Information Asymmetry and Beliefs Reveal Self Interest Not Fairness

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Abstract

Decades of research suggests that other-regarding preferences explain deviations from the self-interested behavior predicted by standard theory. However, the vast majority of this evidence considers strategic interactions when agents are fully informed and economic conditions are stable. We relax both of these conditions by expanding the widely used gift-exchange game to include permanent endowment shocks and information frictions. Varying information conditions reveals that a large fraction of the behavior previously attributed to fairness and reciprocity is actually driven by self-interest motives and intentions-based concerns. Counter-intuitively, we find that information frictions do not always benefit the more informed party.

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1 Introduction

Decades of research have produced convincing experimental evidence that other-regarding preferences lead people to deviate from the self-interested outcomes predicted by standard economic theory (Camerer, 2011; Charness and Kuhn, 2011). A significant stream in this literature models experimental labor markets under full information and stable economic conditions to study how variation in structural parameters influences wages, effort, and employment. A general finding is that reciprocity and fairness motives prop up wages and effort above the Nash equilibrium prediction (Fehr et al., 1993, 1998). Such other-regarding preferences motivate many behavioral theories of labor market dynamics.[1]

However, the assumption of full information and stable economic conditions may not be benign if information structure and/or economic volatility changes how market participants convey and perceive intentions and relative payoffs.[2] Further, most real-world transactions feature at least some degree of information asymmetry. Thus, understanding the degree to which information structure moderates other-regarding behavior is important for understanding how other-regarding behavior influences real markets.

This paper relaxes the assumption of full information in a bilateral gift exchange game to study whether and how information conditions influence experimental labor market dynamics. To do this, we introduce permanent endowment shocks, positive and negative, into stable firm-worker relationships under two information conditions. In full information treatments, both firms and workers learn of the shock. Under information

[1]Examples of theories include the fair wage-effort hypothesis(Akerlof, 1982; Akerlof and Yellen, 1988, 1990), reference dependence (Tversky and Kahneman, 1979), adverse selection in quits and hires (Weiss, 1980, 1990), and reciprocity and fairness (Rabin, 1993). For evidence on labor market dynamics, see (Bewley, 1995, 1999; Altonji and Devereux, 2000; Agell and Lundborg, 2003; Dickens et al., 2007; Babecky et al., 2010; Kaur, 2019; Jo, 2019).

[2]There is limited evidence that information matters in ultimatum games (Schmitt, 2004; Kagel et al., 1996; Croson, 1996; Mitzkewitz and Nagel, 1993)

frictions, only firms learn of shocks.

Varying information conditions reveals that a large fraction of the behavior previously attributed to fairness and reciprocity is actually driven by self-interest motives and intentions-based concerns. Introducing information frictions significantly mutes fairness motives in wages following a positive economic shock and heightens them in effort following a negative economic shock. Further, we observe that effort responses depend critically on the economic conditions surrounding wage choices and not just the wage itself. Finally, we show that information frictions do not always benefit the more informed agent.

We distinguish between self-interest and other-regarding motives by eliciting firms' beliefs and workers' effort strategies. Firms raise wages following positive shocks in full information settings primarily because they correctly predict that workers expect a wage hike. Similarly, firms lower wages following negative shocks in full-information treatments because they correctly predict that workers will tolerate wage cuts. In both cases, these behaviors lead to an even split of the shock without modifying profit share. Introducing asymmetric information changes this dynamic. Positive shocks under asymmetric information lead to only moderate wage hikes because firms know that workers do not expect a wage increase. This benefits firms as it allows them to keep a large fraction of the positive shock. Firms also attempt to share negative shocks in asymmetric information treatments. However, workers no longer tolerate wage cuts. Instead, they drastically reduce effort, which significantly shifts profit share in their favor.[3]

Our results suggest that models of other-regarding preferences are likely to lack predictive power of firm behavior in settings featuring information frictions, where self

[3]These results align with findings in Brandts and Charness (2004) and Charness (2004), which together suggest that negative reciprocity may be stronger than positive reciprocity.

interest seems to play the predominate role. Further, our results offer support for intentions-based models, and not outcomes based models, of worker behavior. We show that a parsimonious model featuring a self-interested firm and where wage enters the effort response function proportionally rationalizes our results across the business cycle and under both information conditions. Since the worker's effort depends on proportional wages, information surrounding economic conditions plays a crucial role in how workers respond to wage offers.

Previous work has studied how information can influence wages and efforts in experimental settings.[4] Charness and Kuhn (2007) show in multi-worker firms that revealing within firm wages does not lead to lower levels of effort, and Gächter et al. (2013) shows in a multi-worker gift exchange game that intra-group comparisons can influence reciprocity. Rubin and Sheremeta (2016) use a gift exchange experiment to show that that random productivity shocks reduce wages and effort. Davis et al. (2017) replicate this finding. In our context, shocks corresponds to aggregate economic conditions and not to productivity signals or within firm comparisons.

Our results are consistent with the few available experimental studies that examine how information about available surplus influences allocations. Limited evidence from dictator games suggests that people strategically exploit asymmetric information in their favor when making prosocial decisions (Dana et al., 2006, 2007). Varying information in ultimatum games shows that relative payoffs and fairness enter players' utility functions (Mitzkewitz and Nagel, 1993; Kagel et al., 1996). In a one-shot ultimatum game, Croson (1996) finds that lower information about absolute and relative payoffs yields higher rejection rates.

[4]The idea of modeling labor markets as partial gift-exchanges has extensive experimental backing. Examples using chosen effort are Fehr et al. (1993); Fehr et al. (1998) and Charness (2004). Examples using real-effort tasks are Cohn et al. (2015); Greiner et al. (2011) and Hennig-Schmidt et al. (2010).

There are a few other papers that study experimentally how effort responds to wage changes and economic shocks. Sliwka and Werner (2017) show that, even after controlling for total compensation, wage profiles that feature consistent wage hikes yield considerable increases in total productivity. Gerhards and Heinz (2017) shows that the mere possibility of an exogenous shock strengthens cooperation between individuals in a two-period gift-exchange game, ultimately mitigating its negative impact on total profits.

Exactly which circumstances make wage cuts painful is important to understand. Experiments are particularly useful in this pursuit. Buchanan and Houser (2019) find in a stylized gift-exchange game that the wage-effort relationship responds to nominal but not real wage cuts. Chen and Horton (2016) find that workers in online labor markets naturally form reference points and quit tasks when they encounter wage cuts. However, workers are not upset if they provide a reasonable explanation for wage cuts. DellaVigna et al. (2016) implement a pay cut of a similar proportion and do not find the effect.[5] Several other studies demonstrate reference-dependent behavior among workers. DellaVigna et al. (2017) provide evidence from a natural experiment in Hungary that workers anchor their expectations around recent paychecks. Shvartsman and Diriwächter (2017) show that reported job satisfaction in Germany increases when workers receive a wage increase. This complements the experimental evidence that effort is higher when workers receive wage increases. We contribute to this literature by showing that firms beliefs about workers responses can provide an additional mechanism to explain reluctance to do wage cuts, as Bewley (1995, 1999) survey evidence suggested.

In the next section we describe our conceptual framework where we highlight the role

[5] DellaVigna et al. (2016) cycle workers through three different pay schemes in which workers do a real task for three different charities (all within the one-time experimental session). Perhaps the exposure to changes mentally prepared the workers to accept a wage cut during the final rounds.

of information asymmetries. Section 3 describes our experimental design on how we elicit beliefs and effort responses. Section 4 contains our main analysis and results. Finally, section 5 concludes.

2 Theoretical Framework

2.1 Model setup under full information

In this section, we use a stylized labor market model to illustrate how information surrounding economic shocks can influence wage and effort choices. The key intuition is that because workers care about proportional wages, information regarding the economic conditions faced by a firm play a crucial role in determining effort choices.

We consider a simple market with one firm and one worker that interact for many periods. The firm receives an endowment R at the beginning of each period and sets a wage $w \in [\underline{w}, R]$ for the worker. In response, the worker provides costly effort $e \in [0, \overline{e}]$. Firm's profit function depends on its endowment, the worker effort level and the wage it offers. We assume that firms are self-interested and only care about maximizing their profits, given by

$$\pi_i(w, e) = (R_0 - w)e \tag{1}$$

On the other hand, we assume the worker's utility function takes into account effort as a reciprocal response to wage offers. The higher the wage offered, the higher the level of effort exerted. Additionally, we assume wages enter the worker's utility proportionally, which introduces a channel through which economic shocks, and information surrounding that shock, can enter the effort response function. Therefore, we assume their utility as

$$U_j(e; w, R) = w - c(e) + \left(\alpha \left(\frac{w}{R}\right)^{\beta}\right) e \tag{2}$$

where we assume the convex cost function of effort $c(e) = 0.5e^2$. The last component of the equation represents the worker's reciprocal motive where $\alpha \geq 0$, and $\beta > 0$ are reciprocity parameters. Given this functional form, the optimal effort response function is

$$e^*(w, R) = \alpha \left(\frac{w}{R}\right)^{\beta} \tag{3}$$

We assume throughout that firms know the worker's preferences and form an accurate best response function.[6] Plugging the optimal effort response into the firms profit function and solving for the optimal wage yields the following expression

$$w^*(e^*) = R \left(\frac{\beta}{\beta + 1}\right) \tag{4}$$

This equation yields the comparative static prediction that as R increases (decreases) so will the wage that the firm offers. However, the effect of wages changes on effort are ambiguous and depend on the relative changes between wages and the endowment.

To illustrate this intuition, suppose an economic shock shifts R to R^- where $R^- < R$. Under full information conditions, the firm and the worker will update their wage and effort responses, respectively. This means that the worker selects $e^*(w, R^-) > e^*(w, R)$, and hence, there is room to reduce wages $w^*(R^-) < w^*(R)$ while preserving pre-shock effort.[7] Similarly, following a positive shock shifting $R \to R^+$, with $R^+ > R$, worker select effort $e^*(w, R^+) < e^*(w, R)$ and so in order to preserve pre-shock effort levels firms should raise wages so $w^*(R^+) > w^*(R)$.

[6]We can test this assumption since our experimental setup allows us to discern if firms form accurate beliefs about workers' effort response functions. Our evidence suggests that firm's beliefs are accurate.

[7]This can be untrue if the reciprocity parameters shift considerably in response to a change in economic conditions. Previous models structurally estimates such parameters in a similar context reporting no significant changes upon a shock Buchanan and Houser (2019).

2.2 The Role of Asymmetric Information

The previous intuition does not hold if information about the shock is asymmetric. For example, suppose the firm knows R decreases to R^- but the worker does not so that the worker continues to select $e^*(w, R)$. Firms may lower wages to level $w^*(R^-) < w^*(R)$ as in the case of full information. However, this wage cut now may trigger an even more pronounced decrease in effort since workers are not aware of the change in the firm's endowment since $e^*(w, R) > e^*(w, R^-)$ and workers are still selecting effort based on R. If the firm anticipates this, it may be reluctant to lower wages to level $w^*(R^-)$ and prefers instead to endure the negative economic shock.[8]

Following similar logic reveals that information plays an equally important role following an expansionary shock. Suppose now that R increases to R^+ but the uninformed worker continues to select $e^*(w, R)$. In contrast to the full information setting, the firm does not need to raise wages to preserve effort. Thus, firms can capture a larger share of the positive shock when information is asymmetric.

Overall, this simple model reveals that information structure plays a critical role in determining allocations in this environment. Our experimental design, which closely mimics the intuition of this model, provides a direct test for these hypotheses. We expect that under full information, wages will increase following positive endowment shocks and decrease after a negative shock, as workers will expect a wage hike or tolerate a wage cut. However, we predict firms will engage in more modest wage hikes and wage cuts following demand shocks in asymmetric information treatments. The model also predicts that asymmetric information benefits the firm following a positive demand shock but benefits the worker following a negative demand shock. Thus, we predict that firms lose profit share following a negative endowment shock in asymmetric

[8] This is especially true if the firm thinks the masking of intentions surround a wage cut can modify the worker's wage elasticity of effort.

information treatments, as workers will react harshly to any wage cut. The model is ambiguous about relative allocations following positive demand shocks in asymmetric information treatments, since worker effort and profit depend critically on the relative changes in wages and endowment.

3 Experimental Design

Our experimental design, based on the simple model described in 2, extends the gift-exchange game in three ways. First, firms face either a positive or negative permanent shock to their endowment. Second, we introduce information frictions by varying workers' awareness of the shock. Finally, we elicit firms' beliefs and workers' effort strategies both before and after the shock occurs. The confluence of these extensions allows us to distinguish between self-interest and other-regarding motives in firms' wage choices and to understand whether outcomes-based or intentions-based models better describe worker's effort responses.

We begin each experimental session by reading instructions aloud and administering two comprehension quizzes.[9] Following the second quiz, we randomly assign participants to the role of either firm or worker and form firm-worker pairs. These pairs play through three unpaid practice periods together to familiarize them with the setting. Following practice periods, we randomly form new firm-worker pairs that remain stable for 20 paid periods.

The firm receives an endowment of R, known also to the worker, at the beginning of each period and makes a wage offer w. After learning w, the worker chooses costly effort $e \in \{0, ..., \overline{e}(w)\}$.[10] The firm submits a wage decision using a simple input box. The worker can explore hypothetical choices before implementing them by moving a

[9] We provide instructions in appendix XX.

[10] Workers are not allowed to choose an effort that leads to negative earnings and so a firm's wage choice will often truncate the distribution of possible effort choices.

slider that reveals the firm's and worker's payoffs in real time. [11] Both players then receive feedback on their respective payoffs. The firm also receives information about the worker's effort. Following information revelation, the experiment proceeds to the next period.

After 10 rounds of baseline play where $R = 12$, we introduce a permanent session-level endowment shock. $R^{+} = 16$ following a positive shock and $R^{-} = 8$ following a negative shock. Shocks are common knowledge in the full information treatment. However, only firms learn of the shock in the asymmetric information treatment. Variation in these two factors, shock direction and information structure, yields a 2×2 between-subjects design summarized in Table 1.

Table 1: Summary of Design Treatments

Treatments	**Shock Information**	**Shock**
Positive	Common Knowledge	$R = 12 \rightarrow R = 16$
Negative	Common Knowledge	$R = 12 \rightarrow R = 8$
Pos.Asymmetric	Only Firms	$R = 12 \rightarrow R = 16$
Neg.Asymmetric	Only Firms	$R = 12 \rightarrow R = 8$

We elicit the firm's beliefs of her own worker's effort response, and the worker's effort response function, in periods 5, 10, 11, and 16. This allows us to understand how beliefs evolve as a function of experience during baseline play, how beliefs respond to shocks, and how the structure of information surrounding the shock effects beliefs. We elicit the firm's belief by asking what effort she expects from the worker at each possible wage. We use the strategy method to elicit the worker's effort response function after first asking her wage expectation in that period.

[11] In the positive asymmetric treatment, we do not provide the worker with the firm's payoff information as this information will reveal the shock. We do not find any significant differences in the periods before the shocks, suggesting that this feature did not impact effort choices.

We incentive the worker during elicitation periods by implementing her effort response function and paying her \$5 for a correct wage belief. We incentivize the firm's beliefs by randomly selecting one wage from the wage distribution and comparing it to her worker's actual effort response. We pay the firm \$5 if the effort guess is within .5 units and nothing otherwise.

During elicitation periods, both the firm and the worker can explore all hypothetical choices before providing a response. Similar to how the worker chooses effort in non-elicitation periods, both the firm and the worker can use a slider to understand how a potential effort level for each wage translate into payoffs.[12] After the first elicitation period, we remind each subject of their own choices in the previous elicitation period. Thus, any changes in beliefs or effort reflect actual updates and not a lack of recollection. We provide instructions on screen for subjects during all elicitation periods.

Before moving to results, we briefly address two possible design concerns. First, we circumvent hedging concerns in elicitation periods by paying subjects for either the accuracy of beliefs or for choices. We randomize this choice at the session level. [13] Second, one may wonder if employing the strategy method during elicitation periods induces an artificially high degree of monotonicity in effort responses. However, Maximiano et al. (2007) shows that the strategy method has a negligible effect, if any, on subject behavior. This finding is especially true in low-complexity environments.[14]

[12]See Appendix XX for screen-shots and details on the instructions.

[13]For example, a firm that suspects a worker will not reciprocate but wants to offer a high wage with the hope of reciprocation may guess that the worker will provide low effort at this wage.

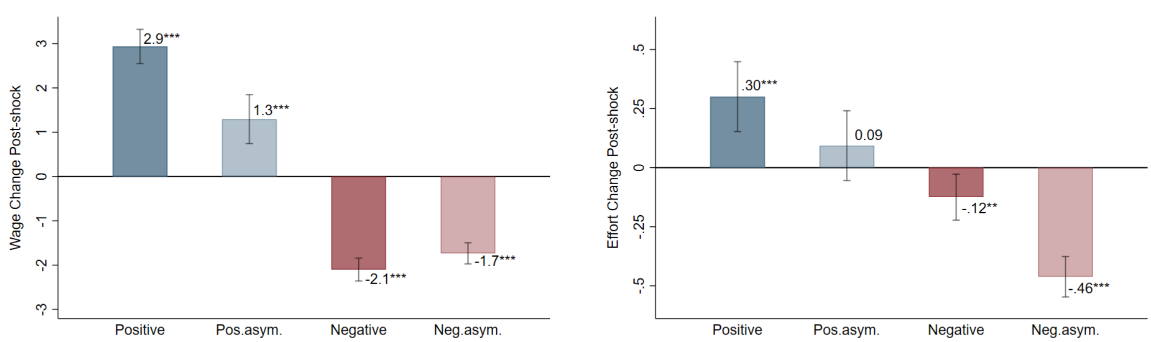
[14]See Cason and Mui (1998); Brandts and Charness (2000); Oxoby and McLeish (2004); Bosch-Domènech and Silvestre (2005).

4 Results

4.1 Information Asymmetry and Wage Rigidity

We find that information frictions play a fundamental role in determining how firms and workers share the benefits or the costs of endowment shocks. Our evidence suggests that firm behavior is explained primarily by self interest and not just by social preferences, and that intentions-based, rather than outcomes-based models, can best explain worker behavior. Introducing information frictions causes firms to selfishly keep most of the positive shock, while still trying to pass along the negative shock. On the other hand, workers tolerate wage cuts only when they are aware of the endowment shock. Under asymmetric information, workers choose a much lower effort in negative shocks, despite being offered wages similar to those under full information.

Figure 3 shows that both wages and effort adjust in the direction of the endowment shock. Introducing information frictions significantly mutes sharing of the positive shock but only leads to a small, albeit significant, difference in how firms share the negative shock. This is true despite firms correctly predicting that workers will not tolerate wage cuts under information frictions.



(a) Pre/Post Wage Change

(b) Pre/Post Effort Change

Figure 1: Wages and Effort Responses to Shocks

Under full information, average wage is 2.9 units higher following a positive shock. In response, average effort increases by 0.3 units. Conversely, negative shocks induce a wage 2.1 units lower and an effort cut of .12 units. Firms' beliefs reveal they expect less effort for a given wage after a positive shock and more effort following a negative shock. Both of these beliefs are accurate (See Figure 2). This suggests that firms beliefs about workers' reaction to these shocks play a predominant role in determining the wage they offer.

The fact that the effort-response function adjusts following these shocks is consistent with an intentions-based model of effort, since an outcomes-based model would predict no change in the effort response function. Workers select effort not based just on the wage but instead on the wage proportional to the endowment. Firm's anticipate this and adjust wages accordingly following endowment shocks.[15]

Introducing information frictions surrounding endowment shocks generates wage rigidity and significantly moderates how workers respond to wage cuts. Wages increase by 1.3 units on average following the positive shock, which is less than 50% of the wage hike following an equivalent endowment shock under full information. Workers do not exhibit a significant response to this muted wage hike. Following a negative shock, firms cut wages by 1.7 units, which is about 20% less severe than the wage cut under full information. Despite this smaller wage cut, workers exhibit a large and highly significant reduction in effort of .46 units. This effort cut is nearly four times larger than the average effort cut under full information.

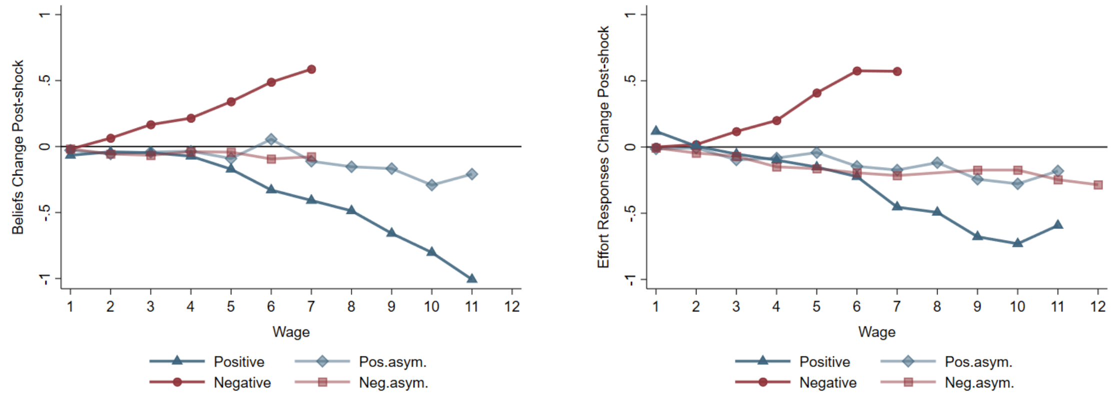
[15]This evidence supports the assumption of accurate contingent reasoning in behavioral models of principle-agent interactions.

Table 2: Wages and effort choices before/after shock

	(1) Wage offer (pos. shock)	(2) Wage offer (neg. shock)	(3) Effort Choice (pos. shock)	(4) Effort Choice (neg. shock)
Mean of dep. var.	6.781***	6.729***	1.667***	1.246***
	(0.459)	(0.239)	(0.224)	(0.106)
Post	2.948***	-2.069***	0.287***	-0.123***
	(0.235)	(0.128)	(0.073)	(0.047)
Asym.info	-0.779	-0.939***	-0.150	-0.040
	(0.567)	(0.305)	(0.275)	(0.135)
Post×Asym.info	-1.667***	0.306*	-0.179*	-0.341***
	(0.332)	(0.175)	(0.104)	(0.064)
Observations	740	1380	740	1380

Notes: Results from a random-effects linear regression. The regression also includes a control for the last round and gender. Clustered standard errors at the individual level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Firms' beliefs demonstrate a clear understanding that information frictions mask the shock to workers. Whereas firms expect shocks to reshape the effort response function under full information, firms correctly predict no change in effort under information frictions. This difference in beliefs, coupled with choice data, gives critical insight into the motives underlying firm behavior. If firms are fully other-regarding, then information frictions should not mute wage hikes following the positive shock. On the other hand, a fully self-interested firm would not offer a wage increase under information frictions. Our results fall between these two extremes.



(a) Pre/Post Beliefs Change **(b)** Pre/Post Effort Responses Change

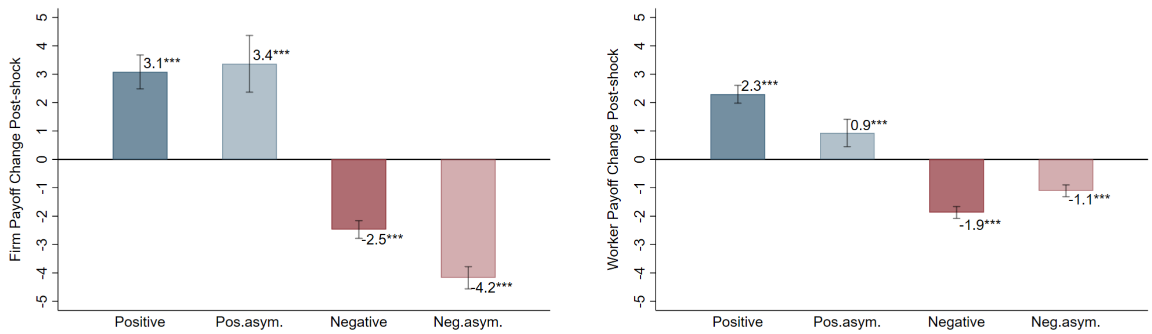
Figure 2: Beliefs and Effort Responses to Shocks

4.2 Payoffs and the Distribution of Endowment Shocks

Our primary finding is that who wins and who loses following an endowment shock depends critically on the information surrounding the shock. We find that information frictions slightly benefit the firm following a positive shock but greatly harm the firm following a negative one. The opposite is true for workers under asymmetric information, who receive a much smaller wage increase following a positive shock but also see a smaller drop in wages following a negative shock.

Under full information, firms and workers split endowment shocks almost equally. Figure 3 shows that positive endowment shocks increases payoffs for both firms and workers and that negative endowment shocks have the opposite impact on payoffs.

Introducing information frictions has little effect on firm payoffs when endowment increases, despite the fact that firms retain almost 60% more of the endowment increase relative to full information sessions. This is a consequence of workers' large effort increases in response to wage hikes in the full information treatment. On the other hand, firms' payoffs fall by about 68% more following a negative shock under asymmetric information than under full information. This results from firms trying to share the negative shock, despite their post-shock beliefs about worker effort. Drastic and punitive effort cuts severely impacts firm profits.



(a) Firm Payoff Change **(b)** Worker Payoff Change

Figure 3: Firms and Workers Payoffs Changes to Shocks

Workers do benefit from information frictions following a negative shock; workers' payoffs fall by only 60% of what they do under asymmetric information than under full information. This happens because their punitive effort cut greatly reduces the cost of effort. This reduction in the cost of effort, coupled with a slightly higher average wage, leads to a higher payoff relative to the full information setting. However, asymmetric information is less beneficial to workers when the endowment shock is positive; average payoffs increase by less than 40% of what they do under full information. Table 3 provides estimates of payoff differences for workers and firms following positive and negative shocks that result from the introduction of information frictions.

Table 3: Firms and workers payoffs before/after shock

	(1) Firm payoff (pos. shock)	(2) Firm payoff (neg. shock)	(3) Worker payoff (pos. shock)	(4) Worker payoff (neg. shock)
Mean of dep. var.	7.413***	5.317***	4.978***	5.629***
	(1.249)	(0.417)	(0.417)	(0.193)
Post	2.931***	-2.482***	2.325***	-1.840***
	(0.405)	(0.183)	(0.200)	(0.107)
Asym.info	0.177	1.079**	-0.712	-0.930***
	(1.533)	(0.533)	(0.514)	(0.248)
Post×Asym.info	0.596	-1.678***	-1.426***	0.707***
	(0.572)	(0.251)	(0.283)	(0.146)
Observations	740	1380	740	1380

Notes: Results from a random-effects linear regression. The regression also includes a control for the last round. Standard errors are in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.3 Accuracy of Beliefs and Optimality

Next we show that firms not only form accurate beliefs about workers' responses, but also, that conditional on those beliefs, they set wages optimally. Table 4 shows that on average, the firm's beliefs about the effort response function closely match the worker's responses. Furthermore, the firm chooses a wage that is equal to or above what is optimal conditional on these beliefs. This logical coherence between accurate beliefs and wage choices leads to the firm choosing the ex-post optimal wage.

Workers also form accurate expectations about their counterparts. Comparing columns 3 and 4 in Table 4 shows how workers expectations on wage offers are not only accurate

	opt.beliefs	opt.response	wage	exp.wage
	(1)	(2)	(3)	(4)
Pre (-)	5.86	6.65	6.82	6.82
Post (-)	4.06	4.35	4.59	4.77
Pre (-Asym.)	5.4	5	5.78	6.07
Post (-Asym.)	3.38	3.31	3.96	5.31
Pre (+)	6.47	6.66	7.45	7.05
Post (+)	8.39	8.26	9.89	9.5
Pre (+Asym.)	5.5	5.06	6.39	6.06
Post (+Asym.)	6.69	5.47	8.22	6.69

Table 4: *Notes:* Opt.beliefs is the average of optimal wages according to firms beliefs. Similarly, opt.response is the average of the optimal wages based on workers response function. Wage is the wage offered by the firm and exp.wage is the expected wage of the workers.

in the pre-periods, but also after the shock occurs in full information treatments. However, this breaks down in asymmetric information treatments where workers cannot incorporate the information about the shocks.

Despite the fact that workers and firms interact for several post-shock periods together and consistently receive wages above or below their expectations, workers do not adjust their effort responses or expectations. Effort responses functions in period 11 and 15 are similar to those elicited in periods 5 and 10.[16] On the other hand, in full information treatments expectations adjust instantaneously, reflected by the accuracy of wage expectations in period 11, even though workers have not experienced any post-shock wage. This highlights the importance of information about the firm's endowment in establishing wage expectations and effort responses.

This failure of wage expectations to adjust may help rationalize the drastic difference we observe in wage-effort dynamics induced by introducing information frictions alongside the negative endowment shock. Further, the behavioral response to this mismatch

[16]We show non-pooled wage expectations in appendix XX.

in wages and expectations seems to be state contingent. Following a positive shock, where firms pay average wages in excess of expectations, workers do not increase effort significantly. However, when firms pay average wages that fail to meet expectations, workers respond by drastically reducing effort. This suggests that, though exceeding a wage may not induce positive reprisal, failing to at least meet expectations leads to severe effort cuts.

5 Conclusion

In this paper, we show that information frictions play a crucial role in moderating social preferences in a strategic environment. Our design allows us to introduce endowment shocks while eliciting the firm's beliefs and worker's responses. Our evidence suggests that firm behavior is explained primarily by self interest and not just by social preferences, and that intentions-based, rather than outcomes-based models, can best explain worker behavior.

Under full information, shocks are shared almost equally between agents. Workers adjust their responses to these shocks, and firms correctly predict these changes. Introducing information frictions changes this dynamic. First, firms only transmit a slight share of the positive shock, which leads to modest increases in effort. Second, firms attempt to share the negative shock with the worker, which now leads to substantial decreases in effort.

We observe that relative profit share depends critically on the information surrounding the shock. We find that information frictions slightly benefit the firm following a positive shock but greatly harm the firm following a negative one. The opposite is true for workers under asymmetric information, who receive a much smaller wage increase following a positive shock but also see a smaller drop in wages following a negative shock. Thus, information frictions do not always benefit the more informed party. Instead, information frictions benefit the first-mover following positive endowment shocks but harm the first mover following negative ones.

This behavior is consistent with our theoretical framework where firms act selfishly and workers actions are determined by intentions and not just outcomes. Firms pass along nearly half of a positive endowment shock under full information, which appears consistent with models of social preferences. However, introducing information frictions drastically reduces pass through of the positive shock. This suggests that self-interest, rather than other-regrading concerns, plays the predominate role in first-mover behavior.

Finally, our evidence provides support for the assumption of accurate contingent reasoning when modeling first-mover behavior in principle-agent problems. Further, we see that information surrounding endowment shocks is perhaps more important for wage expectations than experience following these shocks. Workers' under full information adjust wage expectations fully and accurately in response to endowment shocks. In fact, these workers form accurate wage expectations in period 11 before they actually experience a post-shock. However, workers in asymmetric information treatments never fully adjust wage expectations, even after gaining post-shock experience.

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A Appendix

Table 5: Beliefs and effort responses changes post-shock

	(1) Beliefs diff. (pos. shock)	(2) Beliefs diff. (neg. shock)	(3) Effort Resp. diff. (pos. shock)	(4) Effort Resp. diff. (neg. shock)
Mean of dep.var.	0.215*	-0.100	0.180	-0.155*
	(0.110)	(0.097)	(0.116)	(0.091)
Wage	-0.087***	0.106***	-0.066***	0.118***
	(0.013)	(0.021)	(0.016)	(0.019)
Observations	228	264	228	264

Notes: Results from a linear regression. Rounds 5 and 10 are pooled together, similarly with rounds 11 and 15. The regression also includes a control for the maximum wage. Clustered standard errors at the individual level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Beliefs and effort responses changes post-shock (asym.information)

	(1) Beliefs diff. (asym.pos. shock)	(2) Beliefs diff. (asym.neg. shock)	(3) Effort Resp. diff. (asym.pos. shock)	(4) Effort Resp. diff. (asym.neg. shock)
Mean of dep.var.	0.038	0.082	0.044	0.028
	(0.104)	(0.078)	(0.096)	(0.084)
Wage	-0.016*	-0.003	-0.007	-0.009
	(0.009)	(0.014)	(0.010)	(0.006)
Observations	216	288	216	432

Notes: Results from a linear regression. Rounds 5 and 10 are pooled together, similarly with rounds 11 and 15. The regression also includes a control for the maximum wage. Clustered standard errors at the individual level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.