Does cheap talk promote coordination under asymmetric information? An experimental study on global games

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Abstract

According to Brinadisi and Hyndman (2014), timing endogenous, that providing participants a costly opportunity to extend the decision timing and observe the decisions of other participants at previous periods, can promote the performance of participants significantly, who play global games under asymmetric and incomplete information. Our experiments further verify the effect of cheap talk on the experimental environment of Brindisi and Hyndman (2014). We observe that coordination and welfare of participants who play global coordination games improve significantly under cheap talk. However, this effect is weaker than the effect of timing endogenous and become insignificantly when timing endogenous exists. This experimental result may imply that actions speak louder than words in such investing environment. We also find that the payoff ratios of participants who send an exaggerated message are higher than participants who tell the truth.

Keywords: Global games, Cheap talk, Time endogenous
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1. Introduction

In recent years, some economic environments characterized by strategic complementarities and asymmetric information, such as bank runs, currency attacks, technology adoption, Foreign direct investment and so on, are attracting worldwide attention. In such environments, there is a potential for joint welfare improvements through coordination of actions.

A typical study is Brindisi and Hyndman (2014). They model this type of environment as asymmetry information global coordination games. According to Brindisi and Hyndman (2014), when players' moves are endogenous, that is, when participants have a costly opportunity to extend the decision timing and observe the decisions of other participants at previous periods, the coordination and welfare improves significantly.

On the other hand, there are numerous experimental works observed that participants' performance is improved when they make decisions after the cheap talk. However, to the best of our knowledge, there are very few studies dealing with this issue under the environment of incomplete information and asymmetric information. Therefore, our study focusses on the effect of cheap talk on the experimental environment of Brindisi and Hyndman (2014) and compare this effect with the effect of timing endogenous.

2. Experimental Settings

Table 1

Payoff table

	I	W
I	θ, θ	$\theta - 20, 25$
W	$25, \theta - 20$	$25, 25$

Our experimental design builds upon and complements an earlier experiment by Brinadisi and Hyndman (2014). In all treatments, each player $i \in \{1,2\}$ make a binary investment decision $a_i \in \{I, W\}$. Action I is interpreted as Investing, and action W is interpreted as Waiting. The payoff table is shown in table 1. θ is a realization of Θ, which is a uniform distribution over [20, 50]. Θ is determined prior to the decisions, and the payoff of I is determined by θ. When both players take action I, the return is Θ. If only one player takes action I, the return of player choosing I is $\Theta - 20$. Thereby, the action I exhibit strategic complementarities. On the other hand, W is the safety action since the payoff is normalized to 25.

Following the realization of Θ, but before making any decision, each player receives a private signal x_i, which is a realization of distribution X_i, determined as

$$X_i = \Theta + E_i.$$

E_i is a uniform distribution over [-10, 10]. E_1 and E_2 are assumed to be independent of each other. And E_i and Θ are assumed to be independent for i.

In our experiment, there are two treatment variables in our design. The first treatment variable is whether the game is "simultaneous game" or "sequential game". In the Simultaneous game treatment, a game consists of a single decision round. In the Sequential game treatment, each game consists of 3 decision periods. Players remain in a fixed group of 2 over all 3 periods. In each period, players decide to Invest or Wait. But if player i choose *I* initially in period t($1 \le t \le 3$), the actions of player i in subsequent periods are fixed to *I*. Following the first period, all players are informed at the start of each new period about the other player's action(s) at previous periods in the same group. However, if players Investing initially after the second period, he must bear a delay cost determined as $C = (t-1) \times 2$.

The second and most important treatment variable in our experiment is whether players could send a free message to each other or not. In the without message treatment, the players make the decision immediately following the realization of X_i. On the other hand, in messages treatment, following the realization of X_i, but before making any decision, players in the same group could send a message $m_i \in [0, 70]$ to each other with a free cost. Players will observe the message from another player in the same group before the decision making.

Therefore, our experiments are divided into four treatments depending on whether timing endogenous and cheap talk is present or not (table 2).

Table 2

The information on treatments.

		Timing endogenous	
Messages		Yes	No
	Yes	Sequential game with messages treatment (SEQ-M)	Simultaneous game with messages treatment (SIM-M)
	No	Sequential game without message treatment (SEQ)	Simultaneous game without message treatment (SIM)

Each treatment consists of 40 identical rounds. The procedure of each treatment in each round is as follows (figure 1). In all treatments, at the beginning of each round, participants were randomly matched with another participant. Following the realization of Θ and x_i, participants in the SEQ-M and SIM treatments enter the message stage send a message to their partner who is in the same group. The message is a number that is limited between [0, 70] and up to two

decimal places. A message from the partner is observed when participants enter the action stage before choosing any action. On the other hand, participants in the SEQ and SIM treatment through the message stage and enter the action stage immediately.

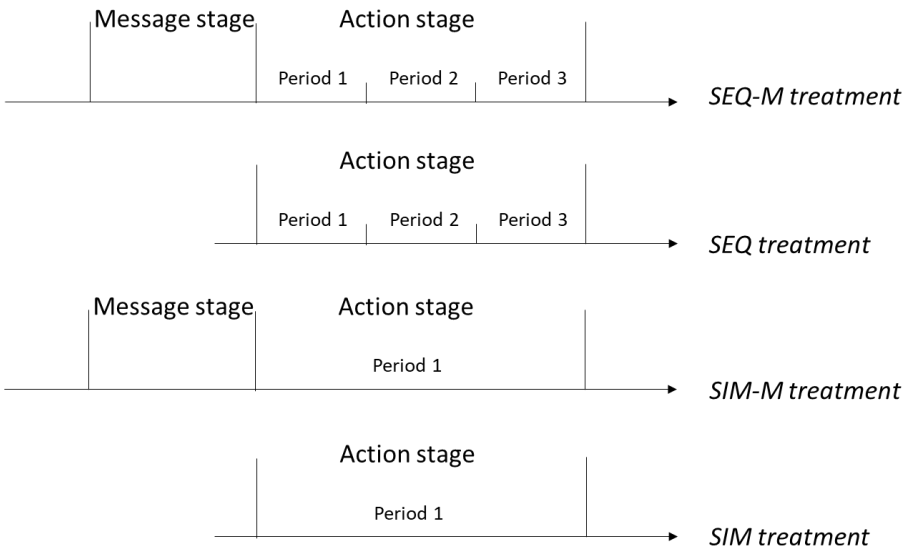
In the Action Stage, participants in the SIM and SIM-M treatment chose *I* or *W* simultaneously just once. While there exist 3 decision periods in the SEQ and SEQ-M treatments. Participants must choose *I* or *W* simultaneously in each period. Note that the participants who choose *I* would not change their actions in the remaining period(s). All participants could observe their partners' past decision(s) in that round. Finally, in all treatments, the value of Θ and profits in that round are displayed in the screens when all participants finish their choices.

The experiment was computerized by z-Tree (Fischbacher, 2007), and all sessions were conducted at the experimental laboratory of the Center for Experimental Economics Laboratory at Kansai University. A total of eight sessions were conducted: Two sessions of experiments were done for each treatment.

We approach the effect of cheap talk from following three aspects, coordination rates, miscoordination rates and payoff ratio. we define coordination rates as the frequencies on joint investment, *(I, I)*; miscoordination rates as the frequencies on (*I, W*) and (*W, I*); and define payoff ratio as $\frac{\pi^a}{\max(25,\theta)}$.($\pi^a$ is the participant's actual payoff).

Figure 1

Experimental procedures in each round.



3. Result

The main experimental results are shown in Table 3, Table 4 and Table 5. Table 3 reports the Logit regression on coordination. The dependent variable is coordination dummy of each round,

which take 1 if both two players in the same group realized the coordination and take 0 otherwise. Table 4 reports the Logit regression on miscoordination. The dependent variable is miscoordination dummy of each round, which take 1 if players miscoordinated and take 0 otherwise. Table 5 reports the OLS regression on average payoff ratios of each group in each round. Sum of the signals and the absolute value of the difference of signals of each group in each round are used to control the effect of signal size. Table 3, 4 and 5 show that coordination rate, miscoordination rate and efficiency ratio of SIM-M game are significantly higher than SIM, and SEQ-M game are significantly higher than SIM-M. However, the differences between SEQ-M and SEQ is insignificant.

On the other hand, Table 6 reports the OLS regression on individual performance. The dependent variable is individual payoff ratio. The table shows a significantly positive relationship between difference between message and signal and payoff ratio.

Table 3
Logit regression on coordination.

	Marginal effect
Intercept	-1.279***
signal+partner's signal	0.015***
|signal-partner's signal|	0.000
SIM VS. SIM-M	0.584***
SIM-M VS. SEQ	0.296***
SEQ VS. SEQ-M	0.088
Round	0.000
Observations	1740

Notes: T test uses robust standard errors clustered for sessions. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 4
Logit regression on miscoordination.

	Marginal effect
Intercept	0.029
signal+partner's signal	-0.002
|signal-partner's signal|	0.007**
SIM VS. SIM-M	-0.080***
SIM-M VS. SEQ	-0.149***
SEQ VS. SEQ-M	0.049
Round	-0.002
Observations	1740

Notes: T test uses robust standard errors clustered for sessions. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

4. Conclusions

We experimentally show that, cheap talk promotes the coordination and welfare significantly, but this effect is weaker than the effect brought by timing endogenous, and become insignificantly under timing endogenous. This experimental result may imply that actions speak louder than words in such experimental design. We also observe that players whose message to their partners

Table 5
OLS regression on payoff ratio of group per round.

	Coff.
Intercept	0.713***
signal+partner's signal	0.002***
|signal-partner's signal|	-0.001
θ	-0.002**
SIM VS. SIM-M	-0.082***
SIM-M VS. SEQ	0.042***
SEQ VS. SEQ-M	-0.000
Round	0.000
R^2	0.135
$adjusted\ R^2$	0.131
Observations	1740

Notes: T test uses robust standard errors clustered for sessions. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 6
OLS regression on individual payoff ratio per round.

	Coff.
Intercept	0.693***
signal	0.003***
message from partner	-0.000
θ	0.002
message - signal	0.001**
SEQ-Dummy	0.044***
Round	0.002
(message - signal)× SEQ-Dummy	0.000
R^2	0.135
$adjusted\ R^2$	0.131
Observations	1740

Notes: T test uses robust standard errors clustered for sessions. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

are higher than self-signal tend to realize a higher payoff ratio. This result may imply players who tell a lie that message is higher than signal, are higher than participants who talk the truth.

There is a large number of studies research the influence of cheap talk on coordination games. But there are very few studies dealing with this issue under the environment of incomplete information and asymmetric information. Furthermore, to the best of our knowledge, there is no experimental research to study the effects of cheap talk and timing endogenous together. Our research has filled in this blank of research on cheap talk, clarified the rule of the cheap talk in the global coordination game under asymmetric information, and also clarified the interaction effect of cheap talk and timing endogenous.

Reference

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