



# Elucidating the association of sports lottery bettors' socio-demographics, personality traits, risk tolerance and behavioural biases



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## ABSTRACT

The goal of this study was to explore the psychological and socio-demographic factors of bettors that are associated with the herding behaviour of sports lotteries through a combination of interdisciplinary perspectives. The multidimensional instrument consisted of five-factor personality inventory, the measures of risk tolerance and two types of herding behaviours, betting patterns and socio-demographics was developed, and then nationwide on-site bettors ( $n = 1032$ ) responded to the questionnaire to conduct a structural equation modelling (SEM) analysis through stratified proportional random sampling and quota sampling methods. The confirmatory factor analysis (CFA) revealed that two structural models displayed goodness-of-fit with respect to the data. Empirical results confirmed the existence of herding behaviours and a gender difference in sports lottery betting. The bettors with neuroticism have lower risk tolerance, and the bettors with greater neuroticism, openness and agreeableness exhibit apparent normative herding behaviours. However, the risk tolerance has only a positively and significantly prediction for informational herding behaviour.

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## 1. Introduction

With the global increase in the enthusiasm regarding sports, more countries have opened up the sales of legalized sports lotteries which have become an important strategy to raise funds and promote sports development in advanced countries. Compared with the general lottery with an average number probability, bettors in a sports lottery must possess more expertise on the betting object. In general, the betting behaviour of a sports lottery has always been considered an alternative investing behaviour with complete rationality according to efficient market hypothesis (henceforth, EMH), which is based on the premise of regarding an individual as an economic man with complete rationality and people generally are able to make decisions in their best interest (Fama, 1965). From the rational decision-making perspective, bettors generally would not choose to wager an amount that exceeds the expected value of the lottery (Matheson, 2001); nonetheless, the so-called “gambler’s fallacy” can commonly arise in many practical lottery betting situations (Clotfelter & Cook, 1993; Papachristou, 2004; Terrell, 1994; Williams, 2005). The empirical

studies on lottery betting behaviours have also shown such paradoxical phenomena (Pelletier & Ladouceur, 2007; Williams & Connolly, 2006). It is possible that general bettors appear to first “switch off” their rational beliefs during betting and then “switch them back on” after betting (Sevigny & Ladouceur, 2003). The prospect theory also provided a proper explanation of the phenomenon that betting is like a psychological process in which bettors might be influenced by a combination of internal (e.g. psychological) and external (e.g. socio-demographic) factors, thus unable to obtain information needed (Kahneman & Tversky, 1979; Tversky & Kahneman, 1974).

Regarding the linkage of personality traits, socio-demographics, risk tolerance, and herding, behavioural economics have noted that personality traits reflected in social adjustment affect an individual’s risk tolerance (Bye & Lamvik, 2007; Engelberg & Sjöberg, 2007); nonetheless, previous studies cannot yet clearly explain whether psychological traits affect decision-making processes through risk tolerance. Compared to the investment management perspective, the BB&K model classifies investors into five types of investors with different risk tolerance (Bailard, Biehl, & Kaiser, 1986). Barnewall (1987) distinguished the personalities of typical investors as two types, namely active and passive, and found that passive investors have a stronger need for securities investments and exhibit a lower risk tolerance than active investors. Pompian (2006) indicated that people with an

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impulsive trait have a higher risk tolerance. Nicholson, Soane, Fenton-O'Creevy, and Willman (2005) indicated that risk tolerance is clearly associated with age and sex, and is strongly rooted in high extraversion and openness with low neuroticism, agreeableness, and conscientiousness. From this perspective, the present study postulates that the personality traits of sport lottery bettors are seemingly related to their risk tolerance. Additionally, although empirical studies seldom examined the relationship between personality traits and behavioural biases (Schaefer, Williams, Goodie, & Campbell, 2004), the relationship among bettors' personality traits, socio-demographics, and behavioural biases can be roughly depicted through relevant studies in sociology (Aasved, 2003; Lim & Lee, 2009), behavioural finance (Baddeley, 2010) and psychology (DellaVigna, 2009; Sehgal & Tripathi, 2009). In behavioural finance theory, herding can be defined as the phenomenon of individuals deciding to follow others and imitating group behaviours rather than deciding independently on the basis of their own information (Baddeley, 2010). The definition of herding behaviour is similar to the concept of "conformity" proposed by the early work of social psychology that emphasizing that people tend to change their beliefs or behaviours and conform to group behaviour when facing group pressure (Allen, 1965). Conformity is an important part of social influence comprised of two primary causes: "informational social influence" that occurs when one looks to the behaviours of group members to obtain information about reality usually in ambiguous situations; and "normative social influence" which results from one's desire to gain approval and acceptance from group members leading to conformity (Bearden, Netemeyer, & Teel, 1989). Subsequent researches revealed that anxious investors tend to lack self-confidence and are more likely to look to the opinions of friends, professional advisers, and informants for decision-making (Stone, Dodrill, & Johnson, 2001). Gambetti and Giusberti (2009) further showed a linkage between anxiety trait and low risk decisions, and further substantiated the importance of incorporating cognitive and emotive factors in theories that seek to explain the relationship between personality traits and risk decision-making across a broad age range. They also predicted that trait anger is associated with the decision to invest, whereas trait anxiety motivates individuals to avoid investments (Gambetti & Giusberti, 2012). Based on this, it can be reasoned that herding behaviour is a phenomenon that reflects the interaction between a person's mindfulness and emotions, and personality traits thus also affect the tendency for herding behaviour. For risk tolerance, risk is an important factor in the making of individual financial and investment decisions (Yang & Qiu, 2005). In general, higher risk tolerance can be attributed to high self-confidence and a lower level of conformity (Menkhoff, Schmidt, & Brozynski, 2006). Because a sports lottery is fundamentally a gambling behaviour, sociologists often link the cause of such behaviour to socio-demographic characteristics, including gender, income, and educational level (Chantal & Vallerand, 1996). Therefore, it can be reasoned that bettors' risk tolerance could be positively related to their herding behaviour.

Because the history of sport lottery in Taiwan is relatively short and remains in its infancy, improvements are needed in many areas including sources of law, scale, marketing, benefit distribution, and betting behaviour survey. Based on this, to examine the internal and external factors associated with the risk tolerance and the herding behaviours of sports lottery bettors through a combination of interdisciplinary perspectives (i.e., personality trait theory, behavioural finance theory, and gambling theory) is not only able to help the lottery bookmaker or operators enhance the in-depth comprehension of bettors' decision-making behaviours, but the findings also can be used as the guidelines of betting strategy for sports lottery bettors.

## 2. Methods

### 2.1. Instruments and scale development

A questionnaire that consisted of four sections was developed: The first section involved the measures of the bettors' personality traits based on the NEO Five-Factor Inventory (NEO-FFI), with appropriate modifications according to the characteristics of domestic bettors (Costa & McCrae, 1992). A total of 41 items were originally generated for the "Big Five" factors: neuroticism (seven items), extraversion (seven items), openness (eight items), agreeableness (eight items), and conscientiousness (11 items). The second section comprised measures of the bettors' risk tolerance. Three sub-dimensions, namely investment risk (four items), risk experience (four items), and speculative risk (three items), were employed to conceptualize the level of risk tolerance based on the instrument developed by Grable and Lytton (1999). The third section was the measures of herding behaviours, including the sub-concepts of "informational social influence" (six items) and "normative social influence" (four items) based on the measurement of susceptibility to interpersonal influence (Bearden et al., 1989). These items were phrased into statements corresponding to a Likert five-point scale, ranging from 1 for "strongly disagreed" to 5 for "strongly agreed", and their means were then calculated as the scores for each dimension. The last section included three betting patterns and seven socio-demographic variables. The betting patterns and socio-demographic variables was included for the purposes of sample description and examination of the differences in the level of risk tolerance and herding behaviour exhibited by sports lottery bettors.

### 2.2. Survey procedures

To allow samplings in order to meet the principles of randomization and representativeness, data collection was conducted by combining two sampling stages. The first stage was to divide the island of Taiwan into four regions (northern, central, southern and the eastern), and the stratified proportional random sampling method was employed to draw 100 lottery betting stations according to the proportions of physical lottery distribution channels in these regions. In the second stage, the well-trained interviewers contacted each dealer of a sports lottery at the betting stations to request permission and assistance with on-site data collection. To qualify for participation in the study, an individual must have also betted in at least one sports lottery within the last month. Consequently, stratified and quota sampling methods were employed to recruit a total of 1073 on-site participants in which 1032 respondents are valid with a 95% confidence level, and the actual sampling error was approximately  $\pm 3\%$ , as shown in Table 1. The valid response rate reached 96.18%.

### 2.3. Data analyses

The valid sample was randomly divided into two halves. The first dataset ( $n = 300$ ) was used to examine the assumptions for multivariate analyses including normality test. The second dataset ( $n = 732$ ) was employed for structural equation modelling (SEM) analysis. Procedures were conducted to calculate descriptive statistics for the socio-demographic information and to examine internal consistency reliability. Upon confirming multivariate normality and according to Anderson and Gerbing's (1988) two-step structural equation modelling approach, a confirmatory factor analysis (CFA) using the procedures in LISREL 8.80 was first performed to evaluate the measurement model and their items for the five revised personality traits, risk tolerance, and herding

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