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An Experimental Study on Self-Monitoring and Gambling Behavior in Thailand

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Abstract

This paper presents finding on an experiment designed to explore whether self-monitoring during a game where money is involved induces different risk-taking behavior in gambling for subjects from Chulalongkorn University. The data from this experiment reveals that self-monitoring is significantly effective in reducing risks in male subjects especially around their initial starting balance. In addition, survey data also suggests how other factors such as gender, income, extraversion, religiousness and alcohol influence can influence higher risk-taking. Thesignificant factors are then used to form a regression to create a better understanding on how much each factor contributes to the behavior and isolate the effects of self-monitoring.

Keywords: Experiment, Gambling, Monitoring

Introduction

Gambling can be considered a form of entertainment since it provides excitement and rewards the winners. However, the types of risk that people choose to take are different; some prefer the excitement from the prospects of earning more which usually means higher risks. Therefore, for those who lose, higher risk-taking behavior leads to higher frequency and also larger magnitudes of losses. In many cases this can lead to heavy financial problems for individuals.

Financial problems arising from gambling are often associated with negative behavior.These problems can often become a motive for committing thievery in order to repay debts or finding cash to continue gambling. While gambling may create problems for those who consistently lose it can also cause problems for people who simply gamble as a part of their lifestyle. In the United States, in the field of poker, some people devote a lot of their time "into securing money to play, talking about poker with others, playing poker, spending money won and managing losses" (Avery, 2009)which contributes heavily into how they shape their lifestyle. Similarly, in Thailand, addicts of football gambling spend a lot of their time thinking about what teams to gamble, how much to gamble and may become serious distractions for education or work (Vongsinsirikul, 2012). Hence, the negative side effects of gambling affect both winners and losers and may be a larger problem than most people expect. This leads to various attempts to prevent gambling.

However, with the Introduction of the ASEAN Economic Community (AEC) the prospect of preventing gambling is nearly impossible. Many existing Casinos are located on the border of Thailand since neighboring countries such as Cambodia do not have laws preventing Casinos. With AEC integrating various different countries in the region, legal gambling in neighboring countries may become easier to access and cause a capital outflow as Risk-Takers move to gamble in venues in neighboring countries. With pressure from neighboring competition and also government move to increase ways of gambling, Thailand may have to adapt to the situation look towards loss prevention.

There have been many attempts in Thailand to stop gambling such as tightening regulations and laws. Thailand's Center for Gambling Studies (2013) reported that there are over 1500 gambling dens operating illegally across the country and are often approved by local authorities as long as they

pay bribes. Hence, there has been continuous debate on legalizing gambling which may able more speculation in the industry but influence crime and may deter current economic behaviors.In addition, the government has recently announced the installment of online lottery machines to stimulate the gambling process to raise more revenue from government-sponsored public lottery. This may be a sign of Thailand moving towards legalizing gambling and the question that people must answer now is not how to prevent gambling but how to control the losses from gambling.

Major institutions in Thailand have solved problems by influencing behaviors through the use of campaigns or teachings. In Buddhism, the major religion in Thailand, the concept of mindfulness is often used in order to remind people to keep calm and composed when making decisions to avoid irrationalbehavior. This concept of mindfulness is similar to that of self-monitoring which forces people to constantly review their current standing before making decisions. This could reduce effects of decision making from emotions and therefore lead to calm and better decision making.

With respect to the monarchy, His Majesty, King Bhumibol Adulyadej created the concept of sufficiency economy which signifies the importance of sufficiency and balanced growth. This concept encourages the whole population to follow a sustainable growth path and way of living through the use of "moderation, reasonableness and requirement for a self-immunity system" (NESDB, 2007). This directly relates to gambling since losses can pull people out of a sustainable path very quickly and therefore must be controlled. On the other hand, self-monitoring fits in with moderation since it reminds people whether they are moving too fast or falling out of balance. In addition, self-monitoring in gambling also influences reasonableness if they lose, it may prompt them to realize that they are spending an unreasonable amount in gambling. However, the question here is whether self-monitoring contributes to the self-immunity system. Does it prevent people from falling out from the middle path? Does it reduce the losses from gambling and problems that it causes?

It is also important to understand the other factors that influence risk taking behavior for two main reasons. The first reason is to isolate any influence of behavior from other sources to get a more accurate view of the

self-monitoring effect. The second reason is to point out othersareas which can be explored which may lead to other treatments or solutions to the problems caused by gambling.

This paper analyzes the effects of self-monitoring in a gambling experiment. The focus of the paper is to see how self-monitoring could reduce losses and whether it could be used to prevent people falling out from the sufficiency economy path even with the existence of gambling. Section 2 is a literature review on existing papers on gambling problems in general and studies on self-awareness and self-monitoring. Section 3 of this paper explains the setting, process of the experiment and the reasoning behind each variable in the experiment and survey. Section 4 is a presentation and analysis of the data collected. Section 5 concludes the finding from the experiment and suggestions for further research.

2. Literature Review

2.1 Gambling and Self-Monitoring

Before looking into detail about what effects gambling behavior, it is important to first look at why people gamble. In general, gambling can initially be a form of entertainment providing excitement; however, people may return to gambling as a method to relieve negative emotions or in attempt to quickly reduce financial problems (Gibson & Sanbonmatsu, 2004). This collection of thoughts negative thought as desperation may deter their ability to judge situations at hand (Park, 1998).This may lead to inaccurately high expectations which induce people to gamble with odds against them.

Rationality dictates that people should only gamble if there is potential benefit from doing so. While some people may say that people gamble as a means for entertainment, it is impossible to overlook the motive of gambling for money. Gibson and Sanbonmatsu (2004) experimented on optimism and gambling and found that those who were optimist took large risks even in the face of poor performances. They concluded that optimists often "maintain unrealistic gambling expectations, perceive losses as near wins, and persist at gambling in the face of losses" (Gibson & Sanbonmatsu, 2004). In addition, positive events may induce people to feel lucky and expect to win more or that

they cannot lose(Avery, 2009). Therefore, this expectation of getting money will induce people to gamble and possibly take higher risks.

This paper focuses on reducing risk-taking behavior through the use of monitoring balance during gambling sessions. This is similar to the concept of self-monitoring except that it focuses solely on the monitoring of earnings. In Thailand, His Majesty the King proposes the idea of Sufficiency Economy which promotes moderation, reasonableness and self-immunity (NESDB, 2007). Sathirathai and Piboolsravut (2004) analyzed the sufficiency and pointed out that knowing oneself is important in creating plans for future development. Similarly, Buddhism proposes the concept of mindfulness which "refers to remembering to bring attention to present momentexperience in an open and nonjudgmental manner" (Huxter, 2007) allowing decision making without influence from emotion or external factors. Huxter (2007) informs that behavioral therapists have been using the concept of mindfulness in treatment for many years. This suggests that it is effective in controlling behavior. It can be seen from both the application and basis of sufficiency economy and mindfulness of Buddhism that good decision making begins from knowing oneself. Therefore applying this to gambling, if one knows their current situation or balance, it may improve their decision making. Since this treatment incorporates the concepts present in teachings and religion, it can be easily adapted and accepted becoming a very useful tool if proven effective.

2.2 Factors that Influence Risk-Taking Behavior by Person

Various studies point out that men and women have different risk-taking behaviors. Martin et al. (2004) showed that a part of risk-taking behavior can be explained by gender and therefore suggested that experiments on risks should take gender into account. Harris, Jenkins and Glaser (2006) present experimental findings that women are less likely to engage in risky behavior possibly due to familiarity with social risks. In contrast, Schubert, Brown, Gysler, and Brachinger (1999) reported that their experiment did not show differences between women and age relation in financial decisions. However, they agree that gender differences do arise in certain frames such as gambling. On the other hand, Powell and Ansic (1997) presents the likeliness of gender

differences influencing behavior in able financial decision makers, however, they note that this may not be true for the general population. Powell et al. (1999) presented results that in population with gambling problems women show less risk loving behavior than men. Therefore, even though there are suggestion both ways about the relationship between gender and gambling, it may be important to consider the interaction between them when analyzing data.

A widely accepted view is that substances such as alcohol and drugs are correlated with high risk-behavior in gambling. Large numbers of studies have suggested that usage of alcohol is often related to poor mental capabilities leading to poor decision making (Barry & Petry, 2008; Park, 1998; Leigh, 1999). A reason for immediate effects of alcohol may be that it interferes with the ability to be forward looking and the ability to focus or remember (Park, 1998). Additionally, (Leigh, 1999)suggests that people who drink heavily may feel like they have lower risks even after the influence of the substance has subsided. As a result, significant behavior differences in risk-taking and gambling may be determined by whether the subject is addicted to alcohol or not.

Other studies point out various different factors which may influence risk taking behavior. Abbott and Cramer (1993) reported thatricher population groups spend a smaller portion of their income on gambling, but the likeliness of gambling increases as income increases. Vestewig (1977) conducted an experiment and reported that extraversioncan cause high-risk taking behavior. On the other hand, Binde (2007) reviewed that religion can often shape gambling environment, however, Liu (2010)experimented that while religious people often prefer lower risks the effects may not be as large as people expect. In order to isolate and model effects of gambling it is also important to take into account these external factors.

Many gambling studies on gambling or risk-behavior are concentrated on students at high-school or university level. Leigh (1999) reviews that young-adulthood is a stage where people are undergoing life-style transitions which may induce risky-behaviors such as crime or heavy drinking. Brown and Newby-Clark (2005) suggests further that gambling disorders are significantly higher in adolescents and young adults possibly due to transition into adult-hood and inability to self-regulate new responsibilities and freedom.

Apart from interesting traits which exist in teenagers it is also important to note that gambling problems that arise for individuals may become larger social problems. Vongsinsirikul(2012) points out that financial problem from gambling for students at university level can often lead to criminal activity than adults. Hence, data on variables affecting teenagers or young adults' behavior in gambling may be useful in proposing solutions into various subjects including illegal activities.

2.3 Factors that Influence Risk-Taking Behavior during Gambling

While some studies explain risk-taking behavior from difference in demographics or inability to correctly analyze situations, economists in the field of behavioral economics suggests that situation during gambling itself may have significant influence on risk-taking behavior.Knetsch and Sinden (1984) experimented on the concept of endowment effect and showed that people value what they have more than its initial value. Developing on the idea, Kahneman, Knetsch and Thaler (1991) explained the endowment effect through the concept of loss aversion where the magnitude of utility from gains is smaller than the same amount of loss. Therefore, even if people act rationally without the influence of substances or inaccurate assessment, people may still choose to take high risks since the potential utility of breaking even outweighs the diminishing negatives to increased losses. This behavior of risk-loving from loss aversion may induce people to gamble, however, people following this theory are rational. Therefore to analyze effects of controls, it may be important to exclude behavior which may be induced by rational reactions to situations since it may have different effects with people in different situations.

Other common factors which can influence risk during games include excitement and the reactions to winning. Anderson and Brown (1984) expressed the importance of goal-driven actions or excitement in influencing excess behavior in gambling. Thaler and Johnson (1990) explored some hypothetical situations and came to a conclusion that people are less affected by loss after gains. They explain that losing a gamble with prior gains or gambling while having house money creates less loss in utility than losing one's own money. This expresses the possibility of behavior being influenced by wins, losses, and length of games.

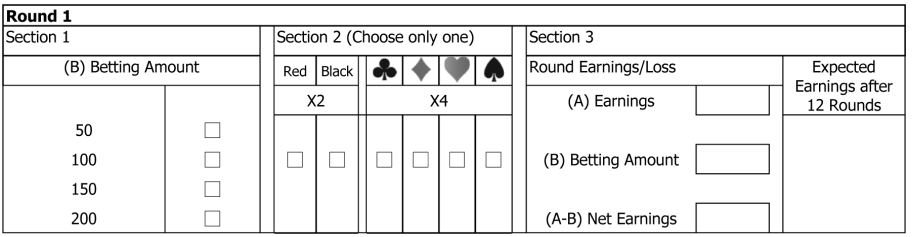
3. Experiment Design

3.1 Game Details

The game used in the experiment is guessing the card game.The cards used are a standard 52 card deck. The game is played individually and the results are based solely on the individual's performance. Each individual are given tokens at the start of the experiment as endowment to use throughout the experiment.

In each round each individuals are asked to fill in a sheet as seen in Figure 1. They are used asked to choose a betting amount and guess the outcome of the draw from the 6 available choices. After that the subjects are asked to calculate their earnings and write their expected outcome.

Figure 1. Experiment Example



The specifications for the game used for this paper are as follows. The number of rounds in this experiment is 12.Each individual starts with an endowment of 1200 tokens. Participants are allowed to choose from a set of betting amounts ranging from 50 to 200 tokens in increments of 50 tokens during the first 6 rounds and an additional choice of betting 0 is given in all rounds after and including round 7. All participants are informed of this occurrence in the instructions and reminded at the beginning of round 7.

The prediction or betting of the outcome comes directly from the apparatus of the experiment which in this case is a deck of cards. Participants can choose between guessing the color of the card or the suit but not both. While losses from an incorrect guess will result in an immediate loss of betting amount, the earnings in case the participant wins can be calculated by:

$$Earnings = \frac{Betting\ Amount}{Probability\ of\ Winning} - Betting\ Amount$$

In addition to the game itself, the participants are also asked to write down what they expect to earn at the end of all 12 rounds. The first expectation is then used to find what the individual expects to get from gambling at the beginning. The other expectations are asked simply for the consistency of the experiment sheets to reduce any possible confusion.

It is also important to discuss the reasoning behind these specifications. The number of rounds corresponds with the time frame given for the experiment and was adjusted after piloting the experiment. A larger number of rounds may create larger varieties of situations for the subjects which are of interest for this paper.

The decision to use a deck of cards is that it connotes gambling and may generate more excitement than using common methods such as rolling a die or tossing a coin and making the lab more similar to gambling in the field. In addition, cards are well known and subjects in general can create accurate probabilities immediately without much thought.Additional decks or removal of cards on the other hand may complicate the game and disturb the intention of using cards in the first place.

Earnings are calculated to be fair, so on average earnings and losses should be equal. This makes it easy for calculation and planning and behavior will not be influenced by opportunity seekers who look to take advantage of unfair games. The expectation asked for at the end is an additional interest which will be mentioned further in the analysis..

The data is collected using paper and the card is drawn and shuffled in front of the subjects by a third person to show that the experiment is fair. In each round, the participants are asked to fill in their decisions onto a sheet. The formats of the sheets are slightly different for the controlled group and the treatment group.

3.2 Controlled Group

The subjects in the control group for this experiment are given just enough to play the game with one addition of asking what their expectation of earning at the end of the session is. Figure 1 shows an example of the sheet the participant is required to fill in for round 1 and 7 of a session.

Figure 2. Controlled Group Choice Selection Sheet for Round 1 and 7

Round 1

Section 1		Section 2 (Choose only one)						Section 3		
(B) Betting Amount		Red	Black	♣	♦	♥	♠	Round Earnings/Loss		Expected Earnings after 12 Rounds
		X2		X4				(A) Earnings		
50	☐									
100	☐	☐	☐	☐	☐	☐	☐	(B) Betting Amount		
150	☐									
200	☐							(A-B) Net Earnings		

Round 7

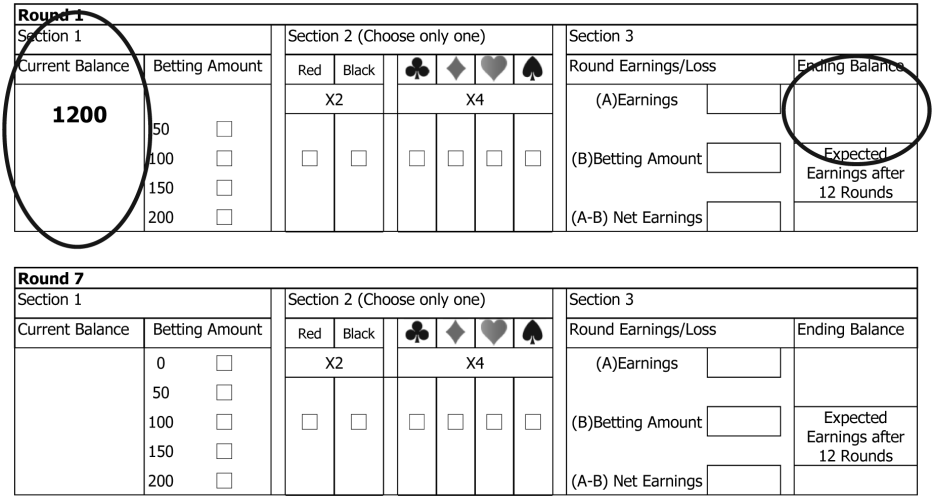
Section 1		Section 2 (Choose only one)						Section 3		
(B) Betting Amount		Red	Black	♣	♦	♥	♠	Round Earnings/Loss		Expected Earnings after 12 Rounds
0	☐	X2		X4				(A) Earnings		
50	☐									
100	☐	☐	☐	☐	☐	☐	☐	(B) Betting Amount		
150	☐									
200	☐							(A-B) Net Earnings		

Participants select their choices of betting amount and prediction using a check-box in section 1 and 2 of the sheet respectively. In section 3 participants calculate their own earnings and write their expectations for what they will receive at the end of all 12 rounds. An example of how to fill in the sheet is given in the instructions given out at the start of the session. In round 7 an additional option of choosing 0 as a betting amount is also available.

3.3 Treatment Group: Self-Monitoring of Earnings

Figure 3 shows an example of the sheets a participant is required to fill in for round 1 and 7 of a session. The subjects in this group receive a similar sheet to the controlled group with an addition of 2 boxes, current earnings and ending balance as circled in Figure 3.

Figure 3. Treatment Group Choice Selection Sheet for Round 1 and 7



The current earnings box is the earnings at the start of a specific round. This box represents the monitoring of earnings since each individual must write their current balance at the beginning of each round, hence, naturally reviewing their current position every round. Note that for the first round, current balance is already filled in for the participants as 1200, this is only present for the first round and participants must fill in their own current balance for the following rounds. The ending balance box is the balance at the end of a specific round. This is added so that computation of earnings can be done systematically round by round.In round 7 an additional option of choosing 0 as a betting amount is also available.

3.4 Questionnaire

Participants are required to fill in a questionnaire after the experiment. The questionnaire consists of 42 questions exploring 6 different areas which may influence risk-taking behavior.

3.4.1 Demographics

The first aspect the questionnaire looked at asks for demographic information and basic details about origin and behavior. The questions in this section include, birth year, gender, nationality, religion, number of siblings

and also the GPA of students. These questions are common in most surveys and the values derived from them can easily be used to group subjects into smaller subgroups. However, when due to most of the sample being in a Thai University, a lot of the data gathered such as nationality and religion is already expected but the questions are added for completeness.

3.4.2 Lifestyle and Spending

The next subject of interest for this questionnaire is lifestyle and spending. These questions focus on income and spending behavior. For income, the questions are grouped into range and students are asked to select their income range. Since all of the subjects studied are focuses on spending on entertainment which in depends on disposable income, it is required to deduct any utility or housing spending for those whose allowance include these factors to be consistent. In this section, participants are also asked to write down how much they spend on entertainment. Since gambling can in some ways considered as form of entertainment their behavior may be influenced by their income and spending.

For lifestyle, the focus is mainly on preferences which may affect personality. The first question in this section asks about the participant's hobbies. The choices focus mainly on hobbies which are directly related to health, gaming and some known common hobbies in the population. This section also includes question about movie genre preferences which can relate to what the person likes. The other aspect looked at in the questionnaire focuses whether an individual is leaning more towards being an introvert or extravert. The questionnaire for introvert and extravert is adapted from and online survey on introvert by Cain (2012).

3.4.3 Alcohol and Smoking

The questions on alcohol and smoking are separated into two questions. First, the participants are asked whether they smoke or not, followed by how many pack of cigarette they smoked per week to indicate the severity of their addiction. The question on alcohol is similar with the exception of instead of asking whether they drink or not, the questions asks whether they are a heavy drinker or not since drinking alcohol is more common than smoking.

3.4.4 Attitudes towards Gambling

The forth aspect that this questionnaire focuses on is attitudes towards gambling. There are five questions in this section. The first question asks the participant to rate the seriousness gambling problems in Thailand on a scale of 1 to 5. This is then followed by how serious do you think gambling laws in Thailand is on a scale of 1-5. These first two questions asks about views on gambling and may suggest if changing perception of gambling or tightening law may affect risk-behavior in gambling. The third question is an open ended question asking what the participant thinks the most serious problem from gambling is. The final two questions ask about the maximum percentage of income that is acceptable to be used in gambling for university students and for people who are above university level.

3.4.5 Preferences over Risk

The final area that this questionnaire explores looks at risk-preferences. This area consists of six questions. The first question is whether the participant has bought a lottery in the last three months; this can slightly reflect any exposure to real gambling for subjects. The following five questions are hypothetical questions which require the participant to assume a situation and think about how they would react in such situations.

4. Experiment Results

The experiment was done in the second semester of academic year 2012. The experiment was done in two consecutive sessions with different subjects. There were 74 subjects in total, 37 male and 37 female. All subjects were first year undergraduate students in the Faculty of Economics' International Program at Chulalongkorn University.

With respect to treatment groups, 37 students received sheets representing the treatment group while the other 37 received sheets representing the controlled groups. The controlled and treatment groups were handed out alternatively. Both groups participated in the experiment at the same time and faced the same results in each round for each session. On average the experiment including instruction reading time, answering questions and doing the questionnaire took approximately 45 minutes. Participants on average received 1246.22 tokens or approximately 99.7 Baht at the end of the session.

The data from this experiment is first analyzed using statistics and significance testing to find whether monitoring has a significant effect. Econometrics is a commonly used method in the field of economics due to the common problems of gathering data and impossibility of controlling for economic experiments. However, simple test statistics is more direct and effective in analysis of random experiments with treatment groups. Therefore we will first look at the effects of monitoring using test of statistical significance.

In section 4.4, the data from the questionnaire will be used with the data from the experiment to form a regression analysis on how various factors can affect gambling behavior. This time a regression analysis is suitable since there are various factor that cannot be controlled in this experiment such as personality and gambling views.

4.1 Summary Statistics

This sections looks at the characteristics of the subjects in the experiment. The summary statistics are shown in Table 1.

Table 1: Summary Statistics of Participants (N = 74)

Variable	Min	Max	Average
Age	18	23	19.5
Gender	0	1	0.5
Thai	0	1	.9864965
Monthly Income	1000	22500	8661.972
Utility Payment	0	13000	354.0676
Disposable Income	1000	20500	8307.028
Entertainment Spending	0	20000	2865.278
Temple Visits	0	20	3.267606
Donate	0	15	2.383562
Introvert Level	0	4	2.449275
Risk Loving	-1	2	.5616438
Drink Times	0	20	1.821918
Smoke	0	1	.0958904
Gaming	0	1	.5993757
Individual Sports	0	1	.5119667

Subjects aged between 18 to 23 years old. Of the 74 participants 50% were male and 50% female with 98% being Thai. Income or allowances were approximately 8662 baht with 354 baht used for utility and therefore 8307 baht left as disposable income on average. 2865 baht were used for entertainment purposes. In addition, the participants on average go to the temple 3.3 times in the last 3 months and donate to charity or beggars approximately 2.85 times in the last month.Most of the students were revealed to be slightly leaning towards being an introvert. With respect to alcohol and smoking the mean amount of times participants went drinking in the last month was 1.82 and about 9.6% of them were smokers. Finally, approximately 60.0% of students played games and 51.2% played individual sports as a hobby.

4.2 Experiment Statistics

From this section onwards we will be using the term risk level to measure the risk-taking behavior that each participant chooses for each round of the experiment. The risk level calculated using the following formula:

$$Risk\ Level = \frac{Betting\ Amount}{Probability\ of\ Winning} - Betting\ Amount$$

This formula is the same as the formula for calculating the round earnings of the participant if they bet correctly. The amount the participants will win depend on if they put more on stake meaning greater losses and their choice whether to bet on a card or suit which relates directly with probability to winning; hence, the higher risk correlates directly with higher potential return and hence can be used as a measurement for risk level.

Table 2 shows the mean ending balance at the end of round 6 and 12, average round risk level taken by participants and the standard deviation of the risk level for each and every round of the experiment. The data is separated into the first half or round 1-6 and second half or round 7-12 of the experiment to highlight any differences the addition of the choice of 0 betting amount induces.The final section includes data from all 12 rounds of the experiment.

Table 2: Summary of Round Ending Balance and Risk during Different Stages of the Game

	Mean Ending Balance	**Mean Risk Level**	**S.D. of Risk Level**
First Half	1287.162	258.221	180.871
Second Half	1246.216	304.571	208.438
Ending	1246.216	281.051	196.200

A significant note for this data is that even after the addition of the betting amount 0, the average risk level taken by participants' increases on average, hence, inducing that there are risks associated with time or past behavior and most participants continue to take risks even with the option of stopping at their current earnings. The cause of this may be that the participants enjoy the excitement from gambling and therefore continues to bet even though they are already earning a high amount. In addition, those who are winning may consider themselves as betting on house money or riding on a wave of luck, therefore leading them to bet even more. On the other hand, those who are losing may be taking higher risks to try to break even in the remaining few rounds.

4.3 Gender Differences

Various researches have suggested that women are more risk-averse than men when it comes to gambling. Table 3 shows the mean ending balance at the end of the experiment and the average risk level for all 12 rounds of the experiment classified by gender.

Table 3: Ending Balance and Risk Level by Gender

	Mean Ending Balance	**Mean Risk Level**
Male	1019.459	308.532
Female	1472.973	253.759

Table 3 suggests some interesting differences between the two groups which are then tested using the two-group mean comparison test. Female participants in the experiment had significantly higher ending balance at the end of the experiment or round 12 (M = 1472.973, SD = 922.903) than male participants (M = 1019.459, SD = 702.167), t(72) = –2.379, p = 0.01. With respect to risk level in each round, female participantstook significantly lower risks (M = 253.759, SD = 203.117) than male participants (M = 308.532, SD = 185.313), t(873) = 4.168, p = 0.00. Therefore, there is sufficient evidence at the 1% level that female subjects take less risk and earn more than male subjects.

4.4 Effects of Self-Monitoring

The main focus of this paper revolves around the effects of self-monitoring. This section looks at the effects of the treatment groups on average ending balance, risk level, and spread of risk. The results are summarized into Table 4.

Table 4: Ending Balance and Risk Level by Monitoring

	Mean Ending Balance	**MeanRisk Level**
Monitor	1315.405	281.9266
No Monitor	1177.027	280.1822

Data from Table 4 suggests that there is some relationship between monitoring and ending balances.Participants with monitoring treatment had higher ending balance (M = 1315.405, SD = 912.492) than those without monitoring (M = 1177.027, SD = 779.743), t(72) = -0.7013, p = 0.2427. On the other hand, risk level in each round was similar for the monitor group (M = 281.927, SD = 9.257) and the controlled group (M = 280.182, SD = 9.511), t(873) = -0.131, p = 0.896.The test statistics suggests that there is insufficient evidence to conclude that monitoring has any significant effects on ending balance or risk level.

However, if we look at effects of monitoring on gender separately, monitoring does actually have a significant effect on males. The results of monitoring by the gender subgroup can be seen in Table 5.

Table 5: Male and Female Ending Balance and Risk Level by Monitoring

	Ending Balance		**Avg. Risk Level**		**S.D. Risk Level**	
Gender	Male	Female	Male	Female	Male	Female
Monitor	1171.364	1526.667	292.070	267.500	199.802	183.196
No Monitor	796.667	1436.364	331.944	244.209	206.038	186.526

Data from Table 5 shows that monitoring effect leads to higher income in males and also lower risk-taking behavior. On the other hand, the effects for female subjects are still unclear. Male participants with monitoring treatment had higher ending balance (M = 1171.364, SD = 796.715) than those without the treatment (M = 796.667, SD = 475.645), t(35) = –1.6299, p = 0.056. In addition, risk level for males werelower for the monitor group (M = 292.070, SD = 199.802) than the controlled group (M = 331.944, SD = 206.038), t(434) = 2.0253, p = 0.0217. Hence, at the 5% significance level, the data supports that monitoring has a significant effect on reducing risk-taking behavior and also increases earnings for males.

However, for females the results turns out to be less significant. Ending balances for female subjects with monitoring (M = 1526.667, SD = 1052.865) were larger than those without monitoring (M = 1436.364, SD = 847.150), t(35) = –0.2885, p = 0.3873. Risk level in female subjects with monitoring (M = 267.500, SD = 183.196) were higher than the group without the treatment (M = 244.2085, SD = 186.526), t(437) = –1.2962, p = 0.0978. Therefore, there is insufficient evidence to conclude that monitoring has any effect on earnings for female but evidence at the 10% level that the treatment can induce more risky behavior in female subjects.

4.5 Loss Aversion and Monitoring

In the experiment, participants tend to take more risks during the second half. This section tests the data to see whether this might be caused

by the concept of loss aversion. The following analysis is done by regressing risk level with the starting balance for each round of the experiment to find if starting balance increases risk-taking behavior. The data is then separated into 4 groups by ranges of starting balances. The area of interest for loss aversion lies in between 601-1199 which is where participants are still able to recover their losses in one round.The other sections are then separated into increments of 600 for consistency. Starting balances over 1800 are combined into one group due to insufficient data and 1200 is excluded due to possible random choices in the first round. The results of the regression are shown in Table 6.

Table 6: Regression of Starting Balance as a Determinant of Risk Level

Round Risk Level				
Starting Balance Range	0-600	601-1199	1201-1800	1800+
Co-Efficient of Starting Balance	0.443 (0.002)	–0.463 (0.001)	0.184 (0.002)	0.063 (0.168)
R^2	0.126	0.121	0.030	0.016
Number of Observations	80	281	299	112

p values are in parenthesis

Table 6 shows the coefficient of starting balance of each round as a determinant of risk level and it significance level.In general, risk level increases as starting balance increases except for data with starting balance in the range of 600-1199 where people become more risk averse as they get closer to 1200 or their initial endowment. This can be explained by the concept of loss aversion where people try to recover their losses immediately if they have the chance. Therefore, if they are within the range of their endowment, they will take higher risks to break even quickly which means higher risks as starting balance falls in the 600-1199 range.

We classify the data into sections as mentioned in Table 6 to find whether monitoring effects on risk-taking behavior in gamblingdiffer for different ranges of current balance throughout the experiment. The data is also classified by gender since male and female response to monitoring may contradict as found in the previous section. The results can be seen in Table 7.

Table 7: Monitoring and Starting Balance as a Determinant of Risk-Taking Behavior by Gender

	Round Risk Level							
Gender	Male				Female			
Starting Balance Range	0-600	601-1199	1201-1800	1800+	0-600	601-1199	1201-1800	1800+
Co-Efficient of Starting Balance	.200 (0.262)	-.438 (0.000)	.391 (0.004)	.120 (0.252)	.437 (0.098)	-.288 (0.049)	.123 (0.094)	.060 (0.459)
Co-Efficient of Monitor	-6.49 (0.912)	-65.090 (0.022)	-72.727 (0.056)	-232.272 (0.025)	7.620 (0.940)	19.584 (0.607)	23.433 (0.356)	-40.405 (0.387)
R^2	0.026	0.177	0.103	0.116	0.137	0.046	0.020	0.026
Number of Observations	51	185	111	37	29	96	188	75

p values are in parenthesis

Table 7 shows that for male subjects, monitoring effects decreases the risk-taking behavior of subjects throughout every range of starting balance. Starting amount is included in the regression to remove risk-taking behavior which may be influenced by starting amount and isolate the effects of monitoring. The signs of the coefficient of starting amount are consistent with the findings in Table 6 suggesting no changes in effects of the variable.On the other hand, the effect of monitoring increasesas starting balance rises and is statistically significant at the 10% level in all ranges except below 600 and 5% level in the 601-1199 and 1800+ range. This suggests that monitoring becomes more effective as people gain more money. In accordance to economic theory, for risk-averse people the marginal utility falls as income rises. Therefore, if people are able to monitor their starting amount they may see that larger risks gives lower returns to utility and therefore choose to take smaller risks to enjoy the utility of excitement while avoiding major losses.

Table 7 also shows that monitoring tend to increase female risk-taking behavior in most areas except over 1800 tokens. However, there is insufficient evidence to make any solid conclusions. The coefficient of starting balance is consistent and therefore suggests that monitoring may not have significant effects on gambling behavior with the female population.

4.6 Other Factors that Influence Risk-Behavior in Gambling

Table 8 shows variables that have significant correlation of over 0.10 with risk level are presented. The variables are selected from topics from the questionnaire and the generated variables (see section 4.1). Only variables with over 0.10 correlations are shown. Some variables such as Buddhism were dropped due to insufficient amount of non-Buddhist subject. The significant results are shown in Table 8.

Table 8: Variables Correlation with Risk Level

Variables	Correlation with Risk Level
Gender	–0.1933
Elder Siblings	–0.1664
Introvert*	–0.1005
Monitor	0.1189
Goal	0.1230
Expected	0.1545
Round	0.1248
Win – 1	–0.1285
Consecutive Losses	0.1467
Disposable Income	0.1151
Entertainment Spending	0.1672
Temple Visits	0.1150
Donate	0.2638
Drink Times in last 3 months	0.3308
Individual Sports	0.1651
Risk Loving*	0.2728

* The following variables measure their respective subjects through the use of scoring from more than one question

The first group of variables analyses data with respect to demographics and personality. The negative gender correlation shows that female tend to be more risk averse. Those who have elder siblings on take lower risks the more brothers and sisters they have. Introverts take on less risk than extraverts.

The next group analyses variables with respect to the game. Those with monitoring treatment tend to take higher risks if we solely look at correlation. The larger the first expected outcome or goal leads to higher risk-taking behavior. As the game progresses, the risk level in general increases. After a win from the previous round subjects tend to bet less. After consecutive losses people tend to bet more.

The last section focuses on income and lifestyle. People with more disposable income take higher risks. Those who spend more on entertainment are more likely to make higher bets.Those who visit temples more often or donate more money tend to bet higher. Heavy use of alcohol is clearly correlated to higher risk taken. Participants who plays individual sports bet more aggressively. Finally, those who are revealed from the questionnaire to be more risk loving look for higher potential earning even when faced with higher risks.

4.7 Regression Analysis of Risk-Taking Behavior

In this section we form a regression to try and map various risk influencing factors from both the questionnaire and the experiment.In this regression only 6 variables were used. Variables were dropped if there are not enough data points to compare between groups, for example, there was only one non-Thai sample in the data and therefore the Thai nationality variable was dropped. Other values were dropped due to difficulty in analyzing numerically. An example for this would be the variable drink times since drinking more may show higher influence from alcohol but an additional glass or bottle of alcohol does not directly relate to amount of risk. Therefore it is only useful in terms of correlation but not as a regression variable. Most of the variables in the previously mentioned group were variables that discussed about hobbies and movie preferences. Finally, some regression suitable variables had similar variables such as income and disposable income, therefore to prevent endogeniety, only one was chosen and the other dropped. The results of the regression are shown on Table 9.

Table 9: Determinants of Risk Levels

Variables	**Coefficients**
Gender	–46.88864
	(0.001)
Disposable Income	.0064451
	(0.000)
Goal	.0336909
	(0.002)
Introvert	–18.52804
	(0.009)
Monitor	–24.26376
	(0.075)
Constant	231.9252
	(0.000)
Risk Loving	57.20788
	(0.000)
	Number of Observations: 779, R2 = 1.377

p values are in parenthesis

All variables except monitor are significant at the 1% level with monitoring is significant at the 10% level. The coefficients show that Female are more comfortable with taking lower risks. Those who have more disposable income tend to bet more and those with higher goals tend to look for higher potential earnings at the cost of higher risks. Introverts bet less than extraverts and risk lovers bet more. Finally, monitoring reduces risk-taking behavior in general.

Conclusion

This paper explores the risk-taking behavior of gambling in Thailand and the effects of self-monitoring using an experimental method involving treatment groups. The results show that application self-monitoring does effects in reducing risk-taking behavior for males subjects.It is also important

to note that self-monitoring also becomes more effective in reducing riskas people gain money and therefore can help people retain any earnings they might have received. This study shows that self-monitoring creates self-immunity by reducing risk and losses and therefore fits with all three aspects of the Sufficiency Economy theory. Even though monitoring effects are statistically significant only in males, there is some evidence that it reduces loss for both genders.This evidence may suggest that policy campaignspromoting self-monitoring behavior may possibly be used to reduce losses from gambling and to an extent reduce the negative side effects of gambling.

While self-monitoring does have effect on risk-taking behaviors there are also other factors which have been highlighted in the presentation of the data.Females tend to take significantly less risky bets than males. Betting also tends to increase with disposable income and higher expectations of earnings and introverts tend to bet less.

Due to the limitations of the project, it was not possible to experiment with people from different age groups.In addition, this experiment is limited by the amount of time and rounds. However, in the field, gambling end when the person decides to stop or runs out of funds. Further research may be done on gambling with more rounds or without a set ending to see whether any effects are consistent with this paper.

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