STATISTICAL ANALYSIS OF BETTING PHENOMENON: WHY IS "ALWAYS" JUST A SINGLE PAIR MISSING

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Abstract

Modern sociological and psychological studies are clearly pointing on the problems of increased usage of services provided by bookmaker's places. In that context, relations between the coefficients of the options and the likelihood of an event options are described. Phenomenon of frequent absence of a single pair is identified and assumptions are made in the context of the strategy "average good" bookmaker. By using the mechanisms of the probability theory, the betting process is formally described by binomial random variable and, the statistical explanation of the phenomenon of frequent absence of one pair at gambling is given exactly. The analysis clearly indicates that the occurrence of a missing couple is not a coincidence or an accident that players tend to interpret the circumstances described, but awaited event associated with the probability distribution. In accordance to given results, it is of great interest to integrate obtained results into the sociology of sport and psychology of sport educational processes.

Keywords: betting, statistics, binomial distribution, sociology of sport, psychology of sport.

Introduction

Modern scientific analysis clearly point to the problem of betting and gambling as a plague of the modern era (Dickerson et al. 1996; Azmier, 2001; Orford et al., 2003; Abbott et al., 2004; Zoričić, 2007; Zoričić, Torre & Orešković, 2009). Specifically, in the present times is hard to find a person who has never ventured into a kind of game of chance. Department stores offer us and impose different kinds of lotteries, the television often displays various types of lottery, bingo and similar games with unplugging combinations of numbers. The casinos are offering various kinds of slot machines, from poker and roulette to the combination of automatic stacking fruit. Sociological, psychological and deeply integrated into the sport is phenomenon that the greatest interest for gaming is directed at the betting on results of sport events (Curry & Jiobu, 1984; Zarevski, 1990; Walker & Barnett, 2003; Abbott et al., 2004; Zoričić, Torre & Orešković, 2009) in which an offer exists for predicting the results of absolutely all sports - from football to horse racing. Sport events that are contained in the offers, are taking place in all parts of the world, from India to Japan and the USA. Accordingly, the aim of this paper is to give mathematical and statistical insight into the phenomenon of the frequent absence of a single pair when using betting options.

Betting strategies of an average good bookmaker

First of all, we would like to point out that a ticket is the winning one only if all the pairs have been hit, while a ticket is a non-winning one ("failed") if the player has incorrectly predicted at least one pair. In doing so, the term *an average good bookmarker* (*user of bookmaker's place service*) implies a sports expert who daily reads sports reports, knows the principles of every coach and clubs whose results he predicts, is familiar with the form of each player, knows the club sponsors, and other valuable information. Furthermore, the average good bookmarker usually bets on a number of pairs he considers have a great chance in achieving his forecasts.

In the simplified model, we will assume that our player bets on 7 different pairs. Let's suppose that he is a skilled player, and that he guesses the outcome of an event with a probability of 0.80 (80%), or makes a mistake in forecasting of a single pair with a probability of 0.20 (20%).

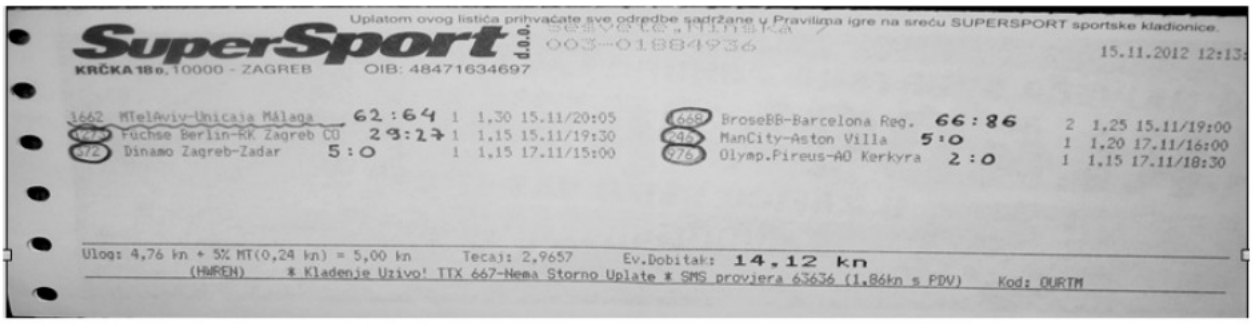

Figure 1. *Ticket paid at the Super Sport bookmarker's place*

It is very likely that the bookmaker, in the previously specified or similar context, will complain either that he "...almost always misses just one pair...", or he has "bad luck." (Figure 1) Why is this so?

The relationship between the option coefficient and the probabilities options

In preparing daily offers, statisticians should first determine the probabilities of all the betting options. Using the estimated probabilities of the accidental offered option, they calculate the coefficient for the given option which they then put in the bookmarker's place offer. The estimates are made based on the past statistics, together with the other data that can be collected on the given issue. In this paper, we will not deal with the methods of probability theory and statistical methods, such as logistic regression and the other methods, by which the bookmarkers do the assess of the realization probability of some random options related to a particular sports event.

Given that the bookmarker's places give daily coefficients, rather than the estimated probabilities, we will give the example of how, using the coefficients, we can calculate the probability of certain options. Therefore, for example, we will look at the offer for a match between Bayern M. - Schalke 04 (Table 1).

Table 1. *'Super chance' option*

Event number	Super chance	Time	p(1)	p(X)	p(2)
56	Bayern M.-Schalke 04	Sunday, 15:30	0.625	0.25	0.125

The bookmaker's place offered winning coefficients on Bayern, 4.00 in the case of a tie, and 8.00 in the case of visiting team, Schalke 04. Events 1, X, and 2 form a complete system of events (Stroock, 2011), mutually exclusive, which is important when calculating the index. The index is then calculated as the sum of the reciprocals offered indices, which relate to the observed options. The bookmarker's place winning index in the case of this pair equals to:

$$i_d = \frac{1}{1.60} + \frac{1}{4.00} + \frac{1}{8.00} = 1$$

This means that in the case of 1 paid monetary unit to players, the bookmarker's place earns 1 monetary unit, while in the case of the uniform payment of 1 monetary unit on the events 1, X or 2, bookmarker's place earns in proportions that follow the probabilities of the occurrence of given events. We may notice that we are talking about a fair option, unless we take in consideration handling charges, given that it is about an event that is a so-called "Super-chance" bookmarker's place.

Now we can calculate the probability of a certain event as:

$$p(1) = \frac{1}{coeff(1)} \cdot \frac{1}{i_d} = \frac{1}{1.6} \cdot \frac{1}{1} = 0.625 = 62.5\%$$

$$p(X) = \frac{1}{coeff(2)} \cdot \frac{1}{i_d} = \frac{1}{4.00} \cdot \frac{1}{1} = 0.250 = 25.0\%$$

$$p(2) = \frac{1}{coeff(3)} \cdot \frac{1}{i_d} = \frac{1}{8.0} \cdot \frac{1}{1} = 0.125 = 12.5\%$$

As the events 1 (home win), X (draw), and 2 (visiting team victory) make a complete system of events; the sum of the probabilities must be 1 or 100%:

$$p(1) + p(X) + p(2) = 0.625 + 0.25 + 0.125 = 1 = 100\%$$

Therefore, based on the available coefficients, we have calculated probabilities that statisticians attributed to each event, without going into the ways and statistical methods which they use to perform these assessments.

Binomial random variable as a betting model

Let's make a model of probability ticket that our player fulfills. As he usually bets on 7 events ("pairs") with the probability of winning of 0.80 per a pair, it is a stochastic experiment that gets repeated 7 times, where all 7 events are independent. Namely, the outcome of a basketball game obviously does not dependent on the outcome of a hockey game or similarly. Every event has only two possible outcomes, either the player has hittted the outcome or he has missed it. Random variable which is marked by X, which gives the number of the hits on such a played ticket, is binomial (Stroock, 2011) with n=7 and p=0.8 parameters. Formally written it looks as following:

$$X \sim B(7\ ;\ 0.8).$$

It is well-known that the probability distribution of this random variable is calculated by the formula

$$P(x = k) = \binom{n}{k} p^k (1-p)^{n-k},$$

where k in the formula stands for number of positive outcomes of the previously described random event, which is in our case, the number of guessed events on the played ticket.

The expected value of a random variable X is

$$E[X] = np = 7 \cdot 0.80 = 5.6$$

According to this, 5 to 6 hits can be expected per a played ticket.

If we calculate probability distribution of random variable X, we can see:

$$P(X = 0) = \binom{7}{0} 0.8^0 0.2^7 = 0.000013$$

$$P(X = 1) = \binom{7}{1} 0.8^1 0.2^6 = 0.000358$$

$$P(X = 2) = \binom{7}{2} 0.8^2 0.2^6 = 0.004301$$

$$P(X=3)=\binom{7}{3}0.8^3 0.2^4=0.028672$$

$$P(X=4)=\binom{7}{4}0.8^4 0.2^3=0.114688$$

$$P(X=5)=\binom{7}{0}0.8^5 0.2^2=0.275252$$

$$P(X=6)=\binom{7}{6}0.8^6 0.2^1=0.367002$$

$$P(X=7)=\binom{7}{7}0.8^7 0.2^0=0.209715$$

This is how the probability function looks graphically.

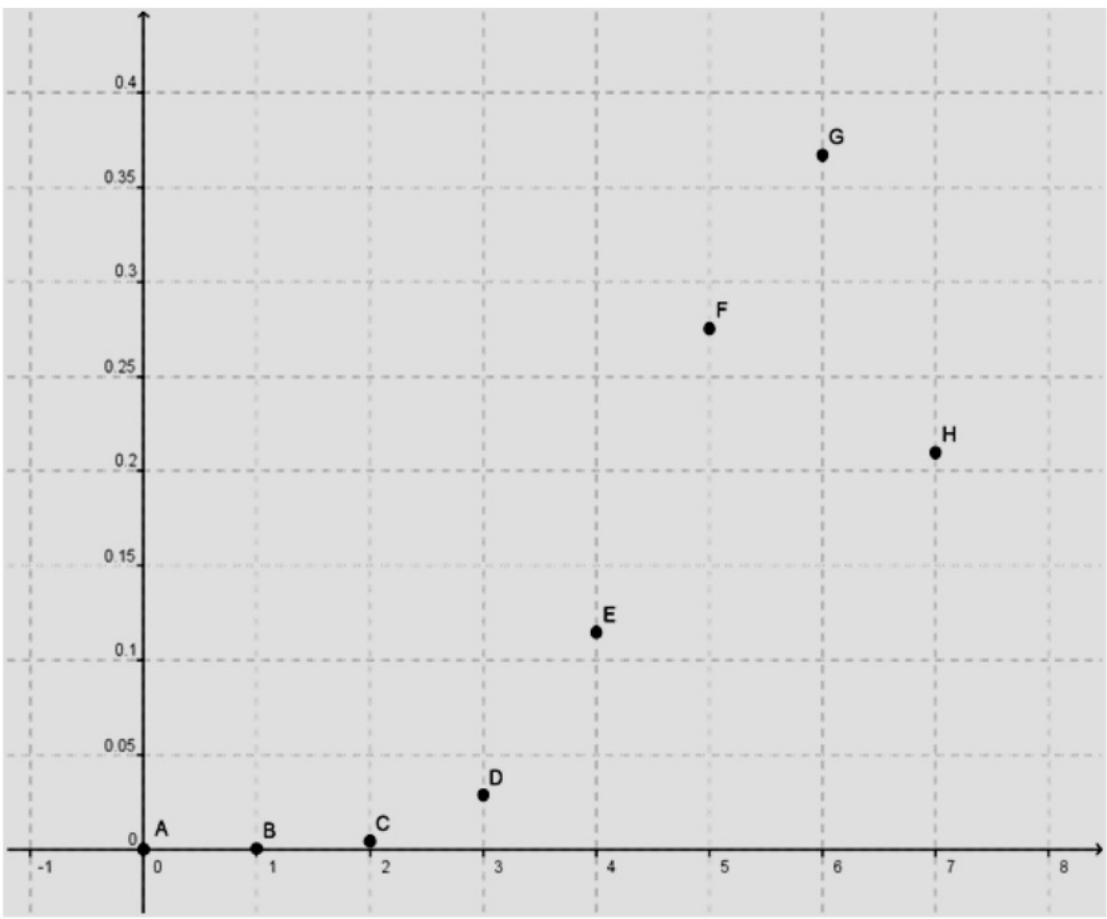

Figure 2. *The graph of the probability function of the random variable X ~ B(7 ; 0.8)*

Let's consider what the player of previously described characteristics could learn from the aforegoing analysis? The probability of scoring exactly 6 pairs, with one miss, is the highest in the previous distribution and is almost 37%. If we add to it the probability of exactly 5 hits, with exactly 2 failures, which are 27.53%, the sum of these two probabilities is 64.22%. It shows good chances of our player's strategy ticket to miss exactly one or at most two pairs. The probability that more than 4 pairs are missed, is almost negligible and is slightly more over 6%. This account shows why very good

bookmakers quite often complain that they missed just 1 pair. A good player will almost never miss many pairs on the ticket. That is way the player likes to believe that he has played his ticket "smartly" and that he "had no luck" since he has missed "just" one pair. Thus, we are not talking about a coincidence or "bad luck" as the players tends to describe the circumstances, but it is about the expected event in relation to the probability distribution. In this model, the probability of guessing all 7 pairs is relatively small and is approximately 21%. According to the law of large numbers (Stroock, 2011), our player will be scoring at every 5th played ticket, which will not even be enough to cover his expenses. Precisely, after many takings of one's chance, the player will miss one or two pairs on more than 64% of the played tickets.

References

1. Abbott, M., Volberg, R., Bellringer, M. & Reith, G. (2004). *A Review of Research on Aspects of Problem Gambling.* Auckland University of Technology, Gambling Research Centre. Commissioned by The Responsibility in Gambling Trust.
2. Azmier, J. (2001). *Gambling in Canada: Triumph, tragedy or tradeoff? Final report and recommendations*. Calgary: Canada West Foundation.
3. Curry, T.J. & Jiobu, R.M. (1984). *Sports: A Social Perspective*. Englewood Cliffs, NJ: Prentice Hall.
4. Dickerson, M.G., Baron, E., Hong, S.M. & Cottroll, D. (1996). 'Estimating the extent and degree of gambling related problems in the Australian population: A national survey'. *Journal of Gambling Studies*, *12*, 161-178.
5. Orford, J., Sproston, K., Erens, B., White, C. & Mitchell, L. (2003). *Gambling and Problem Gambling in Britain*. Hove: Brunner-Routledge.
6. Stroock, D.W. (2011). *Probability theory: An Analitic View*. 2nd ed., Cambridge university Press.
7. Walker, D. & Barnett, A. (2003). The social costs of gambling: an economic perspective. *Journal of Gambling Studies*, *15*(3), 181-212.
8. Zarevski, P. (1990). Psihologija kockanja. *Penološke teme*, *3*(5), 1-6.
9. Zoričić, Z., Torre, R. & Orešković, A. (2009). Kockanje i klađenje – ovisnosti novog doba, Medicus, *18*(2), 205-209.
10. Zoričić Z. (2007). Uspostava i razvoj mreže podrške u tretmanu kockanjem uzrokovanih poremećaja i problema. *Zbornik sažetaka 1. Hrvatskog interdisciplinarnog simpozija s međunarodnim sudjelovanjem.*