

# Anxiety about Standard of Living and Expenditures on Lottery Tickets

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*Prior research has indicated that negative mood can positively influence spending on lottery tickets. In this paper, we use a nationwide random sample to evaluate whether worries about ability to maintain standard of living can affect expenditures on lottery tickets. Our analysis, based on the generalized linear model, indicates that expenditures on lottery tickets vary inversely with education. People with annual incomes of less than \$30,000 spend less on lottery tickets than people belonging to other income categories, Marital status, working status, and gender are found to have no impact on spending on lottery tickets. Worries about maintaining standard of living do not affect lottery spending. However, worried people with some college, incomes \$20,000 to \$30,000, and incomes \$50,000 to \$75,000 will spend higher amounts than people with similar characteristics. To further corroborate results and lessen selection bias, we perform a propensity score matched analysis and find that worries about maintaining standard of living have no effect on the expenditures on lottery tickets.*

**Keywords:** Anxiety, Standard of living, Lottery tickets, gambling, selection bias, propensity score matching

## Introduction

A lottery involves raising money by selling numbered tickets and offering prizes to buyers of tickets whose tickets are selected randomly. From the buyers' perspective, a lottery is a form of gambling. According to the WLA Global Lottery Data Compendium 2014, total sales of state authorized lotteries are about \$188.6 billion. (World Lottery Association, 2014). In the U.S., the state of New Hampshire introduced lotteries in 1964. Currently, all states other than Alabama, Alaska, Hawaii, Mississippi, Nevada, and Utah have lotteries run by their state governments. Wyoming is the last state to introduce lottery in 2013 (Isidore, 2013). In 2017, lottery tickets worth \$76 billion excluding commissions were sold in the United States (Census.gov, 2018). Even though lotteries are popular, people are concerned about them. Lotteries typically have lower expected values than their costs. In addition, it is claimed that lottery tickets are bought by the poor. Lotteries are also objected based on religious grounds. Several reasons have been attributed to buying lottery tickets. Some of them include socialization, excitement, monetary motives, scarcity mindset, unemployment, and moods. However, there is no consensus about what motivates people to buy lottery tickets. Our goal is to analyze the impact of worries about future standard of living on expenditures on lottery tickets. Such a study will help our quest to understand motivation to buy lottery tickets.

## Literature Review

Grote and Matheson (2012) and Ariyabuddhiphongs (2011) provide excellent reviews of literature on lotteries. Ariyabuddhiphongs (2011) suggests one theory that claims people do not think rationally when making decision to buy lottery tickets and there could be different motivations. The study includes two different theories. The theory of judgement under uncertainty explains lotto through the perception of the buyers using representativeness heuristic, availability heuristic, Anchoring and Adjustment heuristic and Framing of Decisions heuristic. On the other hand, cognitive theory of gambling emphasizes the gamblers' irrational beliefs at the different stages of their activities such as gamblers' fallacy, entrapment, belief in hot and cold numbers, unrealistic optimism, superstitious belief, illusion of control, near miss and roll over effect. The research conducted concludes that three reasons that causes

people to buy lotteries are that people are not rational decision makers, that it is for fun and that lotteries are so common that they aren't viewed as gambling. In a recent study, Lutter et al., (2018) suggest social surroundings, need to reach unattainable goals, and tension because of the wide gap between aspirations and what they have as reasons to buy lottery tickets. There are other papers which examine the influence of similar concept of "scarcity mindset" on lottery ticket expenditures. Scarcity epitomizes an individual's unlimited wants and the earth's limited resources (Ellis, 1950). Haisley et al., (2008) empirically find association between scarcity mindset and buying of lottery tickets. According to Halicka and Krawczyk (2014), mood plays a big role in people's decision to buy lottery tickets. Raising positive or negative emotions in people affects their behavior of buying lottery tickets. Based on the study conducted on subjects who were not aware of their participation, it is observed that subjects that were exposed to positive emotions bought a greater amount of lottery tickets than the ones exposed to negative emotions. This included advertising in general and point of sale advertising as well. It also concluded that drawing day of the lottery also affects the mood and thus, Saturday draws when people are in a positive weekend mood also have an effect on buying practices. Burger et al., (2016) supports the theory of positive emotions leading up to the drawing time being cause for buying lottery tickets. On the contrary, Kallmen et al., (2008) find problem gamblers are more likely to be depressed than non-gamblers.

According to Pelletier and Ladouceur (2007), people who buy lottery tickets may not be using concepts of rationality. Lam (2007) argues that people may be buying lottery tickets hoping they can make more money. Lottery winnings are purely based on chance and are not affected by an individual's skills, or intelligence. Even though lotteries come in a variety of forms, draw-based games, instant games and sports games account for the bulk of sales. In most lotteries, winning probabilities are very low. In addition, pay-out ratios are also low. Because of these reasons, lotteries are a losing proposition. Therefore, people with limited cognitive abilities are likely to be involved in lotteries as they tend to overestimate the very low probabilities of winning in lotteries (Kahneman and Tversky, 1979; Rogers, 1998; Rogers and Webley, 2001; Cunningham et al., 2004).

Many studies have examined the influence of demographic variables on the expenditures on lottery tickets. Their primary goal is to analyze whether spending on lottery tickets is regressive and to identify variables that can characterize a problem gambler. According

to Welte et al., (2002), low-income individuals spend a higher proportion of their income on lottery tickets than do individuals with higher incomes. However, a study by Oster (2004) finds that lotteries can become progressive at extremely high jackpot levels. However, this conclusion is based on the association of lottery sales in zip codes and their socio-economic characteristics. Studies also indicate that people with lower educational levels, employment status, and ethnic minorities are more likely to buy lottery tickets (Brown et al., 1992). Education influences both buying tickets and the amount spent on buying lottery tickets. People who work fewer hours are likely to spend more time on stakes than full time employees (Kitchen and Powells, 1991). Mikesell (1994) and Scott and Garen (1994) find that unemployment rates positively influence lottery ticket sales. On the other hand, Blalock, Just, and Simon (2007) find an inverse association and DeBoer (1990) no association. Empirical studies indicate a positive association between lower education levels and an overly optimistic belief of winning the jackpot (Beckert and Lutter, 2009). Financially desperate people are more likely to buy lottery tickets with hopes that the jackpot will dramatically change their finances. (Blalock et al., 2007). Lang and Omori (2009) indicate that the least wealthy are more likely to lose a higher proportion of their income than wealthier households. This means that the lower income groups outspend the higher income groups both in relative and in absolute terms. Studies also find that ethnic minorities are more likely to participate in lottery gambling (Scott and Garen, 1994). Bruyneel et al., (2006), find that bad mood positively influences spending on lotteries. According to functionalists and deprivation theorists (Bloch 1951; Frey 1984), gambling acts as a socially accepted method of mitigating frustrations and tensions resulting from contradictory or unreachable demands placed on individuals in modern societies. This makes lottery tickets a source of dreams to escape reality rather than economic investment (Binde 2012). Gabrielyan and Just (2020) analyze the influence of unemployment rates on the sale of lottery tickets and find that unemployment rates are positively associated with the draw lottery sales and have no influence on instant lottery sales. Their study focuses on individual zip code data to examine the association and does not take into account demographic variables. Our goal is to examine how anxieties about the future standard of living influence expenditures on lottery tickets and include demographic and related variables in our analysis.

### **Methodology**

In order to examine the association between lottery expenditures and worries about future standard of living, we use Gallup News Service Poll January Wave 1—Life Satisfaction/Economy/ Politics of Adults in the United States conducted on January 7-9, 2011. This survey consists of 1018 observations with 158 variables. The survey also includes weights that make the survey demographically consistent with that of the United States. Since our goal is to analyze expenditures on lottery tickets, we ignore Alabama, Alaska, Hawaii, Mississippi, Nevada, Utah, and Wyoming as lottery tickets were not sold in these states during the survey year. For the purpose of analysis, we use dollars spent on lottery tickets in the previous 12 months. We first conduct univariate analysis. We calculate the proportion of the population who have bought lottery tickets, and the mean dollars spent on lottery tickets in the previous 12 months for people who are worried and not worried about maintaining their standard of living by various demographic groups. Since univariate analysis does not consider the influence of more than one variable at a time, we perform multivariate analysis. Since the lottery expenditures are skewed, we use logarithm to the base  $e$  of lottery expenditures plus one as a dependent variable. We perform

generalized linear regression using education, income, marital status, employment status, gender and whether worried about maintaining the standard of living as independent variables. To further corroborate our results and reduce selection bias, we use a propensity score method of analysis (Thoemmes 2012; West et al., 2014). This method identifies control records for each treatment record from a set of observations. This is done using logistic regression analysis with whether a person is worried about maintaining the standard of living or not as a dependent variable. For each treatment observation, matching observations are identified using propensity scores that represent estimates of probability that the person belongs to the worried group. Using propensity scores, we produce a set of observations of people who are worried and matching people who are not worried. We select relevant covariates to perform the logistic regression analysis. We then use the mixed model to evaluate whether lottery expenditures by worried people are different from those who are not worried.

### **Analysis of results**

#### *Univariate Analysis*

In this section, we discuss univariate analysis. The means of dollars spent on lottery tickets purchased in the previous 12 months by people who are worried and not worried that they will not be able to maintain their standard of living by various demographic groups are given in Table 1. In 2011, the worried spent on lottery tickets an average of \$85.84 and the not-worried \$168.83. We first analyze the spending on lottery tickets by age. A higher proportion of worried people over the age of 30 bought lottery tickets as compared to people who were not worried. However, not-worried people in the age-group 18 to 29 and 50 to 64 spent more on lottery tickets than worried people in these age groups. We also examine lottery ticket expenditures by education. People with high school education or less who are not worried spent more on lottery tickets than any other group. A higher proportion of people who are worried, except those with some college education, bought lottery tickets than people with similar education who are not worried. When it comes to the income, people with over the income of \$30,000 and worried spent more on lottery tickets than not-worried people with similar income. Higher proportion of people with income between \$20,000 and \$75,000 who are worried bought lottery tickets compared to not-worried people with similar income. When it comes to marital status, the highest proportion of worried married people bought lottery tickets. However, married people without worries about maintaining the standard of living spent highest mean dollar amounts on lottery tickets. A higher proportion of not-worried males and worried females bought lottery tickets as compared to worried males and not-worried females. However, not-worried males and females spent more on lottery tickets than worried males and females. To sum up, there is no clear pattern for the proportion of people who bought lottery tickets, or the mean dollars spent on lottery tickets by worried and not-worried people for various demographic groups.

#### *Multivariate Analysis*

Since univariate analysis considers only one variable at a time, we perform generalized linear regression analysis. Since expenditures on lottery tickets are extremely skewed and contain many zero values, we use logarithm of expenditures plus one to the base  $e$  as a dependent variable. We use education, annual income, marital status, employment status, and gender as independent variables. The results are presented in Table 2. We will only discuss results that are statistically significant at the 0.05 level.

**Table 1.** Mean Dollars Spent on Lottery Tickets in the Previous 12 Months from the Date of Survey by Various Demographic Groups and Whether Worried about Able to Maintain Standard of Living

Worried: You Will Not Be Able to Maintain Your Standard of Living		Yes			No		
		Number	Proportion buying tickets	Mean spending	Number	Proportion buying tickets	Mean spending
Age	18-29	85	.3102	20.85	76	<b>.4450</b>	<b>389.04</b>
	30-49	179	<b>.5045</b>	<b>124.89</b>	130	.4404	86.42
	50-64	123	<b>.5105</b>	45.91	91	.5077	<b>154.5</b>
	65+	75	<b>.4426</b>	<b>131.9</b>	89	.3512	117.03
Education	High school or less	178	<b>.4634</b>	74.51	96	.4193	<b>416.89</b>
	Some college	166	<b>.4841</b>	<b>66.52</b>	136	.4576	41.35
	College graduate	60	.4261	<b>235.3</b>	68	<b>.4547</b>	219.3
	Post-graduate	62	<b>.4178</b>	25.31	85	.4120	<b>52.39</b>
Income	<\$20,000	95	.2592	17.3	36	<b>.2951</b>	<b>69.07</b>
	\$20,000 to <\$30,000	80	<b>.4345</b>	<b>135.18</b>	33	.1716	62.55
	\$30,000 to <\$50,000	108	<b>.5280</b>	154.33	95	.5223	<b>395.41</b>
	\$50,000 to <\$75,000	63	<b>.7245</b>	77.97	72	.4093	<b>132.55</b>
	\$75,000 and above	99	.4658	54.03	139	<b>.5034</b>	<b>94.58</b>
Marital Status	Married	218	<b>.4879</b>	86.71	231	.4563	<b>231.52</b>
	Not married	247	<b>.4354</b>	<b>85.07</b>	154	.4092	74.97
Employment status	Employed full/part time	245	<b>.5275</b>	58.6085	219	.4843	<b>75.3418</b>
	Not employed	220	<b>.3848</b>	116.151	166	.3757	<b>291.862</b>
Gender	Male	210	.4535	83.71	217	<b>.4703</b>	<b>176.64</b>
	Female	256	<b>.4653</b>	87.58	168	.3949	<b>158.71</b>
Total		465	<b>.4599</b>	85.84	385	.4374	<b>168.83</b>

**Table 2.** Generalized Linear Model with Ln(Dollars Spent on Lottery Tickets in the Previous 12 Months+1) as a Dependent Variable

Parameters	Spec. 1		Spec. 2		Spec. 3	
	Estimate	Chi-Square	Estimate	Chi-Square	Estimate	Chi-Square
Intercept	1.029	<b>16.593*</b>	1.247	<b>20.138*</b>	1.222	<b>21.093*</b>
High school or less	1.039	<b>20.241*</b>	.850	<b>7.417*</b>	1.061	<b>21.240*</b>
Some college	.682	<b>10.260*</b>	.255	.832	.684	<b>10.417*</b>
College graduate	.427	3.347	.285	.850	.456	<b>3.852*</b>
Post-graduate	0		0		0	
<\$20,000	-1.034	<b>13.255*</b>	-1.056	<b>13.886*</b>	-.804	3.711
\$20,000 to <\$30,000	-.537	<b>3.811*</b>	-.573	<b>4.307*</b>	-1.230	<b>8.999*</b>
\$30,000 to <\$50,000	-.174	.650	-.163	.571	-.299	1.140
\$50,000 to <\$75,000	.147	.430	.167	.555	-.395	1.852
\$75,000 and above	0		0		0	
Married	.163	1.075	.148	.884	.123	.610
Not married						
Employed full/part time	.164	1.223	.170	1.324	.140	.898
Not employed	0		0		0	
Male	-.001	.000	.000	.000	.025	.033
Female	0	.	0		0	
Worried about Standard of Living	.118	.665				
Not Worried	0					
HS or less * worried			.094	.132		
HS or less * not worried			0			
Some college * worried			.520	<b>4.533*</b>		
Some college * not worried			0			
College graduate * worried			-.044	.016		
College graduate * not worried			0			
Post-graduate * worried			-.408	1.599		
Post-graduate * not worried			0			
<\$20,000 * worried					-.486	1.464
<\$20,000 * not worried					0	
\$20,000 - <\$30,000 * worried					.849	<b>4.366*</b>
\$20,000 - <\$30,000 * not worried					0	
\$30,000 - <\$50,000 * worried					-.001	.000
\$30,000 - <\$50,000 * not worried					0	
\$50,000 - <\$75,000 * worried					.945	<b>7.628*</b>
\$50,000 - <\$75,000 * not worried					0	
\$75,000 & above * worried					-.286	1.250
\$75,000 & above * not worried					0	
Scale	4.850		4.823		4.784	
Number of observations	819		819		819	
Akaike's Information Criterion (AIC)	4504.69		4505.00		4498,72	

\*Significant at the 0.05 level.

Education is characterized by high school or less, some college, college graduate, and post-graduate. In specification 1, all education variables are statistically significant at 0.05 level. Since the dependent variable is expressed in logarithm to base e, we can calculate the influence of each coefficient by taking exponential function of the coefficient. The coefficient of 1.039 relating to high school or less indicates that people with high school education will spend 2.825 times the mean spending by people with post-graduate degrees. Similarly, people with some college education will spend 1.978 times and college graduates 1.533 times the mean spending on lottery tickets by people with post-graduate degrees. In other words, expenditures on lottery tickets tend to decrease with education as concluded by many other authors. (Brown and Kaldenberg 1992; Clotfelter and Cook 1999; Clotfelter et al., 1999). Consistent with this result, Kaizeler and Faustino (2008) find that lottery sales are lower in countries with higher levels of education.

We have grouped people into five categories based on income. Only people with income less than \$20,000, and \$20,000 to \$30,000 are statistically significant at the 0.05 level. People with an annual income of less than \$20,000 are likely to spend 0.356 times the spending on lottery tickets of people with income of over \$75,000. People with income \$20,000 to \$30,000 will spend 0.584 times the spending by people with income over \$75,000. Marital status, employment status, and gender are found to be statistically not significant at the 0.05 level. However, Welte et al., (2002) based on 2001 survey found that males spent more on lottery tickets than women did.

We find that the zero-one variable representing whether a person is worried about maintaining the standard or living is not statistically significant. This implies that worries about maintaining the standard of living do not influence the expenditures on lottery tickets. However, some specific groups may be influenced by worries. Therefore, we rerun regression by adding additional variables. To evaluate whether people with different education may be influenced by anxiety about standard living, we add new variables that include education dummies\*whether worried dummies. We find that only the variable some college\*worried is statistically significant. This indicates that people with some college education and worried people are likely to spend 1.682 times the mean amount spent by people with some college education and people who are not worried. We also repeat generalized linear regression by adding income dummies\*worried dummies. We find that people with incomes from \$20,000 to \$30,000 and worried will spend 2.336 times the dollar amounts spent by people with incomes from \$20,000 to \$30,000 and not worried. We also find that worried people with incomes from \$50,000 to \$75,000 will spend 2.573 times the dollar amounts spent by not-worried people with the same incomes.

#### *Propensity Score Matching*

To further substantiate our results and remove any selection biases, we perform a propensity score method analysis (Thoemmes 2012; West et al., 2014). Our analysis begins by performing logistic regression analysis with dependent variable as 1 for people who are worried about the ability to maintain the standard of living and 0 for people who are not worried. We use education, income, age, marital status, employment status and gender as independent variables.

Results are presented in Table 3. In Table 4, we present means and standardized mean differences in treatment group (worried) and control group (not worried) before and after matching. The standardized mean differences after matching are less than before matching for most variables except for education (some college), income (\$30,000 to \$50,000), and age (30-50 years) indicating improved matching as a result of using the propensity score method. The standardized mean differences should be close to zero. For after match, they are less than 0.1 except for propensity, income (\$20,000 to \$30,000), and income (\$50,000 to \$75,000) (Rubin, 2001). We compare yearly expenditures on lottery tickets by performing mixed model fixed effects and we find that the dummy variable worried (1=yes, 0=No) is not statistically significant indicating that anxiety about maintaining the standard of living does not influence the expenditures on lottery tickets (Table 5).

#### **Discussions**

In spite of several reasons being attributed to buying lottery tickets, there is no consensus about motivations to buy lottery tickets. Irrationality, socialization, excitement, monetary motives, scarcity mindset, unemployment, and moods are considered as some of the reasons that encourage lottery buying. Several authors (Bloch 1951; Frey 1984) have claimed that people may resort to gambling to reduce frustrations and tensions. Gabrielyan and Just (2020) find that unemployment rates are associated with increased sales of draw lotteries but not instant lotteries. They also find that when unemployment compensation rises, there is a decrease in lottery sales. Our analysis, however, indicates that the proportion of people buying lottery tickets is the same irrespective of whether a person is worried about maintaining his or her standard of living. This is consistent with the results of Mishra et al., (2010) that conclude induced mood does not influence the gambling behavior. Nevertheless, people not worried are likely to spend higher amounts on lottery tickets than people who are worried. This does not disprove the claims that people may buy lottery tickets because of their anxiety. We find that worried people with some college education, incomes between \$20,000 and \$30,000, and incomes between \$50,000 and \$75,000 will spend higher amounts on lottery tickets than not-worried people with similar characteristics.

#### **Conclusions**

To sum up, expenditures on lottery tickets vary inversely with education. People with annual incomes of less than \$30,000 spend less on lottery tickets than people belonging to other income categories. Marital status, working status, and gender are found to have no impact on the spending of lottery tickets. Worries about maintaining standard of living do not affect lottery spending. However, worried people with some college education, who have incomes between \$20,000 and \$30,000, and who have incomes between \$50,000 and \$75,000 will spend higher amounts on lottery tickets than not-worried people with similar characteristics. People with less than \$30,000 annual income spend less on lottery tickets compared to other income categories. This is confirmed by both regression analysis and propensity matching method.

**Table 3.** Output of logistic regression analysis with whether worried about not able to maintain standard of living (Yes=1; No=0) to compute propensity scores

<b>Variables</b>	<b>B</b>	<b>Wald</b>	<b>Sig.</b>	<b>Exp(B)</b>
Constant	-.422	2.487	.115	.656
High school or less	.676	8.133	.004	1.966
Some college	.376	2.902	.088	1.456
College graduate	.178	.510	.475	1.195
Post-graduate				
<\$20,000	.734	7.289	.007	2.083
\$20,000 to <\$30,000	.761	7.989	.005	2.140
\$30,000 to <\$50,000	.088	.185	.667	1.092
\$50,000 to <\$75,000	-.108	.239	.625	.898
\$75,000 and above				
18-29	-.003	.000	.989	.997
30-49)	.624	7.462	.006	1.867
50-64)	.627	7.636	.006	1.873
Over 65 years of age				
Married	-.405	6.577	.010	.667
Not married				
Employed full/part time	-.086	.254	.614	.917
Not employed				
Male	-.152	1.105	.293	.859
Female				
Number of observations		866		
-2 Log likelihood		1132.61		
Omnibus tests of model coefficients – Chi-square (df=13)		71.82	0.000	

**Table 4.** Detailed balance before and after matching

Covariates	Means Treated		Means Control		Std. Mean Diff.	
	Before	After	Before	After	Before	After
propensity	.553	.514	.475	.486	.565	.206
High school or less	.354	.288	.238	.251	.243	.076
Some college	.327	.356	0.298	0.312	-.063	-.095
College graduate	.155	.172	.195	.178	-.112	-.017
<\$20,000	.175	.092	.069	.073	.278	.050
\$20,000 to <\$30,000	.146	.131	.081	.085	.183	.128
\$30,000 to <\$50,000	.258	.270	.243	.254	.034	.037
\$50,000 to <\$75,000	.135	.151	.186	.186	-.150	-.101
18-29 years of age	.087	.077	.081	.080	.023	-.011
30-49	.280	.297	.243	.256	-.083	-.090
50-64	.350	.306	.300	.317	.104	-.023
Not married	.498	.398	.355	.372	.286	.051
Not employed	.516	.507	.505	.492	.022	.030
Female	.522	.463	.471	.485	.102	-.044

**Table 5:** Linear Mixed Model Fixed Effects with Dollars Spent on Lottery Tickets in the Previous 12 Months as a Dependent Variable

Parameter	Estimate	t	Sig.
Intercept	122.28	2.179	.030
Worried=Yes	-51.54	.676	.499
Worried=No	0.00	.	.
Number of observations	735.00		
-2 Log Likelihood	12284.02		
Akaike's Information Criterion (AIC)	12290.02		

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