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### Correlates of Gambling

Ana Brochado

*Instituto Universitário de Lisboa (ISCTE-IUL), DINÂMIA'CEM*

Margarida Abreu

*ISEG-Universidade de Lisboa, UECE and REM*

Victor Mendes

*CMVM-Portuguese Securities Commission and  
CEFAGE-UE*

### Abstract

This study's main objective was to identify which of gamblers' demographic, geographic and socioeconomic characteristics correlate with more frequent lottery playing and stock market trading. The data were collected from two unrelated cross-sectional samples of equity investors and lottery players from a European country. Based on a multiple correspondence analysis of both samples, higher levels of spending on central state lotteries and stocks with lottery features were found to be associated with individuals who have similar socioeconomic characteristics.

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1. Ana Brochado - Corresponding author; email: [ana.brochado@iscte-iul.pt](mailto:ana.brochado@iscte-iul.pt); DINÂMIA'CEM – IUL is supported by FCT Fundação para a Ciência e a Tecnologia, Portugal (PEST-BASE/03127/2020). 2. Margarida Abreu - ISEG - Universidade de Lisboa, Department of Economics; UECE; REM (Research in Economics and Mathematics. email: [mabreu@iseg.ulisboa.pt](mailto:mabreu@iseg.ulisboa.pt). UECE (Research Unit on Complexity and Economics) is financially supported by FCT (Fundação para a Ciência e a Tecnologia), Portugal. This article is part of the Strategic Project (UID/ECO/00436/2019). 3. Victor Mendes - The opinions expressed in this document are those of the author, and not necessarily those of the CMVM. CEFAGE-UE is supported by the Fundação para a Ciência e a Tecnologia - Portuguese Foundation for Science and Technology (grant UID/ECO/04007/2019).

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**Contact:** Ana Brochado - [ana.brochado@iscte-iul.pt](mailto:ana.brochado@iscte-iul.pt), Margarida Abreu - [mabreu@iseg.ulisboa.pt](mailto:mabreu@iseg.ulisboa.pt), Victor Mendes - [victormendes@cmvm.pt](mailto:victormendes@cmvm.pt).

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# 1. Introduction

Gambling has been attracting individuals for centuries (Meng and Pantzalis 2018) because ‘the desire to gamble is deep-rooted in the human psyche’ (Kumar, 2009, p. 1889). Previous studies (Grinblatt and Keloharju 2009, Dorn *et al.* 2015, Gao and Lin 2015, and Kumar *et al.* 2016) report evidence that, for some individual investors, trading functions as a gambling activity. Sensation or thrill seeking can thus be seen as a psychological attribute that underlies the propensity both to play lotteries and to trade in stocks (Grinblatt and Keloharju 2009). Moreover, people’s risk behaviours in one setting predicts risk-taking propensities in other settings (Barsky *et al.* 1997). Similar to playing lotteries, stock trading can offer individuals fun and excitement (Dorn *et al.* 2015).

Gao and Lin (2015) report the existence of a substitution effect between stock trading and lottery participation in Taiwan. Barber *et al.* (2009) also suggest that investors might view stock trading as an opportunity to gamble, and Dorn *et al.* (2015) report that large jackpots significantly reduce the amount of stock trading activity. Kumar *et al.* (2016) examine gambling-motivated trading activity (*i.e.*, gambling-induced sentiment) and conclude that lottery-like stocks are associated with return comovement. Kumar (2009) further conjectures that state lotteries and stocks with lottery-type features attract individuals with similar socioeconomic characteristics in the USA.

Previous studies have identified the demographic characteristics associated with greater propensity to gamble, higher portfolio concentration on lottery-type stocks (*e.g.* Kumar 2009) and stronger participation and more frequent gambling in government lotteries (Lam 2007, Ariyabuddhiphongs 2011 and Brochado *et al.* 2018). This paper adds to the literature by studying a new behavioural outcome, namely, the level of gambling (*i.e.* spending) among specific segments of both stock traders and lottery players. The main objectives are to identify gamblers’ sociodemographic and geographic characteristics correlated with (1) more high-risk stock trading activity and (2) more spending on lottery playing. Using micro-level data, this study aims to answer the following research question: Are the sociodemographic and geographic characteristics of lottery gamblers and stock market gamblers similar?

## 2. Methods

Kumar *et al.* (2011) argue that individuals’ gambling propensity will be stronger in countries with a higher percentage of Catholics as the Roman Catholic Church maintains a tolerant attitude towards moderate levels of gambling. Our research focuses on Portugal, where Catholics represent 88% of the population.<sup>1</sup> We use data from two unrelated cross-sectional samples of equity gamblers (the equity sample) and lottery gamblers (the lottery sample).

The equity sample was collected from a database of retail investors’ accounts provided by one of the top three banks in Portugal. The dataset for each account includes transactions in financial instruments over a 10-year period including dates, ISIN codes, quantities traded and prices, as well as sociodemographic data covering the first account holder’s marital status, birth date, gender, occupation and residence.

We adopt the definition of stocks that includes the perception of stocks as gambling tools (*i.e.* stocks viewed as lotteries), which has previously been applied in the

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<sup>1</sup> Source: INE (2011 census).

literature (Kumar 2009 and Gao and Lin 2015). Gambling in financial market contexts can thus be seen as “the desire to seek lottery-type payoffs (*i.e.* extreme returns at a low cost) using financial assets” (Kumar *et al.* 2016, p. 85). We use a sample of 469 investors considered gamblers (*i.e.*, individuals that meet at least one of the following characteristics: i) do not use any source of information about financial markets and instruments (Abreu and Mendes 2018); ii) has a poorly diversified portfolio, with less than 5 different stocks; iii) these are low-liquidity stocks).

The Santa Casa da Misericórdia de Lisboa (SCML) runs the central government’s games in Portugal in the name and on behalf of the state. The SCML stimulates the demand for government games, promotes them and returns to society at large portion of what individuals have spent on gambling.<sup>2</sup> We focus on the EuroMilhões, a poll-betting, transnational lottery in which players select 5 numbers from 1 to 50 and 2 different ‘lucky star’ numbers from a pool of 11 numbers. The EuroMilhões’s revenues account for approximately 30% of the SCML’s gross sales. Our lottery sample is obtained by using non-probability convenience sampling that targeted at least occasional players of one of the games on offer.

The data were collected by means of a self-administered survey given to gamblers in three retail points of sale. Respondents provide information about which games they gamble, how often and how much they spend on gambling; they also provide sociodemographic information. In total, 462 completed questionnaires are considered.

The two samples are composed of an almost equal number of respondents, and both included active ‘gamblers’ among players in lotteries or stock market traders. The amount spent on the EuroMilhões and the stock trading’s value are converted into ordinal scales based on the respective quartiles.

**Table 1. Sample characteristics**

Notes: n = number; \* source: Instituto Nacional de Estatística’s (n.d.) last data available: age groups reported for Portugal are 15–35, 35–44, 45–53 and 55+ years old.

Variable	Category	Lottery sample (n = 462)		Equity sample (n = 469)		Portugal*
		Count	%	Count	%	%
Gender	Male	316	68.4	399	85.1	47.3
	Female	146	31.6	70	14.9	52.7
Age Group	≤ 33	122	26.4	102	21.7	25.1
	34–43	126	27.3	133	28.4	16.9
	44–53	130	28.1	150	32.0	17.2
	≥ 54	84	18.2	84	17.9	40.8
Marital Status	Married	258	55.8	266	56.7	46.6
	Other	204	44.2	203	43.3	53.4
Residence	Lisbon	268	58.0	142	30.3	12.8
	Oporto	130	28.1	80	17.1	20.4
	Other	64	13.9	247	52.6	66.7
Occupation	Managers & Other Professionals	122	26.4	129	27.5	20.8
	Elementary Occupations	248	53.7	88	18.8	36.5
	Self-employed	26	5.6	180	17.1	–
	Unemployed	66	14.3	72	36.6	42.6

<sup>2</sup> The redistribution is done either through prizes to be won or of the net profit to a vast range of institutional beneficiaries operating in the areas of health, sport, culture, social welfare and cohesion.

The two datasets include the following variables: gender, age group, marital status, residence and occupation (Table 1). The samples have similar age group averages but the percentage of individuals with an elementary occupation is higher in the lottery sample than in the equity sample. Compared with the Portuguese population, there is a higher percentage of gamblers in lotteries and in stocks who are male, older, married and have more qualified occupations. Also, there is a lower percentage of unemployed gamblers than in the Portuguese population.

### 3. Results

#### 3.1 Ordinal regression

We use ordinal regression to assess sociodemographics' influence on the amounts 'invested' in lotteries and stocks. The dependent variable is measured at the ordinal level (*i.e.* four quartiles), and the regressors are converted into binary variables.

Estimation results (Table 2) show that males are more likely to spend more on lotteries and stocks than females. Younger gamblers (less than 34 years old) are less likely to spend more on lotteries and stocks than the older individuals. Residence, however, is not correlated with the lottery- and stock-spending quartiles, and married individuals and managers and other professionals are more likely to spend more on lotteries and stocks. For lotteries, people with an elementary occupation are more likely to spend more than the unemployed, while self-employed individuals are likely to spend less on stocks than unemployed people are.<sup>3</sup>

**Table 2. Ordinal regression**

Base categories: <sup>1</sup> gender = female; <sup>2</sup> age group = 54+; <sup>3</sup> marital status = not married; <sup>4</sup> residence = other; <sup>5</sup> occupation = unemployed; <sup>6</sup> EuroMilhões (monthly spending) = quartile 4; <sup>7</sup> equity (annual transaction value) = quartile 4; link function: complementary log-log; \*\* and \*\*\* denote statistical significance at 5% and 1%, respectively.

Variable	Category	EuroMilhões <sup>6</sup>			Equity <sup>7</sup>		
		Estimate	Std. Error		Estimate	Std. Error	
Gender <sup>1</sup>	Male	0.514	0.186	***	0.712	0.257	***
	≤ 33	-0.852	0.275	***	-2.266	0.299	***
Age Group <sup>2</sup>	34–43	-0.112	0.260		-0.849	0.253	***
	44–53	-0.185	0.258		-0.264	0.289	
Marital Status <sup>3</sup>	Married	0.319	0.180	**	0.367	0.210	**
Residence <sup>4</sup>	Lisbon	-0.393	0.259		-0.263	0.205	
	Oporto	-0.059	0.289		0.197	0.259	
Occupation <sup>5</sup>	Managers & Other Professionals	1.050	0.288	***	0.599	0.240	**
	Elementary Occupations	0.448	0.263	**	-0.397	0.259	
	Self-employed	0.469	0.431		-0.488	0.267	**
Pseudo R <sup>2</sup>	Cox and Snell	0.202			0.257		
	Nagelkerke	0.209			0.279		
	McFadden	0.139			0.117		

<sup>3</sup> A pooled logistic regression was also estimated by combining both samples to check for robustness. Non tabulated results confirm the previous findings.

### 3.2 Multiple correspondence analysis

Multiple correspondence analysis provides a visual representation of each sample's categories and facilitates a fuller understanding and description of the nature of the relationships between the selected categorical and/or qualitative variables and their associated categories. Upon computation of the eigenvalues (a measure of the corresponding dimension's importance in terms of explaining variability in the input data), two dimensions for interpretation are retained for they account for 51.9% (58.4%) of the total variance in the lottery (equity) sample.

The most important variables for each dimension are then identified. A joint plot of category points is created to represent graphically the categories of the five variables under analysis. The spatial distribution of category points reflects associations (for spatially-close point categories) or oppositions (for spatially-distant and diagonally-located point categories).

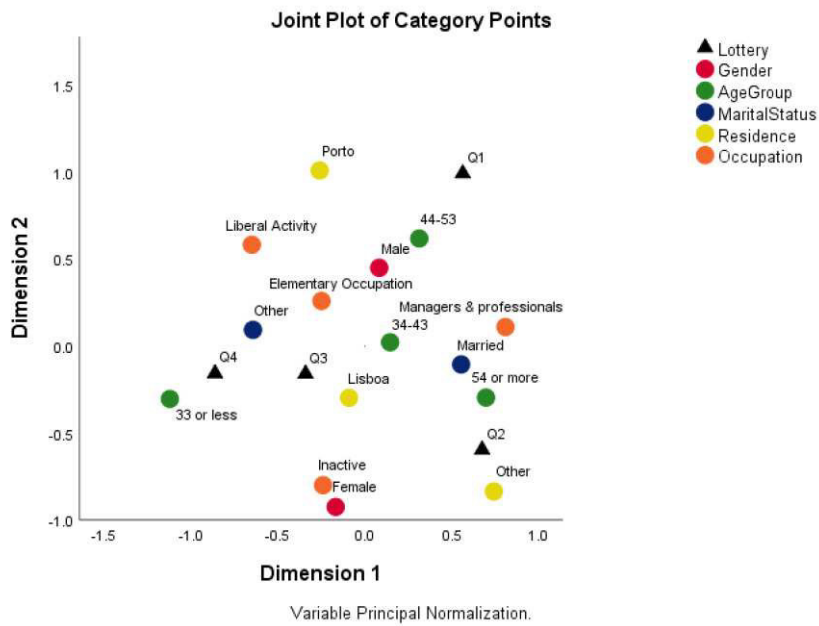
The discriminating measures allow us to conclude that lottery spending, gender and age better explain the first dimension (variance explained = 26.8%). However, marital status, occupation and residence are more relevant in the second dimension (*i.e.* 25.1%). In the equity sample, stock trading, age group and marital status better explain the first dimension (variance explained = 34.6%), while gender, age group, residence and occupation are more important in the second dimension (*i.e.* 23.7%) - Table 3.

**Table 3. Discriminating measures**

	Lottery Sample				Equity Sample		
	Dimension 1	Dimension 2	Mean		Dimension 1	Dimension 2	Mean
Lottery Spending	0.45	0.36	0.41	Stock Trading	0.56	0.02	0.29
Gender	0.32	0.08	0.20	Gender	0.06	0.28	0.17
Age Group	0.42	0.22	0.32	Age Group	0.64	0.49	0.57
Marital Status	0.20	0.24	0.22	Marital Status	0.49	0.03	0.26
Residence	0.16	0.43	0.29	Residence	0.05	0.11	0.08
Occupation	0.05	0.18	0.12	Occupation	0.28	0.50	0.39
Active Total	1.61	1.51	1.56	Active Total	2.08	1.42	1.75
Inertia	0.27	0.25	0.52	Inertia	0.35	0.24	0.58

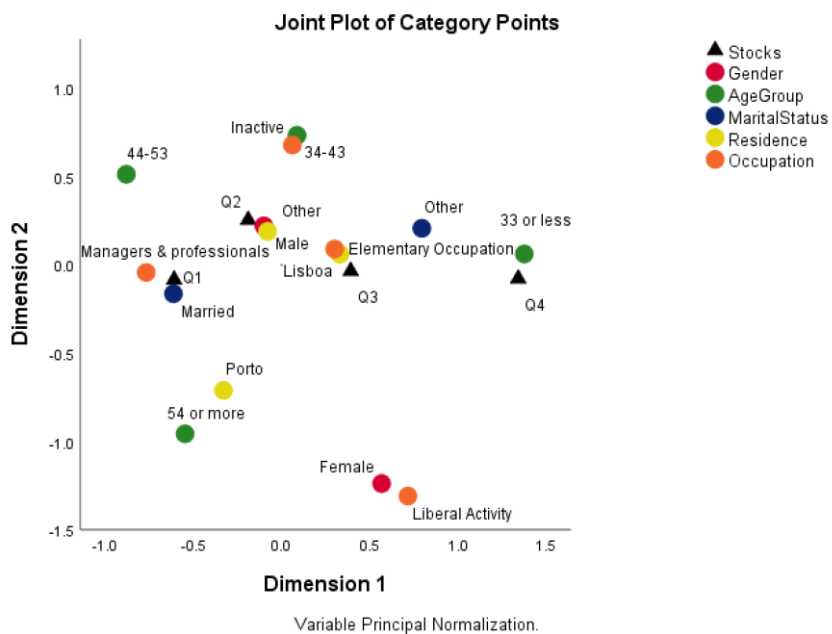
Thus, lottery spending's quartiles 1 and 2 (higher spending) are mainly associated with male, older and married individuals, who reside outside the two largest Portuguese cities and who are managers or highly skilled professionals. Quartiles 3 and 4 are mainly connected with younger and unmarried people. Among lottery gamblers, an association exists between being female and inactive (Figure 1).

**Figure 1. Multiple correspondence analysis (EuroMilhões)**



For the equity sample, stock trading's quartiles 1 and 2 (higher trading value) are mainly associated with male, older and married individuals, who reside outside Lisbon and Oporto and who are managers or highly skilled professionals. Quartiles 3 and 4 (lower trading) are linked mainly with younger, unmarried people. Among equity gamblers, an association exists between being female and self-employed (Figure 2).

**Figure 2. Multiple correspondence analysis (stock trading)**



## 4. Discussion

Our result that male equity traders are more prone to gamble in the stock market is consistent with previous research in different environments (*e.g.*, Dorn *et al.* 2015, Kumar *et al.* 2016 and Meng and Pantzalis 2018). We also show that male gamblers exhibit a higher level of trading activity than female traders, and this result is novel. In fact, previous research has concluded that men participate more in the stock market, but the trading intensity of equity gamblers has not been previously studied.

Overall, the propensity to gamble in the stock market appears to be lower in the 54 or more years old age bracket, which makes up a smaller proportion of the sample of active gamblers compared with national statistics. However, older individuals are more likely to spend more on stocks than are traders with less than 34 years of age. Married individuals are more likely to gamble and to spend more; managers and other professionals are also more likely to gamble and to spend more in the stock market than unemployed people. This set of original results reveals that the profile of gamblers who engage in more intensive equity trading activity is different from the profile of investors who merely show a preference for lottery-type stocks.

Regarding the lottery sample, our results also support the conclusion that a higher level of lottery spending is linked with gender (*i.e.* males), a finding which is in accordance with previous research (Ariyabuddhiphongs 2011 and Brochado *et al.* 2018). In addition, older individuals spend more on lotteries. Lam (2007) also confirmed a positive association between age and frequency of gambling, and Ariyabuddhiphongs (2011) identified a nonlinear association between individual lottery involvement (*e.g.* spending) and age groups. Consistent with Brochado *et al.* (2018), individuals with an elementary occupation tend to participate more frequently in lotteries (they account for more than 53% of our lottery sample); however, we add to the literature by showing that higher spending is associated with more qualified occupations.

Putting our results together, we identify that gamblers' spending on both stocks and government lotteries is similarly correlated with gender, age, occupation and marital status. Human aspirations may justify gambling behaviours in different markets, and, to some extent, gambling-motivated investments could be justified by a desire to maintain or increase upward social mobility, even for those who are wealthier. Individuals' characteristics can thus supersede their tendency to gamble in terms of causality (Kumar 2009).

## 5. Concluding remarks

We add to the literature on gambling by identifying the main correlates of gamblers' spending and providing more evidence for patterns in this behavioural propensity. Our results identify a homogeneous sociodemographic and geographic profile for stock market and lottery gamblers. Empirical data analyses reveal that gender, age, marital status and occupation have similar impact on expenditures in lotteries and stocks, thus providing evidence that gamblers are gamblers regardless of the 'instrument' used to extract fun and excitement.

Our contributions to the literature are significant on two levels. First, our results confirm Kumar's (2009) similar clientele hypothesis and raises it to a new behavioural

outcome: gambling expenditures. Second, we use micro-level data comprising two datasets of active gamblers: lottery players and stock traders.

Despite these contributions, an important limitation is the use of unrelated samples: if the gamblers identified based on stock trading data could be matched to their state lottery purchase records, more cogent conclusions about gamblers' demographic profile could be derived. Future studies may also want to include different types of investments (*e.g.* warrants) and lotteries (*e.g.* instant lotteries).

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