The Economics of Lotteries: An Evidence from Vietnam

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Abstract: This study aims at investigating the behaviors and characteristics of the lottery players and the lottery sellers in the Vietnam's lottery market. Data were collected from two primary surveys in 2010 and 2016. Descriptive statistics and quantitative methods including multivariable regression model and logit model are used to analyze the data by the support from R's statistical software. The findings from the study indicate that Vietnamese people have spent approximately $3.7 billion on purchasing lottery tickets per year. This study also has explored that the average earnings of the lottery sellers is 5.2 million VND per month, however they have to face many challenges with their working conditions. Especially, this research has built the logit models to estimate the probability of the lottery participation. In addition, it is evident that income has a weakly positive effect on the action of buying lottery tickets. Moreover, the factors as age, peer-play, educational attainment and behavior toward risk also contribute to explain the behavior of buying lottery in Vietnam. A strong recommendation is that since the relative purchasing the lotteries power of Vietnamese is 1.86 times higher than that of the worldwide average level, therefore, the Vietnamese state authorities should not encourage their citizens to participate more into the lottery market and spend more on lottery tickets.

Key words: Lottery tickets, lottery players, logit model, Vietnam, VND

INTRODUCTION

In recent years, lottery market has become a controversial topic in many countries not only for economists or politicians but also for massive popular citizens. The reason is that beside many benefits, for example, the lottery market has created a lot of job opportunities and has contributed much for the local and central budgets it also causes several harms to society life such as fraud and profligacy.

Lottery tickets are actually a complicated and interdisciplinary issue at the moment. It is not just economic issue. The reason is that lottery tickets are assets with negative expected return and lottery playing challenges the basic assumptions of economic theory (Garvia, 2007). Moreover, if the reason is that economic gaining, so why do players in the wealthier countries continue to buy lottery tickets? If the reason is not just come from economic aspect, then what do other motivations affect the playing behavior of the lottery players?

Do the poor tend to buy more lotteries than the rich? Several previous studies in developed countries support the conclusion that the poor are more likely to buy more lotteries than the rich (Ghany and Sharpe, 2001 in Canada; Callan *et al.*, 2011, in America; Beckert and Lutter, 2013, in Germany). This finding is reasonable or not when those poor people are limited in financial resource not just because of their low incomes but because they have to spend their budgets on many essential needs such as foods, housing, education and healthcare as well. In other words, the poor may play the most but can least afford to play (Haisley *et al.*, 2008) also went further when considering relative income rather than static or absolute income. In fact, he found that the implicit comparisons with other income classes increase low-income individual's desire to play the lottery. In the case all of above findings are reasonable is it the case for a developing country like Vietnam?

Regarding Vietnam, one motivation for doing this research is that there are several common agreements without evidences about the lottery market. First, people play lottery mostly or uniquely because of economic reason. Second, the poor certainly tend to buy more lottery tickets than the rich. Third, the Vietnamese spending too much on the lottery playing and therefor leads to profligacy for society as a whole. Fourth, the earnings of the lottery sellers are significantly much lower compare to other kinds of jobs in the economy. Those points of view should be evaluated carefully via empirical data set and reasonable explanations.

Moreover, another motivation to do this research in Vietnam is that the lottery service has contributed a considerable percentage on local budgets which especially reached up to around 50% of the budget from domestic activities in several provinces namely Hau Giang

Table 1: The share of the budget from lottery revenues over the budget from domestic revenues in several local governments and central government, Vietnam

Province	Years	Budget from domestic revenues excluding oil revenues	Budget from lottery service (mln. VND)	Share
Hau Giang	2014	910,000	330,000	36.26
	2013	979,000	300,000	30.64
	2012	1,016,465	354,875	34.91
	2011	990,889	319,380	32.23
	2010	729,908	332,421	45.54
	2009	670,397	275,382	41.08
Vinh Long	2014	2,394,187	1,225,561	51.19
	2013	1,953,523	990,291	50.69
	2011	1,552,077	814,289	52.46
	2010	1,542,467	700,000	45.38
	2009	1,079,642	525,928	48.71
	2008	895,903	452,122	50.47
Phu Yen Da Nang	2014	1,605,500	98,291	06.12
	2014	9,202,325	120,214	01.31
	2013	8,612,407	121,405	01.41
	2012	6,746,362	121,356	01.80
	2011	10,938,255	108,991	01.00
	2010	9,306,967	88,671	00.95
	2009	5,602,210	73,167	01.31
	2008	6,107,741	65,275	01.07
Country	2015	638,600,000	20,000,000	03.13
(Vietnam)	2014	539,000,000	20,000,000	03.71
	2013	545,500,000	17,000,000	03.12
	2012	494,600,000	15,000,000	03.03
	2011	382,000,000	8,000,000	02.09
	2010	294,700,000	7,000,000	02.38
	2009	233,000,000	6,500,000	02.79
	2008	189,300,000	6,200,000	03.28

Ministry of Finance, Vietnam (2016)

and Vinh Long in recent years. This means that those provinces depend much on the lottery service to raise their local budgets. In turn, they may try to encourage more citizens to buy more lottery tickets to increase the local budgets or at least keep it stable over time (Table 1). In details, this study aims at answering following research questions:

- What are the characteristics of the demand side?
- Who plays lottery?
- Do the high-income people (the rich) play more lottery than the low-income people (the poor)?
- Which determinants impact on the lottery spending?
- How much money have Vietnamese spent on playing lottery per year?
- What are the characteristics of the seller's side?
- How much does a representative seller earn per month?

Literature review: Several previous studies had tried to explain the reasons why people play lottery. First, regarding economic perspective, economists consider lottery participation as a rational wealth maximizing for the middle and lower-middle income classes (Friedman and Savage, 1948). Rationally, the expected earning is always negative. Unfortunately, lottery players systematically tend to overestimate the very low probability of the game and have overly optimistic assessments of the

chance to win (Beckert and Lutter, 2013). Furthermore, the relatively lower income people are more likely to buy more lottery tickets than those higher income individuals class (Abdel and Sharpe, 2001; Haisley *et al.*, 2008; Callan *et al.*, 2011):

- H_1: The relatively low income individuals tend to buy more lottery tickets than the high income group

Regarding social perspective, gambling is socially accepted way of channeling frustrations and tensions resulting from contradictory or unattainable demands imposed on the individual in modern societies (Parsons, 1968). Gambling is a practice in which tensions can be released without having a disruptive impact on the social order (Beckert and Lutter, 2013). Additionally, the increasing income inequality leads to the rising prevalence of state lotteries (Freund and Morris, 2005). Abdel and Sharpe (2001) found that lottery expenditures declined as the education level of the reference people increased:

- H_2: People with low educational attainment spend more money on lottery tickets

As regards social network approach, peer group is found evidently to have influences on the behavior of lottery playing. In fact, the widespread tradition of sharing

lottery tickets by playing in groups among friends, relatives or colleagues has exceptionally high demand for lottery tickets in Spain (Garvia, 2007). This study also concludes that lottery tickets have transformed from purely economic assets into symbolic carriers of interpersonal ties that convey membership and status position in relevant social networks. Losses are less likely to stop future participation, since quitting would threaten the continuity of the group or one's own membership (Beckert and Lutter, 2013; McPherson *et al.*, 2001; Biju, 2016; Nuchso *et al.*, 2016) stated that close networks tend to be homogenous with regard to socio-demographic characteristics as well as to attitudes and behavior. Moreover, group players share tickets not only primarily out of economic reasons of maximizing their chances but also mostly to establish cohesive social groups and to maintain friendships (Guillen *et al.*, 2012). Group playing is a way to share experience and forms a basis for communication:

- H_3: The peer group has positive link to the expenditure on lottery tickets

Considering cultural perspective, lottery players usually believe in fate, luck and magic. Psychologists have used the notion illustion of control whereby agents deny the operation of chance and believing that they can choose winning numbers through skills and foresight (Langer and Roth, 1975; Lang and Omori, 2009). They also consider lottery playing as a leisure activity like gambling. The lottery players probably know state lotteries offer unfair gambles but derive entertainment value from playing them (Kearney, 2005). In this case, lottery players are rational. However, in some cases they are irrational people. Kahneman and Tversky (1979)'s prospect theory stated that agents overweight small probabilities and underweight large probabilities. Moreover, the goal of getting lottery prize can make lottery players be addicted. Lottery players indulge in fantasies about what could be done with the prize money (Clotfelter and Cook, 1991). One of the main attractions is that the low prize money highly likely occurs while the high and extremely high prize money seem being as unachivable status positions which is playing as a nice dream for any lottery players:

- H_4: People who prefer risk tend to buy more lottery tickets

MATERIALS AND METHODS

The expected utility model: The theoretical foundation of this study which is the expected utility model is Von Neumann-Morgenstern utility function. This is a way to express the choice of customers under uncertainty. In brief, the goal of those consumers is to maximize the expected utility:

$$Max\{EU\} = Max\{p_1EU_1(.) + p_2EU_2(.) + ... + p_nEU_n(.)\}$$

Where:

$p_1+p_2+.....p_n$ = 1
$U_i(.)$ = Comcave utility function
n = Number of choices or game

In details, we need to solve the optimization problem with five components such as the highest lottery prize, enjoyment, social networks, pressure and help:

$$Max\{EU(Prize, Enjoyement, Social, Network, Pressure, Help)\}$$
s.t:
$$0 < Prize < M$$

Where:

Prize = Prize a prize or top prize (economic perspective)
M = Bounded above of the top prize
Enjoyement = The level of satisfaction (culture perspective or entertainment value)
Socal network = Peer effect (network perspective)
Pressure = Social frustrations and tensions (social perspective)
Help = Helping the lottery sellers or society as charity activities (moral perspective)

Data set and an overview of the Vietnamese lottery market

Source of data: The data used to test these four hypotheses come from two surveys with the individual players and the individual seller lottery tickets via questionnaires. Those individuals are mature people who were 18 year old or more residing in Vietnam. Target respondents were selected randomly and were then asked whether or not they had played lottery tickets at least once within the past year. The data of the lottery players and non-lottery players were used for analyzing the decision to play lottery tickets. However, only data of the lottery players were selected for estimating the decision of how much to spend. The first field work was carried out by the author from January-February, 2010 with 150 lottery players and 135 lottery sellers in seven cities and provinces in southern Vietnam including Tra Vinh, Ho Chi Minh City, Binh Duong, Dong Nai, Binh Thuan, Phu Yen and Da Nang. Only 82 players were selected for analyzing and running regression the behavior of playing lottery tickets.

Table 2: Descriptive statistics of the sample

Variables	Definition	Obs.	Min.	SD	Mean	Max.
Gender	Male = 1, female = 0	319	0	0.5	0.51	1
Age	Age of respondent (years)	319	16	15.7	38.96	90
Area	Urban = 1, otherwise = 0	319	0	0.41	0.22	1
Diploma	Primary school = 1, secondary school = 2, high school = 2, undergraduate = 4, graduate = 5	319	1	1.07	3.11	5
Relative	Never buying = 1, rarely = 2, sometimes = 3, frequently = 4, daily = 5	319	0	1.06	3.12	5
Income	The monthly income of the respondent (1000 VND)	319	0	8947.26	8536.36	70000
Spending	The monthly spending on lottery of the respondent (1000 VND)	319	20	231.52	204.08	1600
Risk	Risk loving = 1, risk neutrality = 2, risk averse = 3	319	1	0.62	1.86	3
Income squared	The square of income (1000 VND)	319	0	43444915	1.52e+08	4.90e+09

The second survey was conducted by the author and several coordinators from January-March, 2016 with 430 lottery players and 262 lottery sellers in seven cities and provinces in Vietnam including Ho Chi Minh City, Binh Duong, Dong Nai, Phu Yen, Quang Nam, Da Nang and Hue, 380 lottery players and 259 lottery sellers were selected as entry for this study. The questionnaire was tested via several phrases including having qualitative group discussions among surveyors and with a group of frequent lottery players, obtaining expert evaluations and conducting one pre-test out in the field.

These surveys were designed for this particular study and individual was target respondent. The reason of choosing individual person instead of household is that the household is a collective, not a unitary, entity and the expenditures depend in part on who control the household income (Dzung, 2008; Brown *et al.*, 1992; Von Neumann and Morgenstern, 1944). Moreover, in the case of the household do not share a common utility function, any increase in gambling expenditures may come at the expense of the well-being of those not in control of the household finances (Kearney, 2005).

Descriptive statistics of the sample: The data contains amount of monthly spending as dependent variable and monthly income, levels of education, behaviors toward risk and behaviors of relatives toward lottery tickets as independent variables. Gender, age and living area are control variables (Table 2).

An overview of the lottery players: The proportions of male and female respondents in the survey 2010 were 56.40 and 43.60%, respectively. These shares are nearly equally in 2016 with 49.74% lottery players are female and 50.26% are male. The average age of respondents is 38.96 years old, the youngest and the oldest are 16 and 90 year old, respectively. In other words, the representative lottery player is not too young either too old adult. In fact, respondent is usully a member in a household who normally is a father or mother in their family. There is 78% of respondents (250 respondents)

living in the urban area and the rest of 22% (69 respondents) living in the rural area. This is because the lottery market normally is popular in the cities than the country sides.

Levels of education which are measured by the highest diploma the the respondent obtained at the time that the survey is done. It can be seen in the following figure is that most of respondents holds a high school (102 respondents, 32%) or a undergraduate program (102 respondents, 32%) diploma. The other levels of education are minority with 8% graduate (25 respondents) 8% elementary (26 respondents) and 20% (64 respondents) having secondary diploma. In 2010, there were 58% respondents who had bought at least a lottery ticket. This figure is similar as the US with from 55-66% play at least once a year (Kearney, 2005; Welte *et al.*, 2002). In 2016, a noticeable point is that there is 13% the respondent answer that they have not bought any lottery tickets while 87% people have bought at least one lottery ticket already. The proportion of respondents who had bought lottery ticket (87%) is 29% higher than the corresponding figure in 2010. The 319 observations in this data set are those who have bought the lottery tickets at least one time within one year up to the moment of surveying.

The proportion of buying lottery in Vietnam is higher than several developed countries such as The United States, The United Kingdom, Germany or Spain. However, it is evident that the higher levels of per capita income are associated with an increased probability that a state has a lottery (Coughlin *et al.*, 2006) since lotteries tend to be a regressive taxation. It means that low-income people bear a relatively higher lottery tax burden than those with high incomes.

The high level of income is used for buying lottery ticket can be explain by the behaviors of the lottery players as the following pie chart where 28% respondents are risk-loving, 14% risk aversion and 58% risk neutral people (Table 3). Another reason is because there is 41% respondents said that lottery ticket market is necessary compared with just 11% of respondents answered not necessary and the rest of 48% respondents holding neutral thinking. The proportion of unnecessary answers

Table 3: The playing proportion at least once a year in several countries

Country	Proportion play at least once a year (%)	Year	Studies
US	66	2001	Welte *et al.* (2002)
US	55-66	1982-1998	Kearney (2005)
UK	72	1999	Bickley
UK	68	2007	Bickley (2009)
UK	67	Na	Garvia (2007)
Germany	40	Na	Garvia (2007)
Spain	70	Na	Garvia (2007)
Vietnam	72-76	2010-2016	Minh (2010)

(11%) is remained constant both in 2010 and 2016. However, the share of respondents necessary answers has changed considerably with 9% reduction from 50% in 2010-41% in 2016 and the neural answers has increased from 39% in 2010-48% in 2016.

The highest income respondents get 70 million VND a year while the lowest one do not have income. The players have no income means that they did not work and they are living based on supporting from other members in his or her family or relatives.

An overview of the lottery sellers: The proportion of the female sellers and male sellers are nearly equivalent with 51-48%, respectively. The rest 1% of the sellers belong to the Gay Lesbian Bisexual Transgender (LGBT), so called other gender.

The most sellers work in urban area (76%) others work in rural area. This is because cities usually have good conditions to develop the lottery ticket such as high density of population, good infrastructure, higher standard living compared to the rural area. The high density of people and good and availability of roads lead to low transaction costs of both sellers and buyers.

Regarding ages there are 16% the sellers out of labor force including 1% sellers under 15 year old and 15% over 55 year old for women and over 60 year old for men. An exciting character of the sellers is that most of them just graduated primary school (58%) while nobody have postgraduate diplomas. In details, the higher level of education, the smaller probability to participating in the lottery market with 3% for undergraduate, 7% for high school and 31% for secondary school levels. This finding is different with the same character, education but in the side of the buyers where the probability seemly does not depend on the how high of the diploma accessed by the buyers.

In 2010, the handicapped sellers obtained 17% of the total sellers by observation which was significant higher than the natural handicapped proportion in the southern Vietnam in 2009. 7.8% (GSO, the 2009 Census) but slightly higher than 15.3%, the percentage of disabled people which based on the World Health Organization (WHO)'s framework, known as the International Classification of Functioning, disability and health (ICF) in 2010. The handicapped sellers, however, in 2016, have increased up to 25% compared with the figure in 2010. Since the proportion of natural handicapped people is highly stable, it means that more handicapped people have joined into the lottery market in 2016 compared to the beginning point of time, 2010.

Now let see the average number of working hours of the sellers. It actually has reduced from 10.65 h per day in 2010-9.27 h per day in 2016. According to the Survey 2016, the highest and lowest number of working hour is 16 and 4 h, respectively.

A particular finding of this study is that the average earnings of the sellers, on average, has gone up from 94.225 VND in 2010-172.800 VND in 2016. We suppose that the sellers work 30 day per month. Then the average earnings of the sellers have increased from 2.83-5.184 million VND per month (This level of earning is still much lower than the income of staff in ticket's firm, for example Tien Giang Ticket's Firm with approx imately 29 million VND in 2015. See at http://kinhdoanh. vnexpress.net/tin-tuc/doanh-nghiep/sau-thanh-tra-xo-s o-tien-giang-tra-luong-nhan-vien-30-trieu-dong-mot-tha ng-3414624.html) which is equivalent to 62.208 million VND per year. It means that the averages earning of the sellers grow at 10.6% per year in the period 2010-2016. The figure of the seller's income is higher than the GDP per capita of Vietnam in the end 2015 which is estimated at 45.7 million VND ($2,100) (http://english.vietnamnet. vn/fms/ business/149872/vietnam-s-per-capita-gdp-2015 -reaches-more-than--2-100.html).

Testing by 2 day personal experiment in 2010: The 1st day: 34 lottery tickets were bought during 6 hours of selling (3PM-9PM). It means that the productivity of selling was 5.67 tickets per hour which was equivalent 60.386 VND a day and 1.812 million VND a month. The 2nd day: The total of lottery tickets during 7 h of selling (8AM -11AM and 5PM-9PM) was 52. Having said that the productivity of selling was 7.43 tickets per hour then the earning was 79.108 VND a day and 2.373 million VND a month. The increasing of the productivity from 5.67-7.43, equivalently to the earning from 1.812-2.373 million VND a month, can be explained by the process of learning by doing. This experiment was done by a person without experience of selling lottery ticket before.

Table 4: The daily earnings of the different ways of the lottery selling (1000 VND)

Average	Walking	Bicycling	Sitting (non-handicapped)	Sitting (handicapped)	Other
172.8	173.09	139.1	223.19	162.5	149.5

The survey 2016

Table 5: Potential consumer of lottery ticket market

Source	2014	2015e	2016e
Ministry of Finance	63,000,000,000,000	67,712,400,000,000	72,777,287,520,000
Estimation	-	-	80,984,329,178,885

Moreover, it can be seen that the non-handicapped sellers earn the highest income (223,190 VND) while the people who use bicycle for selling earn the lowest income (139,100 VND). This can be explain by the comparative advantage of the locations that the sitting's sellers have but the bicycling's sellers have not (Table 4).

Another interesting finding is that the average working experience of the sellers has declined from 5.9-7.04 year in the period 2010-2016. It is evident that the sellers, at the moment, are easier to change their jobs than 6 year before. The reason of the lower working experience may be because the higher ages of the sellers which has boosted from 41.37 year old in 2010-48 year old in 6 year later. Having said that the older people are the fewer working time and the lower level of health they have.

It can be said that the most important role of the lottery market in Vietnam is that it can create a large number of jobs. In fact, the proportion of people having no jobs before working in the lottery market is considerably high with 33% in 2010 and 39% in 2016. One important point is that in the period 2010-2016, the proportion of the sellers who sell lottery ticket while also do another jobs decreases by 18% from 34-16%. In other words, the proportion of people who just only sell lottery increased from 66-84%. It can be said that, the sellers have specialized more in the ending compared to in the beginning of the period.

Estimation of the yearly expenditure for lottery: The average monthly income of a respondent is 8.131 million, where the highest and lowest incomes are VND 70 million and VND 0 million per month. However, we decides to cancel out the data of several respondents who have answered with zero (0) income but still buying 1-2 lottery tickets per week in order to avoid the biased responses from those respondents. Moreover, on average, based on the data from 380 respondents in the survey in 2016, we estimate that a representative Vietnamese worker spends 43,508 VND per week which is equivalent to 195,786 VND per month. This amount of money accesses 2.3516% average income of the respondents. It means that a representative Vietnamese labour spends 2,349,435.484 VND a year for buying lottery ticket. The shares of lottery's revenue in 3 regions of Vietnam north, middle and south are different. It is noticeable that most of revenue (88%) comes from the market in South Vietnam, however in the north and middle regions markets just contribute 5 and 7% to the total revenue (http://cafef.vn/doanh-nghiep/thi-truong-xo-so-63-000-ty-mien-nam-kiem-dam-mien-bac-diu-hiu-20151012233339569.chn), respectively:

Estimated spending (2016)

$$= \text{weekly spending} \times 52 \times 45,000,000 \times 0.7 \times (100/88)$$

$$= 80,984,329,178,885 \text{ VND}$$

(equivalent to $3.704 billion)

Where weekly spending drives from the survey 2016, 52 is 52 weeks in a year, 45,000,000 is the estimated population living in the south of Vietnam and 0.7 is the ratio of people can be the potential consumers of lottery ticket market (Table 5) (This figure is estimated from the ratio of labor force participation in Vietnam (http://data.worldbank.org/indicator/SL.TLF.CACT.ZS/countries/VN?display=graph), then adjust the number of population from 15-16 years old).

In 2012, the lottery sales in Vietnam got 53,893 billion VND (http://www.mof.gov.vn/webcenter/portal/ttbt/r/m/thd/thd_chitiet;jsessionid=WbQHXwQC2VqYQkTth3D2nRR0mpCcyL1wqLQ3PLpqlL1lVW3JbHZb!-271180285!-1319253437?dDocName=BTC357024&dID=89771&_afrLoop=22999293029017919#!%40%40%3FdID%3D89771%26_afrLoop%3D22999293029017919%26dDocName%3DBTC357024%26_adf.ctrl-state%3D27u4su3yy_4) which was equivalent with $2.606 billion (Based on the official exchange rate at the end 2012, see http://diendan.vfpress.vn/threads/viet-nam-ty-gia-va-chinh-sach-2011-2015.145200/). Meanwhile, the world lottery sales accessed $224.3 billion (La Fleur, 2008). It means that, Vietnam's lottery share achieved 1.16% of the world market. This proportion was lower than the share of Vietnamese inhabitants over world population (1.33%). Moreover, the average sales per person in Vietnam in 2012 (29.34 USD) was equal to 87.30% the correspondent number worldwide (33.61 USD) (Table 6).

Probability model of the lottery participation: In order to estimate the probability of the lottery participation we use the sample with 419 observations (lottery players) which

Table 6: The proportions of lottery sales and population between Vietnam and World

Indicators in years	World (1997)	World (2007)	Vietnam (2012)	Vietnam/World (%)
Population (person)	5,898,688,337	6,673,105,937	88,809,200	1.33
Sales of lotteries ($)	115,000,000,000	224,300,000,000	2,606,000,000	1.16
Sales/person ($)	19.50	33.61	29.34	87.30

World Bank (2012) (http://data.worldbank.org/indicator/SP.POP.TOTL), La Fleur (2008, 2012), MOF (2012) and geohive.com (http://www.geohive.com/earth/his_history3.aspx)

Table 7: Regression of logit model

Coefficients	Estimate	SE	t-value	p-value
Gender	-3.17615	1.74503	-1.820	0.0687
Age	0.04586	0.06246	0.734	0.4628
Area	3.49968	1.94972	1.795	0.0727
Relative	2.57531	1.10565	2.329	0.0198*
Risk	1.70485	1.91186	0.892	0.3725

$0 > *** = 0.001 > ** = 0.01 > * = 0.05 > 0.0 = 0.1 > = 1$

Table 8: Test model via the confidance intervals for the coefficient estimates

Confident intervals	Coefficients	2.5% level	97.5% level
Gender	-3.176	-6.59633551	0.2440452
Age	0.046	-0.07655745	0.1682697
Area	3.499	-0.32169826	7.3210673
Relative	2.575	0.40827084	4.7423532
Risk	1.705	-2.04232813	5.4520226

extracts from the survey in 2016. The logit model is used to estimate of the probability of the lottery participation of the lottery players. The explanatory variables are modeled based on the previous studies as mentioned in the literature review study:

$$Logit(P) = \beta_0 + \beta_1 \text{ Gender} + \beta_2 \text{ Age} + \beta_3 \text{ Area} + \beta_4 \text{ Relative} + \beta_5 \text{ Risk}$$

The result from regression by logit model with independent variables namely Gender, Age, Area, Relative and Risk as following (Table 7). We have:

$$Logit(P) = -2.927 - 3.176 \text{ Gender} + 0.046 \text{ Age} + 3.499 \text{ Area} + 2.575 \text{ Relative} + 1.705 \text{ Risk}$$

Statistical testing: First, we are going to test the model via the confidence intervals for the coefficient estimates in this model (Table 8). The coefficient of Gender = -3.17615 which belongs to the interval from -6.5963 to -5.6513. Explanations are similarly with age, area, relative and risk. Therefore, we conclude that the model is valid. Second, another criterion for testing the model is the Odds Ratios (OR):

- OR(Gender) = exp (-3.17615) = 0.0417
- OR (Age) = exp (0.04586) = 1.0469
- OR (Area) = exp (3.49968) = 33.1048
- OR (Relative) = exp (2.57531) = 13.1353
- OR (Area) = exp (1.70485) = 5.5005

The 95% of Confidence Intervals (CI) of log odds ratio are:

CI[logOR(Gender)] = [(-3.17615-1.96×1.74503, (-3.17615+1.96×1.74503] = [-6.5964, 0.2441]

CI[logOR(Age)] = [0.04586-1.96×0.06246, 0.04586 + 1.96×0.06246] = [-0.0765, 0.1683]

CI[logOR(Area)] = [3.49968-1.96×1.94972, 3.49968 + 1.96×1.94972] = [-0.3218, 7.3211]

CI[logOR(Relative)] = [2.57531-1.96×1.10565, 2.57531 + 1.96×1.10565] = [0.4082, 4.7424]

CI[logOR(Risk)] = [1.70485-1.96×1.91186, 1.70485 + 1.96×1.91186] = [-2.0424, 5.4521]

We refer the 95% of Confidence Intervals (CI) of odds ratios as following:

CI[OR(Gender)] = [exp(-6.5964), exp(0.2441)] = [0.0014, 1.2765]
CI[OR(Age)] = [exp(-0.0765), exp(0.1683)] = [0.9264, 1.1833]
CI[OR(Area)] = [exp(-0.3218), exp(7.3211)] = [0.7248, 1511]
CI[OR(Relative)] = [exp(0.4082), exp(4.7424)] = [1.5041,114.7]
CI[OR(Risk)] = [exp(-2.0424), exp(5.4521)] = [0.1297,233.2]

We can see that all odds ratios belong to corresponding confidence intervals. Therefore, we can conclude that this model is valid (Table 9). Now, let try to calculate the participation probability with a simple model:

$$Logit(P) = \beta_0 + \beta_1 \text{Age}$$

The result from regression with single independent variable (Age) is illustrated as following.

```
glm(formula = Buy ~ Age, family = binomial)
Deviance Residuals:
    Min    1Q  Median    3Q    Max
-3.2339  0.2386  0.4551  0.6504  0.9068
Coefficients:
           Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.44314  0.42791  -1.036    0.3
Age          0.06996  0.01465   4.774  1.8e-06 ***
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.'0.1'  '1
```

We have:

Table 9: Confidene interval odds ratio belong to corresponding confidence interval

Variable	Odds ratio	95% CI	p-value
Gender	0.0417	0.0014,1.2765	0.0687
Age	1.0469	0.9264,1.1833	0.4628
Area	33.1048	0.7248,1511	0.0727
Relative	13.1353	1.5041,114.7	0.0198
Risk	5.5005	0.1297,233.2	0.3725

Table 10: Test the model via finding the confidence intervals for the coefficient estimates

Confident intervals	Coefficients	2.5% level	97.5% level
Intercept	-0.44314	-1.2818332	0.39554941
Age	0.06996	0.0412402	0.09868356

$$Logit(P) = -0.44314 + 0.06996 \, Age$$

Statistical testing: First, we can test the model via finding the confidence intervals for the coefficient estimates in this model (Table 10). The coefficient of age equals to 0.06996 which belongs to the interval from 0.04124 to 0.09868. Therefore, the model is valid (Table). Second, another criterion for testing the model is the odds ratio.

$$OR(Age) = exp(0.06996) = 1.072$$

The 95% Confidence Interval (CI) of log odds ratio:

$$CI[logOR(Age)] = [0.06996\text{-}1.96 \times 0.01465, 0.06996 + 1.96 \times 0.01465] = [0.004, 0.099]$$

We refer:

$$CI[OR(Age)] = [exp(0.004), exp(0.99)] = [1.004, 1.104]$$

We can see that OR(Age) = 1.072 which belongs to its confidence interval [1.004, 1.104]. Therefore, this model is valid. Now, let try to calculate some numerical probabilities:

$$P = \frac{e^{-0.44314+0.06996Age}}{1 + e^{-0.44314+0.06996Age}}$$

Suppose a person with age equals 20, 30 and 50 years old. Then, the probability of the lottery participation of this person is approximately 0.72, 0.84 and 0.95, respectively.

Do the rich play more lottery than the poor? It can be seen from the follow table is that the poor tend to spend more relative budgets for playing lottery compared to the rich with 3.471 and 2.028%, respectively. This finding supports the result from Beckert and Lutter (2009), Clotfelter and Cook (1987, 1991), Livernois (1987) and Miyazaki *et al.* (1998). These studies had stated that low-income individuals spend a larger share of their incomes on lottery tickets than whom with higher

Table 11: The proportion of spending on lottery over total income

Variables	Average income (1000 VND)	Average spending (1000 VND)	Proportion (%)
The Rich	12,807	260	2.028
The Poor	3,658	127	3.471
Whole	8,427	196	2.326

Survey 2016

Table 12: Regression between lottery spending and relevent explanatory variables in 2016

Coefficients	Estimate	SE	t-value	p-value
Gender	3.73E+01	2.26E+01	1.647	0.1006
Age	2.56E+00	7.64E-01	3.356	0.0009***
Area	-2.64E+01	2.95E+01	-0.894	0.3719
Diploma	-3.12E+01	1.12E+01	-2.777	0.0058**
Relative	6.96E+01	1.09E+01	6.389	0.0000***
Income	9.14E-03	3.30E-03	2.774	0.0059**
Income_squared	-3.89E-08	6.65E-08	-0.584	0.5594
Risk	-3.86E+01	1.91E+01	-2.020	0.0443*

Sig. codes: 0>*** = 0.001>** = 0.01>* = 0.05>0.0 = 0.1> = 1; Adj. R^2 = 0.2949; Minh (2010)

incomes. In other words, there is an inverse relationship between level of income and lottery spending. An adult in Vietnam spend annually approximately 2.352 million VND on lottery tickets with low and high income individualsspending about 1.524 and 3120, respectively (Table 11-12).

Determinants impact on the lottery spending
The model: To understand more about the effects of income and other determinants which can explain the behavior of lottery consumption we need to go further by using quantitative methods to discover. Based on previous studies, we suggest the following form model:

$$Spending = f(Age, Area, Diploma, Gender, Income, Income\_squared, Relative, Risk)$$

Where:
Age	=	The ages of the lottery players
Area	=	The permanent living area of the players
Dilopma	=	The levels of educational attainment
Gender	=	Male or female, Income is the average monthly earnings
Income_squared	=	The square of income
Relative	=	The behavior of peer players toward to lottery gambling
Risk	=	The behavior of the lottery players toward to risk

RESULTS AND DISCUSSION

The scatter plot between lottery spending which is named as the variable spending and income is illustrated in Appendix 1 and 2. It can be seen that this link is weak and ambiguous. Based on the data set of the respondents who have bought lottery tickets within a year, the regression of the lottery spending with respect to explanatory variables is depicted as following:

Spending ≈ -29.70 + 37.26 Gender +2.563 Age-26.39
Area- 31.20 Diploma+69.64 Relative+0.009141
Income-3.888e-08Income-squared-38.57 Risk

To sum up, at the level of significant 5%, five independents can explain the action of buying lottery ticket in Vietnam are age, diploma (educational attainment), behavior of relative (peer-play), income and attitudes toward risk. This result supports the finding of Beckert and Lutter (2013) which found that peer-play, educational attainment and self-perceived social deprivation have strong effect on lottery play.

First, the increasing by one level of educational attainment, for instance from primary school to secondary school level, leads to decreasing approximately 31,000 VND per month. The reverse relationship between levels of educational attainment and lottery spending is supported by several previous studies. Regarding macro-level approach, Faustino used panel data with the country's per-capita lottery sales in 99 countries during the period of 13 year which stated that there was an reverse relationship between education and consumption of lottery products. In addition, Beckert and Lutter (2013) concluded that the poor spend more on lottery tickets than their wealthier and better educated peers. Crowley *et al.* (2012) found that lottery expenditures are negatively associated by levels of educational attainments, including secondary and high school levels.

Second, income is positively associated with lottery spending. Indeed if income increases by 1 million VND, lottery expenditure is expected to rise by 9,141 VND a month. Moreover, it is evident that the effect of marginal diminishing of income is extremely weak. These findings are consistent with the results in Crowley *et al.* (2012). This study also found that players have betting expenditures tends to play and if they play, they are expected to spend more income on lottery tickets. However, Kaizeler and Faustino (2011) based on country-level approach, then found that there was an inverted U relationship between per-capita sales and per-capita GDP. In other words, lottery was a normal good in the first phrase and up to a specific value, the per-capita lottery sales decrease as per-capita GDP increases.

Third, this study has stated that age is positively associated with lottery spending. Some empirical studies proved this finding with players 35 year old and above. In fact, Crowley *et al.* (2012) concluded that for the players within 16-34 years old which had negative link with lottery expenditure but for the players age 35 and above which had positive link with lottery spending. Georgiou found that people under 35 year old are more likely to undertake most

Table 13: Regression between ticket and relevant explanatory variables in 2010

Coefficients	Estimate	SE	t-value	p-value
Gender	2.059596	0.976956	2.108175	0.0384*
Relative	1.318508	0.612290	2.153403	0.0346*
Risk	-1.944880	0.726359	-2.677574	0.0092**

Sig. codes: 0>*** = 0.001>** = 0.01>* = 0.05>* = 0.1> = 1; Adj. R^2 0.346738; Minh (2010)

gambling activities while people 35 and above were found to be more likely to enter national lottery draws.

Fourth, peer-playing is positively statistically associated with lottery spending. If the behavior of the relative, for example from sometimes to daily buying, then lottery players tend to spend nearly 70,000 VND per month. Crowley *et al.* (2013) stated that lottery expenditures are positively affected by manual, unskilled and agricultural workers but negatively affected by non-manual workers, employers, managers and professional workers. Garvia (2007) concluded that networks of social relations have an impact on the decision to play lottery via social embededness approach.

Fifth, the behavior toward risk is negatively associated with lottery spending. One level higher regarding to risk, for instance from risk loving to risk neutral or from risk neutral to risk aversion, lottery spending is estimated to decrease about 38,000 VND per month. Attanasio *et al.* (2012) found that close friends and relative group assortatively on risk attitudes and are more likely to join the same risk pooling group.

Overall, the model can explain 29.64% the action toward purchasing lottery ticket of Vietnamese in 2016 which is highly consistent with the result in 2010 with the level of explanation reaching nearly 35% (Table 13).

CONCLUSION

In other words, both finding results in 2010 and 2016 have proven that the behavior of the relative such parents, brothers, sisters, close friends, close colleagues has influenced on the level of selling lottery tickets in Vietnam. Moreover, gender also affects the number of lottery tickets consumption at the level of significance 10%. Furthermore, the ability of explanation is consistent around 30%. In conclusion, the answer for the question "Do the rich buy more lottery than the poor?" is "Yes, it does". However, the marginal influence of income on the action of buying lottery ticket is weak.

RECOMENDATIONS

Policy Recommendations: A policy should recommend after analyzing the characteristics of the lottery sellers is that Vietnamese government and policymakers should create laws and policies to protect the lottery sellers due to their current working conditions are unfavorable compared to many other kinds of jobs. The job of selling lottery tickets, at the moment is considered as a part of the

shadow economy. In other words, they are unofficial labors. Therefore, the lottery sellers face many challenges when working with the representative agents who directly work with the state lottery companies.

A noticeable point retrieving from this study is that Vietnamese have been really relatively focusing on lottery tickets in recent years. In fact, they spend >1.86 times than the average worldwide level even though on the absolute value they buy >1.51 times compare to the average world spending. Therefore, the state authorities should not motivate their citizens to participate more in the lottery market than the current situation.

LIMITATIONS

The data set using in this study is not allowed to evaluate whether the Vietnam's lottery market is efficient or not. Measuring the efficiency of a market is essential to suggest several feasible and valuable policy recommendations. Moreover, the theoretical foundation of this study does not discussed elaborately enough.

SUGGESTIONS

Further research directions: One necessary direction to do research next time is selecting more data to estimate the efficiency of the Vietnam's lottery market. In addition, in order to understand the behaviors of the agents on the markets including players, sellers, lottery companies some experiments can be carried out with those agents in a laboratory beside data selecting from fields. Furthermore, analysis in the country level can be applied for regional or provincial within Vietnam in order to understand the different patterns among those provinces. Also, a comparative study compare the lottery market in Vietnam and the markets in other countries could obtain more comprehensive results. Another research direction is trying to find theoretical solutions then check it via simulated or empirical data. This approach can make the finding results more valid.

APPENDIX 1
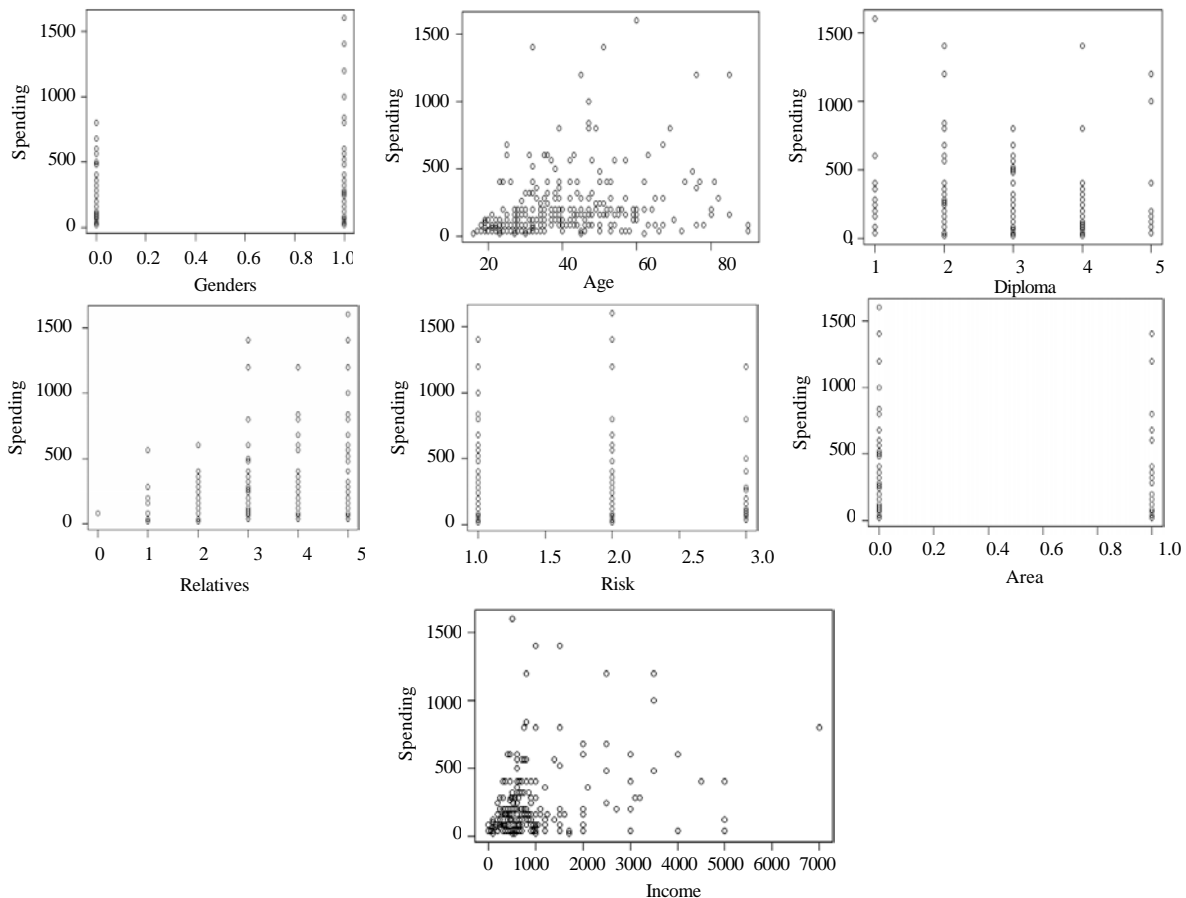
Appendix 1: The scatter plots beween lottery spending and other explanatory

APPENDIX 2
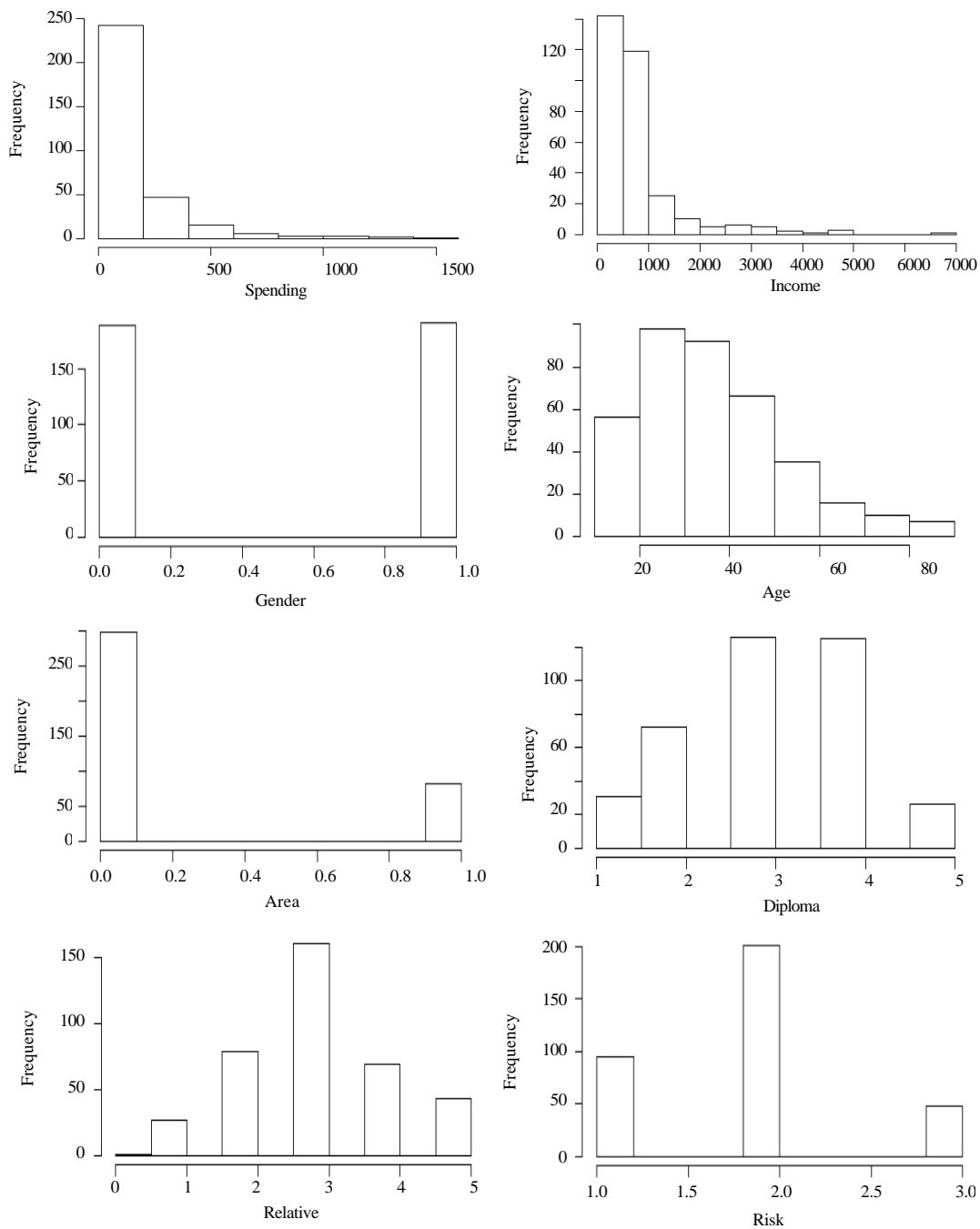
Appendix 2: The histograms of the dependent and independent variables

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