Reciprocity Under Risk *

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Abstract

Does reciprocity extend into environments with risk? Do agents reciprocate in risky environments based on the allocation *after* the resolution of risk (ex-post motive) or *in expectation* (ex-ante motive)? We experimentally study giving and reciprocity in a sequential environment with risk to further illuminate the relationship between an ex-ante and ex-post motive in social preferences. We find evidence of an "endowment effect": when subjects are endowed with the power to affect the ex-ante (ex-post) allocation, subjects care more about the ex-ante (ex-post) allocation. This suggests that ex-ante and ex-post reciprocal motives operate through separate psychological channels. In other words, a change in the ex-ante portion of the utility of an agent cannot be consistently compensated for with a corresponding change in the ex-post portion.

JEL Codes: D90, D81, J22
Keywords: ex-ante reciprocity, ex-post reciprocity, reciprocity, risk

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1 Introduction

Reciprocity is often subject to some risk. An employer may offer stock options to an employee who may then exert additional risky effort. Donors can give risky assets to a charitable organization who may then reciprocate by publishing donor's identities, resulting in an uncertain boost to the donor's public image. Parents can invest in college savings plans for their children, who in turn could invest in end-of-life care for their parents, but this may not necessarily improve the parents' quality of life. Physicians make decisions that can only affect their patients' *chances* at healing while patients can then recommend their physician to others. Consider a more stark example: high polluting countries can agree to reduce emissions for the chance to reduce the effects of climate change. In response, low polluting countries can reward countries who reduce emissions by reducing bilateral tariffs, but how this affects growth is subject to risk.

When choosing how to respond to a risky gift, what does the recipient care about? Do they care about the *final allocation* between themselves and the giver after the resolution of all risk? Or do they care about the *expected allocation*? Consider the employee who receives stock options as part of their compensation package. These stock options *could* be worth nothing by the time they are vested. They could also be worth a considerable amount of money, depending on the success of the company and, importantly, aggregate shocks to the economy. Does this employee then treat these stock options as a "gift" to be reciprocated in the same way as they would treat a gift of their equivalent cash value? Even if they do, if this employee were to respond by working harder, the returns to this increased effort for the firm would also be subject to risk. Knowing this, does the employee also view this risky effort in the same way as they would effort that helps the firm for sure?

In a standard gift-exchange game: a firm gives a wage to a employee, who then responds by exerting a costly effort that increases the firm's profit. The unique subgame perfect Nash equilibrium predicts that the employee exerts minimum effort for any wage level and firm offers the minimum wage if both firm and employee are pure money maximizers. However, numerous laboratory experiments has supported the gift exchange hypothesis of Akerlof (1982), postulating that workers reciprocate above-market wages with above-minimal effort (see e.g. Cooper and Kagel (2016) for a recent survey). Such a positive correlation between wages and efforts is often justified the employee's preference for equitable final outcome (see, e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). We modify the standard gift-exchange game of Owens and Kagel (2010) such that the returns to wage and effort are subject to risk. We call it the *Stochastic Gift-Exchange Game (SGE)*. In SGE, a gift increases the recipient's probability of winning a prize but reduces the gift giver's winning probability. In a sense, a gift in SGE can be thought of as a gift of a lottery ticket. Additionally, the expected payoffs in SGE coincide with the gift-exchange game experiment of Owens and Kagel (2010) so that the behaviors in SGE and the standard gift exchange game are comparable.

Our results yield that the gift exchange hypothesis of Akerlof (1982) is also valid where the returns to wage and effort are risky. Furthermore, we find that behavior in the standard gift exchange game is a good indicator of the behavior in SGE. In order to understand whether stochastic gifts and deterministic gifts are perceived the same, we experimentally investigate two additional variants of SGE: (i) In Wage-SGE, only the returns of wage is stochastic; (ii) In Effort-SGE, only the returns of effort is stochastic. Our results indicate that although similar wages are offered in all three treatments, significantly lower effort is exerted in Wage-SGE and Effort-SGE than that in SGE.

Our experiment is related to recent work that experimentally examines social preferences in the presence of risk (e.g. Bolton et al., 2005; Karni et al., 2008; Krawczyk and Le Lec, 2010; Exley, 2016; Trautmann and van de Kuilen, 2016; Cettolin et al., 2017; Andreoni et al., 2020; Koukoumelis et al., 2021). The most closely related work is that of Brock et al. (2013). They study variants of the Dictator Game where the Dictator can give some of her lottery tickets, and they show that behavioral models that exclude either one of ex-ante or ex-post concerns are incapable of admitting their results. In this study, we extend this result to sequential exchange and reciprocity (i.e. models of reciprocity must include both ex-ante and ex-post factors).[1] Our experimental results highlight the presence of an additional motive aside from ex ante and ex- post reciprocity motives: Individuals, who can increase the ex ante fairness, value the ex-ante fairness more than the ex-post fairness; and the ones, who can increase the ex- post fairness, value the ex-post fairness more than the ex-ante fairness. Such an concept of endowment of fairness is also novel in this literature.

The rest of the paper is organized as follows. In Section 2 we present the experimental design. Section 3 presents our findings regarding the presence of ex-ante reciprocity and how risk augments reciprocity. We discuss the theoretical implications of our results in Section 4.

2 Experimental design and procedures

We ran 16 sessions of the experiment at the Experimental Economics Laboratory at the University of Maryland, College Park. One of the three treatments was administered during each of the sessions. In each session, 16 subjects participated, for a total of 256 subjects. No subject participated more than one session. Subjects earned an average of $22.25 USD, inclusive of a $7 show-up fee. Due to the stochastic nature of payoffs, a function of our experimental design, there was considerable heterogeneity in cash earnings: the minimum payoff was $8 USD; the maximum payoff was $45 USD; and the standard deviation was $8.66. Sessions lasted approximately 90 minutes. The experiment was programmed in zTree (Fischbacher, 2007).

In each session, subjects were divided into two groups: Firms and Employees.[2] Roles were assigned to subjects in the first period and remained fixed for the entire experiment.

[1] Others have studied social preferences under risk in related domains. For example, Houser et al. (2010) investigate the relationship between trust and risk preferences and in a meta-analysis of trust games and Johnson and Mislin (2011) find that behavior in a trust game depends on whether experimenters use a random incentive scheme. Rubin and Sheremeta (2016) show that the reciprocity motive is based on the outcome rather than intentions. In each of these cases, risk is exogenously determined and not a function of the strategy of the agents involved.

[2] The terminology "Person 1" and "Person 2" were employed in our instructions for the roles of "Firm" and "Employee," respectively.

There were 8 rounds with perfect stranger matching, i.e. at each round, a firm was matched with a different employee. In each session, subject play one of the three treatments that will be explained below. Instructions for the SGE treatment are included in Appendix A. At the end of each round, both the Firm and Employee are given feedback regarding i) the chosen Wage, ii) the chosen Effort, iii) whether either the Firm or Employee won the prize, and iv) whether they themselves won the prize. Subjects were paid for one of the eight rounds, chosen at random with equal probability at the end of the experiment.

Stochastic Gift Exchange (SGE)

Before explaining SGE, recall the baseline gift exchange game used in Owens and Kagel (2010)[3]: There are 1000 ECU in total. Each player is endowed with 100 ECU. There are two stages. In Stage One, the Firm chooses how many of their 100 ECU they would like to transfer to the Employee. The Employee is then given five times that number of ECU. In Stage Two, the Employee chose how many of 100 ECU they would like to transfer back to the Firm. At the end of Stage Two, the number of ECU held by player i is as follows:

$$\pi_i(\tau_i^{ecu}, \tau_j^{ecu}) = 100 - \tau_i^{ecu} + 5\tau_j^{ecu} \tag{1}$$

where τ_i^{ecu} refers to the chosen transfer of ECU from player i to player j. At the end of this task, ECU was converted to USD at a pre-specified rate. Say 50 ECU is equivalent to 1 USD. Since the giving is deterministic in the standard gift exchange game, we will refer this game as *Deterministic Gift Exchange (DGE)*.

SGE is also a two stage game. There are 1000 tokens in total. In Stage One, Firm starts with 100 "tokens" and can choose how many they would like to give to the Employee. The Employee then receives five times that number of tokens. In Stage Two, the Employee is given 100 additional tokens and can choose how many (out of 100) they would like to give to the Firm. The Firm then receives five times the number of tokens given to them by the

[3] Filiz-Ozbay et al. (2018) also used the same parameters in an experiment, participated by University of Maryland undergraduates.

Employee. Each token held by the Firm or Employee at the end of Stage Two represents a $\frac{1}{1000}$ chance at a single prize of \$20. The prize can be won by the Firm, the Employee, or by neither; there is no event wherein *both* the Firm and Employee win a monetary prize. At the end of Stage Two, the expected payoff (in USD) for each player $i \in \{Firm, Employee\}$ is as follows:

$$\pi_i(\tau_i^t, \tau_j^t) = 20 \cdot \frac{100 - \tau_i^t + 5\tau_j^t}{1000} \tag{2}$$

where τ_i^t refers to the chosen transfer of tokens from player i to player j.

Remarks:

1. The expected payoff of giving (or receiving) 1 token in SGE is equivalent to giving (or receiving) 1 ECU in DGE.

2. Provided that each agents give the same number of tokens to each other it will be ex-ante fair. Even not giving any token is also ex-ante fair.

3. The initial endowments of 100 tokens each implies an ex-ante endowment of a 10% chance of winning the prize, with the remaining 80% held by the experimenter. If each player transfer all of the 100 tokens, each player will have a 50% chance of winning the prize, i.e. transferring the entirety of both endowments from one player to the other may a pair ensure that the prize would be won by either the Firm or Employee. Hence, transferring all of the tokens is an ex-ante fair and the efficient allocation.

4. Transfer from one agent to another always *increases* the probability of an ex-post unfair allocation of \$20 to one agent and \$0 to the other. Furthermore, under this framework, the set of feasible ex-post allocations is *always* $\{(\$20, \$0), (\$0, \$20), (\$0, \$0)\}$ with transfers affecting the probabilities of each occurring. In this way, transfers can only affect ex-ante comparisons between players and a given transfer from one player to another can never affect the ex-post allocation *for sure*.

SGE Variants

In order to investigate whether the source of risk matters, we implemented two additional treatments: a Wage-SGE and an Effort-SGE. Recall that in SGE, both the Firm and Employee were endowed with 100 tokens; both players were endowed with the same risky good. In the two variants of SGE that we conducted, we instead endowed the Firm and Employee with *different* goods, with one receiving tokens and the other receiving Experimental Currency Units (ECU). ECU were converted to cash directly at a rate of $1 USD to 50 ECU. Tokens each gave a 0.01 percent chance at a mutually exclusive $20 prize, just as in SGE. Table 1 below describes these endowments and the expected payoffs of each player conditional on transfers τ_j^i, denominated in USD.

Table 1: Wage- and Effort-SGE Endowments and Payoffs

	Endowment		Expected Payoffs (in USD)	
	Firm	Employee	Firm	Employee
Wage-SGE	100 tokens	100 ECU	$20 \cdot \frac{100-\tau^t_{Firm}}{1000} + \frac{5\tau^{ecu}_{Employee}}{50}$	$20 \cdot \frac{5\tau^t_{Firm}}{1000} + \frac{100-\tau^{ecu}_{Employee}}{50}$
Effort-SGE	100 ECU	100 tokens	$20 \cdot \frac{5\tau^t_{Employee}}{1000} + \frac{100-\tau^{ecu}_{Firm}}{50}$	$20 \cdot \frac{100-\tau^t_{Employee}}{1000} + \frac{5\tau^{ecu}_{Firm}}{50}$

These asymmetric endowments contribute to asymmetric abilities to affect the ex-ante and ex-post allocations between the two players. In Wage-SGE, the Firm could affect only the ex-ante allocation of the two players by sending a wage of risky tokens. The Employee could affect both the ex-post allocation and, trivially, the ex-ante allocation, by responding to this wage with effort denominated in ECU. The reverse is true in Effort-SGE. At the end of this Task, ECU was converted to USD at a rate of 50 ECU to $1 USD. Note that this exchange rate implies that if a pair chose strategy profiles in SGE and Wage-SGE, for instance, such that $(\tau^t_{Firm}, \tau^t_{Employee}) = (\tau^t_{Firm}, \tau^{ecu}_{Employee})$, it would lead to equal expected monetary payoffs across SGE and Wage-SGE. The analogous case is true for Effort-SGE.

In each treatment, after completing the 8 rounds, in the second part of the experiment, participants made several additional choices as controls. We collected choices in a one-shot deterministic gift exchange game based on the parameters of Owens and Kagel (2010), a Holt and Laury (2002) risk elicitation task, and a variant on the Holt and Laury (2002) task meant to measure the participants' "other-regarding" risk preferences. Additionally, each subject completed a short demographic questionnaire. Subjects were asked about their age, gender, self-reported SAT and ACT scores, and GPA.

3 Results

From Figure 1 below, we can see both positive wages offered by the Firm in SGE and positive Effort in response. There is also little evidence of learning: no discernible trend in Wage or Effort by Period can be detected.

Figure 1: Mean Wage and Effort by Period: SGE

Provided Effort levels are also sensitive to the Wage offered in SGE. Figure 2 shows an overall positive relationship between offered Wage and Effort in response in SGE: average

Effort is roughly 10 tokens in response to Wages offered between 0 and 19 tokens, which increases to roughly 58 tokens in response to offered Wages between 80 and 100 tokens. This effect remains when controlling for subject-level heterogeneity in the tobit[4] regression specifications given in Table 2: the coefficient on Wage is positive and significant in each model specification where the dependent variable is Effort. Furthermore, the coefficient on Wage is significantly greater than 0.2. Notice that a one unit increase in the Wage would be profitable if it resulted in at least a 0.2 unit increase in the Effort response due to how transfers are magnified by a factor of five when transferred from one agent to the other. Thus, a coefficient on Wage significantly greater than 0.2 indicates that positive Wages were profitable on average.

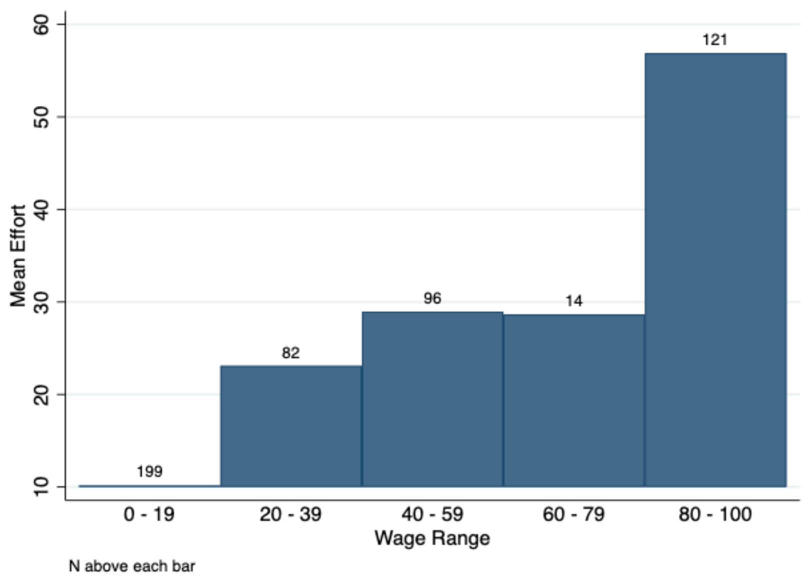

Figure 2: Mean Effort by Wage: SGE

Taken together, the analysis above leads us to our first result:

Result 1 *Ex-ante reciprocity exists in SGE:*

- *Mean Wages and Effort are both positive in SGE*

[4] All regressions in this paper use a tobit or censored regression specification due to the inherent bounds of the strategy space for all subjects. Subjects can only choose Wage and Effort as low as 0 and as high as 100, so our analysis accounts for these limitations with tobit lower and upper limits of 0 and 100, respectively.

Table 2: Effort Sensitivity to Wage: SGE

	(1) Effort	(2) Effort
Wage	0.676***	0.674***
	(0.0819)	(0.0821)
Period	-1.287	-1.295
	(0.789)	(0.789)
GPA		-5.378
		(5.087)
Female		3.235
		(7.609)
Observations	512	512

Standard errors in parentheses
Tobit regressions with lower limit equal to 0 and upper limit equal to 100
Tobit estimated sigma output not included
Robust standard errors clustered at the subject level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- *Effort provided by Employees is sensitive to the size of the Wage in SGE (positive coefficient on Wage in tobit regressions)*

- *Positive Wages are profitable on average (coefficient on Wage is strictly greater than 0.2 in tobit regressions)*

Figure 3 displays the average Wage and Effort by period across all treatments and includes the within-subject mean Wage and Effort amounts in the deterministic gift exchange (DGE) for reference. We can see from it that, while Wages are lower in any SGE variant relative to the DGE control, there is little difference among them (i.e. Wages are generally equal across SGE, Wage-SGE, and Effort-SGE). However, Effort levels are generally lower in Effort-SGE than in SGE and lower still in Wage-SGE across all eight periods.

This effect largely remains when we control for individual-level heterogeneity, risk preferences, learning, and the size of the Wage offered in Table 4. Table 4 reports the results of tobit regressions comparing the Wages and Effort of our relevant treatments. The base case in each model is SGE. Models 1 and 4 with Wage as the independent variable control for the within-subject Wage given in DGE ("Wage in DGE"). In models 2 and 5 with Effort as the dependent variable, we control for the within-subject Effort exerted in DGE ("Effort in DGE"). For robustness, we also conduct alternative specifications that control for the Effort *rate* in DGE ("Effort / Wage in DGE") in models 3 and 6 - though this approach results in a number of observations dropped from the analysis because of zero Wage offers in DGE. Finally, models 4 - 6 control for the number of Safe options chosen in the risk questions and in the risk questions for others as controls for risk preferences: we find that these are only significant in model 6. In all models the row labelled "Dem Controls" indicates whether GPA, Period, and Female are included in the regression, but coefficient outputs are not.

Table 3: Wages and Effort

		Mean	Std. Error	Median	Observations
Wage	SGE	40.42	(1.595)	30	512
	Wage-SGE	42.59	(1.688)	25	256
	Effort-SGE	41.68	(1.699)	25	256
	DGE Control	54.773	(1.684)	50	128
Effort	SGE	27.305	(1.474)	10	512
	Wage-SGE	18.84	(1.209)	5	256
	Effort-SGE	23.805	(1.459)	8	256
	DGE Control	34.156	(1.699)	20	128

Note: Minimum = 0 and Maximum = 100 for all of the above.

Table 4: Treatment Effects

	(1) Wage	(2) Effort	(3) Effort	(4) Wage	(5) Effort	(6) Effort
Wage SGE	-4.625	-16.36***	-13.86**	-3.233	-21.18***	-18.03***
	(9.000)	(6.017)	(5.683)	(9.324)	(7.332)	(6.971)
Effort SGE	-4.881	-12.97*	-12.00*	-1.152	-12.93*	-14.18*
	(8.287)	(6.879)	(7.036)	(9.217)	(7.586)	(7.718)
Wage in DGE	0.566***			0.578***		
	(0.100)			(0.104)		
Wage		0.577***	0.633***		0.605***	0.661***
		(0.0561)	(0.0572)		(0.0628)	(0.0646)
Effort in DGE		0.407***			0.417***	
		(0.0810)			(0.0908)	
Effort / Wage in DGE			17.57***			17.71***
			(4.760)			(4.920)
Risk				2.138	0.433	-3.238*
				(2.443)	(1.946)	(1.694)
Other's Risk				-0.639	-0.460	2.917**
				(2.059)	(1.589)	(1.234)
Constant	-8.686	7.591	3.691	-16.36	8.142	-1.595
	(19.70)	(15.13)	(16.45)	(25.68)	(19.86)	(18.62)
Observations	1024	1024	944	888	880	808
Dem Controls	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Base case is SGE

Tobit regressions with lower limit equal to 0 and upper limit equal to 100

Tobit estimated sigma not included

Robust standard errors; clustered at the subject level

Some subjects dropped from Models 3 and 4 because of multiple switches in Holt-Laury tasks

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

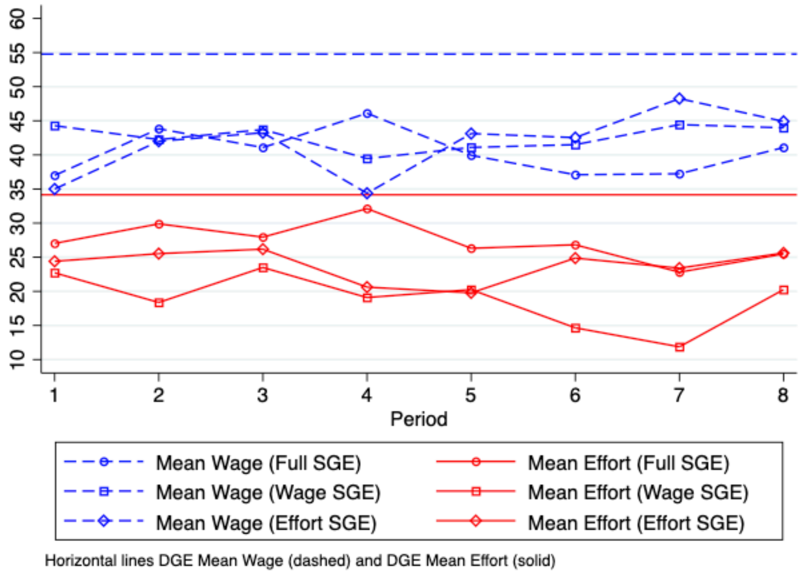

Figure 3: Mean Wage and Effort by Period, All Treatments

From Table 3, we can see that Wage levels are roughly the same across all treatments with some risk, ranging from 41.68 on average in Effort-SGE to 42.59 on average in Wage-SGE, with SGE in the middle at 40.42. None of this variation is statistically significant (Mann-Whitney $p > 0.10$ in each case). There is, however, significant variation in mean Effort across treatments with risk. Effort is lower on average in both Wage-SGE and Effort-SGE than in SGE (Mann-Whitney $p < 0.01$ for Wage-SGE vs SGE; Mann-Whitney $p < 0.05$ for Effort-SGE vs SGE). However, effort is not significantly different between Wage-SGE and Effort-SGE (Mann-Whitney $p > 0.10$). These differences in Effort levels are also present in the entirety of the Effort distribution. Figures 4 and 5 display CDFs for Effort between SGE and Wage-SGE and Effort-SGE, respectively. Both are significantly different in the direction of lower overall effort in both Effort-SGE and Wage-SGE. Taking these results together with the results of tobit regresions comparing treatments in Table 4, we say that Effort is lower in Wage-SGE and Effort-SGE than in SGE.

Taken together, the analysis above gives us our next results:

Result 2 *The source of risk does not matter for Wages:*

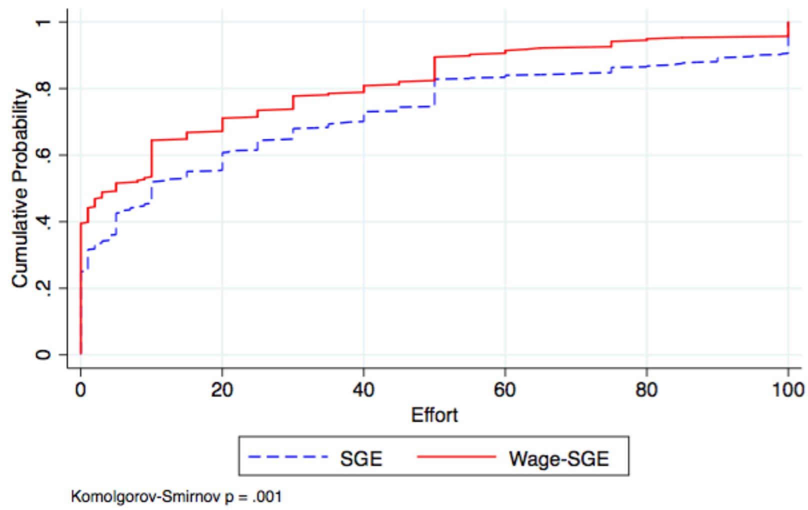

Figure 4: Effort CDF: Wage-SGE and SGE

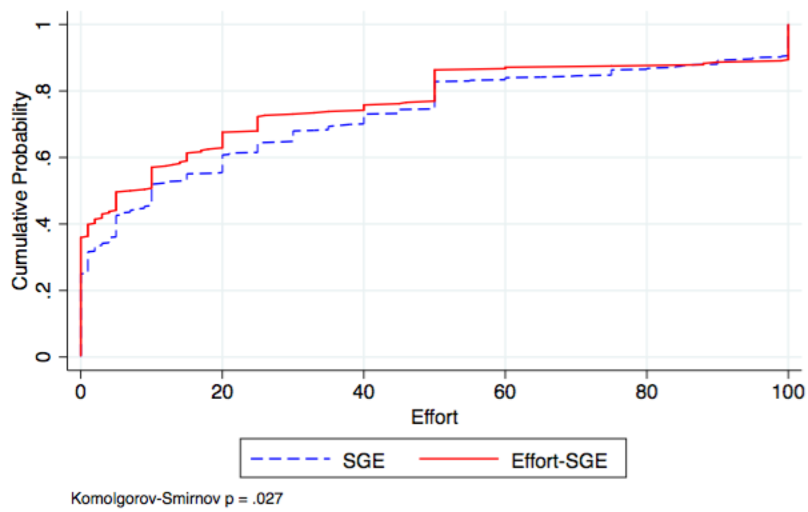

Figure 5: Effort CDF: Effort-SGE and SGE

- *Wages are equal across SGE, Wage-SGE, and Effort-SGE*

Result 3 *Asymmetries in risk matter for reciprocal Effort:*

- *Effort levels are lower in the presence of asymmetric endowments of fairness (i.e. in*

Wage-SGE and Effort-SGE)

4 Concluding Comments

We experimentally investigate the Stochastic Gift Exchange game to show that i) ex-ante reciprocity exists, ii) Wages are lower with any element of risk, and iii) ex-ante and ex-post reciprocal concerns are not directly substitutable. These results, in particular our results on the effects of the asymmetry of endowments on Effort provision, could prove quite useful in applications where a principal is choosing a compensation scheme for some agent. For example, conditional on Effort being stochastic, a comparison of our results from SGE and Effort-SGE might suggest that the principal should choose a risky Wage, since Effort is higher when the endowments are the same. Further study of these and related issues would be necessary to document to what extent our results extend to environments where the principal has a choice between risky and deterministic gifts.

Since in the Wage-SGE and Effort-SGE treatments that Employee subjects prefer to keep more of their endowment when they are endowed with ECU, conditional on the size of the Wage offered. For example, in Wage-SGE when a subject is given tokens but can only respond with ECU, they give less than when they can respond with tokens in kind. The analogous is true for Effort-SGE. What we've identified is a form of the endowment effect wherein subjects prefer to keep what they already own. However, notice that tokens and ECU are effectively the same good: both tokens and ECU represent lotteries over monetary prizes, with ECU merely being degenerate versions of tokens with the same expected value. What is different between a token and an ECU is that the former can affect ex-ante allocations only, while the latter can affect both the expected payment and the ex-post allocation with probability one. In our view, we are thus documenting an endowment effect with regards to ex-ante vs ex-post *reciprocity motives* rather than strict *goods*. Consider a gift of 1 token from Firm to Employee in Wage-SGE. The Firm has increased the expected payoff of the Employee, but has not affected the set of feasible ex-post allocations. When the Employee can only respond by using ECU, they are forced to compensate *ex-ante* giving with *ex-post* giving. The reverse is true in Effort-SGE. Because we see that Effort levels in both Wage-SGE and Effort-SGE are lower than SGE, but not Wages, we argue that Employee subjects are biased toward their own endowments. Such behavior is not consistent with current interpretations of the interplay between ex-ante and ex-post motives in analogous static environments (i.e., in the literature on fairness with risk).[5]

Based on these results, we revisit the Expected Inequality Aversion (EIA) model of Saito (2013). In this model, decision makers maximize a value function that is a weighted sum of *ex-ante* fairness motives and *ex-post* fairness motives. This value function is given by the following:

$$V(p) = \delta U[E_p(x)] + (1-\delta)E_p[U(x)] \tag{3}$$

where $E_p(\cdot)$ is the expected value according to some lottery p, $U(\cdot)$ is an inequality aversion utility function of Fehr and Schmidt (1999), and $\delta \in [0,1]$ is a measure of the strength of the ex-ante fairness motive of the decision maker. An extension into sequential settings might substitute the Fehr and Schmidt (1999) $U(x)$ in the above with a utility function explicitly created to capture reciprocity (e.g. Cox et al. (2007)). Ex-ante motives are described by a preference for equality *in expectation*, given by $U[E_p(x)]$ above. Ex-post motives are described by the standard inequality averse utility function extended to the expected utility case, given by $E_p[U(x)]$. Any model that combines ex-ante and ex-post motives in this way will imply that actions taken taken to affect the ex-ante portion of the decision maker's value function can be directly compensated with commensurate actions to affect the ex-post portion: for any change Δ in $U[E_p(x)]$, a change of $\Delta' = \frac{\delta}{(1-\delta)}\Delta$ in $E_p[U(x)]$ will have the same effect on $V(p)$.

[5]We would like to note that this behavior is also not consistent with subjects simply viewing tokens as less valuable than ECUs of the same expected value, perhaps due to risk aversion left unmeasured by the Holt and Laury (2002) tasks. If this were true, we may expect that Effort is lower in Wage-SGE than in SGE, since Employees have to respond with higher-valued ECU in response to lower-valued tokens. But, we would then expect Effort to be *higher* in Effort-SGE than in SGE, conditional on the size of the gift. Figure 5 shows that this is clearly not the case.

Our results yield that while Wages remain constant across SGE, Wage-SGE, and Effort-SGE, Effort levels are systematically lower in the latter two. This cannot be explained by any model that relies on ex-ante and ex-post motives being separable. Lower Effort in Wage-SGE relative to SGE can only mean that Employee subjects believe that fewer ECU are required to compensate for a given gift of tokens (i.e. Wages in SGE and Wage-SGE). This would imply a particular rate of exchange between ex-ante and ex-post motives. However, since Wages are also equal across SGE and Effort-SGE, this rate of exchange should then imply *higher* Effort in Effort-SGE, since the Wage now affects ex-post motives in the form of ECU. This is not the case in our data, where we find lower Effort levels in Effort-SGE relative to SGE. The result is a form of the endowment effect, not on the good that makes up the endowment, but on which motive, ex-ante or ex-post, the endowment is capable of affecting. When endowed with the ability to affect only the ex-ante allocation, as in SGE and Effort-SGE, Employee subjects seem to care more about giving in expectation. When endowed with the ability to affect the ex-post allocation, as in Wage-SGE, they seem to care more about giving in terms of the final allocation.

A simple modification to EIA might correct this insufficiency. Consider the following value function:

$$\hat{V}(p) = \mu\hat{U}[E_p(x)] + \eta E_p[\hat{U}(x)] \tag{4}$$

where E_p is as above, $\hat{U}(x)$ is the utility function of Cox et al. (2007), and $\mu, \eta \in [0, 1]$ such that $\mu + \eta = 1$ and $\mu > \eta$ iff w (endowment of the decision-maker) is a non-degenerate lottery.

In contrast to EIA, the relative preference for ex-ante and ex-post reciprocity contained in $\hat{V}$ is now determined by two parameters. μ describes the strength of the the ex-ante preference and η describes the strength of the ex-post preference. Here, preferences are dependent on the endowment of fairness in that the form of the endowment w (i.e. whether w is a degenerate lottery or not) determines the relative size of μ and η. Such preferences would then be consistent with the endowment of fairness that we observe in our laboratory results. Although other-regarding preferences have been widely investigated experimentally (see Cooper and Kagel (2016) for an extensive survey), how individuals perception of fairness is effected by their endowment of fairness is new. It is our view that such an approach merits dedicated future research.

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Appendix A Instructions– [SGE]

Thank you for participating in the experiment today. At this time, please be sure that your cell phone is turned off. At no point during this experiment are you allowed to use your cell phone or any other electronic device. You are also not permitted to speak with any other participant in the room. Failure to follow these rules may result in your expulsion from the experiment and forfeiture of any cash earnings you may have otherwise received.

The experiment today is broken into 2 parts. Part 2 is divided into several sub-parts. Your earnings for these parts are independent. These are the instructions for Part 1.

At the end of the experiment, you will receive the sum of the earnings from all parts of this experiment and the $7.00 show up fee. You will receive this amount privately in cash before you leave the lab today.

Part 1

This is an experiment on decision-making. You will be assigned one of two roles: Person 1 and Person 2. Your role will remain fixed throughout the experiment. As there are 16 participants in the lab today, 8 of you will be assigned to be Person 1 and 8 of you will be assigned to be Person 2, with decisions in the experiment being made in pairs.

In each of 8 periods, you will be matched with another participant of the opposite role. This matching will occur so that you will never participate with the same person more than once. You will never learn the identity of the other participant with whom you are matched.

The Decision Environment

In each period, decisions are made in two stages: Stage 1 in which Person 1 makes a decision and Stage 2 in which Person 2 makes a decision. In each period, each Person starts out with 100 tokens. These tokens are virtual and do not have any monetary value directly. You will decide whether to give any of your tokens to the person with whom you are matched and your earnings will depend on the number of tokens you each hold at the end of Stage 2.

Stage 1: In Stage 1, only Person 1 will make a decision. Person 1 will be told how many tokens he/she currently holds (100) and will be asked how many tokens he/she would like to give to his/her Person 2. Person 1 may give anywhere from 0 to 100 tokens to Person 2.

Stage 2: In Stage 2, only Person 2 will make a decision. Person 2 will be told i) how many tokens Person 1 has given them, ii) how many tokens this transfer has become (explained in detail below), and iii) how many new tokens he/she has (100) to give to Person 1. Person 2 will also be asked how many of his/her tokens he/she would like to give to Person 1. Person 2 may give anywhere from 0 to 100 tokens to Person 1.

On Tokens: When tokens are given from one Person to another, they are multiplied by 5. That is, if Person 1 gives X tokens to Person 2, Person 2 will receive 5X tokens. If Person 2 then gives Y tokens to Person 1, Person 1 will receive 5Y tokens. At the end of Stage 2, the number of total tokens held by each Person in the pair will be as follows:

Person 1's Tokens = 100 - tokens given to Person 2 + 5 (tokens given by Person 2)

Person 2's Tokens = 100 - tokens given to Person 1 + 5 (tokens given by Person 1)

Earnings

Earnings in each period are determined by a lottery that depends on the number of tokens held by each Person in the pair. The prize for winning this lottery is $20. There is only one prize to be won in this lottery, so that there are only three potential outcomes: 1) Person 1 wins the lottery, 2) Person 2 wins the lottery, and 3) neither Person 1 nor Person 2 wins the lottery.

The lottery works as follows: out of 1000 tokens (in each pair of participants), one token is the "winning token." Whoever holds this winning token wins the prize of $20. Thus, the more tokens you have at the end of Stage 2, the more likely you are to win the lottery.

At the end of Stage 2 if Person 1 holds the winning token, Person 1 wins the prize of $20. If Person 2 holds the winning token, Person 2 wins the prize of $20. If neither holds the winning token, no one wins the prize of $20.

Though you will make decisions in each of 8 periods, only 1 period will count toward your earnings for this part of the experiment. This period will be chosen at random at the end of the experiment. When making decisions, you will not know which period will be chosen.

Summary

The following is a summary of how the experiment works in each round:

- You are assigned a role as either Person 1 or Person 2 (this is the same for all rounds)
- There are 1000 tokens, one of which is the "winning token". Whoever holds this token at the end of the round wins $20 in that round
- Stage 1: Person 1 is given 100 tokens and can give any amount from 0 to 100 to Person 2. Person 2 then receives 5 times this number of tokens
- Stage 2: Person 2 receives 5 times the number of tokens given by Person 1 and 100 additional tokens. Person 2 can give any amount from 0 to 100 to Person 1. Person 1 will then receive 5 times this number of tokens
- The lottery is then resolved - whoever owns the "winning token" is wins the prize of $20 for that period. You are told a) whether anyone in your group won the lottery and b) whether you won the lottery.
- At the end of 8 periods, one is selected at random and you will be paid for that period.