Evidence of homo economicus? Findings from experiment on evolutionary prisoners' dilemma game

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EVIDENCE OF HOMO ECONOMICUS?

FINDINGS FROM EXPERIMENT ON EVOLUTIONARY PRISONERS' DILEMMA GAME[1]

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Abstracts

This paper aims to analyze subjects' behavior in an experiment on evolutionary process of prisoners' dilemma game. The experiment has been designed by using sixteen one-shot prisoners' dilemma games with payoffs perturbation and random matching players under perfect information. The subjects of the experiment were students and staff in Universitas Gadjah Mada, Indonesia. In contrast to previous studies, for instance Selten and Stoecker's (1986) Cooper's, et.al (1991, 1996), the majority of the subjects in this experiment tend to choose Nash equilibrium strategy consistently from the first game. The result showed that the proportion of the Nash equilibrium outcome was consistently in the range of 85%-88%, whereas the tacit cooperation or Pareto optimum outcome was about 1%-2%. There were evidence that payoffs perturbation influences players' decision. In contrast to the previous studies above, the results from this study revealed that the vast majority of the subjects tend to choose the dominant strategy as prescribed in Game Theory.

Keywords: Prisoner's Dilemma, experiment, random-matching, payoff-perturbation, framing effect.

JEL Classification: C73, C91

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"Human behavior flows from three main sources: desire, emotion, and knowledge,"

~ Plato

1. Introduction

It is always appealing to understand the human behavior under diverse circumstances. It is like being in a science lab testing the outcome of particular environment settings. That particular environment is boundless, making it more engaging. Furthermore, the outcomes are most likely unstable given the dynamic merit of human being. At times, the results meet our predictions but sometimes they do not. These may narrow down conclusions from other findings or widen the gap.

Entertained by the spirit, we construct an experiment to extract the "true" behavior of individuals with settings that most likely reflect daily interactions. We are particularly interested in the settings of social dilemma where individuals' decisions are at odds to the interest of the society.

We arranged an experiment consisting of two sessions, each of which contains sixteen one-shot prisoner's dilemma games. We set up random matching games so a player will only have one chance to meet with particular opponent. We set up payoff perturbation to test whether players change their propensity toward particular strategy. Players will perfectly recall their previous strategies, however, they have no information on their opponents' previous strategy. We also introduced framing effect in the second session of the game to compare players' propensity with or without the effect.

We barely interact with people in static environment. Even if, two individuals will change their decisions from time to time. Moreover, we are likely to meet with different individual in a particular affair. For example, two individuals from different government agencies meet to discuss an issue which cannot be solve in one meeting. Their results of their interactions may change over time given different incentives they are facing. It is also a possibility that they are replace by another colleague. Although he carries the same mission, his respond to incentive will not be the same. This leads to us to idea of random-matching games. See Ellison (1994) and Okuno-Fujiwara and Postlewaite (1995) for further discussion.

Individuals facing the same structure of problem may witness changing incentive. Although the changes are barely noticeable, individuals will respond to it one way or another. We accommodate this through payoff perturbation in the game. We are motivated to see how players respond to changing payoff in the same structure. Binmore and Samuelson (2001) and Hofbauer and Sandholm (2007) present theoretical background of payoff perturbation.

The final aspect of interaction that we highlight is the counterpart's previous history. We leaves footprints when we walk, so do we when making decisions. These footprints establish reputation in an individual which will affect counterpart's approach during an interaction. For example, people look at sellers' history on past sales in Amazon or eBay before making their buying decision. However, records of counterpart's past information are not always observable due to various restrictions or limitations. See Takahashi (2010) for discussion about first-order information.

The result of the experiment showed that most of the times players chose not to cooperate throughout different settings that we set. Non-cooperative strategies are witness throughout the games with an average of about 83%. Similar to our prediction, players respond significantly to changing payoff. Last but not least, we find that game with framing effect setting does not differ to that without framing effect. Our results somehow remind us of the term *homo economicus*.

Our paper consists of five sections. Section 2 explains theory of prisoner's dilemma game and literature review. Section 3 summarizes the experiment design and section 4 highlights the findings from the experiment. Section 5 presents our conclusion on the experiment.

2. The Prisoner's Dilemma Game

The prisoner's dilemma has been one of the greatest knowledge creations in the twentieth century. A tale of dilemma presents difficult situation that an individual face. Such is so common that we can easily evidence it: from children's bedtime stories, folklore, to real life public choice. From theoretical point of view, it provides an essential philosophy in terms of human interaction particularly when conflict of interest surface. It is also powerful enough to provide justification on how societies are arranged and behave, by explaining tendency of each individual's response (Poundstone, 1992). Furthermore, the theory can be applied to answer inquiries in various disciplines and so it establishes itself as a universal concept.[1]

[1] Prisoner's dilemma game was invented by Flood and Dresher in 1950 and got its name from A.W. Tucker (Axelrod, 1984).

Figure 1 shows that each individual faces two strategies and each shall determine the best strategy. The order of the payoff must be temptation (*c*) the highest, followed by reward for cooperation (*a*), punishment non-cooperation (*d*), and sucker (*b*) for being betrayed (Rapoport and Chammah, 1965).

Game theory analysis state that *B* will be the dominant strategy to that of *A* if the game is played in simultaneous one-shot game and each individual is prohibited from any cheap talk or non-binding commitment. Assuming every individual are rational, both players will choose *B* as their dominant strategy. Therefore, (B:B) will be the Nash Equilibrium. Each individual's belief concerning opponent's strategy is strongly influenced by rationality axiom and common knowledge, as long as the game is played simultaneously in a perfect information framework (Romp, 1997).

Strategy *B* is also theoretically the dominant strategy in finitely repeated games. Using backward induction method, each player tends to choose strategy *B* throughout the game. This propensity is the result of assumption that all individuals are rational and tend to maximize their gains. This give prisoner's dilemma games the best response correspondent which imply that rational individuals will chose one dominant strategy even if the payoffs change. It is worthy to note that Nash Equilibrium strategy in prisoner's dilemma game is not the most efficient one. The more efficient strategy in prisoner's dilemma game is (A:A).

Table 1. 2x2 prisoners' dilemma pure game

		Player 2	
		A	B
Player 1	A	(a_1, a_2)	(b_1,b_2)
	B	(c_1,c_2)	(d_1,d_2)

Where: $c>a>d>b$

Several experiment results challenge the solution that game theory offers in prisoner's dilemma game. The results suggest that strategy B may not always be the dominant strategy. Cooper et al. (1996) established twenty one-shot prisoner's dilemma game in which a player only have one chance to meet with particular opponent. The results show that subjects went through a learning process to play Nash Equilibrium strategy. At the first five games, there is about 43% of pairs chose (A:A) strategy. As the games moved on, the proportion of pairs choosing such strategy declined. Table 2 shows that there is only about 20% of pairs chose A:A in the last five games.

Table 2. Results of Cooper et al. (1996)

Games	**Proportion of (*A*:*A*)**
1-5	43%
6-10	33%
11-15	25%
16-20	20%

Source: Cooper et al. (1996)

Evidence from Selten and Stoecker (1986) also shows that strategy B is not the dominant strategy. They devise supergames prisoner's dilemma in which a player plays ten games with his/her opponent in each session. Their result shows that players tend to cooperate until one player defect by choosing strategy B. Hereafter pairs tend to choose (B:B) until the end of the game. The propensity of players to cooperate in the early phase of the game is referred as tacit coordination.

Kreps et al. (1982) proposed theoretical background for individuals to cooperate in finitely repeated game. Information asymmetries can generate significant proportion of cooperation, assuming individuals are self-interested. Andreoni and Miller (1993) establish supergames which explain that individuals respond cooperative behavior as the result of learning process. Cooper et al. (1996) also show similar cooperative result.

Kreps et al. (1982) and Bendor (1993) argue that uncertainty may encourage cooperation. Recent work by Takahashi (2010) suggest that sustained cooperation can be derive from first-order information that is a player can observe his opponent's past action. Experiment results by Gong and Yang (2010) show that cooperation rise when players acknowledge current opponents and their previous opponents actions. They show that cooperation rate increased to 45% from the initial 15%. This shows that reputation and learning process is essential in the establishment of cooperation.

Cooperation may not likely to ascend in successive repeated one-shot prisoner's dilemma game as players are re-matched from one game to another (Gintis et al., 2005). Experiment results from Bereby-Meyer and Roth (2006) shows that the average rate of cooperation from five sessions of successive repeated one shot prisoner's dilemma game is relatively small. The results ranged from 12.6% to 22.3% as reported in Garapin, Llerena, and Hollard (2010).

In similar fashion, Garapin, Llerena, and Hollard (2010) reports that the average rate of cooperation from four sessions of the game ranged from 15.4% to 29.7% (Table 3). However, Vlaev and Chater (2007) find that the percentage of cooperative games in three different payoff setting are up to 33%, 50%, and 71%. The results suggest that the rate of cooperation is relatively low compare to that in infinitely repeated game. This may be sensible since players are experiencing new opponent each time and they tend to exercise their rationality.

Table 3. Experiment results of successive one-shot prisoner's dilemma game

Session	**Number of Subjects**	**Proportion of (*A*:*A*)**	**Session**	**Number of Subjects**	**Proportion of (*A*:*A*)**
BMR-1	10	18.7%	GLH-6	14	17.1%
BMR-2	10	22.3%	GLH-7	14	24.3%
BMR-3	18	21.3%	GLH-8	16	15.4%
BMR-4	18	12.6%	GLH-9	12	29.7%
BMR-5	10	21.6%			

Notes: BMR refers to Bereby-Meyer and Roth (2006) and GLH refers to Garapin, Llerena, and Hollard (2010).
Source: Garapin, Llerena, and Hollard (2010).

Recent evolutionary game theory has been an essential tool in the identification of different types of individuals. Evolutionary stability concept of equilibrium identifies a strategy as evolutionary stable if it has higher reproductive success rate than any other strategy. This theory implies that cooperation may not be the optimal behavioral pattern, however communication of information is essential to justify the existence of cooperation (Brosig, 2002). See also Frank (1987), Harrington (1989), and Frank et al. (1993) for discussion on evolutionary stable outcome and signaling.

There is one particular insight that we learn from established literature: players are not always rational. It also shows that individuals are not *homo economicus*. Although various arrangements may induce incentives to cooperate, in its place, individuals have bounded rationality and are influenced by many social and psychological factors such as altruism, fairness, and reciprocity. We may look further to Selten and Stoecker (1986) and Cooper et al. (1996) findings which give light in the building of assumptions in game theory, particularly assumption of rationality.

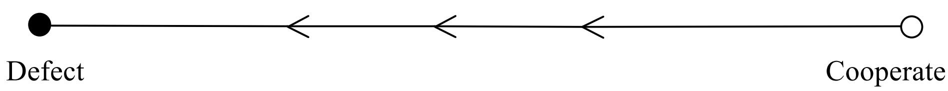
3. Design of Experiment

Several experiments in individuals decision making process[2] and game theory[3] shows that individuals are not entirely rational. Specifically, individuals do not always pursue von Neumann-Morgenstern Expected Utility Function (Mas-Collel et al., 1995). Pradiptyo (2006) also state that it is impossible for individuals to be consistent in their decision making, contrary to the rationality assumption. Therefore, we implement evolutionary game theory as the basis of our experiment design.

According to evolutionary game theory, the analysis will be applied to settings in which individuals can exhibit different forms of behavior and we will consider which forms of behavior have the ability to persist in the population, and which forms of behavior have a tendency to be driven out by others (Easley and Kleinberg, 2010:209). This theory imply that static rationality assumption tend to break down since individuals' belief will evolve over time.

Alexander (2009) illustrate that cooperative strategy will eventually becomes extinct as shown in Figure 1. The arrow represents the population's evolutionary trajectory over time. First, the population belongs to an unstable equilibrium where they cooperate and drive away to stable equilibrium where they defect. Note that if small deviation occurs from stable equilibrium, the population will be driven back to original equilibrium (Alexander, 2009).

Figure 1. The replicator dynamical model of the prisoner's dilemma



Source: Alexander (2009).

We design our experiment using evolutionary game theory concept in the sense that individuals may not be making open decisions. Individuals will make decision according to the state of the environment that he or she is experiencing. The learning process that individuals will go through is the fact they adjust their decision according to the environment.

[2] See Allais (1953) and Tversky and Kahneman (1979) in decision making under risk; Elsberg (1961) in decision making under uncertainty; Holt (1979) in preference reversal.
[3] Cooper et al. (1996), Selten and Stoecker (1986), Pradiptyo (1998)

Their adjustments may not always be the most rational decision according to traditional game theory but will reflect the evolutionary process.

We introduce payoffs variability to test whether individuals are consistent in the decision making process as theory suggests (Table 4). Variability in payoff within prisoner's dilemma structure have been introduced in previous experiments such as Komorita, Sweeney, and Kravitz (1980) and Bonacich, Shure, Kahan, and Meeker (1976). Payoff variability reflects the size of fear, greed, and gains from cooperation. Ahn et al. (1998) shows that players responded significantly to particular change in payoff.

Table 4. Payoffs distribution[4]

	$d/a \geq 75\%$ and $b = 0$ (low coordination benefit)	$d/a \leq 25\%$ and $b = 0$ (high coordination benefit)
$[(c-a)/a] \geq 75\%$ and $b = 0$ (high coordination cost)	**Combination R** (Game I, V, IX, XIII)	**Combination S** (Game II, VI, X, XIV)
$[(c-a)/a] \leq 25\%$ and $b = 0$ (low coordination cost)	**Combination T** (Game III, VII, XI, XV)	**Combination U** (Game IV, VIII, XII, XVI)

Notes:

- The value of *a* is Rp100,000; if $[(c-a)/a] \geq 75\%$, the maximum (minimum) value of *c* is Rp200,000 (Rp175,000); if $[(c-a)/a] \leq 25\%$, the maximum (minimum) value of *c* is Rp125,000 (Rp105,000); if $d/a \geq 75\%$, the maximum (minimum) value of *d* is Rp95,000 (Rp75,000); if $d/a \leq 25\%$, the maximum (minimum) value of *d* is Rp25,000 (Rp5,000).

Variability in the distribution of payoffs is set by utilizing a method analogous to Goldfeld-Quandt heteroscedasticity test in econometrics. Initially, we set payoffs *a* as the reference point. The distribution of *a* will assemble as quartiles if the distribution is divided evenly into four. As the Goldfeld-Quandt test suggest, the second and third quartile are eliminated. Thus, increasing variability of payoffs only uses two extreme distributions: the first quartile ([*c*-*a*]/*a*

[4] See Appendix B for payoffs from each of 16 games

and *d*/*a* with a maximum of 25%) and the fourth quartile ([*c*-*a*]/*a* and *d*/*a* with a maximum of 75%).

We expect the extreme distribution of payoffs to ease hypothesis testing on whether individuals are influenced by the variability of payoffs, even in the same structure. We will test whether distribution of strategy in various combinations is statistically different or not. If in fact there is no significant difference, we can state that individuals behave rationally as theory suggest. If the difference is significant, we may argue that present rationality assumption is lacking evidence in empirical level.

Bendor et al. (1991), Axelrod (1984), and Donninger (1986) established experiment on prisoner's dilemma game where players only discover their own payoffs. Players are blind to opponents' strategy and payoff. This method is called partial feedback. Bendor (1993) argued that partial feedback may induce uncertainty however uncertainty can enhance cooperation in some circumstances. We introduce full feedback in our experiment to observe whether players' undertake learning process during the experiment. Full feedback has been implemented in an experiment by Bereby-Meyer and Roth (2006).

Although players have full feedback of their strategies, they do not have any information regarding their opponents' previous strategies.[5] This particular information is referred as first-order information. Players also do not have information regarding their opponents' previous opponents' strategies (second-order information). See Gong and Yang (2010) for experiment results on prisoner's dilemma game with second-order information.

In addition, we introduce modification of strategies' names to test a hypothesis whether framing effect influence individuals' decisions (Tversky and Kahneman, 1986). Framing effect is a phenomenon in decision-making process, which state that final decisions tend to be diverse if the problem in question is put into different words, albeit the substance is unchanged. For example, the tendency of doctors' decisions to operate with certain procedure will change when the statement change from "50% patients fully recover" to "50% patients still do not fully recover."

The experiment will be conducted in three one-hour classes with a total of 96 individuals. There are 32 individuals in each session which will be randomly divided into two groups: Majapahit (M) and Sriwijaya (S). They will be seated randomly in a computer booth. Each

[5] See Takahashi (2010)

player receives unique identification, for example S3 and M14, which indicates that the player belongs to Sriwijaya group (Majapahit) with order number 3 (14).[6]

There are 16 games in the session and each player will play 16 different games in terms of payoffs and opponents. This implies that every player will face different opponent without a chance meet again until the session finishes. Each player faces a board game in the screen where Majapahit (Sriwijaya) will see his or her strategies in row (column). The strategies are referred as strategy *A* and *B*. Each player will be able to see their past strategies and payoffs in their monitor.

The experiment is open to all academic civics in Universitas Gadjah Mada and the experimenter informed that participants would participate in decision-making game. Each participant has a chance to earn a maximum (minimum) payoff of Rp200,000 (Rp0). The amount of payoff is subject to player's payoff in particular game which he/she selects randomly at the end of the game. The maximum payoff of Rp200,000 is regarded high among most participants since most of them are undergraduate students. For comparison, the cost of particular lunch menu in faculty's cafeteria is Rp5,000. Therefore, the maximum payoff is a worthy amount for "one-hour job."

4. Results of the Experiment

4.a. General Review

The players that participated in the experiments have an average age of 23.9 years old. There are 65.6% of male participants while the rest are female participants. Most participants are undergraduate students which accounted for about 70%. The average monthly income of participants are Rp932,552 or about US$100. There are 23% of participants with income higher than Rp1 million each month. This statistics signify that the amount of maximum payoff is significant to participants since the amount is about 20% of their average monthly income.

First, we present general report on the strategies that players chose during the experiment. We start off with strategies that pairs chose during the experiment. Table 5 shows the propensity of strategies exercised during the experiment. The proportion of players who chose cooperative strategy (A:A) only accounted for 1.2% in the first session. The proportion is

[6] Sriwijaya and Majapahit are the biggest empires in Indonesian history. Both empires lived in different period and do not share anything particular in common.

outstripped by the proportion of players who chose non-cooperative or Nash Equilibrium strategy (B:B), which tally for 81.8%. The proportion of cooperative strategy in the session with framing effect surprisingly declined.[7]

Table 5. Proportion of players' strategies

Session 1	A:A	A:B & B:A	B:B	Session 2	A:A	A:B & B:A	B:B
Game 1-4	1.05	22.9	76.0	Game 1-4	3.2	16.2	80.7
Game 5-8	2.10	16.7	81.3	Game 5-8	0.0	13.6	86.5
Game 9-12	1.1	20.4	78.6	Game 9-12	0.0	16.7	83.3
Game 13-16	0.5	8.4	91.2	Game 13-16	0.0	11.5	88.5
Game 1-16	**1.2**	**17.1**	**81.8**	**Game 1-16**	**0.8**	**14.5**	**84.8**

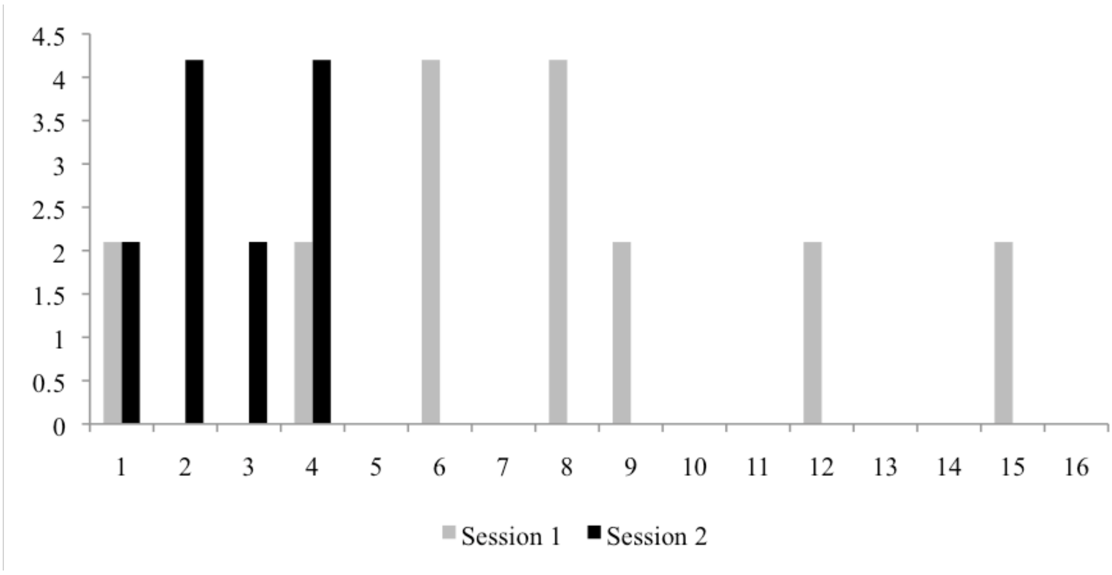
Source: experiment results

The results of our experiment show that players have no difficulty understanding the game, particularly in choosing the best strategy. Learning process which has been confirmed in many experiments was not evidenced. The end results also show that players tend to be rational at the end of the game. The proportion of cooperation is recorded the lowest in the last four games. This pattern is in line with previous prisoner's dilemma experiments. Proportion of A:B and B:A strategy are way higher than the cooperative strategy, meaning that most player tend to practice their rationality every time by choosing B strategy. Only small portion of player chose A and most of them were hoodwinked.

The proportion of cooperative strategy is relatively low compared to that of previous experiments such as Bereby-Meyer and Roth (2006) and Garapin, Llerena, and Hollard (2010). Their experiments ended with cooperative rate at least 15% and in one session it was close to 30%. Cooperative rate in our experiment only averaged for 1.2% in all sixteen games.

Figure 2 to 3 show the proportion of cooperative and non-cooperative strategy in each game. Figure 2 shows that there is no specific pattern on the movement of cooperative strategy throughout the sessions. We find that the proportion of the strategy reached the highest in combination *S* and *U*. This may indicate that players tend to cooperate when the benefit of coordination is high. However, the overall proportion of the strategy is so small that we cannot make any supposition.

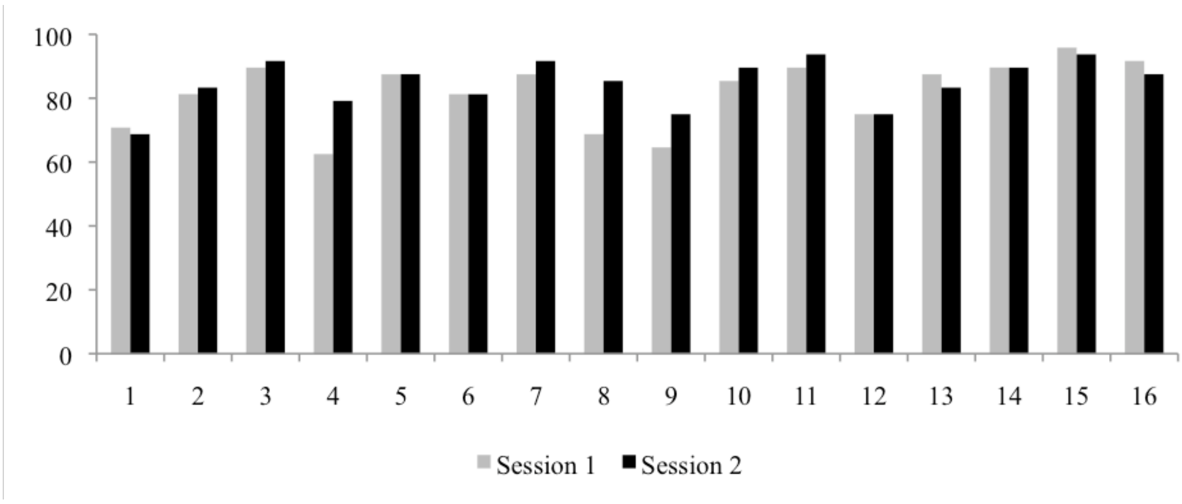
[7] Hereafter, session 1 refers to game without framing effect while session 2 refers to game with framing effect.



Source: experiment results

Figure 2. Proportion of cooperative strategy (A:A)

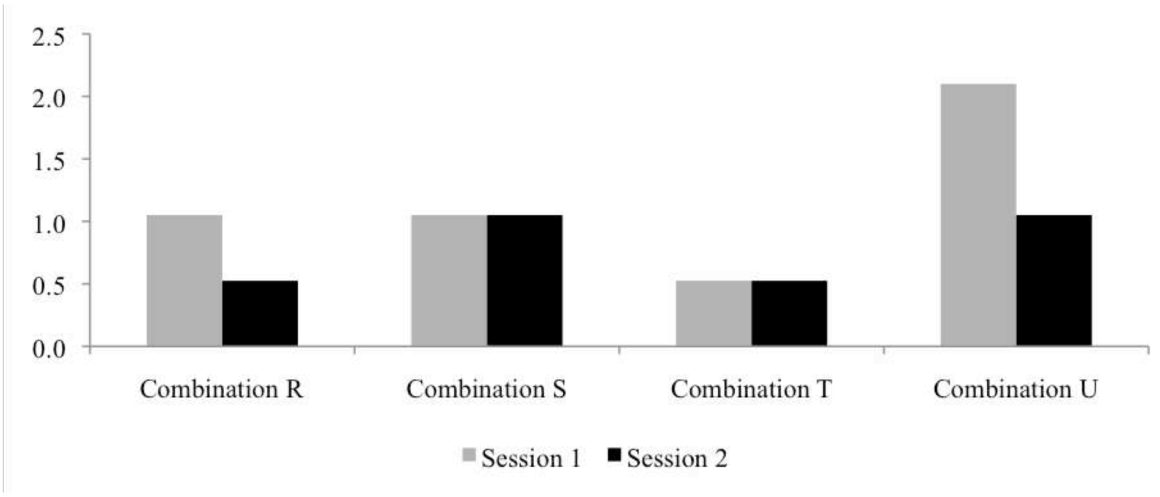
Figure 3 shows the proportion of Nash Equilibrium strategy in two sessions. We indicate a pattern: proportion of Nash Equilibrium strategy tend to rise respectively from combination R, S, and T and slightly diminish in combination U. The diminishing proportion in combination U may be due to low coordination cost and high coordination benefit. There is an indication that players show responses to the changing payoffs.



Source: experiment results

Figure 3. Proportion of non-cooperative strategy (B:A)

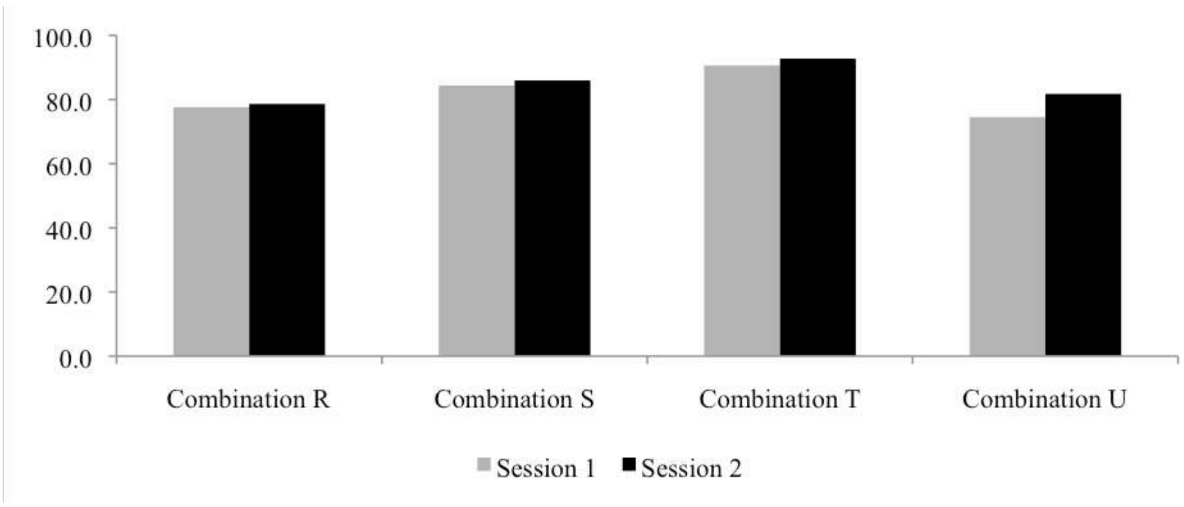
Figure 4 and 5 reveal the proportion of particular strategy in each payoffs combination group. Figure 4 shows no particular pattern in throughout the payoffs combination. We note that the proportion of cooperative strategy is relatively higher in combination U. This propensity is similar to that in Figure 2, players tend cooperate where the cost of coordination is low and the benefit of such is high.



Source: experiment results

Figure 4. Proportion of cooperative strategy (A:A) in each payoffs combination

The pattern in Figure 5 is identical to that in Figure 3. The proportion of Nash Equilibrium in combination U is relatively lower. Again, the results suggest that some players change their strategy as the payoff change. However, this change is relatively small hence has little effect on the overall proportion.



Source: experiment results

Figure 5. Proportion of non-cooperative strategy (B:B) in each payoffs combination

We move on to analyze players' individual strategy. Table 6 shows that majority of players chose strategy B with a range of 86.2-95.1%. The range of players who did not willing to Cooperate increase to 89.1-96.1% after the implementation of framing effect. The results may indicate that players are rational even with the implementation of framing effect. There is a specific pattern in the proportions of strategies that players chose. The tendency of strategy A and cooperate is as follows, the proportion decrease respectively in combination R, S, & T, then increase in combination U. The opposite is evidenced in strategy B and not to cooperate. The pattern is a strong indication that variability of payoffs influenced players' decision in choosing strategy.

Table 6. Proportion of individuals' strategy in each payoffs combination

Session 1	**R**	**S**	**T**	**U**
A	11.7	8.3	4.9	13.8
B	88.3	91.7	95.1	86.2
Session 2	**R**	**S**	**T**	**U**
Cooperate	10.9	7.6	3.9	9.6
Not to cooperate	89.1	92.4	96.1	90.4

Source: experiment results

We compare our findings with results from Ahn et al. (1998). Table 7 shows that players responded to variability in payoff from four sessions of finitely repeated prisoner's dilemma game. However, the proportion of cooperation is relatively high with average of 37% compare to that in our experiment.

Table 7. Proportion of cooperative strategy in Ahn et al. (1998)

Strategy	**Game 1**	**Game 2**	**Game 3**	**Game 4**
Cooperative	44%	37%	32%	35%

Source: Ahn et al. (1998)

Figure 6 shows proportion of male and female players choosing strategy B and not to cooperate during the experiment. Female proportion that chose strategy B is higher than male proportion. We can see that the proportion of cooperative strategy by both gender increased in games with framing effect. The figure shows an indication that there is almost no difference between male's and female's decisions.

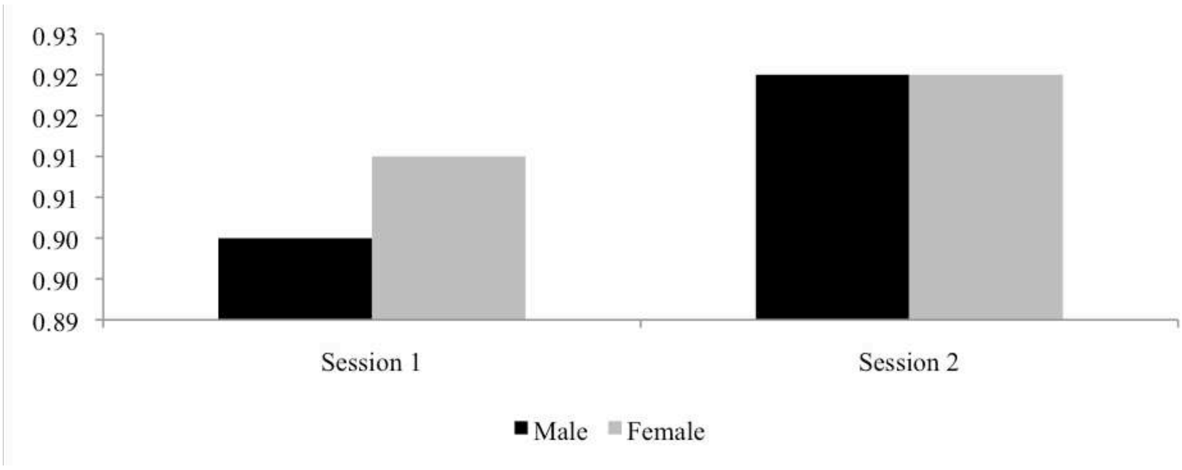


Figure 6. Proportion of non-cooperation strategy between genders

We move on to hypothesis testing of experiment results.

H_{01}: Proportion of strategy A (cooperate) and B (not to cooperate) is the same

Proportion of strategy A and B is significantly different in the first session. The inference from the second session is consistent: proportion to cooperate is significantly different than that to not cooperate. The results are strong indication that strategy B and not to cooperate is dominant during the experiment (Table 8). It is worthy to note that the proportion of players choosing strategy B or not to cooperate increased in the second session.

Table 8. Proportion inference of strategy in each session

SESSION 1				
Strategy A	**Strategy B**	**Proportion A**	**Proportion B**	***p*-value**
149	1387	0.10	0.90	0.000*
SESSION 2				
Cooperate	**Not to Cooperate**	**Proportion to Cooperate**	**Proportion Not to Cooperate**	***p*-value**
123	1413	0.09	0.92	0.000*

Note: We apply Binomial Test to generate the inference; *, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

Table 9 shows details regarding proportion of each strategy in every game. The lowest proportion of players choosing strategy B is 0.81 while the highest is 0.95. Statistics infer that proportion A and B is significantly different in the first session. Yet again, the proportion of strategy in the second session is also significantly different. These results are an early indication that players tend to maximize their own gains.

Table 9. Proportion inference of strategy in each session[1]

Session 1						Session 2					
Game	**Strategy A**	**Strategy B**	**Proportion A**	**Proportion B**	***p*-value**	**Game**	**Cooperate**	**Not to Cooperate**	**Proportion to Cooperate**	**Proportion Not to Cooperate**	***p*-value**
1	15	81	0.16	0.84	0.000*	1	16	80	0.17	0.83	0.000*
2	9	87	0.09	0.91	0.000*	2	10	86	0.1	0.90	0.000*
3	5	91	0.05	0.95	0.000*	3	5	91	0.05	0.95	0.000*
4	19	77	0.20	0.80	0.000*	4	12	84	0.13	0.88	0.000*
5	6	90	0.06	0.94	0.000*	5	6	90	0.06	0.94	0.000*
6	11	85	0.11	0.89	0.000*	6	9	87	0.09	0.91	0.000*
7	6	90	0.06	0.94	0.000*	7	4	92	0.04	0.96	0.000*
8	17	79	0.18	0.82	0.000*	8	7	89	0.07	0.93	0.000*
9	18	78	0.19	0.81	0.000*	9	12	84	0.13	0.88	0.000*
10	7	89	0.07	0.93	0.000*	10	5	91	0.05	0.95	0.000*
11	5	91	0.05	0.95	0.000*	11	3	93	0.03	0.97	0.000*
12	13	83	0.14	0.86	0.000*	12	12	84	0.13	0.88	0.000*
13	6	90	0.06	0.94	0.000*	13	8	88	0.08	0.92	0.000*
14	5	91	0.05	0.95	0.000*	14	5	91	0.05	0.95	0.000*
15	3	93	0.03	0.97	0.000*	15	3	93	0.03	0.97	0.000*
16	4	92	0.04	0.96	0.000*	16	6	90	0.06	0.94	0.000*

Note: We apply Binomial Test to generate the inference; *, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

H_{02}: Proportions of strategies between male and female is the same

Table 10 shows that gender does not play a significant role during the experiment. Statistics infer that male and female decisions are not significantly different. The results show that male and female have similar tendency when choosing strategy.

Table 10. Inference of strategy based on gender

Session	**Gender**	***p*-value**	**Gender**
Session 1	Male	0.687	Female
Session 2	Male	0.652	Female

Note: We apply Binomial Test to generate the inference; *, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

a. Between-Treatment Hypothesis Testing

We progress to testing hypothesis testing between specific treatments to the game. Specifically we infer the influence of payoffs variability in the game. The inferences are essential to extract the true behavior of individuals.

H_{03}: Players' propensity toward particular strategy between payoffs combinations is the same.

Table 11 shows statistics inference between payoffs combinations in the first and second session. Assuming 5% level of significance, payoffs combinations *R* & *T*, *S* & *U*, and *T* & *U* are significantly different. This evidence shows that variability of payoffs indeed influence players' decision making process. Significant difference between combinations *T* & *U* (*R* & *T* and *S* & *U*) shows that players responded to different coordination benefit (coordination cost), assuming coordination cost (coordination benefit) is held constant. Players' propensity changed slightly in games with framing effect. Combination *S* & *T* is statistically different while combination *S* & *U* is not. Significant difference between combinations S & T is due to difference in cost and benefit of coordination.

Table 11. Inference matrix of payoffs combination

Session 1	p-value	Session 1	Session 2	p-value	Session 2
Combination R	0.119	Combination S	Combination R	0.106	Combination S
Combination R	0,001*	Combination T	Combination R	0,000*	Combines T
Combination R	0,387	Combination U	Combination R	0,553	Combination U
Combination S	0,060***	Combination T	Combination S	0,030**	Combination T
Combination S	0,016**	Combination U	Combination S	0,303	Combination U
Combination T	0,000*	Combination U	Combination T	0,002*	Combination U

Note: We apply Mann-Whitney Test to generate the inference; *, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

4.b. With and Without Framing Effects Hypothesis Testing

H_{04}: Players' propensity toward particular strategy in games with and without framing effect is the same.

We evidenced interesting fact: players' decisions did not change significantly in games with framing effect. Combination *R*, *S*, and *T* in games with and without framing effect is not statistically different. Combination U is the only combination which shows significant difference in games with framing effect (Table 12).

Table 12. Inference matrix of payoffs combination with and without framing effects

Session 1	p-value	Session 2
Combination R	0.691	Combination R
Combination S	0.639	Combination S
Combination T	0.433	Combination T
Combination U	0.029**	Combination U

Note: We apply Wilcoxon Signed Rank Test to generate the inference; *, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

H_{05}: Proportions of strategies in games with and without framing effect is the same

The result shows that the proportions of strategies in games with and without framing effect is not significantly different, assuming the level of significance is 5%. This indicates that alteration on the name of the strategy only has little effect on the way players make decision.

Table 13. Inference on Proportion Before and After Framing Effect

Test Statistics	**Significance**
Paired t-test	0.051***
Wilcoxon signed rank test	0.051***
Sign test	0.061***
McNemar Test	0.061***
Marginal Homogeneity Test	0.051***

*, **, *** refers to significant in 1%, 5%, and 10% respectively.
Source: Experimental result.

5. Conclusion

We present an experiment on prisoner's dilemma game with the concept of evolutionary game theory. There are many experiments on prisoner's dilemma game before, however, the experiment was conducted in developed countries. Motivated by difference in social and cultural background, we establish the experiment in the context of developing country.

We design the experiment based on evolutionary game theory which accommodate cultural nature of subjects. We arrange two sessions in the experiment; each consists of sixteen one-shot prisoner's dilemma game with random matching. During each session, a player will only have one opportunity to meet with particular opponent. We allow full feedback after each game so player can perfectly recall their past actions. Players do not have any information on opponents' previous actions. We design variability in payoffs to test whether players will change their behavior. In addition, we set up framing effect in the second session of the game by altering the name of the strategy from strategy A (B) to Cooperate (not to Cooperate). We offer maximum payoff of Rp200,000, which is deemed to be a significant amount for majority of participants.

The results of the experiment are rather unique compare to that of existing experiments. First, we observe no significant difference between male' and female' decision where both tend to choose non-cooperative strategy (B). We also observe that players tend to maximize their gains by choosing non-cooperative strategy.

Pairs also tend to engage in non-cooperative strategy during the experiment, in contrast, only 1.2% and 0.8% (90% and 92%) chose cooperative (non-cooperative) strategy in session 1 and 2 respectively. Players also responded to variability in payoff matrix we setup. There is only little evidence that players tend to change their decision in games with framing effect. With respect to the evolutionary process, we may infer that convergence to non-cooperative equilibrium is rather swift. This implies that players altogether adjust quickly to the environment during the game.

We come to a conclusion that subjects are very rational judging from the results of the experiment. The evolutionary process was swift since most of the individuals exercise their rationality right from the beginning. Moreover, majority of players tend to maximize their own gains and show little unselfishness throughout the game. Is the results evidence of homo economicus?

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Appendix A

Experiment Instruction

Thank you for participating in this experiment. You will be participating in interactive decision making experiment. You will be asked to follow the experiment instruction carefully and make the best decision.

The decision you make will determine the money you will receive in the end of the experiment. The money you earn in the session will be paid in cash at the end of the experiment. If you choose the right strategy, you may earn Rp200,000. However, you may also earn nothing if you did not choose the right strategy.

Attention! You may not communicate with other players during the experiment

General Instruction

The experiment consists of two sessions and each session consists of 16 games. Each game is not related to the game before or after. Three-game practice session will be commenced before the main session begins. Before the game, participants will be divided in to two random groups that is Majapahit (M) and Sriwijaya (S). Each group consists of 16 players and each player will be assigned a certain number from 1 to 16, which is shown in your screen.

For example, if you get number M3 in your screen, you belong to group M with order number 3. If you get number S5 in your screen, you belong to group S with order number 5. Each player in group M will play only once with each player in group S, vice versa. Thus, each player in each group will only play ONCE with players in other group without any chance to meet again.

Game Strategy

In each game, each player face two strategies that is A and B. Each player chooses strategy which he or she deems the best by clicking the strategy button on the screen. Each player will be asked:

ARE YOU CONFIDENT WITH YOUR ANSWER?

YES **NO**

If you are not confident with your answer and you want to change it, click "NO" and you will be able to change to your desired answer. If you are confident with your answer, click "YES" and your answer will be recorded in the server without any opportunity to change the answer.

If both players have given their answers, a table on the right side of your screen will display the strategy that each player took and how much money they earn from each game. There will be 16 games and each player from each group will only play one game with each player in the other group. There will be no repetition of games and opponents in each session.

You will have 30 seconds to choose your best strategy

Session II

Games in the second session of the experiment are similar to the first one. *The only difference* is the strategies. Strategy A will be referred as *Coordination*, meanwhile, strategy B will be referred as *No Coordination*. Other than the naming of the strategies, the games in the second session will be similar to those in the first session.

Remuneration Method

Each player will randomly choose one game out of 32 games in two sessions and each player will earn an amount of money according to the payoff he or she received in that game. The maximum earning is Rp200,000, and if you are not fortunate you may earn nothing or Rp0. No players should pay any amount to the experimenter.

Practice Session

Practice will be carried out after the moderator finished addressing the general instruction before the game commenced. The practice session consist of three games. Each player should fully understand the game before it commence. If you are not, the player is urged to request the moderator to repeat the practice session.

Thank you for your participation in the game

Appendix B

Game 1

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 175,000
M gets Rp 175,000 S gets Rp 0	M gets Rp 25,000 S gets Rp 25,000

Game 2

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 125,000
M gets Rp 125,000 S gets Rp 0	M gets Rp 75,000 S gets Rp 75,000

Game 3

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 175,000
M gets Rp 175,000 S gets Rp 0	M gets Rp 75,000 S gets Rp 75,000

Game 4

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 125,000
M gets Rp 125,000 S gets Rp 0	M gets Rp 25,000 S gets Rp 25,000

Game 5

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 200,000
M gets Rp 200,000 S gets Rp 0	M gets Rp 25,000 S gets Rp 25,000

Game 6

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 105,000
M gets Rp 105,000 S gets Rp 0	M gets Rp 75,000 S gets Rp 75,000

Game 7

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 200,000
M gets Rp 200,000 S gets Rp 0	M gets Rp 75,000 S gets Rp 75,000

Game 8

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 105,000
M gets Rp 105,000 S gets Rp 0	M gets Rp 25,000 S gets Rp 25,000

Game 9

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 175,000
M gets Rp 175,000 S gets Rp 0	M gets Rp 5,000 S gets Rp 5,000

Game 10

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 125,000
M gets Rp 125,000 S gets Rp 0	M gets Rp 95,000 S gets Rp 95,000

Game 11

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 175,000
M gets Rp 175,000 S gets Rp 0	M gets Rp 95,000 S gets Rp 95,000

Game 12

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 125,000
M gets Rp 125,000 S gets Rp 0	M gets Rp 5,000 S gets Rp 5,000

Game 13

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 200,000
M gets Rp 200,000 S gets Rp 0	M gets Rp 5,000 S gets Rp 5,000

Game 14

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 105,000
M gets Rp 105,000 S gets Rp 0	M gets Rp 95,000 S gets Rp 95,000

Game 15

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 200,000
M gets Rp 200,000 S gets Rp 0	M gets Rp 95,000 S gets Rp 95,000

Game 16

M gets Rp 100,000 S gets Rp 100,000	M gets Rp 0 S gets Rp 105,000
M gets Rp 105,000 S gets Rp 0	M gets Rp 95,000 S gets Rp 95,000

Note: Rp refers to Indonesian Rupiah; 1US$ = Rp9,100; A Big Mac costs Rp19,000.

Appendix C

Individuals' Strategies in Session 1, Round 1

M: Team Majapahit

S: Team Sriwijaya

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M2	P	A	B	B	A	B	B	B	B	A	B	B	B	B	B	B	B
M3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M4	L	B	B	B	A	A	A	A	A	A	A	A	B	B	A	B	B
M5	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	A	B	B	A	B	B	B	B	A	B	B	B	B	A	B	B
M9	L	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
M10	L	B	B	A	B	B	B	B	B	A	B	B	A	B	B	B	B
M11	P	B	B	B	B	A	B	B	B	A	B	B	B	B	B	B	B
M12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M16	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S1	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S2	L	B	B	B	B	B	B	B	B	A	B	B	A	B	B	A	B
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S5	L	B	B	B	B	B	B	A	A	B	B	B	A	B	B	B	A
S6	L	B	B	B	B	B	B	B	B	A	B	B	A	B	B	B	B
S7	P	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
S8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S9	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S11	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S12	L	A	B	B	B	A	B	A	B	B	B	B	A	B	B	B	B
S13	P	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
S14	P	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S16	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Individuals' Strategies in Session 1, Round 2

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	B	A	B	A	B	A	B	A	B	B	B	B	B	B	B	B
M2	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M4	L	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M5	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M9	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M11	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M15	L	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B
M16	L	B	B	B	A	A	A	B	A	B	B	B	B	B	B	B	B
S1	P	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S2	L	B	B	B	B	B	A	B	B	A	B	B	B	B	B	B	B
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	A	B	B	A	B	B	B	A	A	B	B	B	B	B	B	B
S5	L	A	B	B	A	B	B	B	A	A	B	A	B	B	B	B	A
S6	L	B	A	B	A	B	A	A	B	A	A	B	A	B	B	B	B
S7	P	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B
S8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S9	P	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
S11	L	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B
S12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	A	B	B	A	B	B	B	B	B	B	B	B	A	B	B	B
S16	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Individuals' Strategies in Session 1, Round 3

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	B	B	B	B	B	A	B	B	B	A	B	B	A	B	B	B
M2	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M3	L	A	B	B	A	B	B	B	A	B	B	A	B	B	A	B	B
M4	L	B	A	B	A	B	B	B	B	B	A	B	B	A	B	A	A
M5	P	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
M9	L	B	B	B	B	B	B	B	A	B	B	B	A	B	B	B	B
M10	L	A	B	B	A	B	A	B	A	B	A	A	B	B	A	B	B
M11	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M12	L	B	B	A	B	B	A	B	B	B	A	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M16	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S1	P	A	A	B	A	B	A	B	A	B	B	B	B	B	B	B	B
S2	L	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S5	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S6	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S7	P	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B
S8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S9	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B
S11	L	B	A	A	B	B	B	B	A	A	B	B	A	B	B	B	B
S12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S14	P	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S16	P	B	B	B	A	B	B	B	A	A	B	B	B	B	B	B	B

Appendix D

Individuals' Strategies in Session 2, Round 1

M: Team Majapahit

S: Team Sriwijaya

A refers to "cooperate"

B refers to "not to cooperate"

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M2	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M5	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	B	B	B	A	B	B	B	B	A	B	B	B	B	B	B	B
M9	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M10	L	A	B	B	B	B	B	B	B	A	B	B	A	B	B	B	B
M11	P	A	B	B	B	B	A	B	A	B	B	B	B	B	A	B	B
M12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M16	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S1	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S2	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S5	L	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S6	L	B	B	B	B	B	B	B	B	A	B	B	A	A	B	B	B
S7	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S8	L	B	B	B	B	B	B	B	B	A	B	B	A	A	B	B	B
S9	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S11	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S12	L	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
S13	P	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

S16	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Individuals' Strategies in Session 2, Round 2

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
M2	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M5	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	A	A	B	B	B	B	B	A	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M9	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M11	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M16	L	B	A	B	A	A	B	B	A	B	B	B	A	B	B	B	B
S1	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
S2	L	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	B	B	B	A	B	B	B	A	A	B	B	B	B	B	B	B
S5	L	A	B	A	B	B	B	B	B	B	B	B	A	B	B	B	B
S6	L	A	A	B	B	B	A	B	B	A	B	B	B	B	B	B	B
S7	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S9	P	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S11	L	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S16	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

Individuals' Strategies in Session 2, Round 3

		Game															
Player	**Gender**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
M1	L	A	A	B	B	B	B	B	B	B	B	B	B	A	B	B	A
M2	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M3	L	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B
M4	L	A	A	A	A	A	A	B	B	A	B	B	B	B	B	B	A
M5	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M6	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M7	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M8	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M9	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M10	L	B	B	B	A	B	A	B	B	B	B	B	B	B	B	B	B
M11	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
M14	P	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
M15	L	A	B	B	A	A	B	A	B	B	B	B	B	B	B	B	B
M16	L	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
S1	P	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B
S2	L	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
S3	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S4	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S5	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S6	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S7	P	B	B	B	A	B	A	B	B	B	A	B	B	A	A	B	B
S8	L	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B
S9	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S10	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
S11	L	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B
S12	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S13	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S14	P	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S15	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
S16	P	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B