

## The conceptual and empirical relationship between gambling, investing, and speculation

JENNIFER N. ARTHUR<sup>1</sup>, ROBERT J. WILLIAMS<sup>2\*</sup> and PAUL H. DELFABBRO<sup>1</sup>

<sup>1</sup>Faculty of Health Sciences, School of Psychology, The University of Adelaide, Adelaide, Australia

<sup>2</sup>Faculty of Health Sciences, University of Lethbridge, Lethbridge, Canada

(Received: June 14, 2016; revised manuscript received: October 16, 2016; accepted: November 6, 2016)

*Background and aims:* To review the conceptual and empirical relationship between gambling, investing, and speculation. *Methods:* An analysis of the attributes differentiating these constructs as well as identification of all articles speaking to their empirical relationship. *Results:* Gambling differs from investment on many different attributes and should be seen as conceptually distinct. On the other hand, speculation is conceptually intermediate between gambling and investment, with a few of its attributes being investment-like, some of its attributes being gambling-like, and several of its attributes being neither clearly gambling or investment-like. Empirically, gamblers, investors, and speculators have similar cognitive, motivational, and personality attributes, with this relationship being particularly strong for gambling and speculation. Population levels of gambling activity also tend to be correlated with population level of financial speculation. At an individual level, speculation has a particularly strong empirical relationship to gambling, as speculators appear to be heavily involved in traditional forms of gambling and problematic speculation is strongly correlated with problematic gambling. *Discussion and conclusions:* Investment is distinct from gambling, but speculation and gambling have conceptual overlap and a strong empirical relationship. It is recommended that financial speculation be routinely included when assessing gambling involvement, and there needs to be greater recognition and study of financial speculation as both a contributor to problem gambling as well as an additional form of behavioral addiction in its own right.

**Keywords:** gambling, investing, speculation, day trading, problem gambling

### INTRODUCTION

The relationship between financial market activity and gambling has been debated for quite some time (e.g., Dewey, 1905; Lapp, 1909; MacDougall, 1936; McMath, 1921; Proctor, 1887). This debate continues today. Within the financial sector, it is common to identify certain stock market activities as gambling-like (e.g., Boyer & Vorkink, 2014; Dorn, Dorn, & Sengmueller, 2012; Hazen, 1991; Kumar, 2009; Skeel, 2009). Similarly, within the gambling field, population surveys of gambling participation sometimes include questions about high-risk stocks, speculative investments, and/or day trading in addition to traditional forms of gambling (Williams, Volberg, & Stevens, 2012; Williams, Volberg, Stevens, Williams, & Arthur, 2016).

Although financial market activity and gambling both entail financial risk, most people tend to regard these things as fundamentally different. The purchase of guaranteed investment certificates (GICs), government or corporate bonds, and company shares (stocks) are often thought of as “investments,” with the term investment having connotations of low risk, positive expected returns, influenced by skill and knowledge, and a wise thing to engage in. In contrast, gambling has connotations of being high risk, with negative expected returns, influenced primarily by chance, potentially addictive and/or financially ruinous, and involving a

completely different set of activities. As will be discussed in this paper, there is a fair bit of truth to these distinctions. Indeed, the harmful and addictive potential of gambling is well established, attributable in part to the short-term time frame of most gambling activities (usually seconds or minutes), the existence of “continuous forms” of gambling (e.g., slot machines, casino table games) that allow for a rapid series of bets, and the negative expected return of most games. As these structural features tend to be absent in investment, “problematic investing” is expected to be extremely rare, if it exists at all.

That being said, within the financial sector there is a continuum between investment and more “speculative” activities that are shorter term, higher risk, and with a primary focus on making a monetary profit. Examples of speculation are:

- *Day trading and high-frequency trading*, where stocks are bought and sold in the same day with the express purpose of making an immediate profit on minor changes in valuation.
- *Penny stocks* (also known as “lottery stocks”) of companies with relatively little or no actual assets

\* Corresponding author: Robert J. Williams; Faculty of Health Sciences, University of Lethbridge, Lethbridge, Alberta T1K3M4, Canada; Phone: +1 403 382 7128; E-mail: [Robert.williams@uleth.ca](mailto:Robert.williams@uleth.ca)

- (the reason their stock price is usually so low) but with a small chance of increasing to many multiples of their current value if their venture is successful.
- *Shorting*: This involves borrowing the stock, immediately selling it, and then hoping the market value of the stock declines so the person can repurchase it at this lower price, return it to the lender, and make a profit.
  - *Derivatives*: There are speculative elements to the derivatives market, where people enter into off-exchange contracts relating to the performance of a stock, commodity, or index on the actual exchange and where the asset may in fact never actually be purchased. The purchase of “options” to buy or sell a commodity or stock at a specified price before a specified date is one example. “Futures contracts” and “forward contracts” are another type of derivative where the buyer agrees to purchase an asset (and the seller agrees to sell the asset) at a specific future point in time for a price that is currently determined.

The extent to which financial speculation is similar to gambling is the extent to which it may have similar addictive and harmful aspects. The primary purpose of the present paper is to identify the similarities and differences between gambling, speculation, and investment by a review of both their conceptual and empirical relationship. Aside from the academic value of this investigation, the overlap between these activities has important clinical implications. Although problem gambling is a well-recognized entity, the contribution of speculative financial activity to problem gambling is not well researched, and very little is known about problematic financial speculation as a potential behavioral addiction in its own right.

## METHODS

The first part of this paper consists of a comprehensive analysis of the conceptual similarities and differences between gambling, speculation, and investment. The second part of the paper involves the identification of all articles speaking to their empirical relationship and a summary of these findings.

A two-stage search strategy was used to identify relevant articles. It started with the use of the keywords “gambling,” “speculation,” “investment,” in combination with the words “definition” “versus,” and “relationship” in the following electronic databases, restricting the search to articles published in English:

- ABI/INFORM Global
- Academic Search Complete
- Business Source Complete
- EconLit
- MEDLINE
- National Bureau of Economic Research
- PsycINFO
- ScienceDirect

As a significant percentage of gambling-related literature is contained in non-academic sources, this literature search was supplemented by a search of gambling-specific databases:

- Alberta Gambling Research Institute Digital Collection

- Australian Gaming Council’s eLibrary
- E-Library – Responsible Gambling Council (Ontario)
- Gambling Research Australia’s Gambling Research Database
- Gambling Research Database (GambLIB)
- Gambling Research Exchange Ontario Knowledge Repository
- Problem Gambling Library (New Zealand)
- Responsible Gambling Infohub

The second part of the search strategy involved checking the reference list of all relevant articles to identify other potentially relevant articles.

## RESULTS

### *Conceptual relationship between gambling, investing, and speculation*

Close to 60 articles and books were identified that either proposed definitions of gambling, speculation, and/or investment and/or have attempted to delineate one of these entities from the others (e.g., Allen, 1952; Angel & McCabe, 2009; Arthur, 2000; Borna & Lowry, 1987; Brenner, 1996; Brenner & Brenner, 1990; Clark, 1987; Cohen, 1970; Hazen, 2005; Holliday & Fuller, 1975; Jacoby, 1950; Kreitner, 2000; Lynch, 2012; McMillen, 1996; O’Malley, 2003; Productivity Commission, 2010; Smith, Hodgins, & Williams, 2007; Szado, 2011; Williams et al., 2016).

Fortunately, there is reasonable consistency in the various definitions that have been proposed for “investing” with the following, capturing the sentiments of most: “purchasing or allocating money into an asset with the expectation of long term capital appreciation or profits deriving from that asset” (e.g., Bogle, 2012). Similarly, although there have been dozens of definitions of gambling proposed over the years, the following definition is fairly representative “staking money or material goods on an event having an uncertain outcome in the hope of winning additional money and/or material goods” (Williams et al., 2016). There has been less consistency in the definitions proposed for speculation. Nonetheless, there is general agreement that compared to investing, speculation usually refers to financial market activities that tend to be shorter term, higher risk, with higher and lower gains and losses, and with a primary focus on making a monetary profit from price movement without regard for the fundamental value of the asset.

These above articles also contain diverse opinion concerning the attributes that differentiate gambling, speculation, and investment. The remainder of this section will review these attributes, as conceptual clarity can be advanced by a thorough understanding of how these activities are best differentiated. The attributes that are most commonly invoked as differentiating gambling, investing, and speculation are: the types of activities and instruments used, time frame, level of risk, positive or negative expected return, and role of chance versus skill. Less commonly invoked attributional differences involve: whether an asset has been purchased or not, whether a stake has been made,

whether there is a definitive outcome associated with a definitive event, and the economic utility of the activity.

*Activities and instruments.* Investment and speculation generally involve a set of activities and instruments quite distinctive from gambling activities. Gambling typically involves the purchase or participation in lottery tickets, scratch tickets, bingo, horse racing, sports betting, private wagers, electronic gambling machines (slots, video lottery machines, pokies, fruit machines, and fixed-odd betting terminals), and various classic casino table games (e.g., poker, roulette, craps, blackjack, and baccarat). In contrast, investment and speculation are typically associated with the purchase of GICs, bonds, stocks, commodities, currencies, real estate, derivatives, and collectibles.

However, there are a few activities that involve intersections between gambling and investment/speculation. One is lottery-linked savings accounts and premium bonds. These are savings accounts and bonds where part of the accrued interest is won in periodic lotteries by a small number of people who hold these bonds and/or savings accounts (Guillén & Tschoegl, 2002; Tufano, 2008). Another is *financial indices wagering*. This is when a person places a bet on the direction of a financial index (e.g., composite index, currency value, and commodity value) or the specific future value of a stock or financial index (“spread betting”), with an agency external to the financial exchange. Financial indices betting is actually a very old type of gambling popular in the late 1800s and early 1900s known as “bucketing” with the venues offering this activity being known as bucket shops (Fabian, 1999; Woodlock, 1908). When this activity was eventually made illegal it was put into the gambling section of most legal codes. Also consistent with its gambling affiliation is the fact that the recent reintroduction of financial indices betting was made by well-established online *gambling providers* (in 2007 by Bet365, Ladbrokes, Paddy Power, and William Hill; Williams, Wood, & Parke, 2012; Wood & Williams, 2007). Most countries (not Australia, Malta, Cyprus, or the Netherlands) have also deemed this activity to be gambling, and therefore do not subject the profits to taxation (the United States does tax gambling profits), unlike capital gains on financial markets which are subject to taxation (Rayman, 2013).

It is more difficult to separate investment from speculation on the basis of the instruments and activities engaged in, although GICs and bonds tend to be associated with the former, and derivatives with the latter. Stocks, commodities, currencies, real estate, and collectibles can be either investments or speculative depending on the specific risk profile of the instrument.

*Time frame.* Most forms of investment are held for a period of months or years. In contrast, in most forms of gambling the outcome is known within just seconds (scratch tickets, electronic gambling machines, and casino table games), minutes (bingo, horse racing, keno), or days (i.e., lotteries, and sports betting). However, while this is a fairly strong distinction, there are some forms of sports betting with much longer horizons (e.g., betting on which sports team will eventually win the championship several months later). The time frame for speculation is quite variable depending on the type of activity. Day trading and

high-frequency trading involve a time frame of seconds, minutes, and hours whereas penny stocks, shorting, options, and futures generally have time frames of weeks, months, and sometimes years.

*Level of risk.* Risk is defined as the likelihood of one’s wager or investment being completely lost. There is a high risk of losing one’s stake in most forms of gambling, although there are some exceptions to this rule. For example, betting on the heavy favorite in horse racing or sports betting confers both low risk and low return. Investment vehicles such as GICs, bonds, mutual funds, and blue-chip stocks tend to entail low risk. In contrast, speculative activities such as day trading, penny stocks, shorting, and options and futures tend to be high risk, although the overall financial risk can sometimes be mitigated when these high risk vehicles are hedged with an offsetting position or contained in a more diversified portfolio.

*Positive or negative expected return.* Risk is related to expected return. Investments in the form of GICs have positive expected returns as long as the financial institution offering the GIC continues to exist. Positive expected return is also true of most bonds and stocks over time (Dimson, Marsh, & Staunton, 2009; Liu, Whited, & Zhang, 2009; O’Shaughnessey, 1998; Siegel & Coxe, 2002). In contrast, virtually all commercially provided forms of gambling are designed to have a negative mathematical expectation over time for the player (e.g., Hannum & Cabot, 2005). However, this is not the case for all forms of gambling. Sports and horse race betting, card counting at blackjack, and person-to-person games (e.g., poker, mahjong) are types of gambling where a long-term positive expected return occurs for a small number of more knowledgeable and skilled gamblers (Hayano, 1984; Silberstang, 1988).

This mixed pattern of returns in gambling is not that dissimilar to the mixed returns with speculation. Although the limited evidence on short-selling suggests it often tends to be profitable (Choi & Hwang, 1994), the evidence is mixed for futures contracts (e.g., Dusak, 1973; Kearns & Manners, 2004), and largely negative for day traders. Most day traders lose money over the long run, with the minority having positive expected returns largely capitalizing on the overall positive trend of the stock markets over time (Barber, Lee, Liu, & Odean, 2014; Jordan & Diltz, 2003; Ryu, 2012). Penny stocks, in addition to their association with fraudulent promotion (Goldstein & Cox, 1990; Tillman, 2005), tend to significantly underperform the market over time (Bali, Cakici, & Whitelaw, 2011; Boyer, Mitton, & Vorkink, 2010; Bradley, Cooney, Dolvin, & Jordan, 2006; Eraker & Ready, 2015).

It is also worth noting that there is a significant difference in the *variability* of returns for gambling versus investment and speculation, as commercial gambling has a precise and mathematically determined negative return, whereas both the size and the direction of the month-to-month and year-to-year changes in financial markets are much more variable and uncertain.

*Role of chance versus skill.* Chance or randomness is one of the features of gambling that has been historically used to distinguish it from investing and/or speculation (e.g., O’Malley, 2003; Reith, 2002). However, as mentioned earlier, while randomness is a central feature of many

gambling games (e.g., lotteries, scratch tickets, electronic gambling machines, bingo, and most casino table games), skill does have a significant influence on the outcome of some gambling activities (i.e., horse race betting, sports betting, and all person-to-person games such as poker, golf, etc.).

What many people fail to realize is the central role that chance also has in the financial markets. Most economists agree that the major financial markets are fairly “efficient,” meaning the current bid/ask price of a stock or commodity is a fairly accurate valuation, as it is an aggregate real-world reflection of what investors know about the stock/commodity in terms of company management, cash and capital assets, and future prospects (Chan, Gup, & Pan, 2003; Malkiel, 2003; Verheyden, De Moor, & Van den Bossche, 2015). Two important corollaries of efficient markets are that (a) day-to-day directional changes in stock valuation are largely independent of the previous valuation (i.e., random) (Fama, 1995; Malkiel, 2003), and (b) the only way of obtaining higher than average returns on the general market is if the person has information that the general public is unaware of (“insider information”), and/or he/she has superior analytical powers in judging the relative importance of the publicly available information.

The evidence indicates that despite the heavy reliance on research and information to select investments, only a small percentage of professional analysts and traders are able to consistently outperform the average return of the market (Andersson, 2004; Bhootraa, Dreznerb, Schwarzcz, & Stohsd, 2015; Cuthbertson, Nietzsche, & O’Sullivan, 2010; Dickens & Shelor, 2003; Fama & French, 2010; Porter, 2004). [Nonprofessional investors generally *underperform* the market due to higher rates of trading (thereby incurring higher transaction costs) and choosing higher-risk financial products (Barber & Odean, 2000; Barber, Lee, Liu, & Odean, 2009; Grinblatt & Keloharju, 2000; Kumar, 2009; Schlarbaum, Lewellen, & Lease, 1978a, 1978b).] The recognition that most investment managers do not perform above chance accuracy has led to the popularity of “index funds” that simply attempt to track the performance of the general market (and that have very low management fees).

*Asset purchase.* Although not often mentioned as a distinguishing feature, asset purchase is actually one of the most distinguishing features of investment versus gambling. By its very definition, investment involves creation or purchase of an asset, with financial gains or losses being due to capital appreciation or depreciation of the asset. In contrast, there is no asset purchase in gambling, rather one’s own money or material goods are put forward as a “stake.” Furthermore, external monies are provided when the bet is won (no external monies are usually provided for investment gains).

Some forms of speculation involve purchase of an asset (i.e., day trading, penny stocks, and shorting), but other forms do not. One example is an options contract that gives someone the ability to purchase or sell an asset but does not oblige them to. Some types of futures contracts also do not involve purchase of an asset (e.g., weather derivatives related to future precipitation and/or temperature). Although buying futures contracts usually involves the future acquisition of an asset, futures contracts are often resold for a profit or loss before physical delivery of the asset actually occurs.

It is notable that up to the 1930s futures contracts for commodities and stocks in North America were unenforceable (and sometimes illegal), as they were legally considered wagers rather than contracts due to the fact that a physical delivery of an asset was not required (Hazen, 1991; Kreitner, 2000). Finally, with respect to penny stocks, it is questionable whether ownership of stock in a company that itself has little or no assets actually qualifies as purchase of an asset.

*Stake.* All forms of gambling involve the staking or proffering money or material goods. In contrast, the asset is never explicitly staked in investment. Similar to gambling, most forms of speculation can be construed as staking material goods (i.e., a recently purchased asset or a contract) in the hope of a favorable future valuation of that asset so that this asset or stake can be sold and a profit realized.

*Definitive event and outcome.* All forms of gambling have a definitive outcome associated with a definitive event. In contrast, there is no specific point in time in which there is a definitive outcome or event associated with investment. In some situations, the investor may not have any intent of ever selling the asset.

Some forms of speculation do not have a definitive outcome associated with a definitive event. Penny stocks are an example. Short selling also does not have a definitive date in which the shares have to be repurchased and returned. However, short sales are virtually always “covered” at some point, as the borrower is often paying interest on a margin account and/or dividend costs for the sold shares. Most other forms of speculation have fairly definitive outcomes associated with definitive events, as all options have expiry dates, futures contracts have to be fulfilled by a certain date, and day traders and high frequency traders generally sell the asset on the same day the purchase is made.

*Economic utility.* The economic value of traditional financial market activity and investing is fairly clear. For example, purchasing government bonds or stocks in a company provides funds to support government or industry endeavors. In contrast, gambling is largely a sterile transfer of wealth from one sector of the economy to another (Borna & Lowry, 1987; Williams, Rehm, & Stevens, 2011). While there is some truth to distinction, it is too broad a generalization, as there are some situations where gambling does have economic value. This occurs when the patron base of the gamblers is from outside the jurisdiction, resulting in an influx of new wealth to the local economy (Williams et al., 2011). It is also true that adding a new and interesting service/good to the economy (e.g., gambling) can have economic value by at least temporarily spurring increased overall monetary circulation and increasing GDP (Walker, 2007; Walker & Jackson, 1998, 2007).

Speculation does not have the same economic utility as investing (Lynch, 2012). Warren Buffett has described derivatives as “financial weapons of mass destruction” (Buffett, 2003) and many people have pointed to credit default swaps as having an important contributing role to the financial crisis of 2007–2009 (Financial Crisis Inquiry Commission, 2011). While it is true that options and futures potentially do have some economic value when used to hedge risk (Bartram, Brown, & Conrad, 2011; Moschini & Lapan, 1995), they do not have this value when used for speculative purposes, which they often are. Furthermore, the

latest research would suggest that options and futures contribute to destabilization of market prices (Somanathan & Anantha Nageswaran, 2015). Evidence does indicate that short selling facilitates market liquidity and decreased volatility (Beber & Pagano, 2013; Sobaci, Sensoy, & Erturk, 2014). However, concern about their negative economic impacts has commonly led to short-selling bans (Beber & Pagano, 2013; Boehmer, Jones, & Zhang, 2013; Jones, 2012). The consensus on day trading and high frequency trading is that they either have a negligible impact or negative impact on the markets through increased volatility (Chung, Choe, & Kho, 2009; De Long, Shleifer, Summers, & Waldmann, 1987; Kyröläinen, 2008; Rebonato, 2015).

*Summary.* Table 1 summarizes the similarities and differences identified in the above analysis. Several observations are warranted. First, gambling differs from investment virtually on all the attributes reviewed, and therefore it is reasonable to consider these two activities as conceptually distinct. Second, gambling and investment differ to the greatest extent on attributes that are not commonly identified (i.e., asset purchase, and stake) and differ the least on an attribute that is often suggested (i.e., role of chance). Third, speculation is conceptually intermediate between gambling and investment, with one of its attributes being investment-like (i.e., activities/instruments), three of its attributes being gambling-like (i.e., level of risk, stake, and definitive event/outcome), and four of its attributes being neither clearly gambling nor investment-like (i.e., time frame, expected returns, asset purchase, and economic utility). Fourth, the definitions of gambling and investing outlined earlier do a good job of capturing and delineating the unique attributes of these respective activities. Fifth, a reasonable definition of speculation deriving from the present analysis would be “financial market activities that, when compared to investments, tend to be shorter term, higher risk, sometimes with higher potential losses and gains, and with a primary focus on making a monetary profit from price movements without regard for the fundamental value of the asset.”

#### *Empirical relationship between gambling, investing, and speculation*

Because of the conceptual overlap between speculation and gambling, it would be reasonable to expect that (a) similar people might engage in both, and/or (b) activity in financial

markets bears some relationship to gambling turnover, and/or (c) problematic play in one would be associated with problematic play in the other. Surprisingly, despite the large amount of literature on the conceptual relationship between these entities, there is relatively little research on the empirical relationship between speculation and gambling, or between gambling and stock market activity more generally. The research that exists on this topic is summarized below:

*Cognitive, motivational, and personality similarities.* One line of investigation has documented cognitive similarities between gamblers and investors. It appears that many investors have the same erroneous cognitions as gamblers, such as (a) being overconfident in their investment skills (Barber & Odean, 2001; Kuo & Lin, 2013; Statman, 2002) and (b) only attending to information that confirms their opinion (confirmation bias; Rabin & Schrag, 1999), and have an illusion of knowledge and control over stock purchase outcome (Barber & Odean, 2000; 2001; Langer, 1975). Similarly, several studies (e.g., Brunnermeier, Gollier, & Parker, 2007; Green & Hwang, 2012; Kumar, 2009) have found that non-professional investors tend to gravitate toward “lottery-type” stocks (i.e., stocks with a low price but with a small chance of increasing many multiples of their current value), which is analogous to gamblers’ preference for products with low participation costs and high potential return (e.g., “penny slots,” large lottery jackpots) independent of the actual payback percentage or odds of winning (Garrett & Sobel, 2004; Schwartz, 2010; Turner & Ferentzy, 2010). Finally, it is fairly clear that investors, like gamblers, are highly loss-averse (Kahneman & Tversky, 1979; Linnainmaa, 2005; Odean, 1999; Shefrin & Statman, 1985).

Motivations also have some parallels. While it is well known that a large portion of gamblers engage in gambling for fun and excitement (e.g., Binde, 2009, 2013), this also appear to be true of a significant portion of stock traders (Dom & Sengmueller, 2009; Gao & Lin, 2015; Kumar, 2009; Ladley, Liu, & Rockey, 2016). Dom and Sengmueller (2009) identified three forms of enjoyment that people derive from trading stock: (a) leisure, (b) aspirations of high payoffs, and (c) sensation seeking, with the latter two types of enjoyment being characterized as “gambling motives.”

Similarities also exist in certain personality attributes (Jadlow & Mowen, 2010), with sensation-seeking and/or risk-taking being a driving factor for both gambling and

Table 1. Conceptual similarities and differences between gambling, speculation, and investment

	Gambling	Speculation	Investment
Activities & instruments	Fairly distinctive from speculation and investment	Fairly distinctive from gambling, less distinctive from investment	Fairly distinctive from gambling, less distinctive from speculation
Time frame	Usually short	Variable	Long
Level of risk	Usually high	Usually high	Low
Expected returns	Usually negative with low variability	Mixed & highly variable	Usually positive and somewhat variable
Role of chance	High	High	High
Asset purchase	No	Sometimes	Yes
Stake	Yes	Yes	No
Definitive event/outcome	Yes	Usually	Usually not
Economic utility	Low	Mixed	High

financial trading (e.g., Powell et al., 1999; Wong & Carducci, 1991). For example, in a group of male Finnish investors, the highest trading volumes occurred in the group with the most speeding tickets (Grinblatt & Keloharju, 2009). Further evidence of this relationship is seen in the fact that people who score high on gambling risk-taking propensity also tend to have a high frequency of stock trading, including day trading (Markiewicz & Weber, 2013). It is also interesting to note that risk-taking tends to be somewhat domain specific and in the development of their widely used domain-specific risk-taking scale (DOSPERT), Weber, Blais, and Betz (2002) found that involvement in financial investment (e.g., mutual funds) was statistically distinct from gambling involvement (e.g., poker) (resulting in a scale with two subtypes of financial risk: gambling and investment). Finally, Jadlow and Mowen (2010) found that material needs, competitiveness, financial conservatism, and numeracy proficiency were predictive of a tendency to engage in both gambling and stock trading, but that impulsivity and emotional instability were negatively related to stock market trading but positively related to gambling.

*Overall level of gambling is related to overall level of speculation.* Considering the similarities in cognitions, motivations, and personality, it is perhaps not surprising that there is also some relationship between overall levels of speculative stock market activity and overall levels of gambling. Barber et al. (2009) found that when Taiwan first introduced their national lottery, trading volume on the Taiwanese Stock Exchange dropped by 25%. Most research has found this impact to be fairly specific to lottery-style stocks having low prices, high volatility, and highly skewed returns. Gao and Lin (2015) demonstrated that when lottery jackpot size in Taiwan was high, stock market trading volume in lottery-type stocks declined by 7%–9%. This same relationship between large lottery jackpots and decreased stock trading volume has also been observed in both the United States and Germany (Dorn et al., 2012), with the impact being specific to small traders, options, and individual stocks (with no impact on bonds, mutual funds, or retirement accounts). Similarly, Chen, Kumar, and Zhang (2015) found that in the U.S. when interest in the lottery was high (as evidenced by higher rates of Google searches for lottery-related terms), (a) stocks with lottery-like characteristics earned positive returns, and (b) initial public offerings of stocks with lottery-like characteristics earned higher first-day returns. Kumar (2009) found that lottery-stock purchase was higher in regions of the United States with demographic characteristics associated with lottery ticket purchase (i.e., lower income, unemployment, minority group race/ethnicity, Catholic, less educated, and younger). Similarly, Kumar, Page, and Spalt (2011, 2016) found that regions of the United States with higher Catholic to Protestant ratios had a stronger propensity to hold lottery-type stocks.

A couple of studies have examined the relationship between casinos and financial markets. Liao (2015) found that casino openings in the United States were related to subsequent increases in financial portfolio risk among individuals with demographic propensities associated with gambling. Cookson (2015) found that the introduction of lottery-linked savings accounts in Nebraska was associated with a 7%–15% decline in casino expenditure.

*Individual speculators are heavily involved in most forms of gambling but have some demographic differences.* While the above research has identified many parallels and aggregate relationships between gambling and stock market activity, there is very little research on the level of gambling involvement within individual stock traders and/or the amount of stock trading within individual gamblers.

One of the first investigations on this issue was by Ozorio and Fong (2004) who found that in a sample of 302 Macau casino gamblers, the level of gambling risk was positively correlated with level of investment risk. Investment risk was assessed by asking about how large the possible gain from an investment had to be for them to risk one-half their current wealth in a venture having a 50–50 chance of succeeding as well as asking them to rank nine different ventures for investing 10% of their net worth that varied in expected rate of turn and variation in expected return.

In a secondary analysis of a large scale Canadian prevalence study of gambling ( $n = 8,498$ ) as well as an Ontario-based longitudinal study of gambling ( $n = 4,121$ ), Arthur, Delfabbro, and Williams (2015) found that high-risk stock traders to be overwhelmingly people who also engaged in traditional forms of gambling such as lotteries, slot machines, and sports betting. However, the reverse relationship was relatively weak – most gamblers did not engage in high-risk stock trading. In addition, high-risk stock traders (a) were found to engage in a significantly wider range of gambling activities and gambled more frequently than traditional gamblers, and (b) had a preference for skill-based games (i.e., casino table games, games of skill for money, sports betting, and horse/dog race betting). Demographically, compared to traditional gamblers, high-risk stock traders were more likely to be male, have a higher income, be better educated, be of Asian or “other” descent, not be divorced, widowed, or separated, and be self-employed or employed full-time.

These findings were replicated in a study of day traders in South Australia derived from a secondary analysis of a state-wide prevalence study of gambling ( $n = 9,245$ ) (Arthur & Delfabbro, *in press*). The large majority of South Australian day traders (90.8%) were found to also engage in traditional forms of gambling, with this level of participation being significantly higher than the past-year gambling participation rate of the general adult population (68.8%). Day traders also had a higher frequency of gambling involvement compared to the general population and had a distinct preference for skill-based formats such as poker, casino table games, sports betting, and horse and dog racing. Further evidence of a connection to skill-based formats was seen in a principal component analysis, which found gambling to dimensionalize into chance-based formats and skill-influenced formats, with day trading loading primarily on the latter. (This relationship between engagement in stock trading and skill-based gambling is something that has also been found by Odlaug, Marsh, Kim, and Grant (2011) among problem gamblers.) Similar to Arthur et al. (2015), day traders in Arthur and Delfabbro (*in press*) had a fairly distinct demographic and health-related profile, with the most robust differences relative to both the general population and to other gamblers were that day traders had significantly higher incomes, were significantly older, more

likely to be employed, less likely to have any stress-related problems, and were more likely to be occasional, but not regular smokers. Compared to the general population, day traders were also more likely to be male, non-indigenous, in poorer general health, married, and to have higher educational attainment.

*Significant overlap between problem gambling and problematic stock trading.* There is mounting evidence that stock market trading can become excessive and addictive similar to other behaviors (e.g., Grall-Bronnec et al., 2015; Marković, Nikolac, Tripković, Haluga-Golubović, & Čustović, 2012; Turner, 2011). In a sample of 582 active Greek stock traders, gamblers, and a control group, Konstantaras and Piperopoulou (2011) found that 11.2% of stock traders demonstrated problematic/compulsive levels of trading. Similarly, in a study of 111 Croatian online stock traders, Marković et al. (2012) found that the majority of the sample exhibited one of more signs of addiction.

The clinical profiles of problem gamblers and problematic stock traders have been found to be comparable. Shin, Choi, Ha, Choi, and Kim (2015) studied 144 South Koreans who sought treatment for problem gambling due to horse race betting (71.4% of the sample) or financial speculation (28.6% of the sample). The two groups were equivalent in terms of addiction severity, age of onset, debt size, and comorbidity profile. However, financial speculators tended to be better educated, live with a spouse, and to be employed full-time. Granero et al. (2012) found high overlap in the clinical profiles of 1,376 Spanish pathological gamblers who did not have problematic stock market activities ( $n = 1,376$ ), compared to both pathological gamblers who had stock market trading either as a secondary problem ( $n = 76$ ) or as their primary problem ( $n = 18$ ). As was found with Shin et al. (2015), pathological gamblers who engaged in stock market activities tended to have higher educational attainment, and pathological gamblers with stock market trading as their primary problem had higher levels of both educational attainment and the personality trait of cooperativeness.

Finally, there is significant overlap in the prevalence of problem gambling and problematic stock trading. Arthur et al. (2015) found the rate of problem gambling to be two to three times higher in high risk stock traders compared to gamblers who did not also engage in high risk stocks. The same result was obtained in Arthur and Delfabbro's (in press) study, where the rate of problem gambling was found to be 7.6% among day traders, compared to 1.7% among individuals who did not engage in day trading. In a convenience sample of 178 Greeks who traded on the Athens stock exchange, Piperopoulou (2004) found that more than one-third of the sample was probable pathological gamblers and up to half had problematic levels of stock trading.

## DISCUSSION AND CONCLUSIONS

Our conceptual review of gambling, speculation, and investment showed that investing is clearly distinct from gambling on many different attributes. The attributes that most clearly distinguish the two are: the investment involves creation or purchase of an asset, which does not occur with

gambling, and the asset is never explicitly staked, whereas this always occurs with gambling. In addition, investment tends to involve a different set of activities and instruments, has a longer term perspective, has lower risk, a greater likelihood of positive expected returns, greater economic utility, and there is usually no specific point in time where there is an outcome or event associated with the asset (whereas gambling always involves a definitive outcome associated with a definitive event). Although the role of chance versus skill is often identified as something distinguishing gambling from investment, this is not a strong differentiator, in that (a) several forms of gambling are highly influenced by skill, and (b) although most investors heavily research their choice of investments, their choices usually do not achieve higher returns than the market average, a result which could be equally well achieved by simply choosing a random selection of stocks.

Our conceptual review also revealed that financial speculation is conceptually intermediate between gambling and investment. Some of speculation's attributes are similar to investment, such as the activities and instruments engaged in (e.g., stocks, commodities). On the other hand, some of its attributes are very gambling-like. For example, in most forms of speculation something is being staked (e.g., money or a recently purchased asset). Also, as occurs in gambling, most forms of speculation have a definitive outcome associated with a definitive event. However, many of speculation's attributes are intermediate between gambling and investment. This includes: (a) time frame, which can be quite short as occurs in gambling or quite long, as occurs in investment; (b) level of risk, which can be quite high like gambling, or quite low, like investment; (c) expected return, which can be negative like gambling or positive like investment; (d) asset purchase, which does not occur in some cases and does occur in other cases; and (e) economic utility, which can be either low, like gambling, or high, like investment.

There is comparatively little literature on the empirical relationship between gambling, speculation, and investment relative to the amount of literature on their conceptual relationship. One line of investigation has identified similar personal attributes of gamblers, speculators, and investors. For example, there appear to be similar cognitive biases, with all three groups tending to be overconfident in their decisions, having a propensity to seek out confirming evidence for their beliefs and actions, having an illusion of control, and being highly loss-averse. Motivations also have parallels, with evidence suggesting that the dominant motivations for all three groups are often the same: i.e., to realize financial gains and for fun and excitement. Personality overlap is seen in the fact that sensation-seeking, risk-taking, material needs, competitiveness, financial conservatism, and numeracy proficiency are common to all three groups, although impulsivity and emotional instability may be more strongly associated with gambling, and high risk tolerance being specifically associated with gambling and speculation.

At a population level, there is evidence of a consistent association between overall lottery activity and overall involvement in speculative lottery-type stocks. Similarly, there is evidence that the introduction of casino gambling

increases portfolio risk and that the introduction of lottery-linked savings accounts has a negative impact on casino expenditure. A similar relationship between gambling and speculation has been observed at an individual level. Although there are some distinct demographic differences between speculators and gamblers (the former more likely to be male, have higher incomes, and be employed), there are indications that the large majority of speculators are heavily involved in traditional forms of gambling, with this being especially true for skill-based formats, such as certain casino table games, games of skill for money against other individuals, sports betting, and horse/dog race betting. Potentially because of their heavy involvement in traditional forms of gambling, there is also tentative evidence that (a) the rates of problem gambling are significantly higher among speculators, and (b) the problematic levels of speculation are strongly correlated with problematic levels of gambling.

The empirical relationship between gambling and speculation is likely due to their conceptual overlap, which results in similar types of people being attracted to both activities. Financial speculation ostensibly entails a high degree of skill and knowledge, which helps explain why speculators are highly involved in skill-based forms of gambling. (The reverse relationship will not be as strong, as many skill-based gamblers will not perceive themselves to have the level of knowledge or income needed for financial speculation.) A propensity for high levels of financial risk is another common conceptual attribute driving both activities (Liao, 2015; Markiewicz & Weber, 2013; Mishra, Lalumiere, & Williams, 2010). Financial risk-taking, in turn, is likely influenced by things such as perceived relative deprivation (Mishra, Lalumiere, Williams, & Daly, 2012) as well as some lack of understanding about the expected returns in gambling and speculative financial activities. In contrast, people who eschew high risk, do not perceive themselves to be less well off compared to others, and are knowledgeable about how both gambling and the financial markets work will be more inclined to avoid gambling and speculation in favor of investment.

#### *Implications and future research*

More research is needed to further elucidate the empirical relationship between gambling, investment, and speculation as well as the basis for their similarities and differences, as most of the above results are somewhat tentative. However, an implication of the existing research is that because of its apparent strong empirical relationship and moderate conceptual relationship, financial speculation should arguably be listed as an additional activity when assessing both gambling involvement and problem gambling. Although this is sometimes done in population surveys (Williams et al., 2012), and/or in some problem gambling treatment centers (e.g., Grall-Bronnec et al., 2015), it is not routinely included.

A second implication of these findings is that there needs to be greater recognition and study of financial speculation as both a contributor to problem gambling as well as an additional form of behavioral addiction in its own right (Granero et al., 2012). The true prevalence and nature of this condition and its natural comorbidity with problem

gambling is somewhat unclear, as there have only been a few studies that have directly investigated this issue. Rather, most of what we know about this condition is derived from population surveys of *gambling* and people who have presented themselves to *problem gambling* treatment centers. However, it is uncertain the extent to which traditional problem gambling assessment instruments capture problematic stock trading. Most speculators probably do not consider themselves “gamblers” and may not consider these questions to be appropriate to their situation. It is notable that the high levels of problematic stock play found by both Marković et al. (2012) and Konstantaras and Piperopoulou (2011) were obtained using adaptations of existing instruments to make them more relevant to stock trading (i.e., DSM-IV criteria for substance dependence in the case of Marković et al., 2012 and the South Oaks Gambling Screen in the study by Konstantaras & Piperopoulou, 2011). The other issue is that although it is evident that a portion of problematic stock traders present themselves to problem gambling treatment centers, it seems likely that only a minority of speculators would think to seek help at such a facility, with these individuals likely having disproportionately high rates of comorbid gambling-related problems.

---

*Funding sources:* No financial support was received for this study.

*Authors' contribution:* JNA and RJW wrote this review. PHD provided commentary and edits to the manuscript.

*Conflicts of interest:* The authors declare no conflict of interest.

---

## REFERENCES

- Allen, D. D. (1952). *The nature of gambling*. New York, NY: Coward-McCann.
- Andersson, P. (2004). *How well do financial experts perform? A review of empirical research on performance of analysts, day-traders, forecasters, fund managers, investors, and stock-brokers* (EFI Report No. 9). Stockholm, Sweden: Stockholm School of Economics.
- Angel, J. J., & McCabe, D. M. (2009). The ethics of speculation. *Journal of Business Ethics*, 90(S3), 277–286. doi:10.1007/s10551-010-0421-5
- Arthur, J. N., & Delfabbro, P. (in press). Day traders in South Australia: Similarities and differences with traditional gamblers. *Journal of Gambling Studies*.
- Arthur, J. N., Delfabbro, P., & Williams, R. J. (2015). Is there a relationship between participation in gambling activities and participation in high-risk stock trading? *Journal of Gambling Business and Economics*, 9(3), 34–53. doi:10.5750/jgbe.v9i3.1034
- Arthur, T. (2000). Is the stock exchange a casino? *Economic Affairs*, 20(4), 42–45. doi:10.1111/1468-0270.00256
- Bali, T., Cakici, N., & Whitelaw, R. (2011). Maxing out: Stocks as lotteries and the cross-section of expected returns. *Journal of*



- Financial Economics*, 99(2), 427–446. doi:10.1016/j.jfineco.2010.08.014
- Barber, B. M., Lee, Y. T., Liu, Y. J., & Odean, T. (2009). Just how much do individual investors lose by trading? *Review of Financial Studies*, 22(2), 609–632. doi:10.1093/rfs/hhn046
- Barber, B. M., Lee, Y. T., Liu, Y. J., & Odean, T. (2014). The cross-section of speculator skill: Evidence from day trading. *Journal of Financial Markets*, 18, 1–24. doi:10.1016/j.finmar.2013.05.006
- Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The Journal of Finance*, 55, 773–806. doi:10.1111/0022-1082.00226
- Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics*, 116, 261–292. doi:10.1162/003355301556400
- Bartram, S. M., Brown, G. W., & Conrad, J. (2011). The effects of derivatives on firm risk and value. *Journal of Financial and Quantitative Analysis*, 46(4), 967–999. doi:10.1017/S0022109011000275
- Beber, A., & Pagano, M. (2013). Short-selling bans around the world: Evidence from the 2007–09 crisis. *The Journal of Finance*, 68(1), 343–381. doi:10.1111/j.1540-6261.2012.01802.x
- Bhootraa, A., Dreznerb, Z., Schwarzc, C., & Stohsd, M. H. (2015). Mutual fund performance: Luck or skill? *International Journal of Business*, 20(1), 53.
- Binde, P. (2009). *Gambling motivation and involvement: A review of social science research*. Solna, Sweden: Swedish National Institute of Public Health.
- Binde, P. (2013). Why people gamble: A model with five motivational dimensions. *International Gambling Studies*, 13(1), 81–97. doi:10.1080/14459795.2012.712150
- Boehmer, E., Jones, C. M., & Zhang, X. (2013). Shackling short sellers: The 2008 shorting ban. *Review of Financial Studies*, 26(6), 1363–1400. doi:10.1093/rfs/hht017
- Bogle, J. C. (2012). *The clash of the cultures: Investment vs. speculation*. Hoboken, New Jersey: John Wiley & Sons.
- Borna, S., & Lowry, J. (1987). Gambling and speculation. *Journal of Business Ethics*, 6(3), 219–224. doi:10.1007/BF00382867
- Boyer, B., Mitton, T., & Vorkink, K. (2010). Expected idiosyncratic skewness. *Review of Financial Studies*, 23(1), 169–202. doi:10.1093/rfs/hhp041
- Boyer, B., & Vorkink, K. (2014). Stock options as lotteries. *The Journal of Finance*, 69(4), 1485–1527. doi:10.1111/jofi.12152
- Bradley, D. J., Cooney, J. W., Dolvin, S. D., & Jordan, B. D. (2006). Penny stock IPOs. *Financial Management*, 35(1), 5–29. doi:10.1111/j.1755-053X.2006.tb00129.x
- Brenner, R. (1996). Gambling, speculation, and insurance: Why they continue to be confused and condemned. *Journal of Applied Corporate Finance*, 9(3), 118–128. doi:10.1111/j.1745-6622.1996.tb00304.x
- Brenner, R., & Brenner, G. A. (1990). *Gambling and speculation: A theory, a history, and a future of some human decisions*. Cambridge, England: Cambridge University Press.
- Brunnermeier, M. K., Gollier, C., & Parker, J. A. (2007). Optimal beliefs, asset prices, and the preference for skewed returns. *American Economic Review*, 97(2), 159–165. doi:10.1257/aer.97.2.159
- Buffett, W. E. (2003). To the shareholders of Berkshire Hathaway Inc. *Corporate Counsel Review*, 22, 271.
- Chan, K. C., Gup, B. E., & Pan, M.-S. (2003). International stock market efficiency and integration: A study of eighteen nations. *Journal of Business Finance & Accounting*, 24(6), 803–813. doi:10.1111/1468-5957.00134
- Chen, Y., Kumar, A., & Zhang, C. (2015, December). Searching for gambles: Investor attention, gambling sentiment, and stock market outcomes (Working Paper).
- Choie, K. S., & Hwang, S. (1994). Profitability of short-selling and exploitability of short information. *Journal of Portfolio Management*, 20(2), 33–38. doi:10.3905/jpm.1994.409475
- Chung, J. M., Choe, H., & Kho, B. C. (2009). The impact of day-trading on volatility and liquidity. *Asia-Pacific Journal of Financial Studies*, 38(2), 237–275. doi:10.1111/j.2041-6156.2009.tb00014.x
- Clark, T. L. (1987). *The dictionary of gambling and gaming*. Cold Spring, NY: Lexik House.
- Cohen, J. (1970). Nature of gambling. *Scientia*, 105(699), 445.
- Cookson, J. A. (2015). When saving is gambling. *Finance Down Under 2015 Building on the Best from the Cellars of Finance Paper*. Retrieved from [https://www2.bc.edu/~pontiff/Conference%20Papers/Cookson\\_FRA.pdf](https://www2.bc.edu/~pontiff/Conference%20Papers/Cookson_FRA.pdf)
- Cuthbertson, K., Nitzsche, D., & O’Sullivan, N. (2010). Mutual fund performance: Measurement and evidence. *Financial Markets, Institutions & Instruments*, 19(2), 95–187. doi:10.1111/j.1468-0416.2010.00156.x
- Dewey, T. H. (1905). *Legislation against speculation and gambling in the forms of trade: Including “futures,” “options,” and “short sales”*. New York, NY: Baker, Voorhis & Company.
- De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1987). *The economic consequences of noise traders* (Report No. w2395). National Bureau of Economic Research, USA.
- Dickens, R. N., & Shelor, R. M. (2003). Pros win! Pros win! . . . or do they?: An analysis of the ‘Dartboard’ contest using stochastic dominance. *Applied Financial Economics*, 13(8), 573–579. doi:10.1080/0960310022000025451
- Dimson, E., Marsh, P., & Staunton, M. (2009). *Triumph of the optimists: 101 years of global investment returns*. Princeton, New Jersey: Princeton University Press.
- Dorn, A. J., Dorn, D., & Sengmueller, P. (2014). Trading as gambling. *Management Science*, 61(10), 2376–2393. doi:10.1287/mnsc.2014.1979
- Dorn, D., & Sengmueller, P. (2009). Trading as entertainment? *Management Science*, 55(4), 591–603. doi:10.1287/mnsc.1080.0962
- Dusak, K. (1973). Futures trading and investor returns: An investigation of commodity market risk premiums. *Journal of Political Economy*, 81(6), 1387–1406. doi:10.1086/260133
- Eraker, B., & Ready, M. (2015). Do investors overpay for stocks with lottery-like payoffs? An examination of the returns of OTC stocks. *Journal of Financial Economics*, 115(3), 486–504. doi:10.1016/j.jfineco.2014.11.002
- Fabian, A. (1999). *Card sharps and bucket shops: Gambling in nineteenth-century America*. New York, NY: Routledge.
- Fama, E. F. (1995). Random walks in stock market prices. *Financial Analysts Journal*, 51(1), 75–80. doi:10.2469/faj.v51.n1.1861
- Fama, E. F., & French, K. R. (2010). Luck versus skill in the cross-section of mutual fund returns. *Journal of Finance*, 65(5), 1915–1947. doi:10.1111/j.1540-6261.2010.01598.x
- Financial Crisis Inquiry Commission. (2011). *The financial crisis inquiry report: The final report of the National Commission on*

- the causes of the financial and economic crisis in the United States including dissenting views*. New York, NY: Cosimo Reports Inc.
- Gao, X., & Lin, T. C. (2015). Do individual investors treat trading as a fun and exciting gambling activity? Evidence from repeated natural experiments. *Review of Financial Studies*, 28, 2128–2166. doi:10.1093/rfs/hhu075
- Garrett, T. A., & Sobel, R. S. (2004). State lottery revenue: The importance of game characteristics. *Public Finance Review*, 32(3), 313–330. doi:10.1177/1091142104264423
- Goldstein, J. I., & Cox, L. D. (1990). Penny stock markups and markdowns. *Northwestern University Law Review*, 85, 676.
- Grall-Bronnec, M., Sauvaget, A., Boutin, C., Bulteau, S., Jiménez-Murcia, S., Fernández-Aranda, F., Challet-Bouju, G., & Caillon, J. (2015). Excessive trading, a gambling disorder in its own right? A case study on a French disordered gamblers cohort. *Addictive Behaviors*, 64, 340–348. doi:10.1016/j.addbeh.2015.12.006
- Granero, R., Tarrega, S., Fernandez-Aranda, F., Aymami, N., Gomez-Pena, M., Moraga, S. L., Custal, N., Orekhova, L., Savvidou, L. G., Menchón, J. M., & Jimenez-Murcia, S. (2012). Gambling on the stock market: An unexplored issue. *Comprehensive Psychiatry*, 53(6), 666–673. doi:10.1016/j.comppsy.2011.12.004
- Green, T., & Hwang, B. H. (2012). Initial public offerings as lotteries: Skewness preference and first-day returns. *Management Science*, 58(2), 432–444. doi:10.1287/mnsc.1110.1431
- Grinblatt, M., & Keloharju, M. (2000). The investment behavior and performance of various investor types: A study of Finland's unique data set. *Journal of Financial Economics*, 55(1), 43–67. doi:10.1016/S0304-405X(99)00044-6
- Guillén, M. F., & Tschoegl, A. E. (2002). Banking on gambling: Banks and lottery-linked deposit accounts. *Journal of Financial Services Research*, 21(3), 219–231. doi:10.1023/A:1015081427038
- Hannum, R. C., & Cabot, A. N. (2005). *Practical casino math*. Reno, Nevada: Institute for the Study of Gambling and Commercial Gaming, College of Business Administration, University of Nevada.
- Hayano, D. M. (1984). The professional gambler: Fame, fortune, and failure. *The Annals of the American Academy of Political and Social Science*, 474, 157–167. doi:10.1177/0002716284474001014
- Hazen, T. L. (1991). Rational investments, speculation, or gambling-derivative securities and financial futures and their effect on the underlying capital markets. *Northwestern University Law Review*, 86, 987.
- Hazen, T. L. (2005). Disparate regulatory schemes for parallel activities: Securities regulation, derivatives regulation, gambling, and insurance. *Annual Review of Banking & Financial Law*, 24, 375.
- Holliday, J., & Fuller, P. (1975). *The Psychology of Gambling*. New York, NY: Harper and Row Publishers.
- Jacoby, O. (1950). The forms of gambling. *The Annals of the American Academy of Political and Social Science*, 269(1), 39–45. doi:10.1177/000271625026900107
- Jadlow, J. W., & Mowen, J. C. (2010). Comparing the traits of stock market investors and gamblers. *Journal of Behavioral Finance*, 11(2), 67–81. doi:10.1080/15427560.2010.481978
- Jones, C. M. (2012). Shorting restrictions: Revisiting the 1930s. *Financial Review*, 47(1), 1–35. doi:10.1111/j.1540-6288.2011.00319.x
- Jordan, D. J., & Diltz, J. D. (2003). The profitability of day traders. *Financial Analysts Journal*, 59(6), 85–94. doi:10.2469/faj.v59.n6.2578
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291. doi:10.2307/1914185
- Kearns, J., & Manners, P. (2004, September). *The profitability of speculators in currency futures markets*. Sydney, NSW, Australia: Reserve Bank of Australia.
- Konstantaras, K., & Piperopoulou, A. N. (2011). Stock market trading: Compulsive gambling and the underestimation of risk. *European Psychiatry*, 26, 66. doi:10.1016/S0924-9338(11)71777-1
- Kreitner, R. (2000). Speculations of contract, or how contract law stopped worrying and learned to love risk. *Columbia Law Review*, 100, 1096–1138. doi:10.2307/1123538
- Kumar, A. (2009). Who gambles in the stock market? *The Journal of Finance*, 64(4), 1889–1933. doi:10.1111/j.1540-6261.2009.01483.x
- Kumar, A., Page, J. K., & Spalt, O. G. (2011). Religious beliefs, gambling attitudes, and financial market outcomes. *Journal of Financial Economics*, 102(3), 671–708. doi:10.1016/j.jfineco.2011.07.001
- Kumar, A., Page, J. K., & Spalt, O. G. (2016). Gambling and comovement. *Journal of Financial and Quantitative Analysis*, 51(1), 85–111. doi:10.1017/S0022109016000089
- Kuo, W. Y., & Lin, T. C. (2013). Overconfident individual day traders: Evidence from the Taiwan futures market. *Journal of Banking & Finance*, 37(9), 3548–3561. doi:10.1016/j.jbankfin.2013.04.036
- Kyröläinen, P. (2008). Day trading and stock price volatility. *Journal of Economics and Finance*, 32(1), 75–89. doi:10.1007/s12197-007-9006-2
- Ladley, D., Liu, G., & Rockey, J. C. (2016). *Margin trading: Hedonic returns and real losses*. Leicester, England: University of Leicester. Retrieved from <https://ssrn.com/abstract=2762219>.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, 32(2), 311–328. doi:10.1037/0022-3514.32.2.311
- Lapp, J. A. (1909). Stock gambling. *American Political Science Review*, 3(4), 566–568. doi:10.2307/1944700
- Liao, C. (2015). *Risk taking begets risk taking: Evidence from casino openings and investor portfolios*. Canada: University of Manitoba. Retrieved from <https://ssrn.com/abstract=2639700>.
- Linnainmaa, J. (2005). The individual day trader (Working Paper). Berkeley: University of California.
- Liu, L. X., Whited, T. M., & Zhang, L. (2009). Investment-based expected stock returns. *Journal of Political Economy*, 117(6), 1105–1139. doi:10.1086/649760
- Lynch, T. E. (2012). Gambling by another name: The challenge of purely speculative derivatives. *Stanford Journal of Law, Business, and Finance*, 17(1), 67–130. doi:10.2139/ssrn.1788219
- MacDougall, E. D. (1936). *Speculation and gambling*. Boston, MA: Stratford Company.
- Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives*, 17(1), 59–82. doi:10.1257/089533003321164958

- Markiewicz, Ł., & Weber, E. U. (2013). DOSPERT's gambling risk-taking propensity scale predicts excessive stock trading. *Journal of Behavioral Finance*, *14*(1), 65–78. doi:10.1080/15427560.2013.762000
- Marković, H., Nikolac, N., Tripković, M., Haluga-Golubović, I., & Čustović, Z. (2012). Connection between addictive behavior and investing on the stock market in Croatia. *Alcoholism*, *48*(2), 69–80.
- McMath, J. C. (1921). *Speculation and gambling in options, futures and stocks in Illinois*. St. Louis, Missouri: G.I. Jones.
- McMillen, J. (1996). Understanding gambling. In J. McMillen (Ed.), *Gambling cultures: Studies in history and interpretation* (pp. 6–42). London, England: Routledge.
- Mishra, S., Lalumiere, M. L., & Williams, R. J. (2010). Gambling as a form of risk-taking: Individual differences in personality, behavioural preferences for risk, and risk-accepting attitudes. *Personality and Individual Differences*, *49*, 616–621. doi:10.1016/j.paid.2010.05.032
- Mishra, S., Lalumière, M. L., Williams, R. J., & Daly, M. (2012). *The determinants of risky decision-making and gambling: The effects of need and relative deprivation*. Final report for the Ontario Problem Gambling Research Centre, Guelph, Ontario. Retrieved from <http://www.sandeepmishra.ca/MishraOPGRC2012.pdf>
- Moschini, G., & Lapan, H. (1995). The hedging role of options and futures under joint price, basis, and production risk. *International Economic Review*, *36*, 1025–1049. doi:10.2307/2527271
- Odean, T. (1999). Do investors trade too much? *The American Economic Review*, *89*(5), 1279–1298. doi: 10.1257/aer.89.5.1279
- Odlaug, B. L., Marsh, P. J., Kim, S. W., & Grant, J. E. (2011). Strategic versus nonstrategic gambling: Characteristics of pathological gamblers based on gambling preference. *Annals of Clinical Psychiatry*, *23*(2), 105–112.
- O'Malley, P. (2003). Moral uncertainties: Contract law and distinctions between speculation, gambling and insurance. In R. V. Ericson & A. Doyle (Eds.), *Risk and morality* (pp. 231–257). Toronto, Canada: University of Toronto Press.
- O'Shaughnessey, J. (1998). *What works on Wall street*. New York, NY: McGraw-Hill.
- Ozorio, B., & Davis, K. C. F. (2004). Chinese casino gambling behaviors: Risk taking in casinos vs. investments. *UNLV Gaming Research & Review Journal*, *8*(2), 27.
- Piperopoulou, N. (2004). Stock market trading: A compulsive gambling behaviour with potential psychological and health problems. *Psychiatriki*, *15*(3), 253–60.
- Porter, G. E. (2004). The long-term value of analysts' advice in the Wall Street Journal's investment dartboard contest. *Journal of Applied Finance*, *14*(2), 52–65. Retrieved from <https://ssrn.com/abstract=670404>
- Powell, J., Hardoon, K., Derevensky, J., & Gupta, R. (1999). Gambling and risk-taking behavior among university students. *Substance Use & Misuse*, *34*(8), 1167–1184. doi:10.3109/10826089909039402
- Proctor, R. A. (1887). Gambling in shares. In R. A. Proctor (Ed.), *Chance and luck* (pp. 162–190). London: Longmans, Green, and Co.
- Productivity Commission. (2010). *Gambling* (Report No. 50). Canberra: Australian Capital Territory.
- Rabin, M., & Schrag, J. L. (1999). First impressions matter: A model of confirmatory bias. *Quarterly Journal of Economics*, *114*(1), 37–82. doi:10.1162/003355399555945
- Rayman, R. (2013). *White paper on spread betting*. London, England: Cass Business School.
- Rebonato, R. (2015). High-frequency trading. *Quantitative Finance*, *15*(8), 1267–1271. doi:10.1080/14697688.2015.1050869
- Reith, G. (2002). *The age of chance: Gambling in western culture*. London, England: Psychology Press.
- Ryu, D. (2012). The profitability of day trading: An empirical study using high-quality data. *Investment Analysts Journal*, *41*(75), 43–54.
- Schlarbaum, G., Lewellen, W., & Lease, R. (1978a). The common-stock-portfolio performance record of individual investors: 1964–70. *Journal of Finance*, *33*, 429–441. doi:10.2307/2326561
- Schlarbaum, G., Lewellen, W., & Lease, R. (1978b). Realized returns on common stock investments: The experience of individual investors. *Journal of Business*, *51*, 299–325. doi:10.1086/295998
- Schwartz, D. G. (2010). *Seeking value or entertainment? The evolution of Nevada slot hold, 1992–2009, and the slot players' experience*. Occasional Paper Series 1. Las Vegas, Nevada: Center for Gaming Research, University Libraries, University of Nevada.
- Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *Journal of Finance*, *40*(3), 777–790. doi:10.1111/j.1540-6261.1985.tb05002.x
- Shin, Y. C., Choi, S. W., Ha, J., Choi, J. S., & Kim, D. J. (2015). Gambling disorder in financial markets: Clinical and treatment-related features. *Journal of Behavioral Addictions*, *4*(4), 244–249. doi:10.1556/2006.4.2015.032
- Siegel, J. J., & Coxe, D. G. (2002). *Stocks for the long run* (Vol. 3). New York, NY: McGraw-Hill.
- Silberstang, E. (1988). *The winner's guide to sports betting*. Plume.
- Skeel, D. A. (2009). When markets and gambling converge. In L. V. Kaplan & C. L. Cohen (Eds.), *Theology and the soul of the liberal state*. Plymouth, England: Lexington Books.
- Smith, G., Hodgins, G., & Williams, R. J. (2007). *Research and measurement issues in gambling studies*. San Diego, CA: Elsevier.
- Sobaci, C., Sensoy, A., & Erturk, M. (2014). Impact of short selling activity on market dynamics: Evidence from an emerging market. *Journal of Financial Stability*, *15*, 53–62. doi:10.1016/j.jfs.2014.08.010
- Somanathan, T. V., & Anantha Nageswaran, V. (2015). The effects of derivatives on prices of the underlying: A synthesis. In T. V. Somanathan & V. Anantha Nageswaran (Eds.), *The economics of derivatives* (pp. 84–94). Cambridge, England: Cambridge University Press.
- Statman, M. (2002). Lottery players/stock traders. *Financial Analysts Journal*, *58*(1), 14–21. doi:10.2469/faj.v58.n1.2506
- Szado, E. (2011). Defining speculation: The first step toward a rational dialogue. *The Journal of Alternative Investments*, *14*(1), 75–82. doi:10.3905/jai.2011.14.1.075
- Tillman, R. (2005). *Pump and dump: The rancid rules of the new economy*. New Brunswick: Rutgers University Press.
- Tufano, P. (2008). Saving whilst gambling: An empirical analysis of UK premium bonds. *The American Economic Review*, *98*, 321–326. doi:10.1257/aer.98.2.321

- Turner, N. E. (2011). The addictiveness of online brokerage services: A first person account. *Journal of Gambling Issues*, 25, 113–129. doi:10.4309/jgi.2011.25.9
- Turner, N. E., & Ferentzy, P. L. (2010). The natural life history of a lottery: The importance of large wins in the establishment and survival of a lottery. *International Gambling Studies*, 10(1), 19–30. doi:10.1080/14459790903437492
- Verheyden, T., De Moor, L., & Van den Bossche, F. (2015). Towards a new framework on efficient markets. *Research in International Business and Finance*, 34, 294–308. doi:10.1016/j.ribaf.2015.02.007
- Walker, D. M. (2007). *Economics of casino gambling*. New York, NY: Springer.
- Walker, D. M., & Jackson, J. D. (1998). New goods and economic growth: Evidence from legalized gambling. *Review of Regional Studies*, 28(2), 47–69. doi:10.1111/j.1536-7150.2007.00528.x
- Walker, D. M., & Jackson, J. D. (2007). Do casinos cause economic growth? *The American Journal of Economics and Sociology*, 66(3), 593–607. doi:10.1111/j.1536-7150.2007.00528.x
- Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, 15(4), 263–290. doi:10.1002/bdm.414
- Williams, R. J., Rehm, J., & Stevens, R. (2011). *The social and economic impacts of gambling*. Final report for the Canadian Consortium for Gambling Research. Retrieved from <https://www.uleth.ca/dspace/handle/10133/1286>
- Williams, R. J., Volberg, R. A., & Stevens, R. M. G. (2012). *Population assessment of problem gambling: Methodological influences, standardized rates, jurisdictional differences, and worldwide trends*. Report prepared for the Ontario Ministry of Health and long-term care and the Ontario Problem Gambling Research Centre, Guelph, Ontario, Canada. Retrieved from <https://www.uleth.ca/dspace/handle/10133/3068>
- Williams, R. J., Volberg, R. A., Stevens, R. M. G., Williams, L. A., & Arthur, J. N. (2016). *The definition, dimensionalization, and assessment of gambling participation*. Report prepared for the Canadian Consortium for Gambling Research. Retrieved from <http://www.ccgr.ca>
- Williams, R. J., Wood, R. T., & Parke, J. (2012). History, current worldwide situation, and concerns with Internet gambling. In R. J. Williams, R. T. Wood, & J. Parke (Eds.), *Routledge international handbook of Internet gambling* (pp. 3–26). London: Routledge.
- Wong, A., & Carducci, B. J. (1991). Sensation seeking and financial risk taking in everyday money matters. *Journal of Business and Psychology*, 5(4), 525–530. doi:10.1007/BF01014500
- Wood, R. T., & Williams, R. J. (2007). Internet gambling: Past, present and future. In G. Smith, D. Hodgins, & R. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 491–514). San Diego, CA: Elsevier. Retrieved from <http://hdl.handle.net/10133/422>
- Woodlock, T. F. (1908). Suppress the bucket shops. *Journal of Accountancy*, 6(1), 8.