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AN EXPERIMENTAL STUDY ON STRATEGIC PREFERENCE FORMATION IN TWO-SIDED MATCHING MARKETS

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Abstract

We study an experiment of the students-proposing deferred acceptance mechanism (DA) in matching markets where firms are matched with students. We investigated the two different situations: (i) Students know firms' preferences and firms submit their true preference, (ii) Students know firms' preferences and firms submit a higher ranking to students who give them higher ranking. This experiment confirms that the matching results under DA influence students' preference formation, which decreases the degree of stability. If firms do not submit their true preferences, students also do not submit their true preferences. As a result, the situation induces instability. Moreover, we find the new pattern of submitted preferences – compromise strategy. If there is an extreme option, students will tend to prefer the in-between option.

1 Introduction

Gale and Shapley's (1962) deferred acceptance mechanism has been used for clearing-houses to match agents on two sides. The most well-known example is the National Resident Matching Program which matches physicians with hospitals in the US. Although it is incentive compatible for one side, the experiment literature reveals that agents often manipulate DA with their preferences over those on the other side (Hakimov and Kübler (2019)). In particular, the degree of manipulation is lower with less

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information on the preferences on the other side (Pais and Pintér (2008)). We further investigate what kind of preferences are submitted to the clearinghouse.

The Japanese entry-level labor market is another example of two-sided matching markets for college students and recruiting firms. Although the market is decentralized with the unraveling phenomena (Roth and Xing (1994)), there are platform companies that post recruiting information about registering firms on the web and then provide the information to registering students. One of such companies, Riku-nabi, analyzed students' behavior on the web and then sold their analyzed preferences of students . This was considered an invasion of students' privacy and caused a social problem. The reason why such information is valuable to firms is that firms desire students who evaluate them high. This kind of firms' preferences corresponds to the skipping-down strategy in the centralized matching mechanism (See Echenique et al. (2016) and Kawagoe et al. (2018) for experimental evidence). The skipping-down strategy of an agent is the preference ordering of moving up agents on the other side if they evaluate themselves highly.

We experimentally investigate agents' strategy of submitting preferences, depending on the behavior of those on the other side. In particular, in our two-sided matching market, one side is "students," while the other side is "firms." We assume that there is a clearinghouse that uses a student-proposing deferred acceptance mechanism (hereafter, DA) for matching students and firms after collecting preferences from students and firms. [1]Our information setting is complete information where all agents know the other agents' true preferences. [2] Our baseline treatment is that firms sincerely report their preferences, and this reporting behavior is known to students. We call it the **sincere strategy (SS) treatment**. Another treatment is that firms use the skipping-down strategy for reporting preferences, which is known to students. We call it the **skipping-down strategy (SDS) treatment**.

The SS treatment was investigated in Echenique et al. (2016) and other studies. Their result is that students are not sincere but use the skipping-down strategy. However, we observe that the skipping-down strategy is rarely chosen in our two treatments. Surprisingly, we find that a new type of strategy, what we call the **compromise strategy**, is pervasive in our experiment.

The compromise strategy is the preference ordering of putting the middle into the

[1]DA is the well-known two-sided matching mechanism. Each student applies to their most favorite firm that has not been rejected. Each firm considers the students it has held together with all applied students and decides to accept and reject. The mechanism terminates when no student remains unassigned. We explain its procedure and properties in Section 2.

[2]Echenique et al. (2016) mentioned that complete information setting is that it first step in understanding participants' response. Moreover, most theoretical studies assumes agents has complete information setting. Of course, like to Pais and Pintér (2008) and Pais et al. (2011), we can check the behavior various information settings. However, the skipping-down strategy in our experiment, student's skipping down strategy based on other sides preference. It is hard to make theoretical predictions.

first choice, excluding the best and the worst choice, in the preference ordering. This type of strategy explains about 40% and 50% of the data in SS and SDS treatments, respectively. The compromise strategy applies the Simonson and Tversky (1992) extreme aversion in individual decision-making to preference strategies in two-sided matching markets.

As Roth (2002) documented, the stability has been the most important property for the functioning of mechanisms in two-sided matching markets. Stability requires that there is no pair of agents who are not matched prefer to match each other. In the realized matching of our experiment, as a result of frequent use of compromise strategy above mentioned especially in , we observed blocking pairs amounts 2 out of 48 students in SS treatment, 17 out of 48 students in SDS treatment had blocking pairs, respectively.

This paper contributes to the literature in two ways. First, we are first in finding compromise strategy can be a major subjects behavior in matching experiment. Moreover, compromising has a commonly reported behavior in individual decision making, which is originally systematically investigated by Simonson and Tversky (1992). Second, to the best of our knowledge, our study is new in conducting treatments in which firms change its behavior based on the preferences submitted by the students automatically(such that by programmed).

1.1 Related literature

DA has desirable properties of strategy-proofness and stability in full information setting. First, Stable in the sense that its resulting matching is stable at the reported preference profile (Gale and Shapley (1962)). Second, it is strategy-proof in the sense that it is a weakly dominant strategy for all students to submit their true preferences (Dubins and Freedman (1981), Roth (1982)). Subsequent to these seminal studies, the following three strands of literature have emerged.

Type of untruthful preference submission in matching experiments

Many experimental studies show that the truth-telling rate is not 100% in DA (See the recent survey by Hakimov and Kübler (2019)).

Other previous experiments found many biases in decision making, for example,

- Skipping-down strategy(Echenique et al. (2016), Kawagoe et al. (2018)) in which a student moves up the firm if it evaluates the student highly. That is similar to priority school bias.

- Priority school bias(Pais and Pintér (2008), Pais et al. (2011)): Students submit to the school where they have a priority higher than their true preference.

- District school bias(Chen and Sönmez (2006)): A student puts their district school into a higher ranking than true preference. Each student is highly prioritized by the school in the district they live in, and hence they are likely to be matched with there. with the school. The bias can be regarded as the same as the skipping-down strategy.

- Minneapolis strategy: (Chen and Sönmez (2006)): Students rank a school with a large capacity (or own school-zone higher.

- Small size bias (Chen and Sönmez (2006), Pais and Pintér (2008), Pais et al. (2011)): Students rank schools with fewer seats lower. Our experiment's capacity is the same(capacity = 1), so the bias is not applicable.

- Similarity preference bias((Chen and Sönmez (2006))): Students avoid conflict by predicting that they will have similar behavior to their own. Students only know their own preferences. Therefore, our experiment's deviation behavior does not apply to any of these.

Recently, other studies have shown deviations from the dominant strategy(Dreyfuss et al. (2019)).

Robustness check of matching theory in various settings

Antler (2015) apply the preferences formation. If agent i 's message expresses that he/she desires agent j , then this makes him/her more attractive to j. This is similar to skipping-strategy; however, they considered changing true preference, not bias.

We use the standard matching model and formulate the skipping-down and compromise strategies in general as follows. Section 2 describes the theoretical background, and our experimental design includes the skipping-down strategy formulation. Section 3 explains our experimental settings. Section 4 presents our experimental results, including the compromise strategy formulation. Section 5 provides the concluding remarks.

2 Model

Our experiment considers a two-sided matching market with agents from two (disjoint) sides, students and firms. For simplicity, we focus on one-to-one matching interaction with the number of students equal to that of firms.

Let there be a finite set of students, S, and a finite set of firms, F. Each student $s \in S$ has a strict preference relation $\succ_s$ over the set of firms, and each firm $f \in F$ has a strict preference relation $\succ_f$ over the set of students. Let $\succ_S = (\succ_s)_{s \in S}$ and $\succ_F = (\succ_f)_{f \in F}$. Strict preference means that there are no tied ranks; each participant

arranges the members of the other group in ranking order. We denote by $p_s(f)$ the position of firm f with respect to the student s's preference $\succ_s$. For example, if a student s lists f_A as the most preferred firm, f_B as the second preferred firm, then $p_s(f_A) = 1$ and $p_s(f_B) = 2$.

Similarly, we denote $p_f(s)$ the position of student s with respect to the firm f's preference $\succ_f$. For example, if a firm f's second choice is student $s_1, p_{s_1}(f) = 2$.

A *matching* μ is a function μ: $S \cup F \to S \cup F$ such that each student is assigned a firm and each firm is assigned a student, i.e., for each $s \in S$ and each $f \in F$ satisfies (i) $\mu(s) \in F$, (ii) $\mu(f) \in S$, (iii) $\mu(s) = f \Leftrightarrow \mu(f) = s$. Given matching μ, a pair $(s, f) \in S \times F$ is called a blocking pair if $s \succ_f \mu(f)$ and $f \succ_s \mu(s)$. A matching μ is *stable* if there is no blocking pair.

We assume that a clearinghouse collects preferences from students and firms. It determines the matching via a mechanism using collected preferences. In other words, each agent submits their preference to the clearinghouse, which implements an mechanism to determine the matching result. We call a collection of preferences $(\succ_i)_{i \in S \cup F}$ as a preference profile. A *mechanism* φ is a function that maps preference profiles to matchings. Let φ_i be the agent who is matched with agent i. A participant $i \in S \cup F$ has their own true preference $\succ_i$, other preference $\succ_i'$ and other participants' preference represented by $\succ_{-i}$. We call truth-telling is a *dominant strategy* for participant i if $\varphi_i(\succ_i, \succ_{-i}) \succ_i \varphi_i(\succ_i', \succ_{-i})$ for any $\succ_i'$ and any $\succ_{-i}$. Moreover, when it is the dominant strategy for all participants $s \in S$ to submit their true preference $\succ_s$, the mechanism is called *strategy-proof*.

We use Gale and Shapley (1962)'s student-proposing deferred acceptance mechanism (DA) that selects a matching by using the following algorithm.

DA

> **Step 1**: Each student applies to her first choice. Each firm tentatively assigns its seats to its applicants following the firm's preferences. Any unassigned student is rejected.
>
> **Step k $\geq$ 2**: Each student who was rejected at the previous step applies to her next favorite firm. Each firm considers the students it has been holding together with its new applicants and tentatively assigns its seats following the firm's preferences. Any unassigned student is rejected. The mechanism terminates when no student remains unassigned.

DA is known to satisfy the following properties. First, DA is stable in the sense that its resulting matching is stable at the reported preference profile (Gale and Shapley (1962)). Second, it is strategy-proof in the sense that it is a weakly dominant strategy for all students to submit their true preferences (Dubins and Freedman (1981), Roth (1982)).

In our experiment, we let the participants play the role of students, not firms, and then submit their preferences to the clearinghouse, i,e., experimenter which uses DA. In our design of experiments, participants as students are endowed with their true preferences. In submitting their preferences, participants as students do not have to submit their true preferences but can choose any. If the submitted preferences are not true, we say that they *manipulate* preferences. Since DA is strategy-proof, participants have no incentives to manipulate preferences. Hence, if we observe manipulating preferences in experiments, the reason would not be the mechanism in use.

The literature reports that deviation from truth-telling in DA is pervasive (Hakimov and Kübler (2019)). Although DA is strategy-proof, many previous experiments studies show some tendency of deviating preferences. A typical example is the skipping-down strategy in which a student moves up the firm if it evaluates the student highly (Echenique et al. (2016), Kawagoe et al. (2018)). For example, if firm f_A has s as its top choice and firm f_B has s as its the second choice, student s prefers f_A to f_B. We assume strict preferences, so the skipping-down strategy is uniquely determined. We define the skipping-down strategy as follows;

Skipping-Down Strategy

1 Given true preference $\succ_s$ of student s and true preference profile $\succ_F$ of firms F, we say that strategy $\succ'_s$ is the skipping-down strategy of student s if for any two firms f and f', $f \succ'_s f' \Leftrightarrow [p_f(s) < p_{f'}(s)]$ or $[p_f(s) = p_{f'}(s)$ and $f \succ_s f']$.

2 Given true preference $\succ_f$ of firm f and the preference profile $\succ_S$ of students S, we say that strategy $\succ'_f$ is the skipping-down strategy of firm f if for any two students s and s', $s \succ'_f s' \Leftrightarrow [p_f(s) < p_f(s')]$.

As an example, suppose that firm f_A has student s_1 as its first choice and f_B has student s_1 its third choice. Then, $1 = p_{f_A}(s_1) < p_{f_B}(s_1) = 3$, so the student s_1's skipping-down strategy $\succ'_{s_1}$ implies $f_A \succ'_{s_1} f_B$. Similarly suppose that both firms f_A and f_B has student s_1 its first choice, $p_{s_1}(f_A) = p_{s_1}(f_B) = 1$. Suppose also student s_1 has $f_A \succ_{s_1} f_B$ as his true preference $\succ_{s_1}$. Then the student s_1's skipping-down strategy $\succ'_{s_1}$ is $f_A \succ'_{s_1} f_B$.

3 Experimental design

The participants played the role of students. At the same time, firms' behavior is programmed. We have three treatments, varying information given to the participants on firms' strategies. Once all the preference profiles were collected, the matching results were calculated by DA. Specifically, three treatments are:

• `Treatment 1 (SS)` – Students know firms' true preferences, and firms are programmed to submit their own true preferences.

• `Treatment 2 (SDS)` – Students know firms' true preferences, and firms submit are programmed to follow the skipping-down strategy.

Table 1: Example of SS

(a) Firm f 's true preference

First	s_1
Second	s_2
Third	s_3
Fourth	s_4
Fifth	s_5
Sixth	s_6

(b) submitted ranking of firm f by students

First	s_3, s_4
Second	s_5
Third	s_1,s_2, s_6
Fourth	
Fifth	
Sixth	

(c)Firm f' submit preference

First	s_3
Second	s_4
Third	s_5
Fourth	s_1
Fifth	s_2
Sixth	s_6

For example in SDS as shown in Table 1, a firm f's true preference $\succ_f = s_1 \succ_f s_2 \succ_f s_3 \succ_f s_4 \succ_f s_5 \succ_f s_6$ in panel(a). Suppose that s_3 and s_4 submitted firm f as their first choice, s_5 submitted as the second choice, s_1, s_2 and s_6 submitted as the third choice in panel(b). Then, firm f submits its preference $\succ'_f = s_3 \succ_f s_4 \succ_f s_5 \succ_f s_1 \succ_f s_2 \succ_f s_6$ in panel(c).

The SS is a typical treatment. Table 2 panels (a) and (b) summarize true preferences used across three treatments. We chose true preferences as in panels (a) and (b) for two reasons. First, in SS if all participants submit their truth-telling, then everyone will match with their second-ranked firms (indicated by TT in panel (a) first column). Second, panel (c) indicates students' skipping-down strategy. In SS, firms submit their true preference as panel (b). In SDS, firms submit their skipping-down strategy as panel (d) based on students skipping down strategy as panel (b). This design would verify whether participants take the skipping-down strategy even at the cost of being worse off (indicated by SD in panel (a) first column).

Table 3 summarized the first choice of truth-telling and skipping down strategy. Under our specification of true preferences shown in Table 2 panels (a) and (b), any student following the skipping-down strategy manipulates their own first choice. We distinguish which truth-telling or skipping-down strategy is taken.

Our experiment was computerized using the experimental software oTree (Chen et al. (2016)). One group consists of six participants. Each participant was seated randomly. No communication among participants was allowed. The total number of participants was 96 (each treatment has 48 participants $\times$ 2). We recruited participants at the University of Tsukuba.

SS and SDS each had three experimental sessions. At the beginning of each session, we distributed the instructions and read it to them by reading software. We prepared the review question along with the instructions, and we gave participants points as an incentive to solve the review question (15 minutes). All participants answered all questions correctly and got all points. We distributed the answer to the review question, and participants checked the collect answer (5 minutes). After gathering the review questions and answers, we started the participants to play only one round. There was no time limit for the decision-making. Matching results were displayed after every participant in the group submitted preferences. The points gained depended on the result of the match, as follows; If a participant match with the first choice, the participant gets 14 points, second choice 11 points, third choice, 9 points, fourth choice 8 points, fifth 7.5 points, sixth 7 points. Note that points are converted based on the ranking of true preference. After the matching result was displayed, participants answered a questionnaire. Each subject was privately paid the sum of his/her earnings for the review question and experiment(show-up fee is 500 JPY, 1 point equals 50 JPY).

Table 2: Experimental settings

(a) True preference of students

	$\succ_{s_1}$	$\succ_{s_2}$	$\succ_{s_3}$	$\succ_{s_4}$	$\succ_{s_5}$	$\succ_{s_6}$
	f_A	f_B	f_F	f_A	f_B	f_F
TT	f_E	f_C	f_A	f_B	f_F	f_D
	f_C	f_D	f_B	f_F	f_A	f_E
SD	f_B	f_F	f_C	f_D	f_E	f_A
	f_F	f_A	f_E	f_C	f_D	f_C
	f_D	f_E	f_D	f_E	f_C	f_B

(b) True preference of firms

$\succ_{f_A}$	$\succ_{f_B}$	$\succ_{f_C}$	$\succ_{f_D}$	$\succ_{f_E}$	$\succ_{f_F}$
s_6	s_1	s_6	s_1	s_2	s_2
s_5	s_3	s_1	s_2	s_6	s_4
s_3	s_4	s_2	s_6	s_1	s_5
s_2	s_6	s_3	s_4	s_5	s_1
s_1	s_2	s_5	s_3	s_4	s_6
s_4	s_5	s_4	s_5	s_3	s_3

(c) Skipping-down strategy of students based on Table (b) true preference of firms

$\succ'_{s_1}$	$\succ'_{s_2}$	$\succ'_{s_3}$	$\succ'_{s_4}$	$\succ'_{s_5}$	$\succ'_{s_6}$
f_B	f_F	f_B	f_F	f_A	f_A
f_D	f_E	f_A	f_B	f_F	f_C
f_C	f_D	f_C	f_D	f_E	f_E
f_E	f_C	f_D	f_E	f_C	f_D
f_F	f_A	f_F	f_A	f_B	f_B
f_A	f_B	f_E	f_C	f_D	f_F

(d) Skipping-down strategy of firms based on Table (c) skipping-down strategy of students

$\succ'_{f_A}$	$\succ'_{f_B}$	$\succ'_{f_C}$	$\succ'_{f_D}$	$\succ'_{f_E}$	$\succ'_{f_F}$
s_6	s_1	s_6	s_1	s_2	s_2
s_5	s_3	s_1	s_2	s_6	s_4
s_3	s_4	s_3	s_4	s_5	s_5
s_2	s_6	s_2	s_6	s_1	s_1
s_4	s_5	s_5	s_3	s_4	s_3
s_1	s_2	s_4	s_5	s_3	s_6

Table 3: Experimental settings, first choices

	s_1	s_2	s_3	s_4	s_5	s_6
Truth telling	f_A	f_B	f_F	f_A	f_B	f_F
Skipping-down	f_B	f_F	f_B	f_F	f_A	f_A

4 Results

Our interest is how the difference in firms' decision-making affects students' decision-making process. The stability is compared by the number of blocking pairs.

4.1 Stability

We evaluate what percentages of realized matching under each treatment are unstable, using the number of participants who have blocking pairs. The number of students who have blocking pairs are as follows; 1 in SS, and 14 in SDS. [3]

Result 1. *Having information about firms taking skipping-down strategy results in more unstable matchings.*

Support. Significantly more participants had blocking pairs in SDS compared to SS ($p < 0.001$, one-sided proportion test), . □

Table 4: summary of decision making

	SS	SDS
truth telling	43.75 %	29.16 %
manipulation	56.25 %	70.84 %
first choice manipulation	47.9 %	60.41 %
skipping-down	8.3 %	12.5 %

Notes: Each proportion is divided by the number of participants (such as 48).

4.2 Truth-telling

Table 4 presents the proportion of participants who played truthfully (regarding induced preference). We check whether participants manipulated their first choice firm or not (We call such behavior *first choice manipulation*). Note that first choice manipulation includes skipping-down strategy as shown in Table 3.

[3]The number of blocking pairs is as follows; 2 in SS, 17 in SDS, respectively.

Result 2. *Having information about firms taking the skipping-down strategy reduces truth-telling. Approximately ten percent of the participants take the skipping-down strategy in both treatments.*

Support. Table 4 shows the truth-telling rate. Significantly more participants submitted their true preference in SS compared to SDS ($p < 0.0068$, one-sided proportion test) . We check whether first-ranking firms were skipping-down strategies for each student's submitted rank; the first-ranked firm is consistent with the one predicted under the skipping-down strategy. In our experiment, the rates of taking the skipping-down strategy are 8.3 % in SS and 12.5 % in SDS.

□

Although our specification of true preferences is motivated by skipping-down strategies observed in Echenique et al. (2016), Kawagoe et al. (2018), such strategy is not typical in our data.[4]

4.3 Compromise strategy

Given that skipping-down is not frequently observed in our experiment, we introduce another type of strategy called compromise strategy to better explain our data. This bias is similar to a compromise effect (Simonson (1989), Simonson and Tversky (1992)). Simonson (1989) distinguished compromise effect from the other effect, Simonson and Tversky (1992) surveyed in which they asked people to choose one of three options that differed in price and quality. They show that the chosen rate of the middle option is relative to the other extreme. To the best of the author's knowledge, this is the first study to find a compromise strategy in matching.

We model the students who submit their preferences, taking care of the balance between i) to which firms they rank highly and ii) from which firms they are highly ranked. Note that the skipping-down strategy emphasizes only ii), but the novel point of compromise strategy is to consider i) and ii) simultaneously.

To illustrate our idea of compromise strategy, let us look at Table 5 , which illustrates how student 1 makes his compromise strategy.

Table 5 consist of panel (a), (b) and (c). Panel (a) extracted student 1's true-preference. Panel (b) extracted how student 1 is ranked by each firm. Panel (c) is generated by panels (a) and (b), where x-axis is $p_f(s_1)$and y-axis is $p_{s_1}(f)$. For simplicity, we denote point $(x, y) = (p_{f_A}(s_1), p_{s_1}(f_A))$ by A. That is, point $A = (5, 1)$ summarizes the balance between how firm A ranks s_1 (fifth) and how s_1 ranks firm A (first). Similarly, we can plot $B = (1, 4)$, $C = (2, 3)$, $D = (1, 6)$, $E = (3, 2)$ and $F = (4, 5)$.

[4]Other biases reported in existing experimental matching literature are not applicable since any firm has capacity of one in our design and we focus on first-choice manipulations.

In our data, student 1 is likely to submit firm E or C as her first choice. That is these points are middle-ranked in the set. Note that this behavior can be explained by neither truth-telling nor skipping-down strategy: if student 1 follows truth-telling, he should submit firm A as his first choice; if student 1 follows skipping-down strategy, he should submit firm B or D as his first choice.

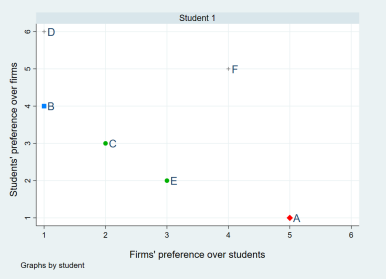
Table 5: Example: Student 1's compromise strategy

$\succ_{s_1}$
A
E
C
B
F
D

(a) $\succ_{s_1}$

$\succ_{f_A}$	$\succ_{f_B}$	$\succ_{f_C}$	$\succ_{f_D}$	$\succ_{f_E}$	$\succ_{f_F}$
	s_1		s_1		
		s_1			
				s_1	
					s_1
s_1					

(b) student 's rank from firms



(c) plot of s_1

Notes: In (c), red-diamonds is true preference, blue-square is skipping-down strategy, green-circle is compromise strategy, gray-cross is other.

We formalize compromise strategies as follows.

Compromise strategy

We formalize the compromise strategy of student s. Plot a point $(p_f(s), p_s(f))$ for each firm f. Here $p_f(s)$ is the position of student s in firm f's preference, while $p_s(f)$ is the position of firm f in student s's preference. We denote f_A for the firm corresponding to point A. We say that a point A **dominates** a point B in the graph if $p_{f_A}(s) \leq p_{f_B}(s)$ and $p_s(f_A) \leq p_s(f_B)$ for at least one strict inequality. Consider the set of undominated points, Z. When there are more than one undominated points, we have the two **extreme points**: the points for the lowest and the highest in the vertical axis.[5] We define a **compromise strategy** to be any strategy whose first choice is in the undominated set excluding the two extreme points.[6].

Now, we show that, following the above elimination steps of choices, student 1 participants to submit firms C or E. For example, in Table 5 panel (c), student 1 has six points: $\{(5,1),(1,4),(2,3),(1,6),(3,2),(4,5)\}$. Since $(1,6) \geq (1,4)$, point D is eliminated. Similarly, $(4,5) \geq (1,4)$, point F is eliminated. Then, student 1's $Z =$

[5]Due to the domination relation in the undominated set, the lowest (highest) point in the vertical axis corresponds to the highest (lowest) one in the horizontal axis.

[6]The compromise strategy occurs when there are at least three points in Z

$\{(5,1),(1,4),(2,3),(3,2)\}$. Since $(5,1)$ has minimal y-coordinate, point A is eliminated. Similarly, $(1,4)$ has maximal y-coordinate, point B is eliminated. Thus, the points which survives the elimination procedure are $\{(2,3),(3,2)\}$. Since the points $(2,3)$ and $(3,2)$ respectively corresponds firms C and E. Therefore, a compromise strategy is to submit firms C or E.

Figure 1 summarizes all students' preferences and strategies of our interest; red-diamond is the true preference, blue-square is skipping-down strategy, green-circle is compromise strategy, gray-cross is other, respectively. Table 6 summarized participants' compromise strategy of their first choice like as Table 3. If the subject has several compromise strategies, we indicate "self" that the participant submits a firm as her first choice as the highest-ranking, and we denote "firm" that the participant submits a firm as her first choice is highly regarded. Table 7 shows the rate of chosen compromise strategy as first choice like as Table 4.

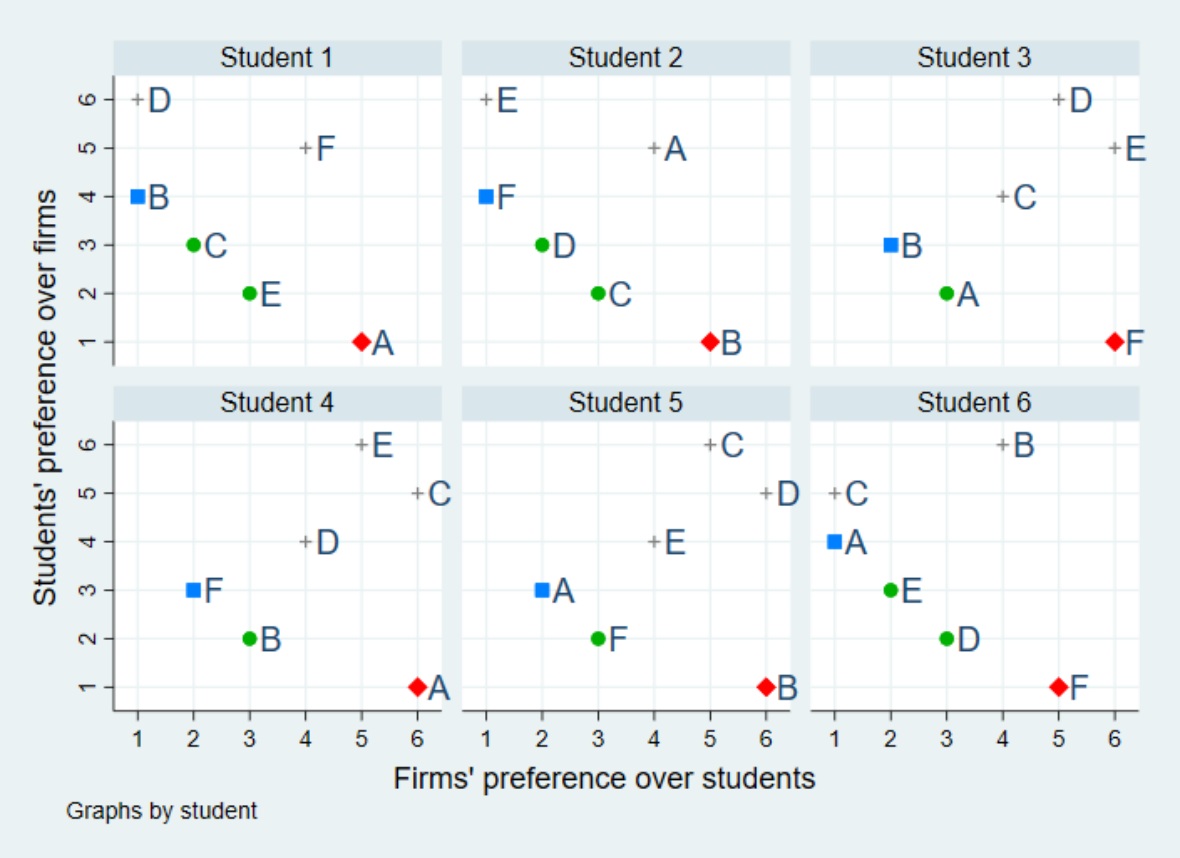


Figure 1: Plot of each student's preference

Result 3. *Under SS and SDS, the number of compromise strategies is significantly higher than the number of skipping down strategies.*

Table 6: Compromise strategy as first submit

	s_1	s_2	s_3	s_4	s_5	s_6
Compromise	C,E	C,D	A	B	F	D,E
- self	E	C	-	-	-	D
- firm	C	D	-	-	-	E

Notes:'self' means that the participant submit a firm as her first choice as the highest ranking of her. 'firm' mean that the participant submit a firm as her first choice which highly regarded.

Table 7: Summary of compromise strategy

	SS	SDS
compromise	39.58 %	47.91 %
- self	20.83 %	29.16 %
- firm	18.75 %	18.75 %

Notes: Each proportion is divided by the number of participants (such as 48).

Support. The skipping-down strategy was taken 8.3% in SS, and 12.5% in SDS in Table 4. The compromise strategy was taken 39.58% in SS, and 47.91% in SDS in Table 7. Significantly, participants who chose the skipping-down strategy compared to participants who chose compromise strategy in SS (p <0.001, one-sided proportion test), also we compare these in SDS (p <0.001, one-sided proportion test). □

5 Conclusion

In this study, we have focused on the effect of preferences disclosure on matching. As other previous studies have shown, people use the skipping-down strategy of ranking the firm, which evaluates him higher. Our experiment supposes that the preference information is disclosed, and firms take the skipping-down strategy. In this case, we observed that students hardly submit their true preferences. As a result, the situation induces instability is observed. Moreover, we find the new pattern of submitted preferences – compromise strategy. If there is an extreme option, students will tend to prefer the in-between option.

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