

Chapter IV

Results

4.1 Findings about Acceptance

An important empirical finding is that responders violate consequentialism. In the Ultimatum Game the proposer brings forward the unique offer either to gain more or reduce the rejection rate; however the more critical role is responder. Throughout the study of reciprocity that we can understand human being's behavior is multivariate and complex thus even the proposer tried to avoid the risk of rejection, sometimes their offers were still rejected.

There are some interesting subjects in our survey studying:

Special case 1: a boy found that it's much funnier for accessing power rather than get the experimental money, so he rejected a "50 – 50" offer.

Special case 2: a boy rejected the "50 – 50" offer, and the reason was "I'm the one who's going to decide the direction of deal; I deserve more than 50 to make me stay satisfied".

Special case 3: a boy accepted the offer of 5 Baht only, without even think about it. The reason is "as long as my friends are happy, I'm happier."

So there are always some random shocks to the game without rationality, and these un-rational behaviors are not within any field of study that we may be able to

learn. Hence whatever the strategies that the proposers may be using to avoid rejections, there are still some aspects will direct the game to different outcomes.

The frequency of acceptance does not only change with the actual outcome, but also depends on the context of other available alternatives, such as reducing inequality and envy which also fits the disappointment aversion quite well. In case of any responder who is always looking for higher pay-off and/or lower inequality, he is always going to reject the fair offers.

Findings also show violations of several rationality principles:

- Pareto Dominance: Only select un-dominated strategies.
- Consequentialism: Choice should not depend on other available alternatives.
- Individualism: Preference should depend on the own assets only.

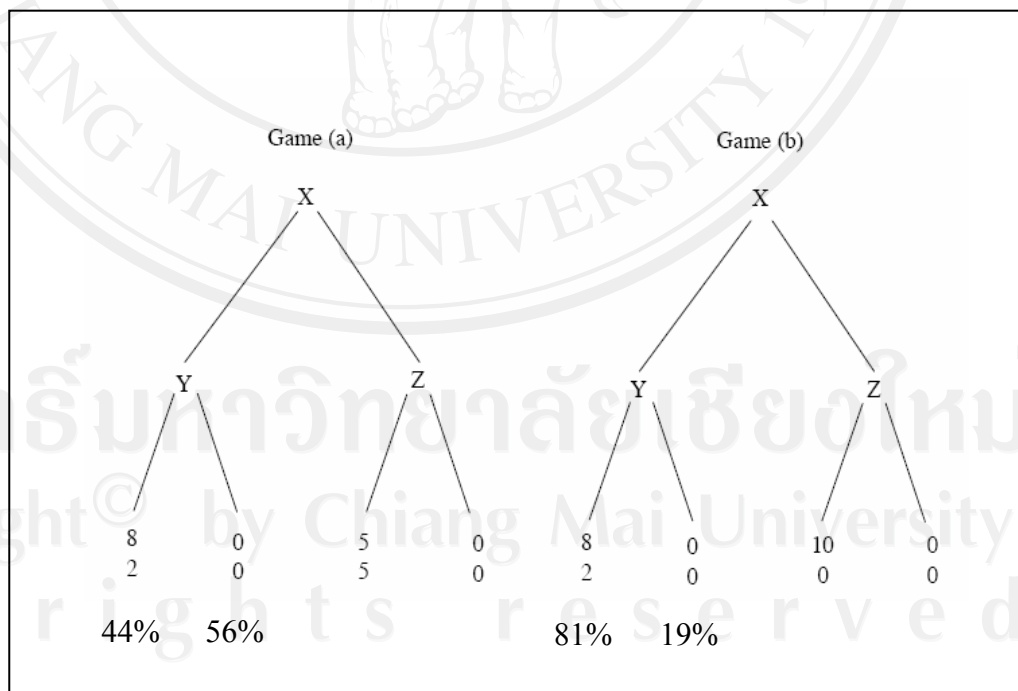


Figure 4-1 Fair or Unfair choices

Consider the two forms of the game depicted in figure 4-1. The same offer of 80/20 is rejected at a higher rate of 44.4% if the proposer could have chosen an equitable outcome (left figure), but rejected at a lower higher rate of 19% if the 80/20 offer is the most equitable alternative the responder could have chosen (right figure) [Falk et al. 1999]. Thus any model by preferences which depend only on the outcome, such as Schmidt-Fehr preferences of inequality aversion [Fehr and Schmidt 1999], falls short of explaining this relation.

Acceptance rates of 80/20 offer differ in the 50/50 and the 100/0 context at 95% confidence level. When 80/20 is the fairest offer, stated envy and perceived fairness are highly positively correlated ($\rho=0.83$ at 95%).

One's motivations for latter decisions are significantly highly related to other person's being as well as one-self's own outcome. These kinds of motivation are in associate with the predicted concept of envy, deserve and also reciprocity. If in case that losing can reduce the inequality between one person and his opponent than people are always choosing to lose.

As far as the sample size is 100, within the four different aspects that we had analyzed; only the WTA (stated willingness to accept) is in accordance with stylized facts, and yet the actual behavior is much too friendly. The WTA is the best fit for the theoretical prediction is actually quite reasonable.

It is clear to see that the WTA is quite according to the theoretical predicted data with only very few differentia in Figure 4-2. So far our experiment can be quite precise and promising.

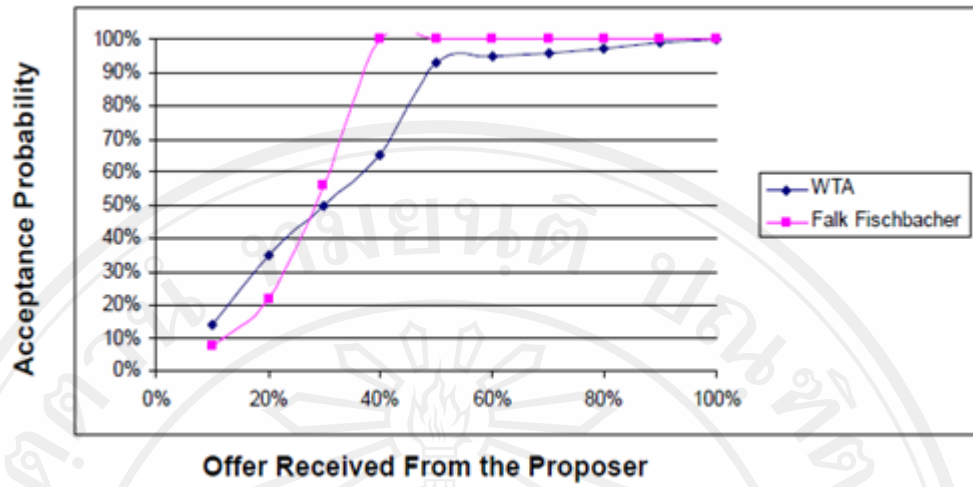


Figure 4-2 WTA vs. Theoretical expectation

In Figure 4-3, it is clear to see that aside from the WTA, the responders somehow showed a discrepancy between no money involved stated acceptance levels and money involved actual acceptance levels. While the stated willingness to accept is well in accordance with stylized facts and the psychological model of Falk and Fischbacher, the actual responder's behavior turns out much too friendly.

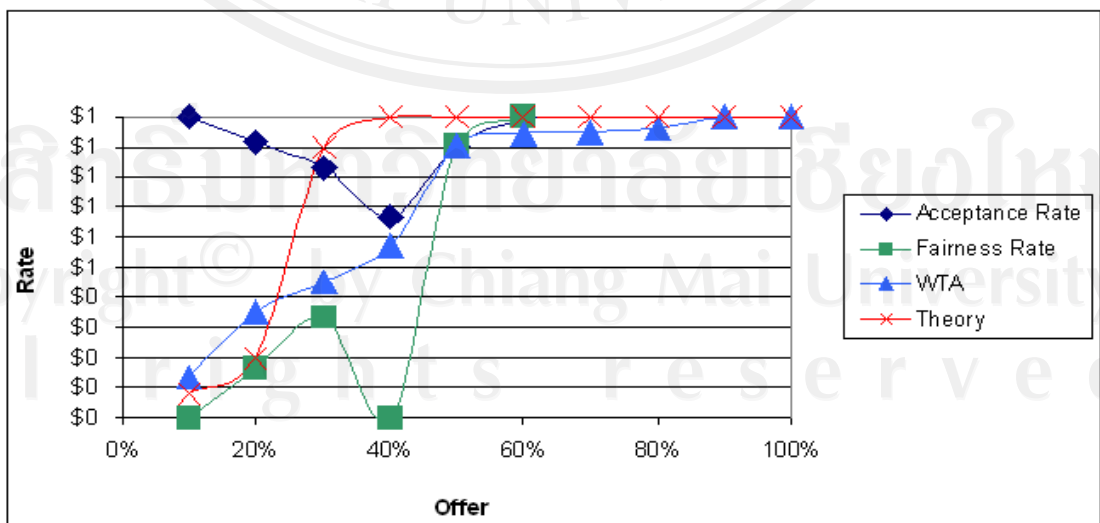


Figure 4-3 Acceptance Rate vs. Fairness vs. WTA vs. Theoretical expectation

For the Fairness Rate line, it is somehow very special. The line goes quite frankly from the offer of 0% to about 30%, the acceptance rate goes higher with higher offers, somewhat between 30% to 40% offer the acceptance rate dropped dramatically, and then after 40% the acceptance rate grew healthy again. In this case interviewees rather like to believe that 40% is not as fair as 30% even 20% or 10%. By inquired information from the interviewees we found that for people who thought 10%-30% was rather fairer is because firstly they usually are easy to be fulfilled, and secondly they are dealing with their close friends or relatives. However as we have predicted that some mentally stronger proposers will perceive the weakness responders as well. In comparison, most mentally stronger responders thought that not even 40%-45% is fair. However these explanations are not very scientific or economical. The special fairness attitude discrepancy may also be caused by the homogeneous group of students in Thailand. Anyway, this may also be kind of Buddhism economy.

As for the Real Game (money involved) Acceptance Rate, it is also somewhat special and there are some surprising findings. Quite frankly we can separate the Acceptance Rate line into 2 parts. For the first part, it is the part after the offer of about 40% which is rational and normal. We can generally predict that the higher the offer is the higher the acceptance rate will be. The second part is the part that the offer is lower than 40%. In this part from 0% of the offer up to 39% of the offer, as the offer grew higher the acceptance rate goes lower.

It is extremely strange that the higher offer generates the lower acceptance. There are very few offers which are 0% in our experiment. Nonetheless by far all the

responders were accepted the offer, and the reasons are simple and quite similar “as long as my friend gets everything I can stand for it”. Maybe this kind of kinky outcome is brought by the homogeneous sample group. However since the offer raise from 0% to 10% the acceptance rate decreased to 90%, in 20% offer area the acceptance rate kept on dropping to 80% and so does 30%-39% area. Yet, this kind kinky discrepancy also fits the perceived weakness quite well. The stronger the proposer acts the more they are able to get, and also easier to take advantage from the weaker opponent.

		Stake	Proposer	Offer	Fair	Acceptance	Propose	Minimum	Accepting Bad Offer
Stake	Pearson Correlation	1	.010	.106	-.036	.000	.120	-.310**	-.070
	Sig. (2-tailed)		.921	.294	.721	1.000	.234	.002	.490
	N	100	100	100	100	100	100	100	100
Proposer	Pearson Correlation	.010	1	.280**	.327**	.127	-.042	-.100	-.099
	Sig. (2-tailed)	.921		.005	.001	.209	.675	.322	.329
	N	100	100	100	100	100	100	100	100
Offer	Pearson Correlation	.106	.280**	1	.432**	.080	.033	.149	-.596**
	Sig. (2-tailed)	.294	.005		.000	.430	.746	.138	.000
	N	100	100	100	100	100	100	100	100
Fair	Pearson Correlation	-.036	.327**	.432**	1	.467**	.209*	-.004	-.170
	Sig. (2-tailed)	.721	.001	.000		.000	.037	.970	.090
	N	100	100	100	100	100	100	100	100
Acceptance	Pearson Correlation	.000	.127	.080	.467**	1	.167	-.295**	.105
	Sig. (2-tailed)	1.000	.209	.430	.000		.096	.003	.299
	N	100	100	100	100	100	100	100	100
Propose	Pearson Correlation	.120	-.042	.033	.209*	.167	1	-.132	-.227*
	Sig. (2-tailed)	.234	.675	.746	.037	.096		.190	.023
	N	100	100	100	100	100	100	100	100
Minimum	Pearson Correlation	-.310**	-.100	.149	-.004	-.295**	-.132	1	-.139
	Sig. (2-tailed)	.002	.322	.138	.970	.003	.190		.168
	N	100	100	100	100	100	100	100	100
Accepting Bad Offer	Pearson Correlation	-.070	-.099	-.596**	-.170	.105	-.227*	-.139	1
	Sig. (2-tailed)	.490	.329	.000	.090	.299	.023	.168	
	N	100	100	100	100	100	100	100	100

Figure 4-4 Correlation of important factors

Unfortunately the discrepancy still can not be explained by any specified one of the individual characteristics from the survey or theory. However by looking at the

analyzed data at Figure 4-4, it's clear to see that there are 3 important factors are highly correlated to fairness, thus we can boldly assume that the stated fairness is the best explanatory variable for the acceptance rates.

4.2 Regression

In statistics, regression analysis includes any techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables — that is, the average value of the dependent variable when the independent variables are held fixed. Less commonly, the focus is on a quantile, or other location parameter of the conditional distribution of the dependent variable given the independent variables. In all cases, the estimation target is a function of the independent variables called the regression function. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function, which can be described by a probability distribution.

Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships. In restricted

circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables.

A large body of techniques for carrying out regression analysis has been developed. Familiar methods such as linear regression and ordinary least squares regression are parametric, in that the regression function is defined in terms of a finite number of unknown parameters that are estimated from the data. Nonparametric regression refers to techniques that allow the regression function to lie in a specified set of functions, which may be infinite-dimensional.

The performance of regression analysis methods in practice depends on the form of the data-generating process, and how it relates to the regression approach being used. Since the true form of the data-generating process is in general not known, regression analysis often depends to some extent on making assumptions about this process. These assumptions are sometimes (but not always) testable if a large amount of data is available. Regression models for prediction are often useful even when the assumptions are moderately violated, although they may not perform optimally. However, in many applications, especially with small effects or questions of causality based on observational data, regression methods give misleading results.

[http://en.wikipedia.org/wiki/Regression_analysis]

- Probit Regression

As we went through the study, we had used a lot of software to find the most suitable one and also the most suitable model for the Ultimatum Game. So far, Limdep, E-Views, SPSS are the most accurate software for the Ultimatum Game

Regression Calculation, and the most suitable model to find the correlation of each factors supposed to be Probit Regression.

A probit model is a popular specification for an ordinal[1] or a binary response model that employs a probit link function. This model is most often estimated using standard maximum likelihood procedure, such an estimation being called a probit regression. [http://en.wikipedia.org/wiki/Probit_model]

Probit Regression attempts to fit the cumulative distribution function of the standard normal distribution to the specified data. Probit is most often used in fitting binomial distributions where the data of interest can have two states. To perform a probit regression, the appropriate data must be chosen. As the regression is performed using the Maximum Likelihood Estimator technique, as described in the Method section. The coefficients resulting from the regression show the influence of variables on the binomial probabilities.

In each of the different statistical software by calculating the correlation of different factors, we found that the fairness as we assumed in Chapter 4.1 is of course the most dependable variable in the Ultimatum Game.

In E-Views we had the following results showed in 3 tables:

Table 1: Acceptance Rates for Contextual Choice

Offer	80/20	50/50	80/20	100/0
Acceptance Rate	58%	99%	87%	39%
dto. Literature	44%		81%	
<u>Fairness</u> (Mean)	2.70	3.99	3.07	-

Table 2: Probit Regression

		Coef.	Std. Err.	<i>z</i>	<i>P</i> > <i>z</i>	95% Conf. Interval
Acceptance	Fair	1.60	.40	3.95	0.000	.80 2.39
	const	.35	.27	1.28	0.202	-.18 .88
<u>Fairness</u>	Propose	2.23	1.14	1.96	0.049	.005 4.47
	const	-.21	.52	-0.41	0.680	-1.23 .80
Acceptance	WTA	2.80	1.76	1.60	0.110	-.63 6.25
	const	-.86	1.34	-0.64	0.519	-3.49 1.76

Table 3: Seemingly Unrelated Bivariate Probit

		Coef.	Std. Err.	<i>z</i>	<i>P</i> > <i>z</i>	95% Conf. Interval
<u>Fairness</u>	Propose	2.14	1.12	1.92	0.054	-.04 4.34
	const	-.17	.50	-0.34	0.737	-1.16 .82
Acceptance	WTA	2.69	1.66	1.62	0.105	-.56 5.94
	const	-.77	1.26	-0.61	0.542	-3.25 1.70
	/athrho	.97	.29	3.39	0.001	.41 1.54
	rho	.75	.13			.39 .91

In all 3 tables that we calculated by probit and bivariable probit model, the correlation of fairness and acceptance is high and the coefficient is also as well as we'd been hoped. As we can see in figure 4-4, the correlation for fairness and other important factors are well connected in any software.

The first four stylized facts are well confirmed for the real money game. The modal offer of 50% was accepted in 91%. Only 6% of all offers were above 50%, and also 6% of the offers were at 20% and below. The stated minimum willingness to accept follows very well the prediction of Falk and Fischbacher. Figure 4.2 shows the best fit of the model (2.6) yielding a reciprocity parameter for the responder of $\rho_2 = 1.91$, in close proximity to the suggested value of 2. The stated acceptance rates for the contextual choice displayed in Figure 4.2 show the same trends as in the literature [Falk et al. 1999]. Differences remain within the range of reported cultural variations

[Fehr and Schmidt 2004]. The acceptance rates for the 80/20 offers are significantly higher (at 95% confidence) in presence of the 50/50 option, and just at the lower edge of the confidence interval if 100/0 is the only alternative. In the latter case, both contrary feelings of envy and desert of the responder with regard to the proposer receiving a share of 80\$ are significantly higher than those of self-satisfaction with the own lower share of 20\$. Surprisingly, in the same case - when 80/20 is the fairest possible offer - perceived fairness and envy are highly positively correlated (0.83 at 95%).

In the real game, acceptance and fairness rating, although disparate, were nevertheless found significantly correlated at 95% confidence level. The only attitude with a significant correlation was the stated goal to set a maximum loss before entering rounds of gambling. We found a slightly negative correlation of -0.29 . Thus, surprisingly, people who are cautious about risk are less likely to accept the given offer.

We found, however, a strong discrepancy between the stated willingness to accept and the actual acceptance behavior in the game with real money. Even though offers at 30% and below were considered unfair, they were nevertheless accepted at an overall high rate increasing for smaller offers. There is only one variable significantly correlated with the attitude to accept offers at 30% and below. This question reads "If somebody cheats me, I will still be kind to him/her." No other attitudes are able to explain the lack of negative reciprocation. Acceptance of low rates at 40% and below was found highly significantly negatively correlated (-0.61) with the stated minimum offer the subject was willing to accept. A particular anomaly

is constituted by the 8 out of 50 responders who were confronted with an offer of exactly 40%. Only 70% of them actually accepted the offer, although lower offers were accepted at a higher rate. None of the 8 responders found the offer fair, while several people did so for a lower offer of 20% or 30%. Except for this single data point, stated willingness to accept runs parallel to the fairness perception of the real game.

A probit regression showed that fairness is a significant variable explaining the acceptance rate in the real money game (Table 2). Alternatively, a two stage estimation method is employed. The acceptance rate is modeled against the stated minimum willingness to accept, and fairness is modeled as a function of the actually proposed value. This is in concordance with the findings that fairness considerations have a greater influence on the responder than envy or altruism [Bethwaite and Tompkinson 1996].

By Limdep, it's more likely to be explainable.

```
--> PROBIT; Lhs=FAIR; Rhs=ONE, PROPOSE; Prob=proba
Normal exit from iterations. Exit status=0.
```

Dependent variable		FAIR			
Weighting variable		None			
Number of observations		100			

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
-----+Index function for probability					
Constant	-.21397480	.51803769	-.413	.6796	
PROPOSE	2.23836357	1.13926996	1.965	.0494	.4512000

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Additionally to using the single equation probit, we have also run a seemingly unrelated bivariate probit on the simultaneous equation model. The results are shown in table 3. The correlation was found significantly different from zero, and we reject the null hypothesis at .0001 level of significance. However, the simultaneous equation model seems to perform no better than the single equation probit model.

In the table above we can see clearly that not only the acceptance is highly correlated to the fairness of one's value but also the proposal that one's going to make. It's also logical to understand that if you take some value as fair then you are going to apply it through your proposal and also as the respond to your choice as we have already mentioned.

We have also conducted the calculation for all these three variables in Limdep and the result is not surprising but promising. Still the fairness is the most important variable and it is still significantly connected to the other two relatively important variables.

Generally speaking, in the Ultimatum Game the actual behavior is mostly affected by fairness value of the offer, and there is a general tendency to not reciprocate negatively in spite of being treated unfairly.

We also find that offers slightly below 50% such as 40%-49% are perceived as more unfair offers than very low offers such as 0%-39%. This may be viewed as perceived weakness.