# How does the difference in the perspectives of accounting institutions affect the development of trust and reciprocity?: History, institution, and experiment

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## Abstract

The objective of this paper is to examine how the difference in the perspectives of the formation of disclosure and auditing institutions among countries affect the development of trust and reciprocity between managers and investors, and how these influence the performance of society.

We use the trust game with disclosure option and compare the American-oriented system (American condition) and the British-oriented system (British condition) by experiments. Our results show that there are certain risks in the American-oriented system because managers could use the disclosure option to get the trust of investors and then betray their trust.



**Keywords** Experimental comparative institutional analysis; trust game; trust; reciprocity; disclosure option; the American-oriented system; the British-oriented

system;

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## 1 Introduction

The objective of this paper is to examine how the difference in the perspectives of the formation of disclosure and auditing institutions among countries affect the development of trust and reciprocity between managers and investors, and how these influence the performance of society. We use the trust game with disclosure option and compare the American-oriented system (American condition) and the British-oriented system (British condition) by experiments. Our main results show that there are certain risks in the American-oriented system because managers could use the option to get the trust of investors and then betray their trust.

People's faith in accounting and auditing institutions has been shaken after the exposure of large accounting frauds, such as the Enron scandal.[1] These discussions ultimately boil down to the most fundamental and important question: For whom have the accounting and auditing institutions been established? For whom do the accounting and auditing systems exist? Thinking in a simple way, would differences in the perspectives of institutions result in some type of gap in human relationships and the overall performance of a society? In order to answer this question, what method can one use to approach the issue?

In this paper, we approach the issue by using a new framework of experimental comparative institutional analysis,[2] which combines comparative institutional analysis

[1] Refer to Benston et al. (2003) and Brewster (2003) regarding the Enron scandal.
[2] Refer to Kawagoe (2010) and Taguchi (2011) for more details on this framework.

(Aoki 2001, 2010; Grief 2006) and behavioral game theory (Camerer 2003). On the basis of the methodology described above, we will extract the essence of the issue using the game theory, and then we will actually examine it by economic experiments.

In history, although there are many arguments on the perspectives of formation of accounting institutions among countries, mainly there are two types of the perspectives. The first perspective is the British-oriented disclosure system. In this perspective, disclosure and auditing systems have been established for shareholders. In the Corporate Act of 1879 of the U.K., for example, shareholders had requested trustful accounting systems and hired an auditor to verify whether or not managers tell a truth (Edwards 1978). The second perspective is the American-oriented disclosure system. In this perspective, disclosure and auditing systems have been established for managers. In 1901, For example, A Manager of U.S. steel Co. had set a trustful accounting system and hired an auditor to prove her own innocence and to finance huge money (Edwards 1978, Watts and Zimmerman 1983). However, it is not clear how the difference of the perspectives of formation of accounting and auditing systems affect the performance of institution and society. This is open to the question.

To solve this question, we use the modified trust game and compare two institutions by experiments.

The remainder of the paper is organized as follows. The next section discusses related literature. Sections 3 and 4 develop the model and explain the experimental design. Section 5 presents the experimental results. Section 6 offers a summary and concluding remarks.

# 2 Related literatures

## 2.1 The trust game

In this study, we adopt the trust game (Berg et.al. 1995) because it has one of the essential factors of the relationship between managers and shareholders.

First, we discuss the essence of the issue on the basis of the trust game (Berg et al. 1995).

The trust game is a two-step game played by a sender (shareholder or investor) and a receiver (manager). The first step is the determination of investment amount. In this step, a sender freely determines the amount of money ($M$) that can be given to the receiver within the limit of the initial endowment ($E$) ($0 \leq M \leq E$). The receiver conducts business activities using the amount $M$ as the initial capital to earn $e$ times the amount received. $e$ is defined as a multiplier and $e > 1$. The amount of money that the receiver actually receives is $eM$.

The second step is the determination of repayment amount. In this step, the receiver determines the amount of money to repay for the sender ($K$) within the limit $eM$ ($0 \leq K \leq eM$).

In sum, the sender's gain ($gain_{sender}$) and the receiver's gain ($gain_{receiver}$) are as follows.

$$gain_{sender} = E - M + K. \tag{1}$$

$$gain_{receiver} = eM - K. \tag{2}$$

Compared to the modified trust game (described later), it is important that the multiplier $e$ is also common knowledge among the players in this game.

In the trust game, the amount of $M$ can be regarded as an indicator of the degree of the sender's trust for the receiver. This is because the amount of $M$ would change

according to the expectation concerning the amount repaid by the receiver; the more the sender trusts the receiver, the larger the amount of $M$ the sender would invest the receiver. On the other hand, the amount of $K$ or ROI (Return on investment[3]) can be regarded as an indicator of the level of reward in the partner's trust (reciprocity).

## 2.2 The subgame perfect equilibrium of the trust game and experimental results

Next, we will predict the consequences of the trust game using the game theory. We solve this game by the backword induction.

First, considering the receiver's behavior in the second step, the receiver is not required to repay a positive amount of $K$ if he is only maximizing his own gain, regardless of the sender's behavior in the first step. Therefore, it would be the optimal strategy for the receiver to set $K = 0$ regardless of the sender's behavior in the first stage. Considering this fact, it would be logical for the sender to set $M = 0$ (not give anything to the receiver) in the first step. We can expect these consequences on the basis of the subgame perfect equilibrium, which is a standard equilibrium concept in game theory.

However, despite this prediction of the game theory, numerous psychological and economic experiments have observed a phenomenon in which the sender provides a positive amount of $M$ to the receiver and the receiver repays a positive amount of $K$ (Berg et al. 1995, 130).

Furthermore, it is said that a rewarding relationship between sender and receiver, in which the amount of $K$ which the receiver repays increases as the amount of $M$ which the sender invests increases, is observed. In this way, there are cases where the experimental results contradict the prediction of the subgame perfect equilibrium by the game theory. Therefore, as discussed below, we need to not only develop a model, but also need to conduct experiments to test the hypothesis of the theory.

[3]ROI is defined as the rate of $K$ per $M$

### 2.3 The trust game and accounting literatures

This section shows some accounting literatures which have used the trust game. There are mainly two papers in accounting literatures. Here, we will pay attention to the multiplier $e$ in the trust game.

Basu et.al. (2009) verified the importance of recordkeeping by repeated trust game experiments. In Basu et al. (2009), the multiplier $e$ was fixed and common knowledge. In our model (which will be showed in the section 3), in contrast, the multiplier $e$ was flexible and private information of the receiver.

Lunawat (2009) examined the sequential equilibrium theory of disclosure and reputation by modified trust game. In Lunawat (2009) only the sender decides whether to disclose the multiplier $e$. In our model, in contrast, not only the sender but also the receiver decide. So our model would be original one.

## 3 The model and history

### 3.1 History of the formation of disclosure and auditing system: two types of institutions

Let us return to the issue mentioned at the beginning. To solve the problem that "for whom do accounting and auditing institutions exist?", we would look back on the history of the formation of disclosure and auditing system.

There are two major perspectives of historical developments of accounting institutions among countries, The first perspective is the British-oriented disclosure system. In this perspective, disclosure and auditing systems have been established for shareholders. In the Corporate Act of 1879 of the U.K., for example, shareholders had requested trustful accounting systems and hired an auditor to verify whether or not managers tell a truth (Edwards 1978). In audit theory, this idea is known as the information hypothesis, which states that audits exist to protect shareholders and investors,

on the assumption that managers may lie (Wallace 1986). For example, it is said that the need for audits by accountants spread from the perspective of protecting shareholders in the United Kingdom in the nineteenth century (Tomooka 1995). We will call this perspective the British-style (British-oriented) disclosure system.

The second perspective is the American-oriented disclosure system. In this perspective, disclosure and auditing systems have been established for managers. In 1901, For example, A Manager of U.S. steel Co. had set a trustful accounting system and hired an auditor to prove her own innocence and to finance huge money (Edwards 1978, Watts and Zimmerman 1983). In audit theory, this idea is called the stewardship hypothesis, which states that audits are utilized by managers as a means to prove their own innocence (bonding), to secure a large amount of capital (Wallace 1986). It is said that, historically, the need for audits performed by an accountant increased owing to this idea, which originated primarily in the United States (Edwards 1978). We will refer to this idea as the American-style (American-oriented) disclosure system.

## 3.2 The model: trust game with the disclosure option

Next, we will consider how the difference in the perspectives of disclosure and auditing institutions among countries affect the development of trust and reciprocity between managers and investors, and how these influence the performance of society.

We would modify the traditional trust game. Again, we will pay attention to the multiplier $e$ in the trust game. There are two major differences between the traditional trust game and our modified one.

First, in our model the multiplier $e$ is not public information but private information. This is because, in reality, the multiplier $e$ is considered as managerial ability of managers or firms and as a private information of managers (the receiver in the trust game). The role of the disclosure and audit system is to let society know (to share the knowledge of) a credible $e$. We can say that this setting better represents the reality.

Second, in our model there are two types of the options to disclose the multiplier $e$. Their types depend on the two perspectives of the formation of institutions. As mentioned the above, the multiplier $e$, which is considered as managerial ability of managers in reality, is private information. Thus, we will introduce a disclosure option in this game, to allow sharing the knowledge of the value $e$ through disclosure and auditing systems. This option would be available to both the manager (receiver) and the investor (sender). Once the option is used, an objective and credible value of $e$ is shared among the players. The first type is in the British-style disclosure system. In this system, the investor (sender) has the option to require the manager (receiver) to disclose credible value of $e$. The second type is in the American-style disclosure system. In this system, on the contrary, the manager (receiver) has the option to disclose credible value of $e$ by herself. Therefore, we will compare the case in which the investor has the option (the British condition) and the case in which the manager has the option (the American condition).

1. The American condition: The manager (receiver) determines whether to exercise the option to share the value of $e$ before playing the trust game. When the option is chosen, the value of $e$ is disclosed to the investor (sender), and then, the trust game is played in the same manner as described in the previous section. When the option is not chosen, the game is played without disclosing the value of $e$ to the investor (however, the investor knows in what probability distribution the value of $e$ can be found).

2. The British condition: The investor (sender) determines whether to exercise the option to require the manager (receiver) to disclose credible value of $e$ prior to playing the trust game. The subsequent flow is the same as in the American condition.

To make the analysis simpler, we assume there is no cost to exercise the option. Furthermore, it is assumed that the value of disclosed $e$ is credible and 100% reliable. Figure 1 shows the essence of the whole setting of our modified trust game. Figure 2 shows the timeline of our model.

*Insert Figure 1 about here.*

*Insert Figure 2 about here.*

### 3.3 The subgame perfect equilibrium of the trust game with the disclosure option and the hypothesis

What differences can we see in the behavior of investors and managers when the British and American conditions are compared? Moreover, from the perspective of institutional design, which condition promotes corporate investment and which condition causes corporations to respond to the trust of investors?

According to the predictions of the game theory, there should be no difference between these two conditions. Because whether the value of $e$ has been disclosed does not affect the gain of both players.[4] Figure 3 shows the game tree and the theoretical predictions of the game theory.

*Insert Figure 3 about here.*

We propose the following hypothesis for this model:

**Hypothesis 1** *There is no statistically difference in senders' and receivers' action (the*

[4]This is also because there is no cost to exercise the option in our model.

*amount of M and that of K) between the The American condition (in which the receiver has the disclosure option) and the British condition (in which the sender has the disclosure option).*

# 4 Experimental design

we conducted experiments of the trust game with the disclosure option under the British and American conditions described in the section 3.

We report data from the 28 subjects, collected in February 2013. Eighteen subjects participated in the American condition and ten subjects participated in the British condition. All sessions were conducted at Doshisha University in Japan. Subjects were primarily undergraduate students from Doshisha University recruited by advertisements and e-mail. Due to the abstract and relatively simple nature of the decision task, a background in accounting was not a prerequisite for participation. No one participated in more than one session of this experiment. Each participant took part in 20 rounds of decision making. Participants took about 90 minutes (including instructions) to complete and earned about ¥2,872 on average.

The experiment was run on networked computers using the z-Tree experiment software package (Fischbacher 2007) (Figure 4). Our subjects were asked not to directly communicate with one other, and the only interactions were via a computer program. Also, all treatments randomly re-matched the pairs of subjects in each period to minimize the potential impact of reciprocal concerns.

*Insert Figure 4 about here.*

At the beginning of a session, subjects were seated in a single room and given written instructions. Instructions were read aloud to subjects in an attempt to make the rules of the game common knowledge. After this, subjects took a quiz to assure they

understood them. We strove for neutral terminology in the instructions.

After action choices were entered, each subject was shown the following information: his/her own action, another's action, and his/her own payoff (Figure 5). In all treatments, subjects were not given information, either individually or in aggregate, about the results of other pairs of subjects. At the end of the round, subjects were asked to observe their results and enter the information from that round into a record sheet.

*Insert Figure 5 about here.*

The experimental session ended after round 20. Each subject received his/her earnings from 20 rounds at the rate of ¥ 50 per point. Additionally, all subjects received ¥ 2,000 for showing up.

While a subject's partner in the game was randomly selected each time, the subject's role (sender or receiver) was determined at the beginning of the experiment and remained the same throughout those 20 plays. Specifically, in both conditions, 18 or 10 individuals were divided into two groups (a group of senders and a group of receivers) of 9 or 5 individuals, and each individual from one group played the trust game with a randomly selected subject from the other group.

Parameters for the experiment were standardized for both conditions as follows. The value of the initial endowment $E$ is 10. The value of multiplier $e$ was set to become 3 or 5, each with a 1-in-2 chance. However, since it would be difficult to compare both conditions if there is a bias in the resulting values of $e$, the experimenter selected cases in which the frequency of occurrence on the basis of the above distribution is ten times the actual value of $e$ and applied them to all pairs of senders and receivers in the two conditions.

# 5 Experimental results

Next, we will explain the results of the experiment.

First, we explain the changes that occurred in the audit option usage under each condition as the game was repeated. The bar graph in Figure 6 shows the rate at which the audit option was taken to disclose the value of $e$ under each condition in the first half (1 to 10 times) and in the second half (11 to 20 times).

*Insert Figure 6 about here.*

Accordingly, we can see that during the first half, the usage rate under the British condition was very high, at about 86%, whereas it remained at approximately 64% under the American condition. In the second half, the usage rate was approximately at 82-86% under both conditions.

This indicates that whereas investors frequently requested the disclosure of $e$ by exercising the option in the British condition, the managers were not eager to exercise voluntarily the disclosure option during the first half of the experiment in the American condition. However, this preference drastically changes in the second half of the experiment, and the difference in the usage rate almost disappears. The reason for the disappearance of the gap between both conditions can be attributed to a significant increase in the usage rate under the American condition.

How can we explain the significant increase in the rate of the option usage under the American condition? Figure 7 shows the average investment by condition and option usage.

*Insert Figure 7 about here.*

Figure 7 shows the following trends for the American conditions: The amount of

investment is clearly higher when the disclosure option is used compared to when it is not used. From this, we see that the disclosure system promotes corporate investment behavior under the American condition.[5]

So the reason why the usage rate of the option significantly increased under the American condition was supposed that managers learned that the amount of investment increases when the option was exercised. In other words, under the U.S. condition, whereas managers who took the disclosure option to share the value of $e$ earned the trust of investors and subsequently received larger investments as a result, mangers who did not take the option lost the trust of investors and received lower investments.

Why the shareholder trust the manager under the American condition ? Perhaps, the shareholder imagined that the manager who took the option to share the value of $e$ was trustworthy and would repay more money. But their imagination was misunderstanding. Whether to take the option is not associated with repaying more money in this game. We could call this trend as "the shareholder's illusion for managers."

Finally, in order to see how managers rewarded investors for their investments, let us look at the investor's ROI (Return on Investment[6]). ROI could show the receiver (manager)'s reciprocity for the sender (investor) in this game. Figure 8 shows the ROI by condition using a line graph.

*Insert Figure 8 about here.*

We see that the common tendencies of ROI under both conditions and option usage. The ROI is clearly higher when the option is used compared to when it is not used. These results indicate that the ROI becomes higher in an environment in which trust is created.

[5]This difference is statistically significant($p < .05$). Our hypothesis is not supported in the amount of $M$.
[6]This indicator was also used by Basu et al. (2009).

Then, there is the difference between these two conditions. As we can see from Figure 8, the ROIs under the British condition are higher than those under the American condition are, regardless of using the disclosure option. Figure 9 shows the total period of ROI and the time series change of ROI by condition.

*Insert Figure 9 about here.*

In total period, Figure 9 shows that there is the difference of ROI between the two conditions. This difference is statistically significant($p < .05$). Our hypothesis is not supported in the amount of *ROI*.

In time series, Figure 9 shows that the ROI drastically decreased under the US condition. The reason is that, under the US condition, there were managers who purposely chose to betray investor trust after choosing the disclosure option.

The important point is the fact that ROI under the British condition are higher, even though the average investment amount is actually higher under the American condition. Consequently, we see that the managers who earned investors' trust by using the disclosure option under the American condition were less likely to reward the investors for their investment, compared to the managers who were asked to disclose the value of $e$ under the British condition.

# 6 Conclusion

This paper used an experiment to examine how differences in the perspectives (formation processes) of disclosure and auditing systems affect the trust and reciprocity formation between managers and investors, and ultimately how these differences influence the overall performance of society.

Specifically, we hypothetically created in a laboratory setting two societies; one where managers themselves had the disclosure option (the American system) and an-

other where the option was available to investors (the British system). We examined how subjects who were given financial incentives behaved, how the trust and reciprocity was developed, and how the performance of the societies changed as a whole.

There are three important implications. The first point is that disclosure systems promote investment behavior among investors under the American condition, where managers can voluntary take the disclosure option. This result suggests that corporate investment could become more active under an American system. Second, however, the active investment is supported by "the shareholder's illusion for managers." Third, the experiment shows that there are certain risks in the American system because managers could use the disclosure option to skillfully win the trust of investors and then betray that trust.

The last point has an important implication for the real world. It seems that large accounting frauds such as the Enron scandal are increasing, and looking back, similar incidents have occurred under the American system. This may be because this system actually has a mechanism to lead investors to trust managers and the latter to betray that trust. If this is true, perhaps we need to seriously consider the mechanism of the American system.

This study has some limitations as the following points: First, the model in this paper merely extracted the essence of the real issue; therefore, it does not necessarily reflect everything about the real world. Undoubtedly, it is necessary to analyze other factors simultaneously. Second, there is a need to conduct comparative reviews with systems other than the American and British systems (e.g., comparison between a society where the value of $e$ is shared knowledge and another, where $e$ remains as private information (i.e., there is no option)). Future research can help explore these ideas and overcome these limitations.

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Figure 1: the setting of trust game with disclosure option compared with the normal trust game

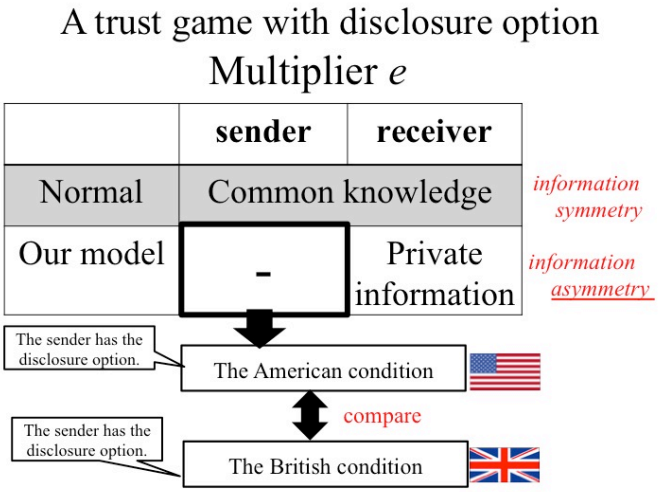

Figure 2: the timeline of trust game with disclosure option and the theoretical prediction

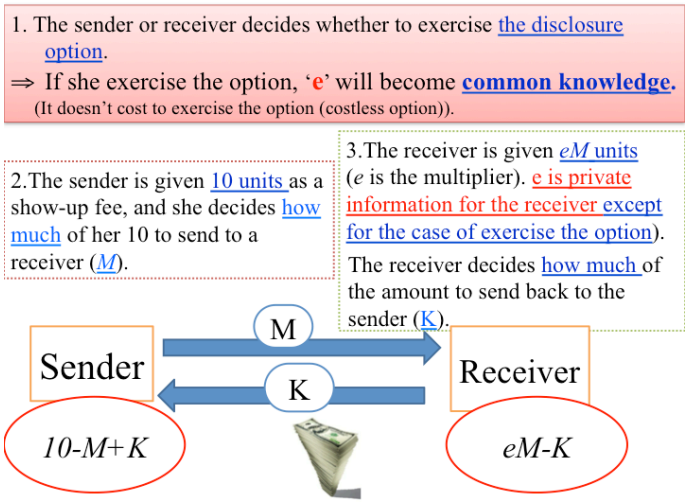


Figure 3: the game tree of trust game with disclosure option

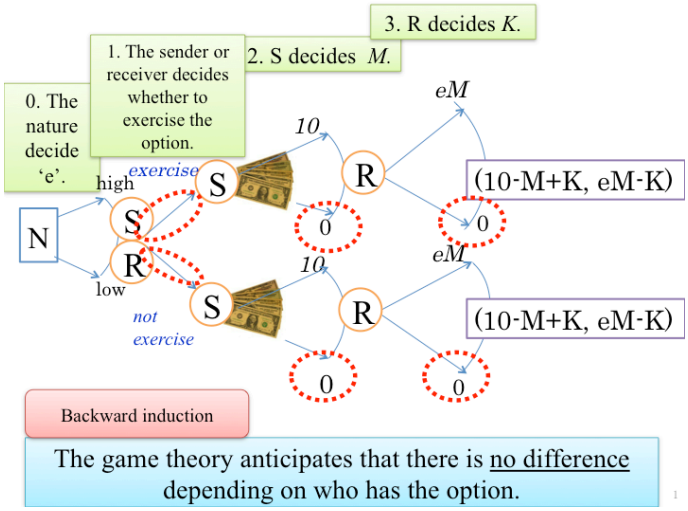

Figure 4: z-tree

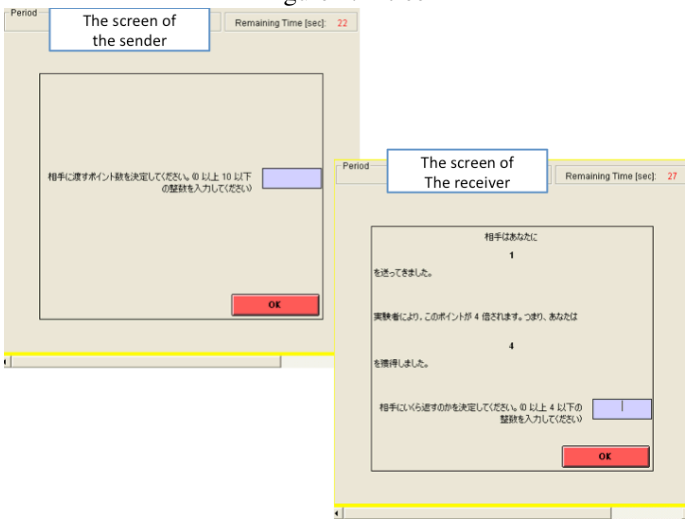


Figure 5: Information after action choices were entered

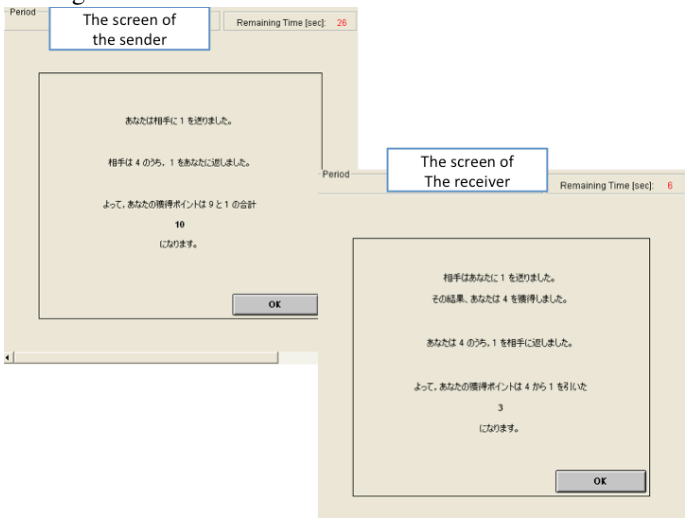

Figure 6: Changes in the Usage Rate of the Audit Option (Rate of Disclosure of *e*) by Condition

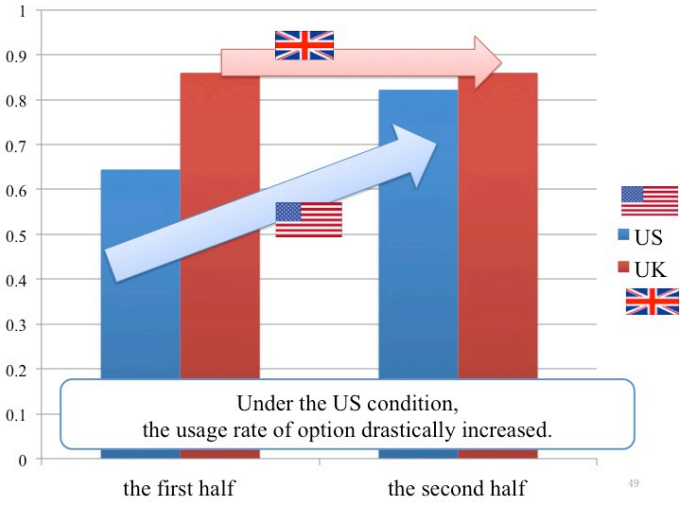


Figure 7: Changes in Average Investment by Condition and Option Usage

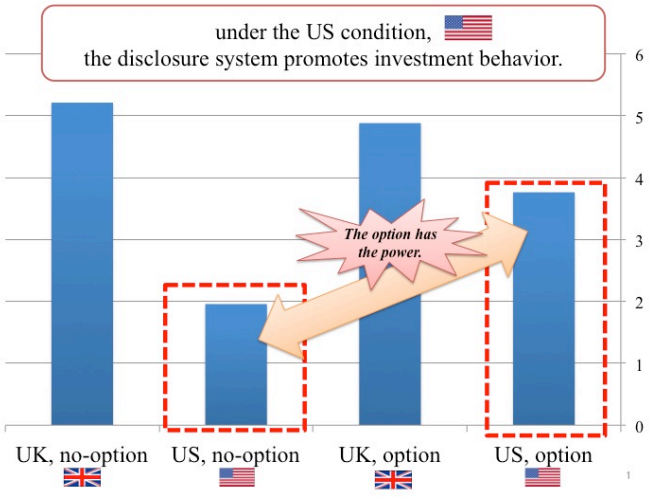

Figure 8: Changes in the ROI by Condition and Option Usage

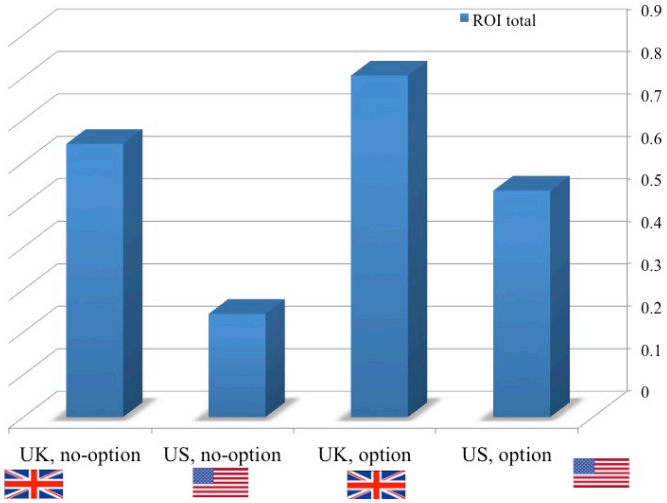


Figure 9: ROI in total period and time series by condition