GENDER DIFFERENCE OF SEARCHING BEHAVIOR

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This study examines individual searching behavior in simple lab experiments to investigate whether there is different searching behavior of different gender. Overall, our lab evidence from experiments suggests three results: first, there is no gender difference of human searching behavior. Second, searching cost does attenuate people to search. Third, a striking result is that information does not make people searching more, which means that people may have a satisficing level in their mind.

I. INTRODUCTION

Studies of searching behavior have often focused on the differences between the searching strategies of beginners and experts due to their experience. In some research, such as “Search and Satisficing” paper by Andrew Caplin, Mark Dean and Daniel Martin and the satisficing modelling of Simon (1955) tried to find out how people search and make choices. In this paper, we study how people rank and search goods in two different situations. We also complement previous studies by including gender difference into examination. We examine whether there is any gender-specific difference influencing people’s searching behavior.

In the real world we find that males will go directly to the product they want and buy it in a short period of time (lower “satisficing level” according to Caplin’s paper). And females may look around all the products and confirm their final choice after a longer period of time (“satisficing “level is higher according to Caplin’s paper). However, “Gender Differences in Risk Aversion and Ambiguity Aversion” by Lex Borghans, Bart H.H. Golsteyn, James J. Heckman and Huub Meijers, a paper which investigated risk aversion, suggested that women are more risk averse than men. In this case, female should search less than male in order to avoid risk. We investigate this kind of searching behavior by including search cost and information cost. We study whether gender difference has an impact on individual’s willingness to pay for searching and searching time he or she needs. Also, we look into how the existence of

information affects human searching behavior, both males and females.

Insider information are everywhere in the real business world. With information cost, people are expected to search more as they may want to know the true value of goods and be able to search until they accept the value. It is believed that people will search more and have a better buying performance when they face a lower information cost and search cost, vice versa. And without search cost, they are expected to search until the end and get the lowest price they want.

I.A Related research

A large body of the existing literatures investigate the impact of incomplete consideration on the quality of choices. However, they do not put gender difference into consideration. How people rank and search for the goods? Do people have different “satisficing” level when gender difference exists? Our study tries to answer these questions.

Bayer and Changxia Ke analyzed a simple two-shop search model in the laboratory by testing if consumers behave differently in equivalent situations, where prices were displayed either as net prices or as gross prices with discounts. Searching decisions of rational buyers should depend on the net price offered in shop one, the search cost and the net price distribution in shop two. And the result is observed price-framing effects reduce the consumer’s propensity to search. They also found discount biases in the treatments. Consumers tend to over-value a discount that is provided in the initial shop.

Andrew Caplin, Mark Dean and Dniel Martin developed a search-theoretic choice experiment to study the impact of incomplete consideration on the quality of choices as many daily decisions were made without full examination of all available choices. People may miss the best option available without fully consideration. In addition, as for the satisficing model of Simon [1955], Simon posited a process of item-by-item search, and the existence of a “satisficing” level of utility. Their experiments covered settings that differed in the number of options available and the complexity of these objects. As a result, they found broad

support for Simon's hypothesis in all cases. Most subjects searched sequentially, and stopped searching when reservation utility was realized.

Also, from the existing literatures, studies reported that limited searching period worsened people's buying performance. However, if the search time becomes longer, too many options will be provided and people cannot process all of them in one time. Thus, a longer searching period may also increase the complexity and affect subjects' buying performance. This can be one of the factors they overlook.

In this paper, we study whether different gender has different willingness to pay for searching. Second, we look into how information affects searching behaviors, both males and females. To provide a strict test of these, we form 3 different treatments as follows:

Treatment I: No information provided and no searching cost
Treatment II: No information provided with searching cost
Treatment III: Information provided with searching cost

In our treatments, we vary two factors: (1) whether subjects are informed of the range and probability distribution of prices and (2) whether subjects have to pay a search fee for every additional search.

The main results of this study fall into three categories. First, there is no significant gender difference. Second, the existence of a positive searching cost attenuates people to search more. Third, it is striking that the disclosure of information does not induce people to search more.

The balance of this study is organized as follows. Sections II and III present the experimental designs and procedural details for our lab experiment. Section IV describes the theoretical prediction and section V shows our experimental results. Section VI discusses the relevancy of these findings to other reasons. Section VII concludes.

II. EXPERIMENTAL DESIGN

II.A Treatment I

We randomly drew 30 numbers from the Excel and prepared a paper listing 30 prices (price ranging from HKD$10 to HKD$50). The subject was endowed with HKD$50. The experimenter verbally gave a price to subjects and subjects had to decide either to accept and pay the existing price or continue to search another price with no searching fee. Subjects were informed that they could freely stop searching and then refer back to and pay any one of the previous prices. Subject's payoff was as follows:

HKD$50 – price

Each participant's experience typically followed three steps: (1) getting a price, (2) deciding whether to search another price or stop searching, and (3) conclusion of the experiment and receipt of money. In Step 1, subjects were given a price. Subjects were informed of the price and they were instructed that they must choose at least one price to pay before the experiment ended. In Step 2, subjects were informed that they now have two options: (1) stop searching and pay any one of the previous prices or (2) search an additional price. If they chose the former option, they would proceed to Step 3. If subjects chose the latter option, subjects could pick another price with no searching fee and receive another price. In Step 3, the experiment ended and subjects received their monetary payoff in addition to a HKD$10 show-up fee.

To have a better comparison of searching behavior among subjects, all subjects received the same price in the same sequence in all treatments. Price might go up or go down randomly. If subjects continued to choose searching, they would face the same price pattern:

$$P_1, P_2, \dots, P_{30}$$

The sequence, range and probability distribution are presented in the Appendix.

In this treatment we wanted to find out whether different gender has different buying performance, which was measured by the number of price subjects searched. We examined the average times male and female subjects searched.

II.B Treatment II

Treatment II took place in the same fashion as treatment I, with one exception. Instead of no searching fee, subjects had to pay HKD$1 searching fee for every additional envelope searched. In this treatment, subject's payoff was equal to:

HKD$50 - price – accumulated searching cost

In this treatment, we examined whether different gender had different willingness to pay for searching where there was a searching cost.

II.C Treatment III

Treatment III took place in the same fashion as treatment II, with one exception. Subjects were informed of the range and probability distribution of prices. In this treatment, subject's payoff was same as that in treatment II:

HKD$50 - price – accumulated searching cost

In this treatment, we examined how information affected searching behaviors for both males and females.

III. PROCEDURAL DETAILS

We recruited students of City University of Hong Kong (CityU) by sending an email to them via CityU's email system. After they received the e-mail, they can do an online registration through a link provided in the mail. They were not informed of the topic and the content of our experiment before they showed up in our experiment. In total, 69 students participated in 3 treatments of our experiments on 29th April 2015. 6 subjects (3 males and 3 females) participated in treatment I while 37 subjects (17 males and 20 females) participated in treatment II. Lastly, 26 subjects (13 males and 13 females) participated in treatment III.

IV. THEORETICAL PREDICTIONS

IV.A Treatment I

Theoretical prediction is that if people are rational, they will search all prices and choose the best price that maximizes their benefits at the end. There should be no difference between males and females as they have same endowment and same price sequence. In other words the equilibrium will be searching 30 times and choose to pay $11.

IV.B Treatment II

Theoretical prediction is that the existence of searching cost increases cost of searching, and as a result people will search less compared with no searching cost. However, gender difference does not affect the cost, so under the traditional prediction males and females should have equal searching times. Moreover, if people are rational, they should make a choice close to price $21, which yields a $12 consumer surplus. Figure 1 shows the consumer surplus (50 – price – searching cost) of subjects.

IV.C Treatment III

Theoretical prediction is that people should search more compared with treatment II when they are provided with information. They should make a choice closer to price $21 compared with treatment II.

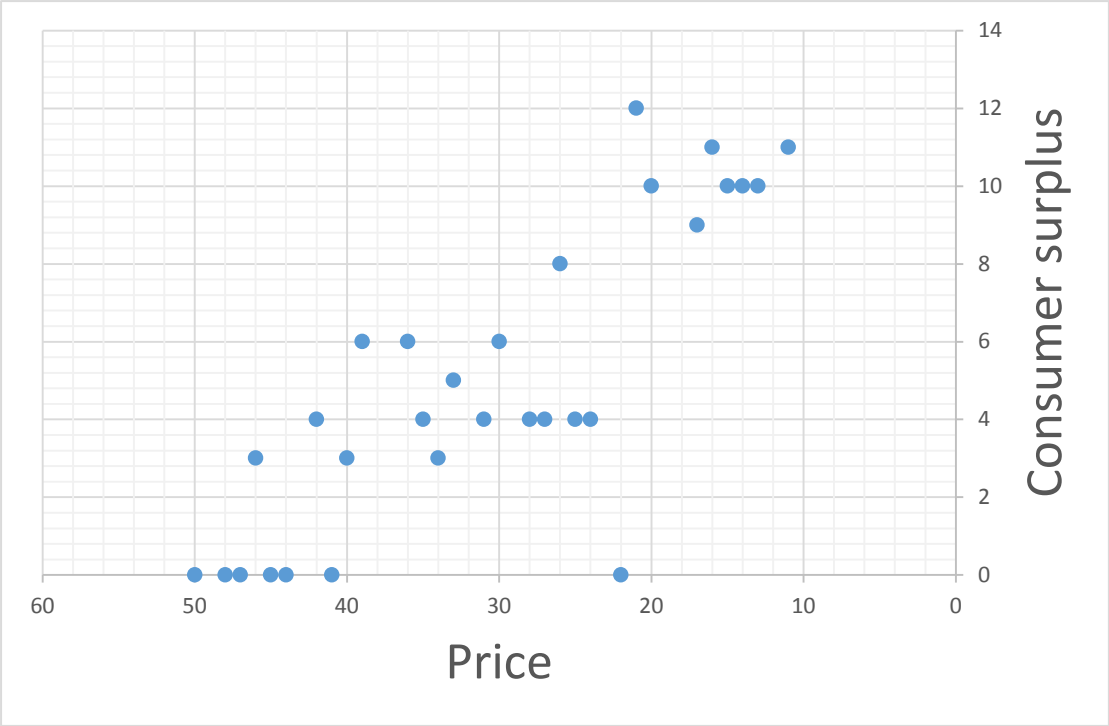

Figure 1

V. EXPERIMENTAL RESULTS

V.A Treatment I

The experimental result of males is in line with the theoretical prediction that all male subjects choose to search all prices. However the result in female deviates from the traditional prediction that only two out of three female subjects choose to search all prices. One of the female subject is an outlier that she just searches for 11 prices. The result is as follows:

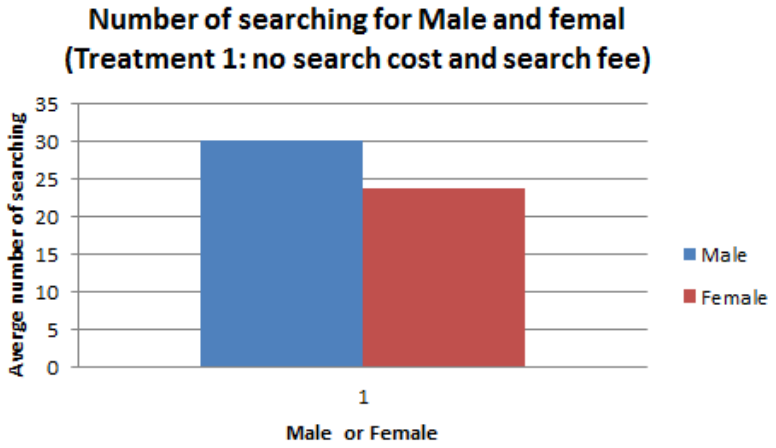

Figure 2

From figure 2 we can notice that the average number of searching for males and females is 30 and 23.6667. The following tables report the details of result of this treatment:

Table 1.1

Number of searching for Male and femal (Treatment 1: no search cost and search fee)				
Male				
Session	Subject ID	Gender	Number of searching	Average
4	11	M	30	30
4	12	M	30	
4	14	M	30	

Table 1.2

Number of searching for Male and femal (Treatment 1: no search cost and search fee)				
Female				
Session	Subject ID	Gender	Number of searching	Average
4	15	F	11	23.6667
4	17	F	30	
4	18	F	30	

V.B Treatment II

As for the result of treatment II, people do search less when there is a positive searching cost. However, we do not observe a significant gender difference.

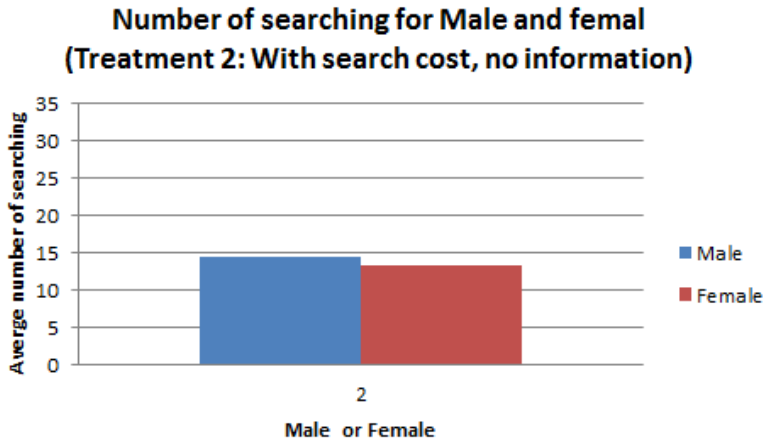

Figure 3

From figure 3, we can see that the average times of searching for males is slightly larger than females. Men search 14.4118 times in average and women search 13.3 times in average. The following tables and figure 4 report the detail of result of this treatment:

Table 2.1

Number of searching for Male and femal (Treatment 2: With search cost, no information)				
Male				
Session	Subject ID	Gender	Number of searching	Average
1	27	M	8	14.41176
1	30	M	12	
2	3	M	23	
2	5	M	14	
2	6	M	12	
2	9	M	30	
2	10	M	25	
3	4	M	14	
3	5	M	14	
3	6	M	8	
3	7	M	11	
3	8	M	8	
3	9	M	5	
4	4	M	17	
4	8	M	17	
4	13	M	11	
4	16	M	16	

Table 2.2

Number of searching for Male and femal (Treatment 2: With search cost, no information)				
Female				
Session	Subject ID	Gender	lumber of searching	Average
1	28	F	7	13.3
1	29	F	5	
2	1	F	14	
2	2	F	30	
2	4	F	8	
2	7	F	14	
2	8	F	17	
2	11	F	9	
3	1	F	7	
3	2	F	20	
3	3	F	12	
4	1	F	20	
4	2	F	8	
4	3	F	8	
4	5	F	14	
4	6	F	11	
4	7	F	4	
4	9	F	30	
4	10	F	11	
4	19	F	17	

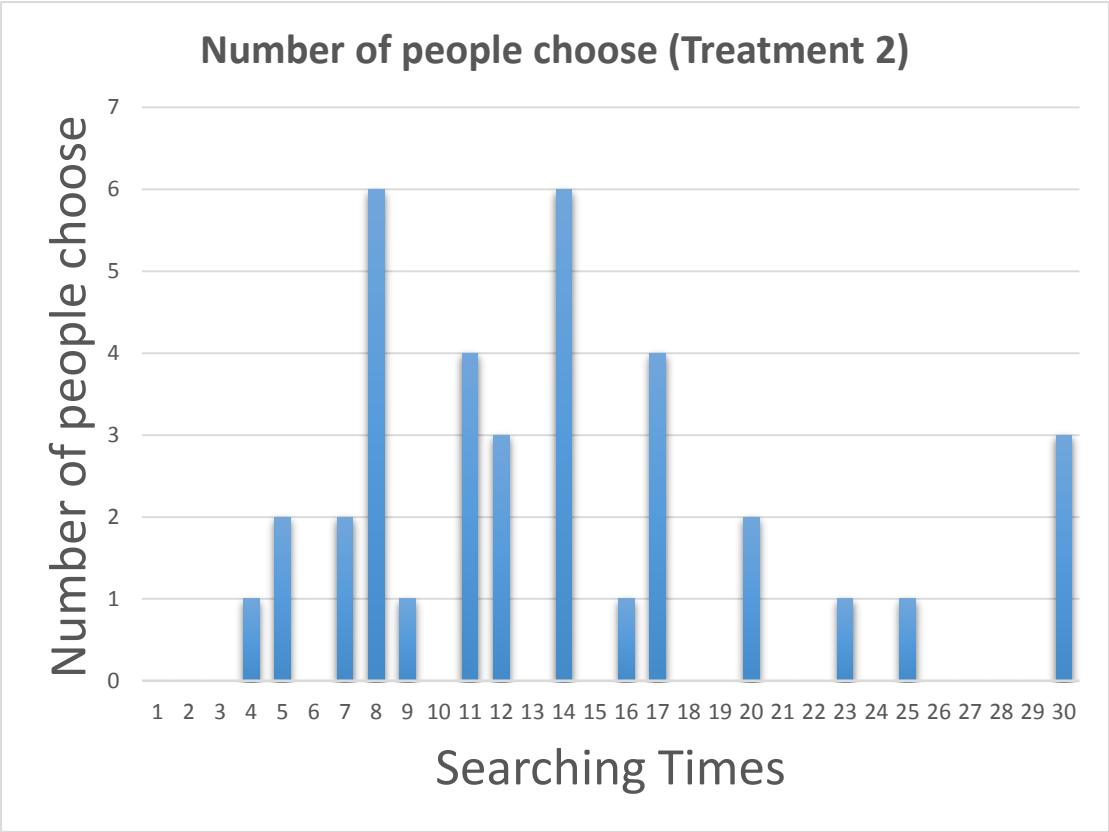

Figure 4

V.C Treatment III

Lastly, the result of treatment III is striking that it is not totally in accord with theoretical prediction. Providing information does not make people search more, which contradicts to what theory predicts. However, there is also no significant gender difference of searching times. The result is illustrated with Figure 5.

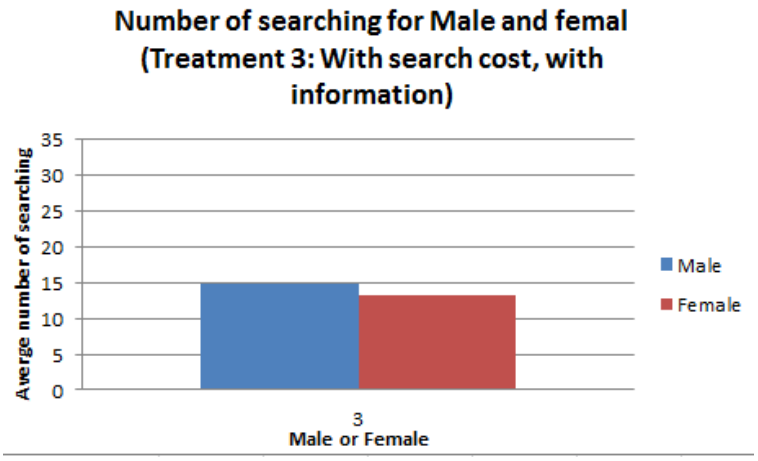

Figure 5

From figure 5 we can observe that the average number of searching for males is 14.6923 while that for females is 13.3077. The average number of searching for both males and females is not increased because of disclosure of information. The following tables and figure 6 present the details:

Table 3.1

Number of searching for Male and femal (Treatment 3: With search cost, with information)

Male

Session	Subject ID	Gender	Number of searching	Average
1	2	M	16	14.69231
1	4	M	14	
1	5	M	5	
1	7	M	14	
1	8	M	23	
1	9	M	16	
1	11	M	14	
1	12	M	17	
1	14	M	17	
1	18	M	16	
1	20	M	8	
1	22	M	17	
1	23	M	14	

Table 3.2

Number of searching for Male and femal (Treatment 3: With search cost, with information)				
Female				
Session	Subject ID	Gender	Number of searching	Average
1	1	F	14	13.30769
1	3	F	16	
1	6	F	24	
1	10	F	17	
1	13	F	16	
1	15	F	19	
1	16	F	14	
1	17	F	14	
1	19	F	2	
1	21	F	14	
1	24	F	7	
1	25	F	5	
1	26	F	11	

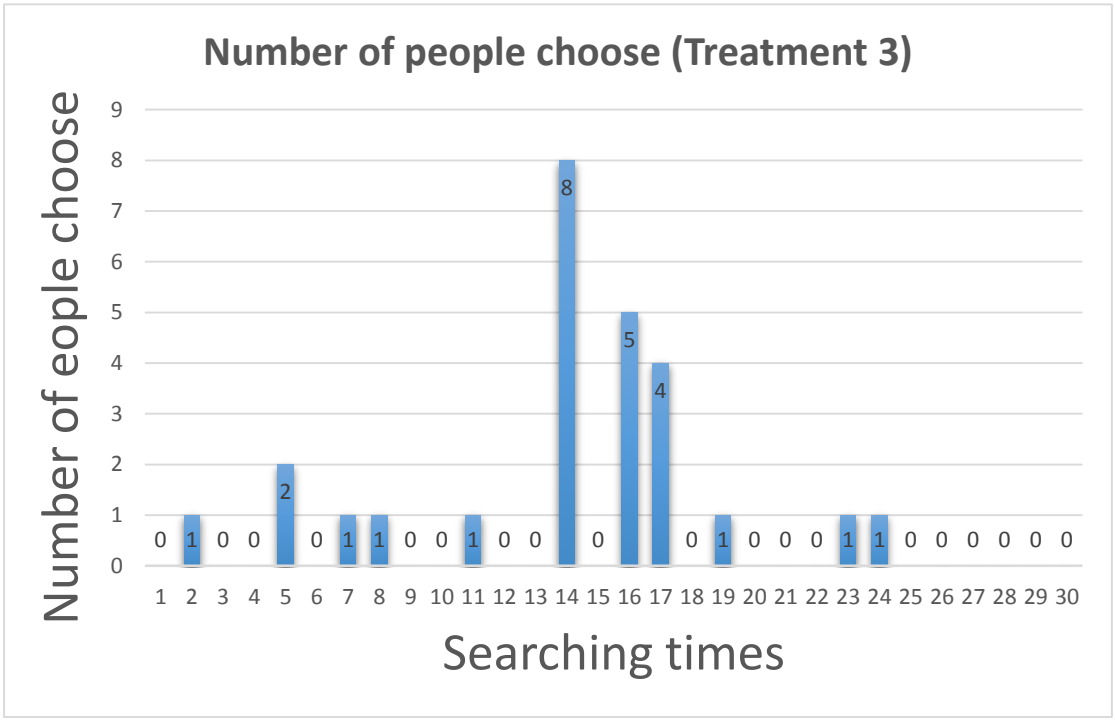

Figure 6

V.D Implications

From the above-mentioned results we can see people searching behaviour is mainly affected by cost, but not gender difference. The following figure shows the whole picture:

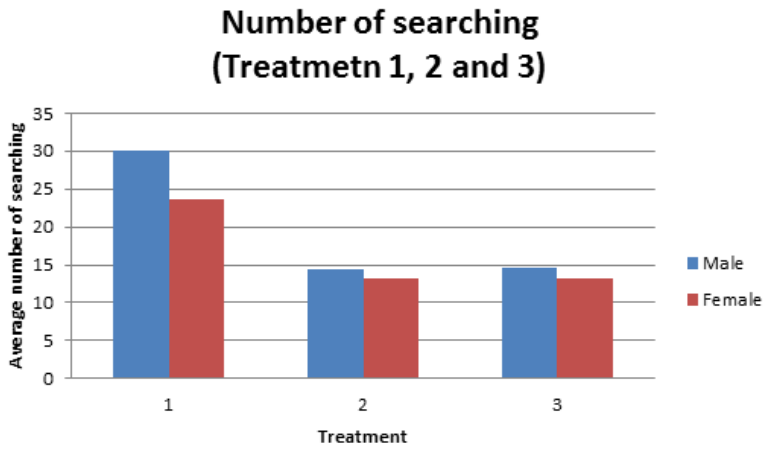

Figure 7

In treatment I, the average number of searching for male is 6.3333 times more than female because of the existence of an outlier. In treatment II the average number of searching for male is marginally 1.1118 times more than female and we observe no gender difference. In treatment III the average number of searching for male is marginally 1.3846 times more than female and we observe no gender difference. However, what is worth attention is that a disclosure of information does not make people search more. It implies that people may presume a satisficing level in their mind that hinders them to search more and it is related to bounded rationality.

By comparing the result between treatment I with treatments II and III, we can see searching cost significantly affects people' searching behaviour. When searching cost increases, people tend to search less.

In treatments II and III, females marginally search less than males maybe because females are more uncertainty averse than males. They do not like to face too many uncertainties.

V.E Regression from EViews

To test our results in a statistical way, we run a regression on the number of searching. The dependent variable is the number of searching and we include six independent variables.

The first independent variable (a dummy variable) is gender, either male or female, denoted as MALE in the regression.

The second independent variable (a dummy variable) is cost, either with searching cost or without searching cost, denoted as SCOST in the regression.

The third independent variable (a dummy variable) is information, either with information or without information, denoted as INFOR in the regression.

The forth independent variable (an interaction term) is male with search cost, given that subjects are male and under a situation with search cost, demoted as MALESCOST in the regression.

The fifth independent variable (an interaction term) is male with information, given that subjects are male and under a situation with information, denoted as MALEINFOR in regression.

The sixth independent variable (an interaction term) is with search cost and with information, denoted as SCOSTINFOR in regression. The regression is:

$$\text{NUMBER OF SEARCHING} = \alpha + B_1\,\text{MALE} + B_2\,\text{SCOST} + B_3\,\text{INFOR} + B_4\,\text{MALESCOST} + B_5\,\text{MALEINFOR} + B_6\,\text{SCOSTINFOR}$$

The regression result is as follows:

Dependent Variable: NUMBER_OF_SEARCHING
Method: Least Squares
Date: 05/14/15 Time: 21:09
Sample: 1 69
Included observations: 69

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.66667	3.734547	6.337226	0.0000
MALE	6.333333	5.281447	1.199166	0.2350
SCOST	-10.56140	4.018578	-2.628144	0.0108
INFOR	-3.692308	6.712602	-0.550056	0.5843
MALESCOST	-5.026832	5.705876	-0.880992	0.3817
MALEINFOR	0.078114	3.331718	0.023446	0.9814
SCOSTINFOR	3.894737	6.636464	0.586869	0.5594

R-squared	0.281605	Mean dependent var	15.01449
Adjusted R-squared	0.212083	S.D. dependent var	7.287162
S.E. of regression	6.468425	Akaike info criterion	6.667669
Sum squared resid	2594.112	Schwarz criterion	6.894317
Log likelihood	-223.0346	Hannan-Quinn criter.	6.757588
F-statistic	4.050592	Durbin-Watson stat	1.992283
Prob(F-statistic)	0.001730		

Figure 5

We choose 5% as the significance level. The regression result reveals several things. Firstly, in treatment I, if subjects are male, the number of searching will be 6.3333 more than that of females. The result is insignificant because of the existence of an outlier and insufficient sample.

Second, if there is searching cost, the number of searching will be 10.5614 less than that without searching cost and the result is statistically significant (0.0108). This result supports the theoretical predication and suggests that searching cost has a huge impact on human searching behaviour.

Third, if there is information provided to subjects, the number of searching will be 3.6923 less than that without information provided. This is a surprising result because a disclosure of information should make subjects search more. If subjects do a simple calculation in their mind, they should infer that they can receive a lower price if they search more. The result is insignificant (p-value is 0.5843) and indicates that information is not an influential factor of human searching behaviour.

Forth, if males have to pay a searching cost, the number of searching will be decreased by 5.0268 times more than female. That means males

are more sensitive to searching cost than females. However, the result is not significant in determining the number the searching.

Fifth, if males are provided with information, the number of searching will be increased by 0.0781 times more than female. However, this result is not significant either.

Sixth, if there is a search cost and information is provided, the number of searching will be increased by 3.8947 times but the result is again not significant.

V.F Implications from Regression

From the regression result we can see that searching cost does affect people searching behaviour. The searching cost does supress people's incentive to search. However, disclosure of information seems not to be an important factor affecting human searching behaviour.

VI. DISCUSSION

In general, people always believe that there are some differences between male and female, especially in terms of behavior. The experiments in “Search and Satisficing” paper by Andrew Caplin, Mark Dean and Dniel Martin and “Discounts and Consumer Search Behavior: The Role of Framing” paper by Ralph-C Bayer and Changxia Ke induced that searching behavior became one of the mainstream of economics.[1] [2] However, our paper suggests that there is no significant difference of searching behavior due to gender difference.

Our research aims to investigate the gender differences in searching behavior and their differences in searching behavior when there is different disclosure level of information. In our experiment, we vary searching cost and disclosure of information in order to find out the gender gap of searching behavior.

There are many rooms for improvement in our experiment. For example, the gender gap in searching behavior may be different when the age of subjects is changed. Take the experiment of “Do competitive workplaces deter female workers? A large-scale natural field experiment on job entry decisions” as an example, it aimed to examine the different gender’s attitudes of finding competitive position in the labor market.[3] It found that there was a link between gender-based differences in competitiveness and the age of job-seekers, which older age cohorts showed much less of a gender gap than their younger counterparts. Therefore, we believe that the searching behavior of subjects from different age groups may differ as well. However, in our experiment, all the subjects are students from City University of Hong Kong who have an age between 17 and 23. We cannot find a significant different result in this age group. We may improve our experiment by inviting people from different age groups to be our subjects and obtain a more comprehensive result.

Finally, an interesting finding from our paper is that people do not search

[1] http://www.econ.brown.edu/fac/Mark_Dean/Pub_Paper_6.pdf
[2] ftp://ftp.repec.org/opt/ReDIF/RePEc/mpi/wpaper/Tax-MPG-RPS-2011-11.pdf
[3] http://www.nber.org/papers/w16546

more when they are provided with information. This is a surprising finding since information should presumably make people search more as it provides a way for people to calculate. If people are rational, they should make use of information provided and find out a price that maximize their net benefits. However, our finding is that information does not induce people to search more. This implies that people may presume and have a satisficing level in their mind and support Simon's finding, which creates a friction and deviates from equilibrium. This result can be further investigated regarding the bounded rationality of people.

VII. CONCLUSION

In this study, we look into human searching behavior and depart from traditional experimental investigation by including gender difference into consideration. Our study yields several unique insights. First, there is no significant gender difference. Second, the existence of a positive searching cost attenuates people to search more. Third, it is striking that the disclosure of information does not induce people to search more. This result can be further examined regarding the bounded rationality of people.

Acknowledgments

The authors gratefully thank Dr Li King King for giving an opportunity to conduct this study and assisting the process of our experiment.

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Simon, H. A. 1955. “A Behavioral Model of Rational Choice.” Quarterly Journal of Economics, 69: 99–118.

APPENDIX

Appendix I: Range and probability distribution of prices

Price range	Number	Probability
10 to 20	7	0.233333333
21 to 30	8	0.266666667
31 to 40	7	0.233333333
41 to 50	8	0.266666667
total	30	1

Appendix II: Sequence of prices

Price	Down	Up
50		
46	↓	
48		↑
47	↓	
42	↓	
39	↓	
45		↑
40	↓	
36	↓	
44		↑
41	↓	
35	↓	
33	↓	
34		↑
30	↓	
31		↑
26	↓	
21	↓	
28		↑
27	↓	
20	↓	
25		↑
24	↓	
16	↓	
17		↑
15	↓	
14	↓	
13	↓	
11	↓	
22		↑

Appendix III: Instruction form of treatment I

Instructions

Welcome to our experimental study on searching behavior. You will receive a show-up fee of HKD $10. In addition, you can gain more money as a result of your decisions in the experiment.

You will be given a subject ID number. Please keep it confidentially. Your decisions will be anonymous and kept confidential. Thus, other participants won't be able to link your decisions with your identity. You will be paid in private, using your subject ID, and in cash at the end of the experiment.

When you have any questions, please feel free to ask by raising your hand, one of our assistants will come to answer your questions. Please DO NOT communicate with any other participants.

You are endowed with $50. In this experiment, there are 30 rounds. In the first round, we will distribute a price to you. Then, you can choose to accept and pay the existing price or choose to search another price to pay.

If you choose to accept, your payoff will be equal to:

$50 – price on the price card

If you choose to search for another price, the experiment will proceed to the next round, and we will show you the second price. If you choose to accept the price, your payoff will be equal to:

$50 – price on the price card

The experiment will end when you accept the price or you reach the end of 30 rounds.

Please be noted that:

(i)You must pay a price before the experiment ends.
(ii)There is no pattern in prices (i.e. price may go up and down once you search).
(iii) You can choose to pay the existing price or prices from previous rounds in every round.

Thank you!

Appendix IV: Instruction form of treatment II and treatment III

Instructions

Welcome to our experimental study on searching behavior. You will receive a show-up fee of HKD $10. In addition, you can gain more money as a result of your decisions in the experiment.

You will be given a subject ID number. Please keep it confidentially. Your decisions will be anonymous and kept confidential. Thus, other participants won't be able to link your decisions with your identity. You will be paid in private, using your subject ID, and in cash at the end of the experiment.

When you have any questions, please feel free to ask by raising your hand, one of our assistants will come to answer your questions. Please DO NOT communicate with any other participants.

You are endowed with $50. In this experiment, there are 30 rounds. In the first round, we will distribute a price to you. Then, you can choose to accept and pay the existing price or choose to search another price to pay.

If you choose to accept, your payoff will be equal to:

$50 – price on the price card

If you choose to search for another price, the experiment will proceed to the next round, and we will show you the second price with $1 search fee. If you choose to accept the price, your payoff will be equal to:

$50 – price on the price card – search fee

The experiment will end when you accept the price or you reach the end of 30 rounds.

Please be noted that:
(i)You must pay a price before the experiment ends.
(ii)There is no pattern in prices (i.e. price may go up and down once you search).
(iii) You can choose to pay the existing price or prices from previous rounds in every round.

Thank you!