[7]. If people have reference-dependent fairness preferences, policy measures may affect these points subsequently impacting how workers evaluate their employment situation[8]. Introduction of a minimum wage, or a wage proposal, may change the reference point according to which employers, or employee, judge an offer as fair or unfair. This may affect

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[4]This is weaker than Charness et al (2012) where the wage decision is fully delegated to workers as workers are not directly involved in the decision making process.
[5]Recall that in price and quantity control experiments, non-binding controls impacted market efficiency and prices.
[6]Notice, we strictly follow the Fehr, Kirchsteiger and Riedl (1994) protocol.
[7]As in Falk, Fehr and Zehnder (2006).
[8] Falk, Fehr and Zehnder (2006) make a similar point with regard to worker entitlements.

the wages offered by the employers and, ultimately, the employees' decisions about the effort levels.

2. Experimental Design

Our design follows Fehr, Kirchsteiger and Riedl (1993). The game has two stages. The first stage is a one-sided oral auction in which employers and workers exchange one unit of labor time. Employers propose a wage[9] and the monitor conveys the offers to the other room using Google chat. If the worker accepts the offer, the contract is concluded and this is communicated (via Google chat) to the other room. If not accepted, the employer can change the bid in an additional round with another higher one than the previous unaccepted bid. The first stage lasts three minutes. If the contract is not concluded, they earn zero profits in this period. In the second stage, workers determine the value of the good by choosing an effort level anonymously (their choice is revealed to their employer only to eliminate group pressure effects) and without any constraint (there are no sanctions associated with the effort chosen). Note that the identities of workers, or employers, is not revealed at any stage and participants had no knowledge about the person they were paired with.

We ran three treatments, the Baseline (BASE), the Endogenous wage proposal (ENDO) and the Exogenous minimum wage (EXO) treatments. We ran four sessions for the BASE and EXO treatments (Fehr, Kirchsteiger and Riedl, 1993) and five for the ENDO treatment. The different treatments are described below. Each session had twelve periods. In all sessions there were more workers than employers. The excess supply of workers is to give the competitive theory its best shot. Labor market terms were not used in the experiment: employers were called buyers, workers were called sellers, wage was called price and effort level was called quality level. Each participant knew how profits are computed and had sufficient time for reading the instructions and clarify doubts.

Participants received 3 euros for their participation, in addition to the profits earned during the experiment (average earnings for employers and workers were 3.24 and 7.02 euros, respectively). Experimental Money (EM) was used with an exchange rate of 45 units (of EM) to 1 euro. The experiments lasted for two hours including the instructions (Appendix A). Subjects were (randomly selected) volunteer students recruited by e-mail (using ORSEE) and they participated in this type of experiment for the first time. Previous to each session, each subject extracted a card determining what role they assumed: worker or employer.

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[9] It has to be multiple of five in order not to put a commission fee. It enables workers to earn a small amount of money at marginal trades.

Workers and employers were in separate rooms. In each room the supervisor transmitted the bids, acceptances and effort levels to the other room using Google chat.[10]

The treatment BASE is the free market setting as in Fehr, Kirchsteiger and Riedl (1993). In the ENDO treatment we introduce an endogenous minimum wage proposal from the employees. Each employee can make a minimum acceptable wage offer. Employers are then shown the average of all the offers as the "wage proposal" on part of the workers. The minimum wage proposal is not binding and, in theory, should not affect worker wage offers and/or effort levels. We conjecture that a minimum wage proposal will create entitlements for workers about the wage they perceive as a fair wage and, if it is not reciprocated, may induce negative reciprocity to the workers obtaining lower effort levels. It would be interesting to see whether fairness and reciprocity concerns hold when minimum wage proposals come from the workers and are not exogenously imposed, and how it may alter their perception of what is a fair wage.

In the EXO treatment we introduce an exogenous minimum wage. From earlier experimental work it is known that a minimum wage above the competitive level has consequences in labour markets. For this reason the minimum wage is chosen at the competitive level. Participants are informed that the minimum wage is set by a regulator and offers below this wage will not be accepted[11].

The payoffs of worker i is given by,

$$u_i = w_i - c - m(e_i)$$

where w_i is the worker wage, $c = 26$ (constant) is the monetary cost of providing one unit of labor time, e_i is the effort level provided by the worker, and $m(e_i)$ is the monetary effort cost. The monetary effort cost schedule is in Table I (it was the same for all workers):

Table I: Monetary Effort Cost Schedule									
e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
$m(e)$	0	1	2	4	6	8	10	12	15	18

The payoff of employer j, whose partner trade chose an effort of e_j for a wage of w_j is

$$\pi_j = (v - w_j)e_j$$

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[10] This is very similar to Fehr, Kirchsteiger and Riedl (1993) where wage proposals are made using telephones.
[11] The experimental evidence on price (wages) and quantity controls suggests to the contrary (Isaac and Plott (1981), Smith and Williams (1981), Coursey and Smith (1984), Kujal (1994), Falk, Fehr and Fischbacher (2003)). We, however, know from earlier experimental literature that this is not the case. Even non-binding price, or quantity, controls impact agent behavior.

where $v = 126$ is a valuation given exogenously. The assumption that effort interacts with wage in the payoff of the employers had been made to avoid losses and analyze only fairness concerns. Utilities, payoff functions, effort costs and the values of all parameters were public information in all treatments.

3. Hypotheses and Econometric Model

Five hypotheses are studied; the first three are from Fehr, Kirchsteiger and Riedl (1993).

HYPOTHESIS 1: The effort level is increasing in the wage.

Money-maximizing agents have no incentives to choose an effort level higher than the minimum one (effort is costly) and workers cannot be punished for providing low effort. If firms assume that agents are money-maximizers they do not have incentives to offer wages above the equilibrium wage level. With parameters values of $v = 126$ and $c = 26$ one should expect that wages converge to the competitive equilibrium level of 30. But if workers behave according to the first hypothesis, that is, if workers worry about fairness, the observed wages should be above the market-clearing level and average effort should also be above the minimum one.

HYPOTHESIS 2: Average wages are higher than the market-clearing wage. In the repeated game average wages do not converge to the market wage.

HYPOTHESIS 3: The average effort is above the minimum one and does not converge to the minimum one in the repeated game.

We add two additional hypotheses. In the first one we state how the introduction of a minimum wage in the EXO treatment and an initial wage proposal in the ENDO treatment affect wage offers.

HYPOTHESIS 4a: If the introduction of a minimum wage provides a reference point to employers, then imposing a competitive minimum wage should *lower wage offers* in the EXO treatment.

If the gift exchange hypothesis is true then the prevailing wage will be above the competitive wage. A competitive minimum wage *below* the prevailing wage may provide a reference point to firms and may guide them towards lower wage offers. This may thus result in firms lowering wage offers.

HYPOTHESIS 4b: Wage proposals should have no effect on wage offers in the ENDO treatment.

We assume that wage proposals will have no effect on wage offers as a-priori we have no reason to argue otherwise. While the relation between effort and wage is clear, it is not clear to us how employers will react to wage proposals. However, as point out below the relationship between wage proposals and effort is clearer if making a wage proposal results in entitlements (towards the proposal).

Finally, note that in the ENDO treatment workers can compare the initial wage proposal with the wage offer they finally accept. It may be the case that workers may show negative reciprocity if initial wage proposal is not met. This may result in lowered effort on the part of the workers. It is thus interesting to ask as to what happens to effort depending upon the difference between the initial wage offer and the final accepted wage. This gives us our final hypothesis.

HYPOTHESIS 5: If the final accepted wage offer is *lower than the wage proposal* then effort is negatively impacted in the ENDO treatment.

3.1 Econometric model

We use panel data regressions to look at individual behavior in a repetitive environment[12]. Further, we also use non-parametric tests where applicable. Although in each period the pairings can be different, the person who takes the decision (in each period) is always the same. Given this we consider our sample as longitudinal data. If y_{it} (worker i in period t) is our variable of interest, the panel data model can then be described by,

$$y_{it} = x_{it}\beta + \alpha_i + v_{it}; \; i = 1, \ldots, N \; (workers); \; t = 1, \ldots, 12 \; (periods)$$

where, x_{it} is the it-th observation on k explanatory variables, β is the parameter vector, α_i denotes the unobserved individual-specific time-invariant effects that are assumed as

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[12] This was suggested by one of the referees.

random[13]. Note that v_{it} is the residual disturbance term with zero mean, constant variance, and is uncorrelated across time and individuals. Using Generalized Least Squares regressions we obtain unbiased, consistent and efficient estimates of β for all models in our study. In a panel data environment, model errors for an individual (in different time instants) may be correlated, to take into account this possibility we used cluster-robust standard errors in the regressions.

4. Experimental Results

Below we present results testing our hypotheses[14]. In Table II we present descriptive statistics of our sample for each treatment: the lowest, highest and overall averages of the accepted wages and effort. In the BASE and EXO treatments 275 (out of 276) wage offers were accepted. In the ENDO treatment 359 out of 360 wage offers were accepted.

Table II. Descriptive statistics

Treatment	Lowest wage	Highest wage	Overall average wage	Lowest effort	Highest effort	Overall average effort
BASE	25	95	60.1	0.1	1	0.27
EXO	30	120	54.5	0.1	1	0.28
ENDO	10	120	65.8	0.1	1	0.22

One can see from Table II that the lowest accepted wage (10) was observed in the ENDO treatment. In the other two treatments minimum wage offers were closer to the competitive market wage. Low wage offers were sometimes rejected by the workers, interestingly, when the employers responded by improving (upon the wage offers), the workers reciprocated by choosing a lower conversion rate (seemingly to punish the firm for the earlier low offer).

Now we compare overall averages as an initial approximation to our hypotheses. One can observe in Table II that the overall average wage in the EXO treatment is lower than in BASE, while the overall average effort is similar in both these treatments. On other hand, the overall average wage is higher in ENDO than in BASE, but the overall average effort is lower. It seems that the imposition of an exogenously imposed minimum wage and an endogenous wage proposal has opposing effects.

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[13] After running Hausman tests for all regressions.
[14] Both referees suggested shortening the paper.

It may be that the exogenously imposed competitive minimum wage provides a reference point to the employers' which then negatively affects the wage offers, meanwhile, effort levels are maintained. On the other hand the effect of endogenous wage proposals is negative on worker effort levels, average wage, however, increases in this case. We check the effect on effort in the ENDO treatment in Hypothesis 5 where we check for the relationship between wage proposals and average effort at the individual level. It could be that the effort level decreases because workers feel entitled to the wage proposals and subsequently, if the wage offer is lower than the wage proposal, they reciprocate negatively and decrease effort levels. Below we test each hypothesis individually.

Hypothesis 1:*The effort level is increasing in the wage.*

It will be illustrative to look at the scatter plots first where we plot average efforts and accepted wages for each treatment (Figure I). One can observe that there exists a positive trend in average wage with respect to the average effort. We check the individual relationship between effort and wage estimating the following panel data model using the entire sample for each treatment:

$$effort_{it} = \beta_0 + \beta_1 wage_{it} + \beta_2 period_t + \alpha_i + v_{it}, \ i=1,...,N; \ t=1,...,12$$

Where, α_i denotes the unobserved random individual-specific time-invariant effects and v_{it} is the residual disturbance term. We have included (a variable) *period* to control for possible temporal trend of the effort. To control the possible effects of the treatment on effort, we have included two variables: EXO and ENDO in the regression of column 2 (including the whole sample). The dummies equal one when an individual has participated in EXO and ENDO treatment, respectively. They measure the difference in the effort with respect to the BASE treatment (the reference category). From our results, β_1 is significantly greater than zero. Hypothesis 1 thus cannot be rejected.

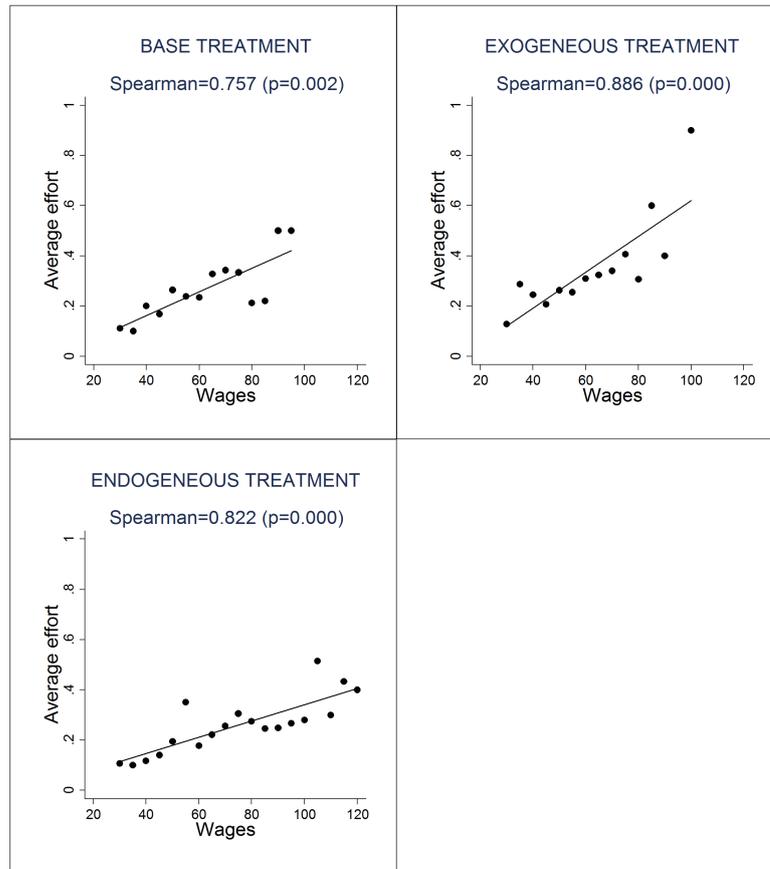Figure I. Average effort-wage relationship in each treatment

Table III: Determinants of effort, panel data regressions

	All treatments	All treatments	BASE treatment	EXO treatment	ENDO treatment
Wage	0.003***	0.003***	0.004***	0.004***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Period	-0.009***	-0.009***	-0.007**	-0.011***	-0.008**
	(0.000)	(0.000)	(0.043)	(0.005)	(0.037)
EXO treatment	-	0.025	-	-	-
		(0.249)			
ENDO treatment	-	-0.066***	-	-	-
		(0.001)			
Constant	0.125***	0.127***	0.065*	0.115*	0.098**
	(0.000)	(0.000)	(0.059)	(0.080)	(0.024)
N	909	909	275	275	359
Overall-R^2	0.113	0.151	0.130	0.183	0.130

Note: * denotes significance at the 10 % level, ** - at the 5 % level, and *** - at the 1 % level

One sees (Table III) that the wage coefficients are positive and significant in all regressions, implying that effort level depend positively on wages. These results are along the line of the main result in Fehr, Kirchsteiger and Riedl(1993). This gives us our first result.

Result 1: *The effort level is increasing in wage for all treatments (BASE, EXO and ENDO) and is declining across time. Hypothesis 1 on the wage-effort relation is not rejected.*

It is important to note the negative time trend for the variable *period* in all the treatments. This implies a declining trend in effort across all periods and suggests that running longer experiments may be useful to study the stability of the wage-effort relationship. Further, note that the average effort in the ENDO treatment is lower relative to the BASE treatment (column 2). We will come back to this result later. We now study the second Hypothesis.

Hypothesis 2: *Average wages are considerably higher than the market-clearing wage and do not converge to it in the repeated game.*

In a first approximation to check Hypothesis 2, we present the evolution of average wages by periods in Figure II. We observe that wage offers start at similar levels in all the treatments. However, in the EXO treatment they decline till the fourth period and then stabilize. From the fourth period onwards, the average wage in the EXO treatment is always smaller relative to BASE although it is still significantly above the minimum wage. In ENDO the average wage is higher than in the control except in the last period. In addition we observe that there is an increasing gap between the minimum wage proposals and the wage offers. Also note that the wage offers decline as minimum wage proposals increase. It seems that increasing wage proposals has a negative effect upon wage offers from the employers. In all treatments average wages are significantly above the minimum wage of 30.

Figure II: Evolution of Average Wages
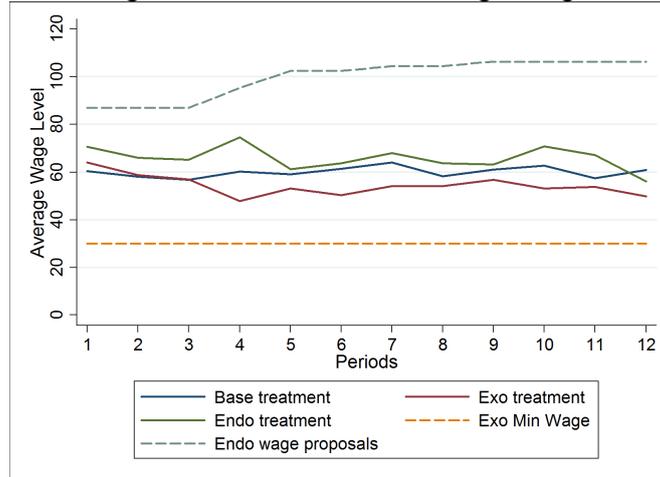
To further substantiate these results we study the evolution of the "Average Relative Overpayment (*ARO*)" (Fehr et al, 1993) by periods. *ARO* is defined as the difference between the average wage in a period w_0 and the market-clearing wage divided by the surplus:

$$ARO = (w_0\text{-}c\text{-}\tau)/(v\text{-}c)$$

ARO represents the proportion of surplus that employers give to their workers. Note that the theoretical prediction, i.e. the competitive equilibrium prevails, under all scenarios is that the shared amount should be zero. If hypothesis 2 were true, *ARO* should be greater than zero and should not converge to zero. In Figure III we can observe the average *ARO* by period.

Figure III. Average Relative Overpayment by periods
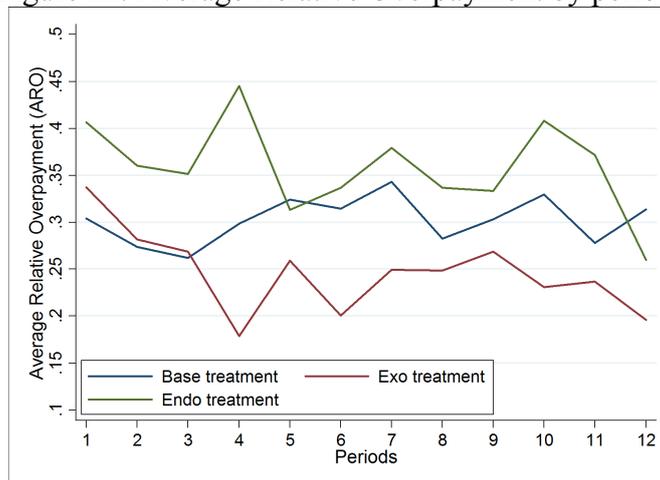
One can observe that *ARO* is above zero in all periods and all treatments and does not converge to zero during the length of the experiment. This result further confirms hypothesis 2.

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Result 2: *Average wages are considerably higher than the market-clearing wage. Wages do not converge to the market wage and ARO does not converge to zero for the duration of the experiment. Hypothesis 2 is not rejected.*

It is clear that (Figure III) *ARO* has significantly higher value in the ENDO treatment than in BASE and EXO treatments (*Kolmogorov-Smirnov (KS) p-value=0.000*). These results show that under the endogenous wage proposal, employers (on average) share a higher proportion of the surplus than under the BASE or EXO treatments. This is an interesting result as it indicates that wage proposals from employees can nudge employers into offering higher wage offers. However, it is not clear if this sustainable in the longer run if workers don't reciprocate with increased effort. In fact one does see a declining trend in the last three periods coinciding with decreasing average wage offers (Figure II).

Note that *ARO* declines across periods in the EXO treatment. There is a negative relationship between *ARO* across the periods *(Spearman correlation coefficient=-0.567, p-value=0.054)*. This suggests that when a minimum wage is imposed exogenously, employers share smaller proportion of the surplus as the experiment progresses affecting income distribution negatively. Finally, the introduction of an exogenous minimum wage reduces *ARO* relative to the two other treatments. One can observe in Figure III that *ARO* has the lowest values in the EXO treatment (the difference between BASE and EXO treatments is significant, *KS p-values=0.000*). This lends support to the assertion that the minimum wage institution crowds out private fairness and can be efficiency decreasing. We now study Hypothesis 3.

Hypothesis 3: *The average effort per period is above the minimum and does not converge to the minimum level in the repeated game.*

Average effort levels per period are represented in Figure IV. One can see that average effort is above the minimum (0.1) in all periods. There is a negative relationship between average effort and experiment duration in the BASE and EXO treatments, however, it is not significant (Spearman correlation coefficient (BASE) *=-0.390, p-value=0.211*; Spearman correlation coefficient (EXO) *=-0.470, p-value=0.123*). Hypothesis 3 is supported for the BASE and EXO treatments.

The ENDO treatment, on the other hand, displays a strong and significant negative tendency between average effort and experiment duration (Spearman correlation coefficient

between average effort and periods is -0.758, *p-value=0.004*). Note that we also need to take into account another factor when understanding the wage-effort relationship in the ENDO case. Workers make wage proposals and the average proposal is sent to the employers. Given the average wage offer the employers then make their wage offers. From Figure II one can see that the gap between the average wage proposal and average accepted wage is increasing. If workers react negatively to the increasing gap (Figure II) this could be a contributing factor to this negative relationship.

In the regressions in Table IV we observe that controlling for the wage proposal-wage offer gap the variable *period* variable is no longer significant. This tells us that there is no significant relationship between average effort and the duration of the experiment and that the decline in effort can be explained by increasing wage proposals-wage offers gap. This leads us to the conclusion that Hypothesis 3 is also supported in the ENDO treatment. We summarize these results below.

Result 3: *In all three treatments, the average effort is above the minimum level and does not converge to it in the repeated game. Hypothesis 3 is not rejected for any treatment.*

Figure IV: Evolution of Average Effort Levels
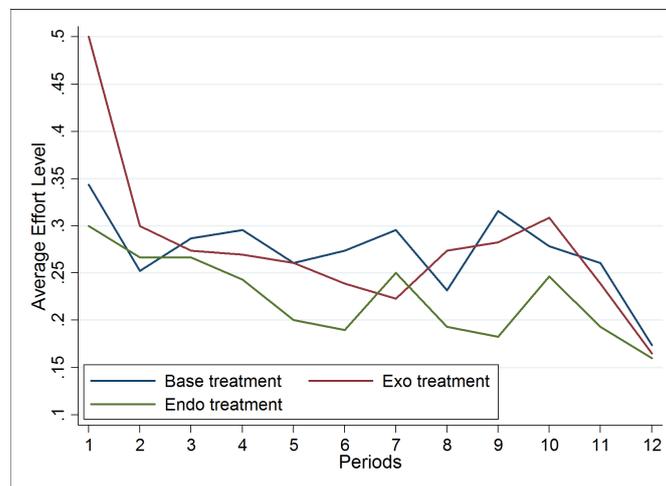
We now test Hypothesis 4.

Hypothesis 4a: If the introduction of a minimum wage provides a reference point to employers it should lower wage offers in the EXO treatment.
Hypothesis 4b: The endogenous wage proposals should have no impact on wage offers in the ENDO treatment.

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In a first approximation to test Hypotheses 4, we compare the evolution of average wage by treatment (see Figure II). Using KS tests, we find that wages in EXO treatment are lower than in BASE (*p-value=0.001*) and in ENDO treatment wages are higher than in BASE treatment (*p-value=0.001*). To confirm these results, we estimate a panel data regression model for the whole sample (909 observations) where the wage offers are explained as the function of the treatment and period.

$$wage_{it} = \beta_0 + \beta_1\, EXO_i + \beta_2\, ENDO_i + \beta_3\, period_t + \alpha_i + v_{it};\ i=1,...,909;\ t=1,...,12$$

Where, EXO_i and $ENDO_i$ are dummies that equal one when i-individual has participated in EXO and ENDO treatments, respectively; α_i denotes the unobserved random individual-specific time-invariant effects and v_{it} is the residual disturbance term. The results are shown in Table IV.

Table IV: Determinant of wage, panel data regression

Variables	Coefficients (p-values)
EXO	-5.694 (0.011)**
ENDO	5.754 (0.064)*
Period	-0.358 (0.154)
Constant	62.387(0.000)***
N	909
Overall R^2	0.060

* Significant at the 10%, ** 5%, and *** 1% level.

The introduction of a competitive minimum wage in the EXO treatment results in the reduction in wages offers significantly relative to the BASE treatment. Meanwhile, the agents use the minimum price as a signal to induce firms to offer greater wages in the ENDO treatment.

Result 4a: *The introduction of the competitive exogenous minimum wage reduces average wage offers in the EXO treatment. Hypothesis 4a is not rejected.*

Result 4b: *Meanwhile, average wage offers are greater in the ENDO treatment. Hypothesis 4b (no effects) is rejected.*

Now, we check hypothesis 5. This is one of the main results of the paper. Here we check how simply making a wage offer impacts effort in the gift-exchange experiments.

Hypothesis 5: *If final accepted wage offer is lower than the initial wage proposal then effort is negatively impacted in the ENDO treatment.*

Even though the introduction of the competitive exogenous minimum wage reduces average wage offers, average effort is not significantly different when we compare the BASE and EXO treatments (see Figure IV, *KS p-value=0.913*). The sustained high levels of (average) effort suggests that workers use effort levels as a signaling device to obtain higher wages.[15] This, however, is not the case in the ENDO treatment. While average wages are higher, relative to BASE, in the ENDO treatment (Figure II, *KS p-value= 0.001*), effort is significantly lower (Figure IV, *KS p-value=0.017*; Table III, column 2). Below we discuss this.

Our hypothesis is that if final accepted wage offer is lower than the initial (average) wage proposal in the ENDO treatment then effort is negatively impacted (Hypothesis 5). One reason this could occur is that a wage proposal creates entitlements, or expectations, on a certain wage. Upon not being met, the workers then negatively reciprocate with decreased effort.

As a first look, we show a scatter plot of the difference between the average initial wage proposal and the average accepted offer versus the average effort by period in Figure V. One can observe the relationship between both the variables is significantly negative.

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[15] Some subjects asked us this question during the experiment.

Figure V. Differences between proposal and accepted wages vs. average effort
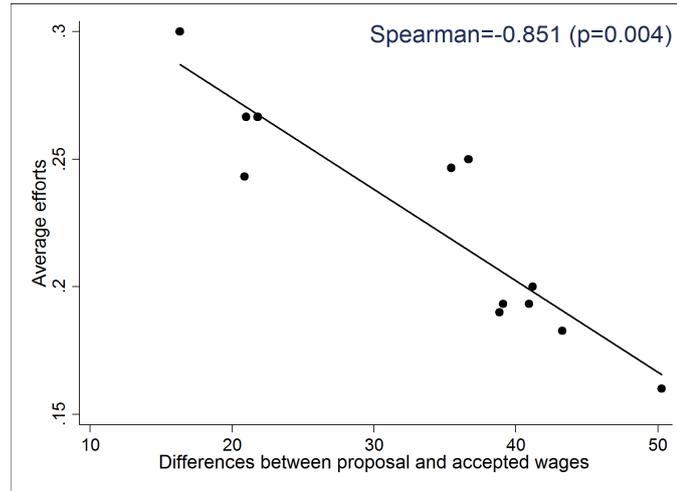
To check the relationship between the effort level and the difference between the wage proposals and the final accepted offer in the ENDO treatment, we estimate the following panel data model.

$$effort_{it} = \beta_0 + \beta_1 wage_{it} + \beta_2 pos\_dif_{it} + \beta_3 neg\_dif_{it} + \beta_4 period_t + \alpha_i + v_{it}, \; i=1,...,359;$$
$$t=1,...12$$

where, pos_dif_{it} is the difference between the wage proposal and the accepted wage, if this difference is positive, and zero otherwise; neg_dif_{it} is equal to the absolute value of the difference between minimum wage and the accepted wage if this difference is negative, and zero otherwise; α_i denotes the unobserved random individual-specific time-invariant effects and v_{it} is the residual disturbance term. Observe that differences between pos_dif and neg_dif coefficients would indicate asymmetry in the effects of positive and negative deviations, that is, different effects depending on whether the wage proposals are higher or lower than the final accepted offers. The results are presented in Table IV.

Table IV: Determinants of effort in ENDO treatment, panel data regression

Variables	Model 1	Model 2	Model 3
Final accepted wage	0.003***	-	0.0004
	(0.000)		(0.608)
Positive difference between wage proposals and the final accepted offer	-	-0.003***	-0.003***
		(0.000)	(0.003)
Negative difference between wage proposals and the final accepted offer	-	0.001	0.001
		(0.741)	(0.706)
Period	-0.008**	-0.002	-0.002
	(0.037)	(0.612)	(0.457)
Constant	0.098**	0.336***	0.297***
	(0.024)	(0.000)	(0.001)
N	359	359	359
Overall R^2	0.130	0.156	0.157

Note: * denotes significance at the 10 percent level, ** - at the 5 percent level, and *** - at the 1 percent level

One can observe in Table IV that as the positive differences between wage proposals and the final accepted offer increase, effort declines. When these differences are taken into account, neither final accepted wages, nor *period* are significant in the model. This implies that the negative wage effort relation is driven by the wage proposal-accepted wage difference and is not due to the declining time trend. This confirms Hypothesis 3 for ENDO treatment.

___Result 5___: *If the difference between the final accepted wage and the wage proposal is positive then effort is negatively impacted in the ENDO treatment. Hypothesis 5 is not rejected.*

This result shows that effort is negatively related with wage expectations in the ENDO treatment. Agents respond with smaller effort levels when firms do not offer wages in line with the average wage proposal. We hypothesize that the opportunity to make wage proposals provides workers some wage entitlement and, when not realized, is negatively reciprocated through lower effort levels. This is an example of negative reciprocity when worker expectations are not realized. Curiously, the opposite situation is not found, when the final accepted wage is greater than the wage proposal, i.e. the workers do not respond with greater effort.

It seems reasonable to assume that worker expectations impact their effort, as least in the shorter run. Situations where economic agents are involved in the decision making process are not uncommon. Workers sit in the boardrooms as representatives and make

proposals towards firm functioning. Students sit on the academic board of many Universities and put forth proposals. Our result is interesting and novel as it points out that in situations where wage proposals are made, the proposer may feel entitled to that wage and upon not getting it respond negatively by expending less effort.

Finally (as in Fehr, Kirchsteiger and Riedl, 1993) we analyze how the introduction of a minimum wage affects efficiency. When a_{ij}-trade partners conclude a transaction, the sum of their gains is defined as:

$$G_{ij} = \pi_i + u_j = (v - w_i) \, e_j + w_i - c - m(e_j).$$

Standard theory predicts the minimum effort and a wage equal to $\tau + c$. With the values of the parameters chosen in Fehr, Kirchsteiger and Riedl (1993) the joint benefits are:

$$G_s = (v - c - \tau) \, e_{min} + \tau = 0.1 * 96 + 4 = 13.6$$

Note that G_s is lower than the maximum G_{ij} that can be achieved: i.e. there is a conflict between individual and joint benefits. If fairness considerations exist then this discrepancy may be decreased. We use f_{ij} as a measure of efficiency of a transaction between the *ij*-trade partners: $f_{ij} = G_{ij}/G_s$. Standard theory predicts $f_{ij} = 1$ and the highest possible value of f_i is 7.29 (when $w = 125$). Therefore f_{ij} takes values between 1 and 7.29.

The average efficiency by periods is presented in Figure VI. Stigler (1946) commented that the introduction of a minimum wage should result in resource misallocation. We find that, in comparison to the BASE, average efficiency is significantly lower in the EXO treatment *(KS p-value=0.005)*. The reduction in efficiency (as well as the one in the wages offered and the relative overpayment) is another of the negative consequences of the introduction of the exogenous fairness based institution. Note that in the ENDO treatment, average efficiency is not significantly different than in the BASE treatment *(KS p-value=0.256)*. We can conclude that the introduction of the endogenous minimum wage increases the average wage offer and the Relative Overpayment.

Figure VI. Average efficiency by periods
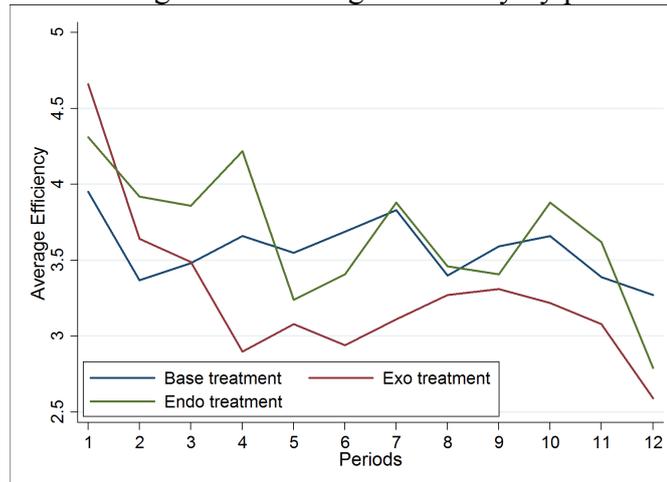
5.Conclusion

We add to the experimental literature (Charness (2004), Charness and Brandts (2004), Falk, Fehr and Zehnder (2006), and Owen and Kagel (2010)) that has studied how imposing minimum wage impacts gift exchange. We find that minimal interventions in labour market institutions can impact the status quo. Depending upon the nature of the intervention, i.e. exogenous or endogenous, either wage levels or effort may be impacted.

Our first main contribution is that we study endogenous wage proposals. To the best of our knowledge we are the first ones to study this institution. We find that average wages increase in this setting. It seems that the act of receiving proposals from workers pushes average wages up. Contrarily, negative reciprocity is observed in effort when wage proposals are not met. In fact, in the endogenous proposal treatment wage decline can be explained by this proposal-wage gap. Secondly, we study the imposition of a minimum wage at the competitive level that should a-priori not impact outcomes in a competitive market[16]. As in the earlier price-quantity control experiments we find that it does matter, even though the equilibrium outcomes are not changed. We find that an exogenous minimum wage creates a reference point that negatively impact wages.

Wage proposals in the workplace are common and can take various forms. For example, workers can be asked to propose their wage expectations in many scenarios, or in more complex scenarios workers, or unions, can bargain over wage increases. Wage proposals and counterproposals are made in any such process and this results in stronger form of wage entitlements. It seems that allowing the workers to propose a minimum acceptable wage results in creation of expectations regarding expected wages which, when not met,

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[16] Earlier studies have studied minimum wages above the competitive level.

result in lower effort (negative reciprocity). Average wage offers increase in this framework and are above the BASE and EXO treatments. Surprisingly, the higher wage levels result in negative reciprocity when wage offers do not coincide with average wage proposals. It seems that it is not only the wage level but also the wage expectation that plays a role in determining worker effort. It is interesting to note that this result is achieved in a competitive environment where in principal wages should converge to zero.

In the second treatment we introduce an exogenously imposed competitive minimum wage. We find that average wage levels are lower than in the control experiments. However, average effort levels do not decline correspondingly. It seems that even though private fairness is crowded out, i.e. lower wage offers are obtained; workers still offer higher effort levels. The distribution of wages offered shifts to the left, with a substantial proportion of the offers (38.41%) near the minimum wage levels. We find that the minimum wage institution crowds out private fairness resulting in lower wage offers. Further, average relative overpayment that fairness creates is also diminished. It also creates a negative trend in the evolution of effort levels workers reciprocate firms with. It seems that effort is also negatively affected in the long run. Finally, and most importantly, efficiency declines.

References:

Brandts, Jordi and Gary Charness, 2004. "Do Labour Market Conditions Affect Gift Exchange? Some Experimental Evidence." *The Economic Journal* 114(497), 684-708.

Charness, Gary, 2004."Attribution and reciprocity in an experimental labor market." *Journal of Labor Economics* 22, 665–688.

Charness, Gary, Ramón Cobo-Reyes, Juan A.Lacomba, and Francisco Lagos, 2012. "The hidden advantage of delegation: Pareto-improvements in a gift-exchange game." *American Economic Review* 102(5), 2358-79.

Coursey, Don and Vernon L. Smith, 1984. "Price Controls in a Posted Offer Market." *American Economic Review* 73, 218-221.

Falk, Armin, Ernst Fehr, and UrsFischbacher, 2003. "On the nature of fair behavior." *Economic Inquiry* 41, 20-26.

Falk, Armin, Ernst Fehr, and Christian Zehnder, 2006. "Fairness Perception and Reservation Wages. The Behavioral Effects of Minimum Wage Laws." *Quarterly Journal of Economics* 121(4), 1347:1381.

Fehr, Ernst, Georg Kirchsteiger, and Arno Riedl, 1993. "Does fairness prevent market clearing? An experimental investigation." *Quarterly Journal of Economics* 108(2), 437-459.

Isaac, R. Mark and Charles R. Plott, 1981. "Price Controls and the Behavior of Auction Markets: An Experimental Examination." *American Economic Review* 71(3), 448-459.

Kujal, Praveen, 1994. "Firm Specific Output Limits in a Posted Offer Market: Distributive and Efficiency Effects." *Journal of Economic Behavior & Organization* 25(2), 257-269.

Owens, Mark F. and John H. Kagel, 2010. "Minimum wage restrictions and employee effort in incomplete labor markets: An experimental investigation." *Journal of Economic Behavior and Organization* 73(3), 317-326.

Smith, Vernon L. and Arlington Williams, 1981. "On Non-binding price controls in a Competitive Market." *American Economic Review* 71, 467-474.

Stigler, George J., 1946. "The Economics of Minimum Wage Legislation." *American Economic Review* 36, 358365.

Appendix A:

Instructions

All the agents are provided with the instructions and have to read them before the beginning of the experiment. They receive two sheets: Sheet 1 with the instructions and Sheet 2 with the values of the parameters and prepared to write down their decisions on it.

A.1 General Instructions

Please, read the instructions carefully. If you make appropriate decisions, you can earn a considerable amount of money. At the end of the experiment, all the profits you have made will be paid to you in cash.

The experiment you will participate in consists of two stages. In the first stage six of you act as buyers, and nine of you as sellers. In the second stage, the sellers will determine the value of the goods for the buyers. At the end of this document you will find another sheet (sheet 2) to write your decisions.

A.2 BASE: Instructions for Sellers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. Every buyer can offer a price and a supervisor in the buyers' room gives the price to a supervisor in the sellers' room who writes this price on the blackboard. Then, you will have a list of offers on the blackboard and you can accept one of this. To accept an offer you just have to say your seller's number (all of you have a seller's number written in Sheet 2) and the price of the offer you want to accept. If, e.g., a price of 50 is offered and you as seller number 5 want to accept this offer, you just say: 'Number 5 sells for 50'. In this case, the transaction is concluded. The buyer will not know your identity. He will just know that his offer is accepted. You have then to write your accepted price on Sheet 2.

You can sell one unit of the good in each trading day and each buyer can buy, at most, one unit of the good per trading day. Each seller may accept an offer or not, but the sellers cannot make counter-offers. After three minutes the trading day ends and the second stage takes place where you can fix the value the good will have for the buyer. Buyers receive a certain amount of experimental money (reselling price) from us for

each unit they have bought (the reselling price is noted in sheet two). After this, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. The profit of a buyer (measured in experimental money) is the difference between the reselling price and the price at which she has bought the good from you. How much one unit of experimental money is worth for 'your' buyer depends on your choice of a conversion rate. As we explained before, in the second stage you will determine the value the good will have for 'your' buyer and this will be choosing a conversion rate. If you choose, e.g., the rate 0.5, your buyer gets EM 100 for 200 units of experimental money. Then, the profits of the buyers are: (reselling price - price) *conversion rate. Only 'your' buyer will be informed about your choice of the conversion rate. In Sheet 2 you have a list of the conversion rates you can choose. As well as the price you accept, you have to write down your decision about the conversion rate on Sheet 2. The supervisor in your room will take the information on your Sheet 2 and will inform the conversion rate you choose to 'your' buyer.

You, as a seller, have two kinds of costs: production costs and decision costs. The latter are associated with your choice of the conversion rate. The higher the conversion rate you decide to give to 'your' buyer, the greater your decision costs. Of course you incur costs only in case you participate in the market. In case you do not accept any offer, your costs in this day are zero. You have the information about both types of costs in Sheet 2.

Your profits (paid in experimental money) are: profit = price -production costs - decision costs. Do you have any question?

A.3 BASE: Instructions for Buyers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. As a buyer, youcan offer a price that must be divisible by 5. The offers will be announced to the sellers by a supervisor in the room. The sellers will not know your identity; they will only know the price offered. If a seller accepts your offer, all buyers are informed about this acceptance. In this case, an agreement is concluded and the good is bought by you at the offered price. If your offer is not accepted you are free to change your offer but the new one must be higher than the highest price that have not been accepted. Each seller may accept your offer or not but, she cannot make a counter-

offer. During each trading day you can buy one unit of the good. Therefore, a trading day ends for you when your offer is accepted.

After three minutes the trading day ends and the second stage takes place. In this second stage, the seller who has sold the good to you on this day can fix the value that the good will have for you. You, as a buyer, get a certain amount of experimental money (reselling price) from us for each unit you have bought. This reselling price is written in Sheet 2. After this second stage, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. Your profit (paid in experimental money) is the difference between the reselling price and the price at which you have bought the good. How much one unit of experimental money is worth to you depends on the choice of a conversion rate by 'your' seller. In Sheet 2 there is a list with the conversion rates she can choose. If she choose, e.g., the rate 0.5, your will get EM 100 for 200 units of experimental money. Then, your profits are: (reselling price - price) * conversion rate.

Sellers have two kinds of costs: production costs and decision costs. The latter are associated with their choice of the conversion rate. The higher the conversion rate 'your' seller chooses, the greater her decision costs. You have the information about both types of costs in Sheet 2. The profits of a seller paid in EM are: profit = price - production costs - decision costs. Do you have any question?

A.4 EXO: Instructions for Sellers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. Every buyer can offer a price and a supervisor in the buyers' room gives the price to a supervisor in the sellers' room who writes this price on the blackboard. Then, you will have a list of offers on the blackboard and you can accept one of this. To accept an offer you just have to say your seller's number (all of you have a seller's number written in Sheet 2) and the price of the offer you want to accept. If, e.g., a price of 50 is offered and you as seller number 5 want to accept this offer, you just say: 'Number 5 sells for 50'. In this case, the transaction is concluded. The buyer will not know your identity. He will just know that his offer is accepted. You have then to write your accepted price on Sheet 2.

The regulator has established a minimum price equal to 30. Therefore, buyers cannot offer prices below this amount.

You can sell one unit of the good in each trading day and each buyer can buy, at most, one unit of the good per trading day. Each seller may accept an offer or not, but the sellers cannot make counter-offers. After three minutes the trading day ends and the second stage takes place where you can fix the value the good will have for the buyer. Buyers receive a certain amount of experimental money (reselling price) from us for each unit they have bought (the reselling price is noted in sheet two). After this, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. The profit of a buyer (measured in experimental money) is the difference between the reselling price and the price at which she has bought the good from you. How much one unit of experimental money is worth for 'your' buyer depends on your choice of a conversion rate. As we explained before, in the second stage you will determine the value the good will have for 'your' buyer and this will be choosing a conversion rate. If you choose, e.g., the rate 0.5, your buyer gets EM 100 for 200 units of experimental money. Then, the profits of the buyers are: (reselling price - price) *conversion rate. Only 'your' buyer will be informed about your choice of the conversion rate. In Sheet 2 you have a list of the conversion rates you can choose. As well as the price you accept, you have to write down your decision about the conversion rate on Sheet 2. The supervisor in your room will take the information on your Sheet 2 and will inform the conversion rate you choose to 'your' buyer.

You, as a seller, have two kinds of costs: production costs and decision costs. The latter are associated with your choice of the conversion rate. The higher the conversion rate you decide to give to 'your' buyer, the greater your decision costs. Of course you incur costs only in case you participate in the market. In case you do not accept any offer, your costs in this day are zero. You have the information about both types of costs in Sheet 2.

Your profits (paid in experimental money) are: profit = price - production costs - decision costs. Do you have any question?

A.5 EXO: Instructions for Buyers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. As a buyer, you can offer a price that must be divisible by 5. The offers will be announced to the sellers by a supervisor in the room. The sellers will not know

your identity; they will only know the price offered. If a seller accepts your offer, all buyers are informed about this acceptance. In this case, an agreement is concluded and the good is bought by you at the offered price. If your offer is not accepted you are free to change your offer but the new one must be higher than the highest price that have not been accepted. Each seller may accept your offer or not but, she cannot make a counter-offer. During each trading day you can buy one unit of the good. Therefore, a trading day ends for you when your offer is accepted.

The regulator has established a minimum price equal to 30. Therefore, you, as a buyer cannot offer a price below this amount.

After three minutes the trading day ends and the second stage takes place. In this second stage, the seller who has sold the good to you on this day can fix the value that the good will have for you. You, as a buyer, get a certain amount of experimental money (reselling price) from us for each unit you have bought. This reselling price is written in Sheet 2. After this second stage, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. Your profit (paid in experimental money) is the difference between the reselling price and the price at which you have bought the good. How much one unit of experimental money is worth to you depends on the choice of a conversion rate by 'your' seller. In Sheet 2 there is a list with the conversion rates she can choose. If she choose, e.g., the rate 0.5, your will get EM 100 for 200 units of experimental money. Then, your profits are: (reselling price - price)* conversion rate.

Sellers have two kinds of costs: production costs and decision costs. The latter are associated with their choice of the conversion rate. The higher the conversion rate 'your' seller chooses, the greater her decision costs. You have the information about both types of costs in Sheet 2. The profits of a seller paid in EM are: profit = price - production costs - decision costs. Do you have any question?

A.6 ENDO: Instructions for Sellers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. You as a seller have to inform the supervisor in your room the minimum price that you wish to receive for the product you sell. The average of all the offers given by all sellers is then transmitted to the supervisor in the buyers' room. The supervisor in the

buyers' rooms informs the buyers about the average wage. A buyer can offer a price that can be smaller, higher o equal to this average wage. After this information has been transmitted, the supervisor in the buyers' room sends all the prices that buyers offer to the supervisor in the sellers' room. These prices are then written on the blackboard. Then, you will have a list of offers on the blackboard and you can accept one of this. To accept an offer you just have to say your seller's number (all of you have a seller's number written in Sheet 2) and the price of the offer you want to accept. If, e.g., a price of 50 is offered and you as seller number 5 want to accept this offer, you just say: 'Number 5 sells for 50'. In this case, the transaction is concluded. The buyer will not know your identity. He will just know that his offer is accepted. You have then to write your accepted price on Sheet 2.

You can sell one unit of the good in each trading day and each buyer can buy, at most, one unit of the good per trading day. Each seller may accept an offer or not, but the sellers cannot make counter-offers. After three minutes the trading day ends and the second stage takes place where you can fix the value the good will have for the buyer. Buyers receive a certain amount of experimental money (reselling price) from us for each unit they have bought (the reselling price is noted in sheet two). After this, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. The profit of a buyer (measured in experimental money) is the difference between the reselling price and the price at which she has bought the good from you. How much one unit of experimental money is worth for 'your' buyer depends on your choice of a conversion rate. As we explained before, in the second stage you will determine the value the good will have for 'your' buyer and this will be choosing a conversion rate. If you choose, e.g., the rate 0.5, your buyer gets EM 100 for 200 units of experimental money. Then, the profits of the buyers are: (reselling price - price) *conversion rate. Only 'your' buyer will be informed about your choice of the conversion rate. In Sheet 2 you have a list of the conversion rates you can choose. As well as the price you accept, you have to write down your decision about the conversion rate on Sheet 2. The supervisor in your room will take the information on your Sheet 2 and will inform the conversion rate you choose to 'your' buyer.

You, as a seller, have two kinds of costs: production costs and decision costs. The latter are associated with your choice of the conversion rate. The higher the conversion rate you decide to give to 'your' buyer, the greater your decision costs. Of

course you incur costs only in case you participate in the market. In case you do not accept any offer, your costs in this day are zero. You have the information about both types of costs in Sheet 2.

Your profits (paid in experimental money) are: profit = price - production costs - decision costs. Do you have any question?

A.7 ENDO: Instructions for Buyers

At the market, a good is traded, each seller sells the same good to any buyer, and the buyer can buy it from any seller. The market is opened for a trading day that lasts three minutes. Before you offer a price for the product the supervisor in your room will inform all the buyers the average of the offers that sellers wish to accept. As a buyer, you can offer a price that must be divisible by 5 that can be smaller, higher o equal to the average informed. The offers will be announced to the sellers by a supervisor in the room. The sellers will not know your identity; they will only know the price offered. If a seller accepts your offer, all buyers are informed about this acceptance. In this case, an agreement is concluded and the good is bought by you at the offered price. If your offer is not accepted you are free to change your offer but the new one must be higher than the highest price that have not been accepted. Each seller may accept your offer or not but, she cannot make a counter-offer. During each trading day you can buy one unit of the good. Therefore, a trading day ends for you when your offer is accepted.

After three minutes the trading day ends and the second stage takes place. In this second stage, the seller who has sold the good to you on this day can fix the value that the good will have for you. You, as a buyer, get a certain amount of experimental money (reselling price) from us for each unit you have bought. This reselling price is written in Sheet 2. After this second stage, a new trading day is opened. There will be twelve trading days.

In the experiment we will use experimental money (EM) where 45 EM = 1 Euro. Your profit (paid in experimental money) is the difference between the reselling price and the price at which you have bought the good. How much one unit of experimental money is worth to you depends on the choice of a conversion rate by 'your' seller. In Sheet 2 there is a list with the conversion rates she can choose. If she choose, e.g., the rate 0.5, your will get EM 100 for 200 units of experimental money. Then, your profits are: (reselling price - price)* conversion rate.

Sellers have two kinds of costs: production costs and decision costs. The latter are associated with their choice of the conversion rate. The higher the conversion rate 'your' seller chooses, the greater her decision costs. You have the information about both types of costs in Sheet 2. The profits of a seller paid in EM are: profit = price - production costs - decision costs. Do you have any question?

A.8 Sheet 2: for Sellers

Seller number:

Write down your decisions about:

	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
Conversion rate:						
Price (1):						
Production costs (2):	26	26	26	26	26	26
Decision costs (3):						
Profits (1)-(2)-(3):						
	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12
Conversion rate:						
Price (1):						
Production costs (2):	26	26	26	26	26	26
Decision costs (3):						
Profits (1)-(2)-(3):						

The reselling price of the buyers is fixed and equal to 126. And the profits of the buyers are: (reselling price - price) * conversion rate.

Feasible conversion rates (CR) and associated decision costs (DC):

C R	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
D C	0	1	2	4	6	8	10	12	15	18

A.9 Sheet 2: for Buyers

Buyer number:

Write down your decisions about:

	Period 1	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
Price (1):						
Reselling price (2):	126	126	126	126	126	126
Conversion rate (3):						
Profits ((2)-(1))*(3):						
	Period 7	**Period 8**	**Period 9**	**Period 10**	**Period 11**	**Period 12**
Price (1):						
Reselling price (2):	126	126	126	126	126	126
Conversion rate (3):						
Profits ((2)-(1))*(3):						

The decision cost of the sellers is fixed and equal to 26. And the profits of the sellers are: profit = price - production costs - decision costs.

Feasible conversion rates (CR) and associated decision costs (DC):

CR	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
DC	0	1	2	4	6	8	10	12	15	18