

When Will There Be Gift Exchange?
Addressing the Lab-Field Debate With a Laboratory Gift Exchange Experiment

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ABSTRACT

Gift exchange experiments have demonstrated that norms can affect labor market outcomes. However, varied gift exchange findings from lab and field experiments have questioned the relevance of gift exchange in labor markets of interest and helped spark an ongoing debate about the relative merits of lab and field experimentation. This paper uses a laboratory experiment to identify two parameters that affect the likelihood that workers engage in gift exchange. Gift exchange is more prevalent when workers are rich relative to the firm and when worker effort is efficient. The experiment helps to reconcile previous results from lab and field experiments.

Keywords

Experimental Economics, Laboratory Experiments, Gift Exchange

JEL Classification Codes

C90, D21, J30

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I. Introduction

A debate about the relative merits of laboratory and field experiments has flared over the past decade. Vocal critics of the lab argue that laboratory experiments may not generalize to “real world” environments, making it difficult to draw inferences from laboratory games to economic markets of interest. These authors point to differential treatment effects across the lab and the field to demonstrate a lack of generalizability of laboratory findings (Harrison and List 2004; Levitt and List 2006, 2007a, 2007b, 2008; Al-Ubaydli and List 2012). Proponents of the lab argue that field experiments are subject to the same weakness: results from one particular field setting may not generalize to other field settings, suggesting that the field is simply a different environment, without any special status, in which to look for treatment effects (Falk and Heckman 2009, Kagel 2009, Camerer 2012).¹

Throughout the debate, gift exchange has been a central example emphasized by authors on both sides (see for examples Levitt and List 2007a, Falk and Heckman 2009, Kagel 2009) in part because of the importance of gift exchange as an example of the role norms can play in labor market outcomes² and in part because gift exchange results measured in the laboratory and in field have been shown to differ drastically.

Laboratory tests of gift exchange involve a first mover (a “firm”) making a transfer (a “wage”) to a second mover (a “worker”), who is then given the opportunity to make a transfer back (“effort”) to the first mover, after which the game ends.³ Laboratory experiments routinely find that experimental workers respond to higher wages by providing more effort.⁴

¹ More recently, Camerer (2012) systematically addresses the five differences that Levitt and List (2007a) highlight between lab and field to demonstrate that they have less of an impact on results than Levitt and List suggested. Al-Ubaydli and List (2012) argue for the superior generalizability of field experiments by developing a model of generalizability and assuming that laboratory experiment settings are further from natural settings of interest than field experiment settings.

² Gift exchange experiments are meant to test the gift exchange model of the labor market (Akerlof 1982, 1984). Gift exchange theories suggest that there is a social norm for gift exchange such that the receipt of a gift generates a desire to reciprocate. It implies that when employers pay a wage higher than the market-clearing wage (a gift for the worker) the worker will exert more effort (a gift for the employer).

³ Most laboratory experiments have subjects play the game multiple times with random re-matching of firms and workers and subject anonymity to mitigate potential strategic concerns of repeated play. In general, one or both of the transfers is scaled to make the transfers socially efficient.

⁴ Early examples include: Fehr, Kirchsteiger and Riedl (1993); Fehr, Gachter and Kirchsteiger (1997); Fehr et al. (1998); Charness (2000); Gachter and Falk (2002); Hannan, Kagel and Moser (2002); Charness (2004); Charness, Frechette and Kagel (2004); and Brandts and Charness (2004). For a review, see Fehr, Goette and Zehnder (2009).

Field studies of gift exchange generally take place in settings where worker productivity is measurable and where workers can be treated with exogenous positive wage shocks.⁵ These experiments find mixed results for gift exchange. In certain settings, at least some subset of workers produce more in response to unexpected, short-term increases in pay (Cohn, Fehr and Goette 2008, Bellemare and Shearer 2009, the bonus treatment in Englmaier and Leider 2012; see Falk 2007 for gift exchange in charitable giving). In other settings, cash gifts fail to generate extra productivity while in-kind gifts do so (Kube, Marechal and Puppe 2011). Still other settings generate temporary gift exchange effects, for a short while after a wage shock (the data entry task in Gneezy and List 2006). Finally, some field settings generate no evidence of gift exchange (List 2006; the door-to-door fundraising task in Gneezy and List 2006; Hennig-Schmidt, Rockenbach and Sadrieh 2010; the no bonus treatment in Englmaier and Leider 2012).

In this paper, I help explain differential results on gift exchange across laboratory and field settings and address the laboratory and field debate while doing so. My experiment is motivated by the observation that two parameters systematically differ between experiments that find evidence of gift exchange and those that do not: (1) the relative wealth of firms and workers and (2) the efficiency of worker effort. Comparing previous experiments across lab and field, we see less evidence of gift exchange when firms are rich relative to workers and when worker effort is not efficient.

In a controlled laboratory setting, I test whether each of these parameters affects gift exchange. Consistent with the variation in previously observed gift exchange results, I find that workers are less likely to engage in gift exchange when firms are made richer than workers or when worker effort is not efficient. These findings help to reconcile disparate gift exchange results across lab and field settings.

By suggesting that these two parameters can help explain differential gift exchange results, my findings challenge the presumption that variation in results between lab and field are due primarily to whether the experiment is run in a lab and field setting or due to the specific features of lab and field environments that have been the focus of the ongoing debate.⁶

⁵ There is a related literature investigating how wage cuts affect effort in the spirit of the fair-wage hypothesis of Akerlof and Yellen (1990). That literature consistently finds a decrease in effort in response to a surprise decrease in wages.

⁶ Much of the ongoing debate has focused on five factors that Levitt and List (2007a) argued differed between lab and field settings: the selection of subjects into the experiment, the stakes, the role of

I am by no means the first to attempt to explain why gift exchange results differ across settings. One way to address this discrepancy in results is to conduct similar experiments in a number of environments, which include both laboratory and field settings of interest. List (2006) provides a prime example of this strategy. List (2006) finds gift exchange among sports card buyers and sellers in a laboratory experiment but does not find gift exchange when the same populations play a similarly structured game outside of the lab (i.e. in a sports card market without observable experimenter scrutiny). The List (2006) results demonstrate how gift exchange can vary across settings, and the paper describes the care involved in selecting a field setting that looks similar to the laboratory on many important dimensions. One limitation of this approach, however, is that even with care in selecting the field setting, a number of factors change as List (2006) moves from the laboratory to the field. The move from the lab to field removes observable experimenter scrutiny, but it also changes: (1) the information that players have about the setting, (2) the rules of the game, and (3) the action spaces available to the players. While the series of experiments clearly show us that gift exchange changes with the environment, it raises the question of why the results change. Without knowing what factors led to the differential results between the lab and field, it is impossible to know whether a different field setting will display results more like the lab or more like the field.

My approach in this paper is also distinct from the strategy, as proposed in Camerer (2012) and elsewhere, of addressing differential treatment effects between lab and field by running laboratory environments that more closely mirror a field environment of interest. While such an approach may also be a fruitful avenue to pursue, it poses a similar challenge of identifying all of the ways that two settings differ and being selective about the factors that are adjusted to make the laboratory look more like the field. By contrast, the laboratory experiment in this paper includes an exogenous shock to firm wealth and worker efficiency (explained in the next section) that makes the experimental setting look *less* like field environments outside the lab. This design choice allows us to investigate how two parameters (i.e. firm wealth and the efficiency of worker effort) affect gift exchange without confounding the perceived generosity or

experimenter scrutiny, the duration of the game. Much ink has been spilt addressing these features: some have noted that it is often possible to eliminate these differences in the lab (e.g. by changing the subject pool recruited, the stakes they face, the extent of experimenter scrutiny, and the length of the experiment). Selection into the study is an interesting research topic in its own right (see e.g. Slonim et al. 2012).

intention of a given wage.⁷ In this case, the difference between the laboratory and the field is a strength — not a weakness — of the laboratory

The approach in this paper is to vary parameters in the laboratory and looks for changes in a treatment effects to make a comparative static prediction about where gift exchange will be stronger and where it will be weaker. This approach is one of the foundations of the experimental methodology within economics, and it is not unique to the laboratory. Additionally, conducting a study in the laboratory to investigate why lab and field results differ is by no means a challenge to field experiments. Rather, this paper suggests a particular way in which laboratory and field experiments are complements in the production of knowledge. In particular, field experiments have the potential to identify settings where treatment effects differ significantly from those found in the laboratory. These field settings are likely complex environments that differ from the laboratory on a variety of dimensions. When field experiments uncover treatment effects that differ from those found in the lab, we can return to the lab to investigate individual parameters that differ between the laboratory and field and might generate the differences in results. Using both methodologies, researchers can come to better understand the underlying mechanisms driving behavior in the lab and the field.⁸

II. Motivation and Literature Review

Variation in the perception of firm wealth and the efficiency of worker effort appear to correlate with the strength of gift exchange observed across experimental settings. Table 1

⁷ Previous gift exchange experiments have investigated firm wealth and worker productivity but have confounded the effect of these factors with the perceived generosity of a given wage, preventing us from drawing sharp conclusions about whether firm wealth and worker productivity could drive differences across settings. Xiao and Bicchieri (2010) make some firms initially richer than workers and find less effort returned to richer firms. This design confounds firm wealth and the generosity (i.e. the intention) of the wage since the same wage might be interpreted as less generous coming from a rich firm leading to less effort returned. Similarly, Hannan, Kagel and Moser (2002) find no difference in gift exchange between firms that are relatively productive and relatively unproductive, but their design confounds efficiency of effort with intentions of wage offers (and with firm wealth, which also varies with productivity). A wage may seem more generous coming from a relatively unproductive (and poor) firm. Intentions are a worrisome confound since intentions have been shown to directly affect worker effort (see Charness 2004 and Charness and Levine 2007).

⁸ In advocating for this complementarity between laboratory and field research, I join a plurality of researchers — spanning the both sides of the debate — who agree that laboratory experiments and field experiments can complement one another (see Levitt and List 2007a,b; List and Reiley 2008; Roth 2008; Falk and Heckman 2009; Kagel 2009; Hennig-Schmidt, Rockenbach and Sadrieh 2010; Roth 2012; Al-Ubaydli and List 2012; Camerer 2012; Kessler and Vesterlund 2012).

provides a list of experiments (and settings within experiments), classifying each setting based on whether the firm is likely to be perceived as poor or rich and whether worker effort in the experiment is likely to be perceived as efficient or not efficient. For the laboratory experiments, this classification can be achieved simply by looking at payoffs. Since field settings are more complex, however, classifying them is necessarily subjective and open to interpretation. The bold citations are those that find significant positive evidence of gift exchange.

Table 1: Classification of Laboratory and Field Experiments on Gift Exchange

	Firm Perceived as Poor	Firm Perceived as Rich
Worker Effort Perceived As Efficient	Fehr, Kirchsteiger and Riedl (1993) Fehr, Gachter and Kirchsteiger (1997) Fehr et al. (1998) Charness (2000) Gachter and Falk (2002) Hannan, Kagel and Moser (2002) Charness (2004) Charness, Frechette and Kagel (2004; no payoff table) Brandts and Charness (2004) List (2006; lab experiments) Falk (2007)	List (2006; field experiment) Gneezy and List (2006; data entry) Cohn, Fehr and Goette (2008) Bellemare and Shearer (2009) Hennig-Schmidt, Rockenbach and Sadrieh (2010; data entry) Hennig-Schmidt, Rockenbach and Sadrieh (2010; folding info treatment) Kube, Marechal and Puppe (2011; in-kind gift) Kube, Marechal and Puppe (2011; monetary gift) Englmaier and Leider (2012; bonus treatment)
Worker Effort Perceived As Not Efficient	Charness, Frechette and Kagel (2004; payoff table) Gneezy and List (2006; door-to-door fundraising)	Hennig-Schmidt, Rockenbach and Sadrieh (2010; folding no info treatment) Englmaier and Leider (2012; no bonus treatment)

Note: Bolded citations indicate that an experiment found a significant positive effect of gift exchange.

The vast majority of previous laboratory experiments on gift exchange appear in the top left cell of Table 1 in bold. In almost all previous laboratory studies of gift exchange, subjects in the role of the firm are poor relative to subjects in the role of the worker in experimental currency at the time when the worker makes an effort choice⁹ and worker effort is efficient (in

⁹ Fehr, Kirchsteiger and Riedl (1993) allow firm wages to be between 30 and 130, and for any wage larger than 35 the worker is at an experimental unit advantage at the time of his effort choice. For example, after a wage of 72 (the mean wage across all sessions), the worker has 46 experimental units and

that it increases the social surplus for the firm and worker).¹⁰ These previous laboratory experiments routinely find evidence of gift exchange.¹¹

In field experiments on gift exchange, however, there is significant variation in whether firms are likely to be perceived as rich relative to workers and whether worker effort is likely to be perceived as efficient. There is also variation in whether these field experiments find evidence of gift exchange. Falk (2007) observes gift exchange in a charitable giving setting where “firms” are poor street children in Dhaka, Bangladesh who send a gift of postcards to “workers” who are relatively wealthy potential donors in Zurich, Switzerland. In Falk (2007) we expect workers to perceive the firms to be relatively poor and for worker effort to be perceived as efficient in that potential donors are likely to think that a transfer from rich people in Zurich to poor street children in Dhaka generates significant social surplus.

In other field experiment settings, workers are likely to perceive the firm as rich. In these settings, we often do not observe gift exchange. List (2006) does not observe gift exchange when firms are hobbyists buying cards at a sports card convention — enjoying leisure and spending disposable income on their hobby — and workers are sellers at the same convention who are there to earn a living. Gneezy and List (2006) do not observe sustained gift exchange from a surprise positive wage shock to students whose effort benefits a university library system. The university, the library, and the salaried employees working there are likely to be perceived as rich by the student workers making an hourly wage. Kube, Marechal and Puppe (2011) also have students work for a university library and do not observe gift exchange from a 20% wage

the firm has 5.4 experimental units. The worker then has the opportunity to make a return gift. The majority of laboratory experiments on gift exchange have adopted similar parameters.

¹⁰ It many experimental settings, return gifts are scaled linearly by a factor of five (Brandts and Charness 2004) or contribute to a multiplicative scalar of firm endowment (Fehr, Kirchsteiger and Riedl 1993; Fehr et al. 1998; Charness 2000; Charness 2004; Charness, Frechette and Kagel 2004). Hannan, Kagel and Moser (2002) vary the productivity of effort in a gift exchange setting using costs of effort similar to Fehr, Kirchsteiger and Riedl (1993), but almost all wages lead to environments where effort is efficient.

¹¹ Fehr and Schmidt (1999) use laboratory gift exchange results as an illustrative example for their model of inequity aversion. After the firm makes a wage transfer to the worker, the worker is relatively rich, which generates a distributional motive to returning effort — a motive that is stronger the larger the initial wage — and eliminating this inequity is relatively cheap given the efficiency of worker effort.

increase.¹² Hennig-Schmidt, Rockenbach and Sadrieh (2010) do not observe gift exchange in a similar data-entry task in which workers are employed by a University research institution.¹³

In a field experiment setting where workers are very unlikely to perceive their effort as efficient, we do not observe gift exchange, even though the firm might be perceived as poor. Gneezy and List (2006) do not find gift exchange among subjects who solicit donations for a charity by going door-to-door. These solicitors generate donations that are on average less than their wage over the same time period and so we might think workers are unlikely to perceive their effort as efficient.¹⁴

Some gift exchange experiments have varied features of the experimental setting and looked for differences in the strength of gift exchange. I describe those experiments here and explain why different settings from the same experiment may fall into different cells of Table 1.

Englmaier and Leider (2012) vary whether a manager informs employees that he gets a bonus if employees reach a productivity target in their data entry task. The authors only observe gift exchange when the employees know about the bonus. The manager announcing his bonus establishes a direct benefit for the manager from worker effort, so the change can be interpreted as increasing the perceived efficiency of effort, both because subjects may care about the welfare of the manager or because the existence of the bonus signals something about the value of the data entry task.

Hennig-Schmidt, Rockenbach and Sadrieh (2010) vary whether workers folding envelopes in a real-effort laboratory experiment know the market price for having envelopes folded. When the workers are uninformed about the price, the authors do not observe gift exchange from a 10% wage increase. When workers are informed about the price, the same 10% wage increase generates higher productivity. The authors interpret the relevant change as surplus information becoming available and argue that information about the surplus being created must be available for gift exchange to be present. However, the relevant change may have been

¹² Kube, Marechal and Puppe (2011) observe gift exchange when workers receive an in-kind gift.

¹³ Gift exchange is sometimes observed — at least among certain sub-groups of subjects — in settings where we might expect workers to think of firms as being relatively rich (e.g. Cohn, Fehr and Goette 2008 where employees work for a publishing house launching a new newspaper and Bellemare and Shearer 2009 where employees work for a tree-planting firm that received a bonus from the government).

¹⁴ In labor market environments we expect worker effort to be efficient on average (if it were not, the firm could not profitably compensate workers for their effort). In certain field settings, however, additional effort may not be efficient (e.g. worker effort may already be close to the first best). Additionally, a particular field setting created for an experiment may not provide the opportunity for efficient production.

making workers perceive their effort as more valuable to the experimenter and thus more efficient. In fact, data from Hennig-Schmidt, Rockenbach and Sadrieh (2010) suggests that price information impacts beliefs about the efficiency of worker effort. In the initial work phase, when everyone is being paid the same wage, workers who receive the information produce 13% more envelopes than workers who do not receive the information.¹⁵

Charness, Frechette and Kagel (2004) find less gift exchange in a laboratory experiment in which workers are provided with a payoff table with possible combinations of wages and effort. This difference is driven by lower effort response to the highest wages offered in the experiment. In Charness, Frechette and Kagel (2004), worker effort is less efficient when wages are higher, so providing the payoff table to workers may serve to highlight the lower efficiency of worker effort at higher wages, leading to less gift exchange at high wages.

This reading of the previous literature suggests that we are more likely to observe gift exchange when firms are poor relative to workers and when worker effort is efficient — as in most laboratory experiments and some field experiments — and we are less likely to observe gift exchange when either the firm is rich relative to the worker or when effort is likely to be perceived as neutral or inefficient. This observation that relative wealth of the firm and worker and the efficiency of worker effort may contribute to the variation in results motivates our experimental design.

The experiment directly manipulates relative wealth and the efficiency of effort to identify their impact on gift exchange results. In some conditions of the experiment, the firm is made rich relative to the worker; in others, the firm is made poor relative to the worker. In some conditions of the experiment, worker effort is made efficient; in others, it is not. The experiment compares the effort-wage relationship across these conditions. As will be shown below, results are consistent with the pattern in Table 1: gift exchange is significantly diminished when the firm is made richer than the worker and it is somewhat diminished when worker effort is made neutral rather than efficient.

¹⁵ This difference is calculated from Table 5 in Hennig-Schmidt, Rockenbach and Sadrieh (2010) and is based on the pre-treatment round, before some subjects receive a higher wage as a gift. Data provided by the authors shows this difference to be marginally statistically significant (OLS with robust standard errors, 56 observations, $p=0.085$).

III. Experimental Design

Participants played 24 rounds of a bilateral gift exchange game as either a firm or a worker.¹⁶ Each participant kept the same role throughout the game and was randomly re-matched with a player of the other type in each round so that he never played with the same participant twice in a row. The experiment lasted one hour, participants were paid for one randomly selected round, and average earnings were \$20.60 per participant (including a \$10 show up fee). The experiment was run on z-Tree 2.1.4 (Fischbacher 2007).

At the start of each round, the firm had 30 units and the worker had 35 units.¹⁷ Each round consisted of three stages. In the first stage, the firm chose a wage of 0, 5 or 10 units, which was multiplied by 4 and transferred to the worker (so the worker received 0, 20 or 40 units).¹⁸ In the second stage, a random outcome determined whether the firm received an additional 60 units (was “Rich”) or 0 units (was “Poor”) and whether worker effort was efficient, so the number of units of effort chosen by the worker was multiplied by 4 (“4-to-1”) before it was transferred to the firm, or worker effort was not efficient, so units of effort were transferred without being scaled (“1-to-1”). At the start of the experiment, all participants were told publically that the four possible realizations of the random outcome were equally likely.¹⁹ Both the firm and worker were informed of the results of the random outcome in each round. The parameters of the experiment were chosen such that if the firm received 60 units, he had more experimental units than the worker at the end of the second stage, regardless of the wage.²⁰ In the third stage, the worker chose an effort level — any whole number of units between 0 and 10 — and that number of units was subtracted from his payoff. This number of units was multiplied by 1 or 4, as determined by the random outcome, and transferred to the firm.

Payoffs to the firm and worker were therefore determined by:

$$\pi_f = 30 - w + 60 \cdot R + T \cdot e$$

$$\pi_w = 35 + 4w - e$$

¹⁶ Instructions framed the game in a neutral way. Subjects were either a “first mover” or “second mover” and chose whether to “transfer” their “experimental units.”

¹⁷ Each experimental unit was worth \$0.20 and earnings were paid in cash at the end of the experiment.

¹⁸ The scale factor of 4 for the wage was meant to encourage positive wages in the first stage and to allow for sizeable transfers to workers without giving the firm a significantly larger initial endowment.

¹⁹ All subjects faced the same random drawing realization.

²⁰ A firm providing the maximum wage of 10 units in the first stage and receiving 60 units in the second stage would have 80 experimental units to the worker’s 75 units. The difference between firm and worker units at the start of the third stage is larger when the firm chooses a smaller wage.

where: π_f is the firm payoff

π_w is the worker payoff

w is the wage chosen by the firm where $w \in \{0, 5, 10\}$

the random outcome determines $R \in \{0, 1\}$ with $P[R = 1] = 0.5$

and $T \in \{1, 4\}$ with $P[T = 4] = 0.5$

e is the effort provided by the worker, where $e \in \{0, 1, \dots, 9, 10\}$

The experiment has a two-by-two, within-subject design. After the firm chose the wage, the random outcome placed the worker in one of the four conditions as shown in Figure 1. The design of the experiment embeds as one of the conditions traditional bilateral gift exchange (“Poor, 4-to-1”) and embeds as one of the conditions a trust game (“Poor, 1-to-1”), with parameters similar to other experiments. In the results section we will show that we replicate the standard bilateral gift exchange and trust game results in those cells.²¹

Figure 1: Four Conditions (2x2 Design)

2 x 2 Design		Firm Wealth	
		Poor (+0)	Rich (+60)
Efficiency of Effort	4-to-1	Poor, 4-to-1	Rich, 4-to-1
	1-to-1	Poor, 1-to-1	Rich, 1-to-1

Since firms are restricted to choosing a wage of 0, 5 or 10 units in the first stage of the game, workers find themselves in one of 12 possible scenarios in each round. Each round, the

²¹ Brandts and Charness (2004) use a scale factor of 5 for both wage and effort in their bilateral gift exchange game while the “Poor, 4-to-1” condition uses 4 for both wage and effort. Berg, Dickhaut and McCabe (1995) use a scale factor of 3 for wage and 1 for effort in their trust game while the “Poor, 1-to-1” condition uses 4 for wage and 1 for effort. As will be explained in the next section, we replicate the results of these previous studies in the relevant cells of our experiment. Instructions are in Appendix A.

firm pays a wage of 0, 5, or 10 units (i.e. the worker receives 0, 20 or 40 units) and one of the four conditions in Figure 1 is realized. The worker then makes an effort choice for that round in response to the particular wage and random outcome realization.

Since firm wealth and efficiency of effects are hypothesized to be driving the effects on gift exchange behavior across settings, we want to identify them without any potential confounds. In particular, it is important to isolate them from the intention associated with a wage, which has been shown to have significant effects on the extent of gift exchange observed (see Charness 2004 and Charness and Levine 2007).²² Consequently, we have the firm choose a wage *before* the random outcome is realized so that the worker's judgment about the "generosity," "fairness," or "intention" of a particular wage is identical regardless of the realization. Other experiments that have varied firm wealth (Xiao and Bicchieri 2010) or the efficiency of worker effort (Hannan, Kagel and Moser 2002) have been answering different questions and so allowed the intention of the wage to confound the pure effects of firm wealth and efficiency that are of interest here.

To investigate how gift exchange changes as a function of the parameters of the experiment, we look at two related measures of gift exchange. First, we look at how much more likely workers are to return positive effort (rather than 0 effort) as their wage increases. This is a natural measure of gift exchange since it asks whether workers become more willing to make a sacrifice to benefit the firm as their wage increases. This binary measure must be positive for a researcher to have a chance of observing gift exchange in a field setting. Second, we will look for gift exchange as measured by the slope of the magnitude of effort (0 to 10 in the experiment) with respect to wage. If either of these measures changes as we change the parameters of the experiment, we will say we have observed a change in gift exchange.

²² Charness (2004) compares worker effort in response to wages determined exogenously (by random process or the experimenter) and wages chosen by a firm. Charness and Levine (2007) randomly manipulate wages so workers receive the same wage from firms with different intentions. Both studies find that firm intentions affect return effort. The experiment here keeps firm intentions constant to isolate the role of firm wealth and the efficiency of effort on gift exchange.

IV. Experimental Results

The experimental results reported here are from 88 participants, students from Boston-area colleges and universities, who participated in five sessions (n=20,20,18,16,14) at the Computer Lab for Experimental Research at Harvard Business School.

In investigating our two measures of gift exchange, we look first at the probability of providing positive effort in response to wage. Results 1 and 2 speak to how much more likely workers are to provide positive effort as wage increases.

Result 1 – As wages increase, workers are more likely to return positive effort when the firm is poor than when the firm is rich (more gift exchange when the firm is poor)

Result 2 – As wages increase, workers are more likely to return positive effort when effort is efficient than when effort is not efficient (more gift exchange when effort is efficient)

Table 2 presents regression analysis using the Linear Probability Model (i.e. OLS) that demonstrates results 1 and 2. Column 1 of Table 2 regresses a whether a worker returns positive effort (i.e. effort greater than 0, our binary measure of gift exchange) on wage, wage interacted with each of the two treatment variables, and round dummies. Column 2 also includes a dummy variable for each worker, capturing the average likelihood that a worker provides positive effort across all rounds of the experiment. In both regressions, the *Wage* coefficient is positive and significant, indicating that as wage increases, workers are more likely to return positive effort. The coefficient on *Wage* of about 5.5 indicates that as wage increases by one experimental unit workers are 5.5 percentage points more likely to return positive effort when the firm is poor and effort is efficient. The *Wage*Rich* coefficient is statistically significantly negative, which indicates that the effect of the increase in wage on the likelihood of positive effort is smaller in magnitude when the firm is rich. The coefficient on *Wage*Rich* of about -3 suggests that when the firm is rich, a one-unit increase in wage is only associated with an increase of 2.5 percentage points in the probability of returning positive effort (less than half the increase when the firm is poor). The magnitude of the slopes and the strength of these results do not change much when worker dummies are added in column 2.

As with the relative wealth of the firm, the efficiency of worker effort influences the likelihood a worker provides positive effort. The *Wage*Not Efficient* coefficient is statistically significantly negative, which indicates that the effect of the increase in wage on the likelihood of positive effort is smaller in magnitude when effort is not efficient (i.e. when effort is transferred to the firm without being scaled).

Table 2: Response of Effort to Wage

	Positive Worker Effort Linear Probability Model (0 or 100) (1)	Number of Units of Worker Effort (0 to 10) (2)	(3)	(4)
Wage	5.55 (0.366)***	5.45 (0.505)***	0.401 (0.037)***	0.392 (0.039)***
Wage*Rich	-2.94 (0.343)***	-2.98 (0.368)***	-0.284 (0.057)***	-0.286 (0.057)***
Wage*Not Efficient	-0.741 (0.195)**	-0.673 (0.179)**	-0.011 (0.036)	-0.004 (0.026)
Round Dummies	Yes	Yes	Yes	Yes
Worker Dummies	No	Yes	No	Yes
Observations	1056	1056	1056	1056
Subjects	44	44	44	44
Clusters	5	5	5	5
R-squared	0.23	0.40	0.27	0.45

Standard errors, clustered by session are in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%.

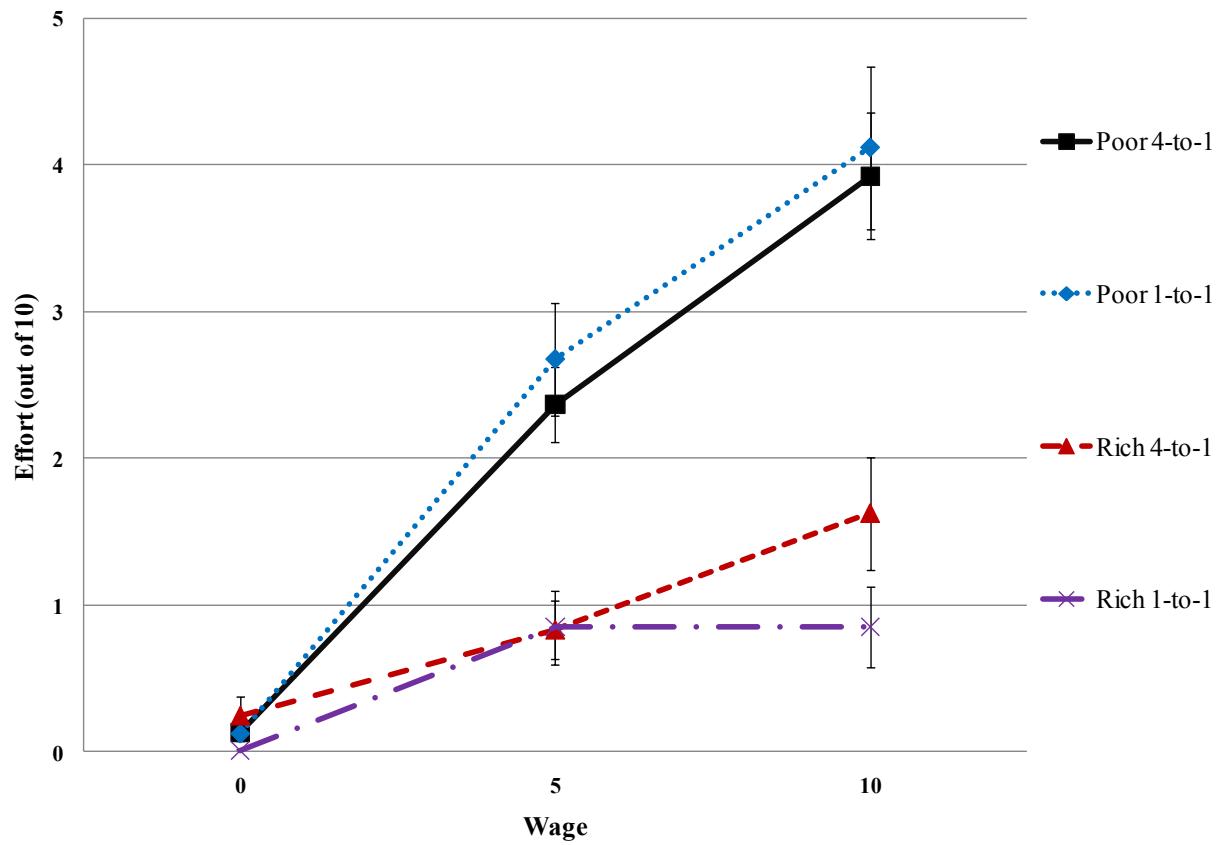
Independent Variables: *Wage* is the wage chosen by the firm (0, 5 or 10); *Rich* is a dummy=1 if the firm is rich; *Not Efficient* is a dummy=1 if the transfer rate is 1-to-1. *Round Dummies* are dummy variables for each round. *Worker Dummies* are dummy variables for each worker to account for heterogeneous generosity among subjects assigned to the role of worker.

Our second measure of gift exchange is the slope of effort in response to a higher wage. Figure 2 shows the mean worker effort by condition and wage, averaging over all observations of all workers. Regardless of the condition, a wage of 0 units by the firm is met with an average effort of nearly 0 units from workers. In addition, on average workers in all conditions return positive effort in response to a positive wage of 5 or 10 units. For the “Poor, 4-to-1” and “Poor,

1-to-1" lines we see a positive relationship between wage and effort, replicating previous laboratory gift exchange and trust experiments. In both of these conditions, average effort is increasing in wage. The slopes of the "Rich 4-to-1" and "Rich, 1-to-1" lines appear to be flatter, which suggests Result 3.

Result 3 – As wages increase, workers increase their effort more when the firm is poor than when the firm is rich (more gift exchange when the firm is poor)

Figure 2: Mean Effort by Condition in Experiment 1



Note: Standard errors for worker effort are displayed around each mean.

The regression analysis in columns 3 and 4 of Table 2 supports Result 3. Column 3 regresses worker effort on wage, wage interacted with the two treatment variables, and round dummies. Column 4 adds worker dummies to control for the average effort a worker provides

across all rounds of the experiment. The *Wage* coefficient is positive and significant, indicating that workers provide more effort as wage increases. However, *Wage*Rich* is negative and significant, demonstrating that worker effort is not as responsive to wage when firms are rich.

We do not see the same change in slope associated with the change in efficiency of worker effort, suggesting that while workers are less likely to return positive effort in response to increasing wages when effort is not efficient, those who do return positive effort return more effort on average.

V. Discussion

Previous experimental studies of gift exchange have found that results vary significantly across laboratory and field environments. In most laboratory experiments, workers provide more effort in response to higher wages; while in many field environments, workers do not respond with more output when they receive a positive wage shock. Perhaps as a consequence, gift exchange has been a central example in the debate about the relative merits of laboratory and field experiments.

This paper investigates two parameters that differ systematically between many previous laboratory and field experiments on gift exchange. In almost all previous laboratory gift exchange environments: (1) the firm is parameterized to be poor relative to the worker at the time of the effort provision and (2) worker effort is efficient. In many field experiments, however, worker effort benefits relatively wealthy employers or managers and worker effort does not seem particularly efficient. In our experiment, two measures of gift exchange diminish drastically when firms are made rich relative to workers. Less gift exchange is also observed when worker effort is not efficient. Each parameter may contribute to observed differences across previous experimental results on gift exchange.

It is worth emphasizing that weaker gift exchange in conditions when the firm is rich does not imply that workers will not engage in gift exchange with relatively rich employers. First, we still see a significant relationship between wage and effort when firms are made rich in the experiment. In addition, workers may respond differently to the wealth of employers in a labor market setting where roles and relative earnings are not randomly assigned. Workers in the labor market may know their employers took additional risks to start a company or that they earned the education or experience necessary to become a manager. Nevertheless, increasing the

wealth of the firm in isolation — that is, without confounding beliefs about the employer or the intentions associated with given wages — has a negative effect on the likelihood of observing gift exchange and on the magnitude of gift exchange observed.

While the efficiency of worker effort did not change the slope of effort with respect to wage, higher wages generated a larger increase in the probability of positive effort when effort was efficient. This result suggests that fewer workers may engage in gift exchange in settings when effort is not efficient, potentially making it harder for experimenters to observe gift exchange when worker effort is not efficient.

In using a laboratory experiment to reconcile results across laboratory and field settings, this paper highlights a particular way in which field experiments and laboratory experiments are complements in the production of knowledge. In the lab, an experimenter can create a simplified model of the world in which to investigate a treatment effect. If this simplified setting omits important features of other environments of interest, a treatment effect estimated in the lab might fail to generalize to those other environments. A particular field setting will be complex and will differ from a particular laboratory setting on many dimensions. If treatment effects differ between a lab and field setting, any number of differences may be responsible for the variation. Investigating the impact of each difference has the potential to heighten our understanding of the underlying mechanisms generating the treatment effects.²³ This investigation of which factors generate the difference in treatment effects can occur in the laboratory (as presented here) or in the field. Understanding the impact of each of these parameters can help illuminate the underlying mechanisms driving treatment effects and help researchers to make better predictions about whether an economic environment of interest will generate a treatment effect similar to the one estimated in the lab or to the one estimated in the field.

²³ See also Cohn, Fehr and Goette (2008), which argues that another parameter —the extent to which workers feel that initial wages are unfair — may lead to differential gift exchange results.

V. References

Akerlof, George. 1982. "Labor Contracts as Partial Gift-Exchange." *Quarterly Journal of Economics*, 97: 543-569.

Akerlof, George. 1984. "Gift Exchange and Efficiency-Wage Theory: Four Views." *American Economic Review*, 74: 79-83.

Akerlof, George and Janet Yellen. 1990. "The Fair Wage-Effort Hypothesis and Unemployment." *Quarterly Journal of Economics*, 105: 255-283.

Al-Ubaydli, Omar and John A. List. 2012. "On The Generalizability of Experimental Results in Economics." Fréchette, Guillaume and Andrew Schotter (editors) *The Methods of Modern Experimental Economics*, Oxford University Press.

Bellemare, Charles and Bruce Shearer. 2009. "Gift giving and worker productivity: Evidence from a firm-level experiment." *Games and Economic Behavior*, 67: 233-244.

Berg, Joyce, John Dickhaut and Kevin McCabe. 1995. "Trust, Reciprocity, and Social History." *Games and Economic Behavior*, 10: 122-142.

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

Camerer, Colin. 2012. "The promise and success of lab-field generalizability in experimental economics: A critical reply to Levitt and List." Fréchette, Guillaume and Andrew Schotter (editors) *The Methods of Modern Experimental Economics*, Oxford University Press.

Charness, Gary. 2000. "Responsibility and effort in an experimental labor market." *Journal of Economic Behavior & Organization*, 42: 375-384.

Charness, Gary. 2004. "Attribution and Reciprocity in an Experimental Labor Market." *Journal of Labor Economics*, 22: 665-688.

Charness, Gary, Guillaume Frechette and John Kagel. 2004. "How robust is laboratory gift exchange?" *Experimental Economics*, 7: 189-205.

Charness, Gary and David Levine. 2007. "Intention and Stochastic Outcomes: An Experimental Study." *The Economic Journal*, 117: 1051-1072.

Cohn, Alain, Ernst Fehr and Lorenz Goette. 2008. "Fairness and Effort: Evidence from a Field Experiment." Working Paper.

Englmaier, Florian and Stephen Leider. 2012. "Managerial Payoff and Gift Exchange in the Field." Working Paper.

Falk, Armin. "Gift-Exchange in the Field." *Econometrica*, 2007, 75(5): 1501-1511.

Falk, Armin and James Heckman. 2009. "Lab Experiments Are a Major Source of Knowledge in the Social Sciences." *Science*, 326: 535-538.

Fehr, Ernst, Simon Gachter and Georg Kirchsteiger. 1997. "Reciprocity as a Contract Enforcement Device: Experimental Evidence." *Econometrica*, 65: 833-860.

Fehr, Ernst, Lorenz Goette, and Christian Zehnder. 2009. "A Behavioral Account of the Labor Market: The Role of Fairness Concerns." *Annual Review of Economics*, 1: 355.

Fehr, Ernst, Erich Kirchler, Andreas Weichbold, and Simon Gachter. 1998. "When Social Forces Overpower Competition: Gift Exchange in Experimental Labor Markets." *Journal of Labor Economics*, 16: 324-351.

Fehr, Ernst, Georg Kirchsteiger and Arno Riedl. 1993. "Does Fairness Prevent Market Clearing? An Experimental Investigation." *Quarterly Journal of Economics*, 108: 437-459.

Fehr, Ernst and Klaus Schmidt. 1999. "A Theory of Fairness, Competition, and Cooperation." *Quarterly Journal of Economics*, 114: 817-868.

Fischbacher, Urs. 2007. "z-Tree: Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics*, 10: 171-178.

Gachter, Simon and Armin Falk. 2002. "Reputation and Reciprocity: Consequences for the Labour Relation" *Scandinavian Journal of Economics*, 104(1): 1-26.

Gneezy, Uri and John A. List. 2006. "Putting Behavioral Economics to Work: Field Evidence of Gift Exchange." *Econometrica*, 74: 1365-1384.

Hannan, R. Lynn, John H. Kagel and Donald V. Moser. 2002. "Partial Gift Exchange in an Experimental Labor Market: Impact of Subject Population Differences, Productivity Differences, and Effort Requests on Behavior." *Journal of Labor Economics*, 20: 923-951.

Harrison, Glenn W. and John A. List. 2004. "Field Experiments." *Journal of Economic Literature*, 42: 1009-1055.

Hennig-Schmidt, Heike, Bettina Rockenbach, and Abdolkarim Sadrieh. 2010. "In Search of Workers' Real Effort Reciprocity—A Field and a Laboratory Experiment." *Journal of the European Economic Association*, 8(4): 817-837.

Kagel, John H. 2009. "Laboratory Experiments: The Lab in Relationship to Field Experiments, Field Data and Economic Theory" Fréchette, Guillaume and Andrew Schotter (editors) *The Methods of Modern Experimental Economics*, Oxford University Press.

Kessler, Judd B. and Lise Vesterlund. 2012. "The external validity of laboratory experiments: Qualitative rather than quantitative effects" Fréchette, Guillaume and Andrew Schotter (editors) *The Methods of Modern Experimental Economics*, Oxford University Press.

Kube, Sebastian, Michel Andre Marechal and Clemens Puppe. 2011. "The Currency of Reciprocity: Gift Exchange in the Workplace." *American Economic Review*, 102(4): 1644-1662.

Levitt, Steven D. and John A. List. 2006. "What do laboratory experiments tell us about the real world?" Working Paper.

Levitt, Stephen D. and John A. List. 2007a. "What Do Laboratory Experiments Measuring Social Preferences Tell Us About the Real World?" *Journal of Economic Perspectives*, 21: 153-174.

Levitt, Stephen D. and John A. List. 2007b. "Viewpoint: On the generalizability of lab behaviour to the field." *Canadian Journal of Economics*, 40: 347-370.

Levitt, Steven D. and John A. List. 2008. "Economics. Homo economicus evolves." *Science* 319: 909-910.

List, John A. 2006. "The Behavioralist Meets the Market: Measuring Social Preferences and Reputation Effects in Actual Transactions." *Journal of Political Economy*, 114: 1-37.

List, John A. and David Reiley. 2008. "Field experiments." Steven N. Durlauf and Lawrence E. Blume (editors) *The New Palgrave Dictionary of Economics*, Palgrave Macmillan Publishing.

Roth, Alvin E. 2008. "What have we learned from market design?" *Economic Journal*, 118: 285-310.

Roth, Alvin E. 2012. "Is Experimental Economics Living Up to Its Promise?" Fréchette, Guillaume and Andrew Schotter (editors) *The Methods of Modern Experimental Economics*, Oxford University Press.

Slonom, Robert, Carmen Wang, Ellen Garbarino, and Danielle Merrett. 2012. "Opting-in: Participation Bias in Economic Experiments." Working paper.

Xiao, Erte and Cristina Bicchieri. 2010. "When Equality Trumps Reciprocity." *Journal of Economic Psychology*, 31(3): 456.

Appendix A: Experiment Instructions

PLEASE DO NOT TALK TO ANY OTHER PARTICIPANT FOR THE REMAINDER OF THE SESSION.

IF YOU HAVE A QUESTION AT ANY TIME, PLEASE RAISE YOUR HAND

You are a First Mover

WELCOME

In this experiment, you will play 24 rounds of a decision making game. The experiment involves First Movers and Second Movers. Your role is indicated at the top of this page. You will remain in this role for all 24 rounds.

You will be paid based on your performance in one randomly selected round. In the instructions below, each experimental unit is worth \$0.20. Money earned will be paid to you in cash at the end of the experiment.

EXPERIMENT STRUCTURE

In each round, you will play a decision making game via the computer with a randomly paired participant of the other type. You will be randomly paired with a new participant in each round, so that you never interact with the same participant more than once in a row.

Your identity, and the identity of all other participants, will remain anonymous.

ROUND INSTRUCTIONS

At the start of each round:

There will be 30 units in the First Mover's endowment.

There will be 35 units in the Second Mover's endowment.

Each round will have three stages.

Stage 1) The First Mover will have the option to transfer either 0 or 5 or 10 units from his or her endowment to the Second Mover.
Any units transferred will be multiplied by 4 and added to the Second Mover's endowment. So, if the First Mover transfers:

- 0 units, then 0 units will be added to the Second Mover's endowment
- 5 units, then 20 units will be added to the Second Mover's endowment
- 10 units, then 40 units will be added to the Second Mover's endowment

Additional Materials: Not for Publication

Stage 2) One of four random outcomes will occur. The four outcomes are listed below. Each has a probability of 25%, so all are equally likely.

- 60 units will be added to the First Mover's endowment and future transfers in this round will be multiplied by 1.
- 60 units will be added to the First Mover's endowment and future transfers in this round will be multiplied by 4.
- 0 units will be added to the First Mover's endowment and future transfers in this round will be multiplied by 1.
- 0 units will be added to the First Mover's endowment and future transfers in this round will be multiplied by 4.

Both the First Mover and the Second Mover will be informed of the random outcome.

Stage 3) The Second Mover will have the option to transfer any whole number of units from 0 to 10 from his or her endowment to the First Mover.

The number of units transferred will be subtracted from the Second Mover's endowment. The number of units transferred will then be multiplied by 1 or 4, as determined by the random outcome, and this number will be added to the First Mover's endowment.

This concludes a round.

At the end of each round, record the final endowment for that round on your payment sheet in the appropriate box.

You will then play the same game with a new participant. New transfers will be made and one of the four random outcomes will occur, independent of previous results.

You will never interact with the same participant more than once in a row.

Additional Materials: Not for Publication

EARNINGS

You will play 24 independent rounds over the course of the experiment. At the end of the experiment, you will be compensated based on the results of one randomly selected round.

The US\$ value of your earnings in the randomly selected round is equal to:

\$0.20 * (# of units in your final endowment at the end of the randomly selected round)

This amount will be added to your show up fee and paid to you in cash at the end of the experiment.

Your decisions will remain private information, and no other participants will know the decisions you made during the experiment or how much you have earned.