

# Uncovering the Price of Sin: Do Individual Investors' Decision Restrained by Social Norms? An Experimental Approach

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Many economists have observed a deviation from the standard economic theory. The assumption of narrowly self-interested behavior by individuals cannot accurately explain individuals' decision-making. Recent studies on sin stock provide empirical evidences on the market effect of social norms. "Sin stock" refers to the stock of a company either directly involved in or associated with activities that widely considered as unethical or immoral. Examples include alcohol, tobacco, gambling, sex-related industries and weapons manufacturers. In this paper, we adopt an experimental approach to examine individuals' investment decision on sin stock. Our experiment consists of two treatments, in which individual investors are asked to form an investment portfolio that consists of two stocks, one sin stock and one non-sin stock. In both treatments, the two stocks offer same risk but different return rates and we induce social preference only in *treatment 2* by manipulating the availability of company information. We found that there is weak evidence showing that individuals' investment decision is affected by social norms. Moreover, there is gender difference in individuals' responses to the disclosure of sinful information and some variables seem to play a role in affecting participants' investment decision for a given gender: Women's decision to invest in sin stock is adversely affected by the numbers of economics and finance courses they had taken. Men on the other hand invest less on sin stock if they have a religious belief.

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## 1. Introduction

Contradicting to the standard economic theory where it predicts individuals are driven entirely by self-interest, vast literature evidenced that people exhibit social preferences and thus individual decision-making depends on other

potential factors beyond wealth. As first proposed by Adam Smith, potential factors such as risk, uncertainty as well as the concept of morality should be entered into the utility function (Brady, 2013). Economists such as Akerlof and Kranton in their series of studies (2000, 2005) have introduced the concept of

“identity utility”. They incorporated the psychology and sociology of people’s identity into the economic model which aims to better outline individual’s utility function and thus provide more appropriate explanations of one’s behavior and choice. According to their theory, individuals gain “identity utility” by acting in conformity to the social norms in their society and on the other hand, they lose “identity utility” if acting contrary to the social norms (Davis, 2011). And the concept of “identity utility” had led to the introduction of non-pecuniary moral cost or benefit by List and Levitt (2007) into their model of utility. Rational decision theorists argued that people are rational and thus any moral considerations in decision-making introduce inefficiency in the markets, for example in terms of portfolio theory, by either a rise in risk or reduce in profitability. (Carswell, 2002; Michelson, Wailes, Laan, & Frost, 2004). Hong and Kacperczyk (2009) suggest that the market effect of social norms can be ideally investigated in the securities market where investors have to pay significant financial costs for their discriminatory tastes. Their empirical study of the effect of social norms on U.S. stock market provides evidence that publicly traded companies who involved in the production of alcohol, tobacco, and gambling, which referred as sin stocks are less held by some institutional investors, and as a result, higher expected returns is observed on those stocks. Apart from higher expected returns of sin stocks, Kim and Venkatachalam (2010) in the hope to find an explanation for the abnormal returns observed that the quality of financial reporting of sinful firms is in fact superior relative to other firms. This again implies that the reluctance of investors to invest in sin stocks reflect their non-financial tastes in portfolio formation. Nevertheless,

most of the studies on sin stocks are restricted to empirical and theoretical researches that experimental studies seem to be rare. Whether the behavior of social responsible investment is universe to individual who come from different social background with different gender, age as well as education level or merely applied to some groups of people still left unanswered.

In this paper, we concern with the role of social norms in individuals’ investment decision and what are the possible explanations for their behavior, for instance, why do some people invest social responsibly while some do not, and we further examine whether their behavior can be attributed to any personal characteristics. We designed a laboratory experiment in the form of decision-making game to examine how moral considerations might influence individual decision-making, more precisely, the moral influence on individuals’ investment decision on sin stock. We compare the effect of two treatments by controlling the availability of information related to the stocks that are to be chosen with an amount to invest in by the participants. *Treatment 1* is a task where no company information of any choices of stocks is included and it is used as a base group for making comparison with latter treatment. *Treatment 2* is a task where participants’ social preference is induced through the disclosure of company information (sinful information) which includes company descriptions and pictures of their products. We believed that a visual information of companies’ products can enhance the effect of social preference on individual and thus we paid special care in selecting appropriate photos of companies’ products. In both treatments 1 and 2, we provided two choices of company stocks

where Stock A represents a sin stock and Stock B represents a general utility stock. The risk associated between two stocks is controlled so that the probability of winning is the same (i.e. 50% of winning for each). We conducted our experiment in City University of Hong Kong (CityU) and participants were recruited from the university through an intranet system with an online advertisement.

Given the evidences provided by existing literatures, people's investment decisions are constrained by norms and thus they are willing to pay for a financial cost so as to avoid actions that contrary to their social norms. In our experiment, this implies that when individuals notice about the presence of sin stock (i.e. through the disclosure of sinful information), they will reduce their proportion of investment on sin stock relatively in their portfolio even though the sin stock offers them a higher expected return. More specifically, we are testing the hypothesis that less percentage of resources (i.e. money) will be invested in sin stock in Treatment 2 relative to the base group. Moreover, we further investigate the effect of various variables such as gender, age and educational background etc. in explaining participants' behaviors. In addition to our hypothesis, portfolio theory suggests that investors will maximize expected return as well as minimize variance of their portfolio and since the portfolio with maximum expected return is not necessarily the one that associates with minimum variance (Markowitz, Portfolio selection, 1952; Markowitz, The utility of wealth, 1952). Therefore, we anticipated that subjects will diversify their portfolio by investing both choices of stocks instead of just investing in the one with higher expected return.

There are three main findings in our experiment. Our results include (i) there is insignificant statistical evidence to show that participants invested less percentage on sin stock when sinful information is disclosed even though the absolute amount is reduced in treatment 2 than treatment 1, (ii) there is gender differences in individuals' investment decision when sinful information are disclosed, (iii) in treatment 2 where sinful information is disclosed, some variables such as religious background and number of Economics and Finance courses a participant had taken help to explain subjects' investment decision for a given gender. One possible explanation for the first finding is that the change in subjects' investment decision is not strong enough in the experiment. While Hong and Kacperczyk (2009) revealed that sin stocks are less held by investors in U.S. and that social norms affect the prices and returns of sin stocks, our findings lead to another question whether there is a difference in the behavior of socially responsible investing across countries and cultures due to a weaker sense of social responsibility and as a result, abnormal returns may be absent in sin stocks in some countries. Secondly, the gender differences in our experiment is very significant and is in accordance to other studies that women response to moral dilemmas differently from men. It is evidenced that women have a stronger emotional aversion to harmful action which lead to a gender difference in moral decisions (Friesdorf, Conway, & Gawronski, 2015). Therefore, the gender differences in our experiment can be explained by a stronger emotional aversion that women have on the sinful information we disclosed. Thirdly, we further observed that there are some variables correlated to participants' investment decision on sin stock that can only be observed in

Treatment 2. By just looking at the data from women, the percentage invested in sin stock is negatively correlated to the number of Economics and Finance course(s) a participant had taken. In other words, a participant who took more Economics and Finance courses tend to invest less in sin stock. We interpret this finding is a result of emphasizing corporate social responsibility in the courses offered by the university. On the other hand, we found that men who have religious belief tend to invest less in sin stock. This may suggest that men although have a weaker emotional aversion, their investment decision are also constrained by social norm.

The remainder of this paper is organized as follows: Section 2 presents the design of the laboratory experiment. Section 3 reports the main results from the experiment by comparing the empirical statistics between the two treatments. We conclude and discuss about the implication of our findings in Section 4. And Appendix is attached to include details of our paper.

## 2. Experimental Design

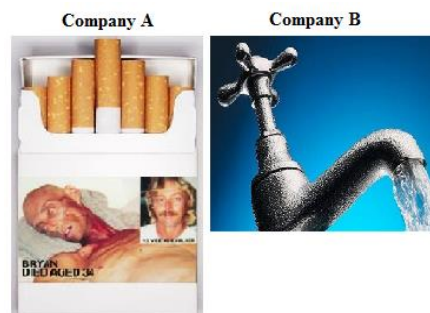
### 2.1 *Experimental Instruction Design*

Traditional Economics and Finance theories and literatures have always come to believe human beings as “Homo economicus”, that is to say, humans are seen as narrowly selfish and are self-interested which optimizes their gains in all general scenarios. For example, given an investment scenario having a choice of two stocks (Stock A and Stock B), with an equal probability of winning ( $p(\text{winning})=0.5$ ), but a different return factor of one dominating another, theories, for instance, the “expected utility theory” helps us to predict that humans would allocate all of their resources into a choice of a higher return security rather than

diverging some or even all of their resources to a lower return security. Therefore, humans who do not invest all of their resources to the higher return security under this case are seen as economically irrational.

We hypothesized that individual investors exhibit a tendency to be restrained by their perceived social norms when making investment decisions. That is to say, individual investors do present with themselves a tendency to avoid investing into a particular stock and forgo probable future financial benefits and costs if the respective company runs a sinful business practice even though its return is higher than other investment alternatives. And because of human beings’ concern at the social benefits and norms, they shall forgo the possible investment gain.

We designed our experiment as a decision-making game which participants are required to form an investment portfolio consisting two stocks, stock A and stock B. The design was one of the uniqueness of our experiment because it helps us to analyze how human beings process and carry out investment decision under the situation which company information are not disclosed (treatment 1) versus the situation which company information and product photos, including sinful business summaries and product photos that impair positive social norms, such as, good health, are disclosed (treatment 2, see below).



The design requires relatively little natural or learnt skills but authentic mental effort from the participants. Participants were first endowed with 10,000 points for every 1,000 points equals HKD 1. Participants can allocate any point between 0 and 10,000 (0 and 10,000 inclusive) to form the portfolio. The sum of the points in the portfolio should not exceed 10,000 points. Each stock represents a predetermined real stock listed in the New York Stock Exchange respectively. However, participants knew nothing about the name and other indicators of how the predetermined stocks perform in the real investment market. For the reasons to incorporate a more authentic stock investment nature we targeted “Philip Morris International Inc” and “California Water Service Group Holding” as Stock A and Stock B respectively. Of Stock A being the sin stock as the company manufacturers tobacco related products. Summaries of the businesses were written by the experimenters regarding to the business operations of the enterprises and were provided as a testing variable in treatment 2 and thus were intentionally omitted in treatment 1.

For each stock if points were allocated by the participant, he then needed to bet on whether the second decimal place of the closing price of that stock on a randomly drawn historical trading day is odd or even (0 is defined as even) and the date was announced in the end of the experiment in each session.

The payoff on the stocks was determined in the following way. If the participant’s bet on odd or even was correct, he received R times of the points invested in that stock. The values of R were 2.7 and 2 for Stock A and Stock B respectively. If his bet on odd or even was inconsistent with the outcome, he lost the points invested in that particular stock. That

was, if he invested X points and won, he received  $R \cdot X$  points. If not, he lost X points.

## 2.2 Experimental Procedure

We recruited students of City University of Hong Kong (CityU) to participate in our 60 minutes experiment through posting advertisements and basic information about the time and venue of our study on the CityU Announcement Portal (CAP) and the Intranet Portal which teaching staffs and students usually communicate and share the use of course materials on, namely the Canvas system. The advertisement provides students with the idea about the show-up fee upon completion of the experiment and an additional amount of money which was conditional on their choices in the experiment. An URL connecting to a Google document set up for experiment recruitment was attached with the advertisement for interested participants to sign-up on a first come first served basis. Three 60-minutes experiment sessions, 4-5pm, 5-6pm and 6-7pm on the 28<sup>th</sup> April, 2015, were opened for students’ choice to sign up for the experiment. General personal information, such as, first name, surname, student ID and CityU email address were obtained from the participants at online registration, duplicated participation from participants was therefore prohibited. A confirmation email was sent to the email address provided by the interested participants individually to acknowledge their successful registration for the experiment. Eventually, 44 participants showed up and participated in the 3 sessions run on the experiment day at the Experimental Economics Laboratory 7-218 on the 7<sup>th</sup> Floor of Academic Building 3 in CityU Hong Kong.

Upon arrival, the participants were asked to fill in their personal information, including

their full name and student ID on a piece of participation record, the “Subject Payment Record” (Appendix 1). At the same time, a piece of paper indicating their “Participant ID” was distributed on a first come first served basis and the participants were then asked to take a seat and reserve an empty seat between themselves and other participants. A session of the experiment commenced when the participants were settled down. The experimenters first distributed then read aloud the experimental instructions (Appendices 2 & 3) to the participants and requested the participants to make their decisions in the decision box on the experimental instructions sheet. When the participants raised their hands, indicating their completion of the task, the experimenters collected the instruction sheet and handed out another set of questionnaire (Appendix 4) for the participants to fill in. Finally, questionnaires were collected after the participants completed the questions. The questionnaire was mainly designed to collect the mental processing rationale of the participants in making investment choices between the two stocks. Further personal information such as, age, number of years in investment experience etc. were obtained to conduct further analysis, for example, regression analysis presented in table format in session 3. Participants waited until all of them in the session had completed both sets of materials, then, the experimenter publicly drew the random historical trading date using the “Random Calendar Date Generator” provided by RANDOM.ORG

(<https://www.random.org/calendar-dates/>).

Subsequently, participants were invited to come out, receive and sign to confirm the acceptance of their payments, including the show-up fee and the additional money earned in the experiment, with the presence of their Participant ID, on the “Subject Payment Record”, one by one under chronological order of their Participant ID and left the laboratory immediately. The payment to each participant was calculated with Excel based on the choices and investments the participants made in the experiment.

### **3. Results**

After describing our experimental design, we present the main results by analyzing the points allocated in Stock A (sin stock) and Stock B (non-sin stock) in the portfolio. First of all, we considered the means and variances of the stocks under the two experimental treatments. Secondly, we tested whether their means and variances are statistically different from each other, meaning, we tested whether our sample of participants exhibited a tendency in avoiding making investment in the sin stock when they were provided with the company information compared to when they were not provided with any information about the companies’ businesses. Finally, we investigated what factors were crucial in affecting the point allocation made by the participants in both treatments and the reason of them.

**Table 1: Summary Basic Statistics of Two Treatments**

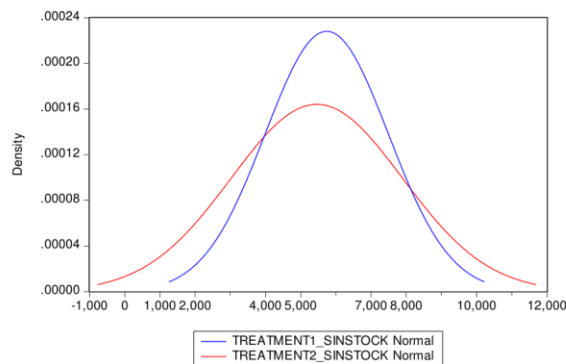
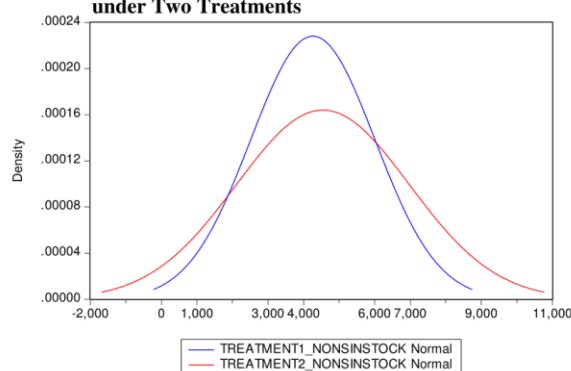
	Treatment 1		Treatment 2	
	Sin Stock	Non sin stock	Sin Stock	Non sin stock
Mean	5740	4260	5458.333	4541.667
Median	6000	4000	5000	5000
Maximum	9000	8000	10000	10000
Minimum	2000	1000	0	0
Std. Dev.	1748.503	1748.503	2431.303	2431.303
Skewness	-0.298174	0.298174	-0.031686	0.031686
Kurtosis	2.612122	2.612122	2.788094	2.788094
Observations	20	20	24	24

Under treatment 1, the mean percentage of investing in sin stock (Stock A) and non-sin stock (Stock B) are 57.4% and 42.6% respectively. However, in treatment 2, when we included the company information in the instruction, participants averagely invested less in sin stock and more in non-sin stock. Numerically, participants averagely invested 54.6% and 45.4% in sin stock and non-sin stock respectively in treatment 2.

Furthermore, Figure 1 and Figure 2 reveal the theoretical distribution comparison between sin stock and non-sin stock under two treatments. It is clear that under treatment 2, the distribution spread out more than the distribution in treatment 1. Also, there was a higher possibility of having more outliers after we provided the sinful information. In other words, the variances of point allocation in sin stock or non-sin stock in treatment 2 are larger than those in treatment 1. Table 1 summarized the statistics results of two samples.

After examining the basic results, we computed another set of data to obtain the difference between the points invested in sin stock and non-sin stock under the two treatments respectively (i.e. points allocated in sin stock minus points allocated in non-sin stock) to obtain an idea which on average whether participants changed their point allocated in sin stock. The results show that

participants averagely invested 1480 points more in sin stock under treatment 1 but only invested 916.7 points more in sin stock under treatment 2. The result once again confirmed that subjects averagely invested less in sin stock after the sinful information were disclosed.

**Figure 1: Theoretical Distribution Comparison of Sin Stock under Two Treatments****Figure 2: Theoretical Distribution Comparison of Non-sin Stock under Two Treatments**

Notes. Since the above figures are theoretical distribution, negative side is included to represent a comprehensive distribution.

Although the difference in point allocation under the two treatments can help us

to confirm our hypothesis in an intuitive way, we further tested the statistical significance of the results by comparing the means and variances of 3 groups of data.. They are, Group 1: Sin stock between two treatments, Group 2: Non-sin stock between two treatments, and Group 3: Difference of point allocation between sin and non-sin stock under the same treatment for two treatments. If the sinful information does affect participants' investment decisions generally, the means and variances of the two treatments should be statistically significant different from each other.

The hypothesis of testing equality of means is:

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

Similarly, the hypothesis of testing equality of variances is:

$$H_0: \sigma_1^2 = \sigma_2^2$$

$$H_1: \sigma_1^2 \neq \sigma_2^2$$

Table 2 and 3 show the result of testing equality of means and variances under 3 groups of comparisons.

**Table 2: Summary Statistics of Testing Equality of Means**

Method	Group 1 Probability	Group 2 Probability	Group 3 Probability
t-test	0.6674	0.6674	0.6674
Satterthwaite-Welch t-test <sup>^</sup>	0.6581	0.6581	0.6581
Anova F-test	0.6674	0.6674	0.6674
Welch F-test <sup>^</sup>	0.6581	0.6581	0.6581

*Notes.* Since we are testing the same outcome from the same set of data but in different presentation of grouping, the p-value is the same across groups.

<sup>^</sup>Test allows for unequal cell variances

**Table 3: Summary Statistics of Testing Equality of Variances**

Method	Group 1 Probability	Group 2 Probability	Group 3 Probability
F-test	0.133	0.133	0.133
Siegel-Tukey	0.2966	0.3096	0.2966
Bartlett	0.1448	0.1448	0.1448
Levene	0.1816	0.1816	0.1816
Brown-Forsythe	0.2079	0.2079	0.2079

*Notes.* Since we are testing the same outcome from the same set of data but in different presentation of grouping, the p-value is the same across groups.



We concludes that despite participants had invested less in sin stock after the disclosure of sinful information, the effect is not statistically significant since the null hypothesis testing equality of means and variances cannot be rejected under all situations.

Although there is no significant effect of participants investing less in sin stock after the sinful information was disclosed, it is worth to investigate what factors affect the decisions of participants to invest. Hence, we combined all samples in treatment 1 and 2 to see whether sinful information or other factors have significant effect on percentage invested in sin stock, non-sin stock and the difference computed between them. Table 4 reveals an interesting result that gender has a significant effect on the three mentioned dependent variables as they are significant at the 1% level.

Since Table 4 concluded the result regressed based on all the samples, it is unclear to acknowledge the comparison result for two treatments on the percentage invested in sin stock given certain factors of participants. Therefore, we separated the data for further analysis. Table 5 summarized the regression functions we used. In treatment 1, the p-value of all variables are greater than 10% significance level, thus are seen as insignificant in determining the percentage of investment in sin stock. However, in treatment 2, the p-value of how many Economics and Finance courses the participants have taken (0.1218) and participants' gender (0.0197) showed that these two factors may affect the percentage invested in sin stock.

Therefore, we refined our regression model to exclude the insignificant factors and include only the above mentioned factors. The result showed, after the sinful information

were disclosed, gender (0.0082) and Economics and Finance courses the participants have taken (0.0247) have effect on the percentage invested in sin stock because their p-value is significant at 5% significance level. Also, by testing the joint significance of the model, F-statistic (0.0067) reconfirmed the mentioned result.

To be more specific, the data showed that men invested 26.4% more than women given the sinful information was disclosed. In other words, men are more rational than women under social norms which men were shown to be more salient to confirm with the classical Economics theories in assuming humans being self-interested. Some of the studies suggest that men have stronger preference for utilitarian over deontological judgments than women. For example, when facing a moral dilemma, men exhibited less utilitarian inclinations than women (Friesdorf, Conway, & Gawronski, 2015). The result matches with our finding. In our experiment, when participants need to choose a stock to invest given the company information, men invested more in sin stock than women showing that men tend to be more utilitarianism.

On the other hand, subjects who took more than five Economics and Finance courses invested 24.6% less in sin stock. One of the reason behind is that they have higher chance to come across with and influence by the Economics and Finance courses which are related to social responsibility and thus they are more aware of the harm of those so called sinful companies.

Since the result indicated a gender difference in investing in sin stock. We ran another regression which was conditioned on

gender under treatment 2 to examine the factors that affected the investment choices between men and women. See Table 6 and 7 for the summarized regression results conditioning on men and women respectively.

However, due to the limited sample base, the results are for reference of future research studies only.

**Table 4: Summary Statistics of the Regression for All Sample**

Variable	Dependent variable:		
	<i>% invested in sin stock</i>	<i>% invested in non sin stock</i>	<i>% Difference invested between stocks</i>
	Coefficient Std. Error	Coefficient Std. Error	Coefficient Std. Error
Constant	90.59849** (41.53074)	9.401511 (41.53074)	81.19698 (83.06148)
Sin information	7.306579 (7.56996)	-7.306579 (7.56996)	14.61316 (15.13992)
Gender	23.86836*** (7.686825)	-23.8684*** (7.686825)	47.73671*** (15.37365)
Economics and Finance Courses have taken	-5.47206 (9.530744)	5.47206 (9.530744)	-10.94413 (19.06149)
Age	-2.19937 (1.512909)	2.19937 (1.512909)	-4.398741 (3.025817)
Years of Learning English	0.459596 (0.920126)	-0.459596 (0.920126)	0.919193 (1.840253)
Highest Study Level	-6.48091 (22.70518)	6.48091 (22.70518)	-12.96183 (45.41036)
Investment Experience	-5.23404 (13.2122)	5.23404 (13.2122)	-10.46807 (26.4244)
Major	0.024874 (7.693605)	-0.024874 (7.693605)	0.049747 (15.38721)
Religion	-2.75301 (7.788844)	2.75301 (7.788844)	-5.506027 (15.57769)
Smoke	-11.5881 (17.09734)	11.5881 (17.09734)	-23.17615 (34.19468)
R-squared	0.340599	0.340599	0.340599
Adjusted R-squared	0.11322	0.11322	0.11322
F-statistic	1.497933	1.497933	1.497933
Prob(F-statistic)	0.190369	0.190369	0.190369

*Notes.* a. Sin information=1 if company information is provided, 0 otherwise; Gender=1 if male, 0 otherwise; Economics and Finance Courses have taken=1 if more than 5 courses taken, 0 otherwise; Highest Study Level=1 if higher than Bachelor's degree, 0 otherwise; Major=1 if under College of Business, 0 otherwise; Religion=1 if having religion belief, 0 otherwise; Smoke=1 if smoke, 0 otherwise.

b. \*\*\*Significant at the 1% level; \*\*Significant at the 5% level

**Table 5: Summary Statistics of the Regression Functions Used in Comparing 2 Treatments**

Variable	Regression Function 1		Regression Function 2	
	Dependent variable: <i>% invested in sin stock</i>		Dependent variable: <i>% invested in sin stock</i>	
	Treatment 1	Treatment 2	Treatment 1	Treatment 2
	Coefficient	Coefficient	Coefficient	Coefficient
	Std. Error	Std. Error	Std. Error	Std. Error
Constant	-84.55408 (158.4402)	97.89373 (47.49174)	50.38333*** (6.611921)	51.98276*** (5.181198)
Gender	-0.771019 (15.46083)	31.40788** (11.93406)	8.583333 (8.018132)	26.46552*** (9.070081)
Economics and Finance Courses have taken	18.95187 (13.7674)	-28.02465 (17.01525)	7.466667 (9.071481)	-24.56897** (10.15133)
Age	5.831826 (7.616797)	-2.562621 (1.877217)		
Years of Learning English	-0.095781 (1.385074)	0.504723 (1.598151)		
Highest Study Level	24.38239 (27.50627)			
Investment Experience	1.6099 (24.52979)	2.39646 (19.17021)		
Major	-14.46565 (15.7602)	4.467267 (10.95579)		
Religion	12.4613 (17.65371)	-4.786389 (10.27549)		
Smoke	14.61191 (27.21987)	-1.873358 (38.68211)		
R-squared	0.502765	0.525706	0.09687	0.379374
Adjusted R-squared	-0.136537	0.25468	-0.00938	0.320266
F-statistic	0.786428	1.939691	0.911715	6.418395
Prob(F-statistic)	0.639865	0.132943	0.420607	0.006679

*Notes.* a. Gender=1 if male, 0 otherwise; Economics and Finance Courses have taken=1 if more than 5 courses taken, 0 otherwise; Highest Study Level=1 if higher than Bachelor's degree, 0 otherwise; Major=1 if under College of Business, 0 otherwise; Religion=1 if having religion belief, 0 otherwise; Smoke=1 if smoke, 0 otherwise.

b. All samples in Regression Function 1, Treatment 2 have Bachelor's degree or higher education, thus we cannot include it as a variable.

c. \*\*\*Significant at the 1% level; \*\*Significant at the 5% level

Concerning the choices made by male participants, the factors that affect their choices in the point allocation that behaved to be statistically significant in the regression conditioned on men was whether the

participants have a religion belief. We can see that religion became a significant factor under treatment 2 when compared to treatment 1. This suggests that religion belief shaped the behavior of men but not women.

**Table 6: Conditional Regression of male's percentage of sin stock investment on the presence of religious belief**

Variables	Dependent Variable: <i>% invested in sin stock</i>	
	Treatment 1	Treatment 2
	Coefficient Std. Error	Coefficient Std. Error
Constant	66*** (6.330409)	90*** (4.830459)
Religion	-2.66667 (8.571414)	-43.33333*** (7.378648)
R-squared	0.01064	0.873385
Adjusted R-squared	-0.099289	0.848062
F-statistic	0.09679	34.4898
Prob(F-statistic)	0.762801	0.002031

*Notes.* a. This table presents the conditional impact on male participants on whether having a religious belief impact the percentage of investment in sin stock under the two treatments. Religion=1 if having religion belief, 0 otherwise.

b. \*\*\*Significant at the 1% level

**Table 7: Conditional Regression of female's percentage of sin stock investment on the level of Economics and Finance courses studied**

Variables	Dependent Variable: <i>% invested in sin stock</i>	
	Treatment 1	Treatment 2
	Coefficient Std. Error	Coefficient Std. Error
Constant	50.5*** (6.952218)	53.57143*** (4.536324)
Economics and Finance Courses have taken	7 (13.90444)	-33.5714*** (10.79861)
R-squared	0.040529	0.391852
Adjusted R-squared	-0.119382	0.351309
F-statistic	0.253448	9.665046
Prob(F-statistic)	0.632602	0.007186

*Notes.* a. This table presents the conditional impact on female participants on whether having studied a certain level of Economics or Finance courses impact the percentage of investment in sin stock under the two treatments. Economics and Finance Courses have taken=1 if more than 5 courses taken, 0 otherwise.

b. \*\*\*Significant at the 1% level

Arriving at the regression of women participants, we found that women took more than five economics and finance courses, however, they invested less in sin stock. The possible reason is that they acquired the social norm through the courses they have taken.

#### **4. Conclusion and Discussion**

Standard Economics theories address human behavior mainly with the belief that complete rationality is common amongst people. It further reveals human's utility optimization behavior with the same logic attributing narrowly-selfishness and self-interest being the ultimate drive. However, recent literatures have inaugurated fresh understanding of human behavior, introducing social elements and other considerations to comprehend how homo-sapiens interact in the reality. We continued to unbox the humanistic ability in making investment decisions and primarily investigated whether we are restrained by social norms with laboratory experiments especially when it comes to the regard of investments into sin businesses. Analyzing the amount of points invested in sin stock, comparing means and variances of the distributions, we proved that the disclosure of sin information does not help avoid participants' point allocation at sin stock in the statistical sense. We confer the result possible to be a limitation of concordance of participants' responses between laboratory and real settings. As it is easy for participants to recognize that their investment decisions in the experiment were not translating any effects, typically socially disfavor ones to the reality. That is to say, participants' investments in the laboratory are not realistically supporting the operations of the sin companies, for instance, producing tobacco related products creating poorer air quality and health conditions of world citizens, which participants might found

it less restrained by their moral understanding to invest in sin stock and thus embrace the higher expected return it carries.

A further discussion plot falls into whether cultural differences contribute to the disclosure of sin information being statistically trivial in determining the level of investment made to sin stock. As several participants who are believed to be non-local students responded in treatment 2 with a lower investment in sin stock than non-sin stock with proportion of allocation ranging from (0%, 100%) to (40%, 60%). Although the total number of such a type of participants is seen irrelevant to the overall number of observations, we wondered if the conventional social and cultural environment in Hong Kong introduced our younger generations to pay less attention of their act to the greater social and cultural context. In addition, we pondered if results are going to be more salient if our experiment was done in other places in the globe, particularly in western countries such as the United States and European countries where social responsibilities happens to be a core collective value, which is strongly advocated about humanity.

Moreover, men having a religious background was also shown to be a factor to cause a reduction in sin stock investment compared to men having no religious background under treatment 2 when sin information is disclosed. Nevertheless, whether a person has a religious background was not proven to be an important factor for women in the same treatment. Possible explanation could be driven out since women are suggested to be more naturally emotional-aversive than men, as a result, the effect of having a religious background to women investment in sin stock exhibits a less salient effect.

Our paper contributes to the existing literature by adopting an experimental approach to the study of individuals' investment decision on sin stock. We provided a new insight to related studies on investment decision by relating personal factors to their investment behavior. Further studies and researches are advised to explore sophisticatedly on the topics such as cultural and gender differences on investment decision.

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## Appendix 2

Participant ID: \_\_\_\_\_

### **Instruction:**

Welcome to our experimental study on decision-making. Each participant receives a show-up fee of HKD 15. In addition, you can earn more money based on your decisions in the experiment.

You will be given a participant ID number. Please keep it confidentially. Your decisions will be anonymous and kept confidential. You will be paid in private and in cash, using your participant ID, 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.



Participant ID: \_\_\_\_\_

**EXPERIMENTAL INSTRUCTION**

You are endowed with 10,000 points (1,000 points = HKD 1). You can allocate any point between 0 and 10,000 (0 and 10,000 inclusive) to form a portfolio. The portfolio is consisted of 2 stocks: stock A and stock B. The sum of the points in the portfolio should not exceed 10,000 points. Each stock represents a predetermined real stock listed in the US stock market respectively.

For each stock (if points are allocated), you also need to bet on whether the **second decimal place** of the closing price of that stock on a randomly drawn historical trading day (the day will be announced in the end of the experiment) is **odd or even (0 is defined as even)**.

The return on the stocks will be determined in the following way. If your bet on **odd or even** is correct, you will receive R times of the points invested in that stock. If not, you will lose the points invested in that stock. That is, if you invest X points and win, you will receive R\*X points. If not, you will lose X points.

**Your decision**

Please make your choice now.

	Odd or Even	Points Allocation	R
Stock A			2.7
Stock B			2
Total	N/A	10,000	N/A

### Appendix 3

Participant ID: \_\_\_\_\_

#### **Instruction:**

Welcome to our experimental study on decision-making. Each participant receives a show-up fee of HKD 15. In addition, you can earn more money based on your decisions in the experiment.

You will be given a participant ID number. Please keep it confidentially. Your decisions will be anonymous and kept confidential. You will be paid in private and in cash, using your participant ID, 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.

**EXPERIMENTAL INSTRUCTION**

You are endowed with 10,000 points (1,000 points = HKD 1). You can allocate any point between 0 and 10,000 (0 and 10,000 inclusive) to form a portfolio. The portfolio is consisted of 2 stocks: stock A and stock B. The sum of the points in the portfolio should not exceed 10,000 points. Each stock represents a predetermined real stock listed in the US stock market respectively.

**Company description:**

Company A is an American tobacco company, which is the second-largest tobacco company in the United States. The subsidiaries of the company manufacture and market a variety of tobacco products, including cigarettes and moist snuff.



Company B is the third largest investor-owned water utility in the United States. Traded on the New York Stock Exchange, the Company has six wholly owned subsidiaries operating in California, Washington, New Mexico, and Hawaii.


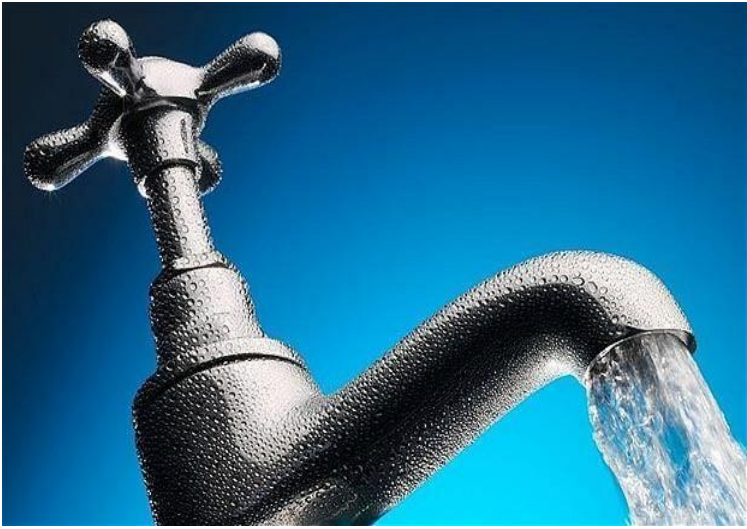
Participant ID: \_\_\_\_\_

For each stock (if points are allocated), you also need to bet on whether the **second decimal place** of the closing price of that stock on a randomly drawn historical trading day (the day will be announced in the end of the experiment) is **odd or even (0 is defined as even)**.

The return on the stocks will be determined in the following way. If your bet on **odd or even** is correct, you will receive  $R$  times of the points invested in that stock. If not, you will lose the points invested in that stock. That is, if you invest  $X$  points and win, you will receive  $R \cdot X$  points. If not, you will lose  $X$  points.

**Your decision** Please make your choice now.

Participant ID: \_\_\_\_\_

	Odd or Even	Points Allocation	R
<p>Stock A: tobacco company.</p>  <p>The image shows a pack of cigarettes at the top. Below it is a newspaper clipping featuring a photograph of a man's torso and a smaller portrait of a man with a mustache. The text on the clipping reads "BRYAN DIED AGED 34".</p>			2.7
<p>Stock B: water utility company.</p>  <p>The image shows a close-up of a silver faucet with water flowing out. The faucet is covered in water droplets, and the background is a solid blue color.</p>			2
Total	N/A	10,000	N/A

## Appendix 4

Participant ID: \_\_\_\_\_

### Questionnaire

Questions below are important to our study, particularly questions number 1 and 2, please answer with care.

1. What is your set of choices in the experiment?
  
  
  
  
  
  
  
  
  
  
2. What is your rationale behind your choice? Please explain.
  
  
  
  
  
  
  
  
  
  
3. Gender  
 Male  Female
  
  
  
  
  
  
  
  
  
  
4. Age \_\_\_\_\_
  
  
  
  
  
  
  
  
  
  
5. Highest education level (or to be) achieved  
 Associate/ Diploma  
  
 Bachelor's Degree  
  
 Master's Degree  
  
 Doctorate Degree  
  
 Others, Please specify: \_\_\_\_\_

6. What is your university major?

\_\_\_\_\_

7. How many years have you been studying English?

\_\_\_\_\_ Years

8. How many Economics and/or Finance course(s) have you taken?

0 to 2

3 to 5

6 to 8

more than 9

9. Do you have any religious belief?

Atheist

Buddhism

Christianity

Taoism

Islam

Others, Please Specify: \_\_\_\_\_

10. Do you smoke?      Yes / No

11. Do you have any investment experiences?

Yes, No. of years: \_\_\_\_\_

No