

# Investment Betting Algorithm

By

Jarrod Long

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF

MASTERS IN SCIENCE  
(MATHEMATICS)

at the

CALIFORNIA STATE UNIVERSITY - CHANNEL ISLANDS

2008

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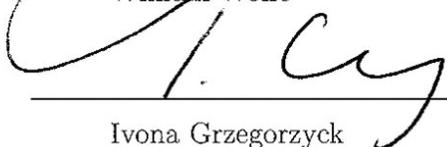
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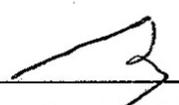
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\_\_\_\_\_  
Jorge Garcia, Committee Chairperson      Date      12/3/08

  
\_\_\_\_\_  
William Wolfe      Date      12/3/08

  
\_\_\_\_\_  
Ivona Grzegorzycz      Date      12/3/08

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 C. B.  
\_\_\_\_\_  
Cynthia Wyels / ~~CHRYSE~~      Date      7-15-08  
DEAN

To my parents, name and name, in gratitude for their encouragement and  
support.

# Acknowledgements

This work is dedicated to my parents:

Melvin Long

Charlsee Mae Long

for unwavering support and continued encouragement.

I must also recognize Dr. Jorge Garcia for his inestimable professional guidance, admonishment and expertise.

I am also grateful to Dr. Ivona Grzegorzczuk for having such a great influence on my mathematical maturity and making this project possible.

Camarillo, California

December 2, 2008

# Abstract

All bettors, including the "House," experience losing streaks and winning streaks. The House typically has a "bankroll" that is orders of magnitude larger than that of any individual bettor, and so can survive losing streaks without going bankrupt, thus remaining solvent long enough to win. Online wagering provides a new twist to this age-old scenario. We use elementary mathematical principles together with the idea of a virtual infinite sample size and the elimination of time as a constraint to develop a fail-proof system that generates the greatest possible exponential growth of capital.

Let  $\sigma$  (stake) be the amount you wish to invest or wager each time and  $\rho$  (return) be your return or odds on a proposition. Let  $n$  (number) be the sum of consecutive losing investments or number of times you can lose on an identical proposition before depleting a specified amount of investment capital called  $\beta$  (bankroll). The resultant equation, which I call the :

$$\text{Investment Bettors Algorithm (IBA)} \quad \beta = 2\sigma \sum_{i=0}^n (\rho^i)$$

provides the answer to remaining solvent long enough to outlast the irrationality of the simulated online "wagers open market" through a geometric progression. The augmented bankroll  $\beta$ , calculated slightly higher than the

typical sum of the Geometric Series, can serve as a safeguard to capital ruin by its extreme disproportion to. Consider further the expected value of even money propositions, a virtual infinite sample size, and the elimination of time as a constraint and you have a no fail system to generate the greatest progressive exponential growth of capital.

Current problems associated with financial return optimization algorithms are identified and discussed. Probable solutions to those problems are also prescribed along with improvements to diversified portfolio design.

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# Chapter 1

## Introduction

### 1.1 Motivation for Experiment

There are several mathematical strategies behind picking an optimal winning wagering schema that many professional players use constantly to get a slightly higher winning percentage than what is expected. This is similar to the approach many investors take in attempting to beat the open market by finding the next winning stock that will have a runaway winning season, so to speak, in the largest international legal casino on the planet, which happens to be the stock market. It's widely accepted in the economic universe that the market cannot be beat; but what about the Casinos and Sports books ?

In an analytical work for Fortune and CNN Money published in 2002 titled 'Is The Market Rational? No, say the experts . . .' Justin Fox [9] summarizes the underlying message of Chicago professor Eugene Fama's address to the American Finance Association in 1969[7] as: In an efficient

market you can't beat the market unless you have inside information. So why bother trying?

Fama was pretty adamant about his belief that is widely held by many efficient-market economists, as they are called, that you simply cannot beat the market. Fox finishes the title to his work after asserting that the market is not rational with the admonition that: "neither are you[rational]—so don't go thinking you can outsmart it[the market]."

I remember hearing in a school lecture, which Fox further notes happened in the early 1960s, that acclaimed MIT finance professor Paul Cootner, who also held this belief of efficient unbeatable markets, was once asked by an offended money manager, "If you're so smart, why aren't you rich?" Cootner is said to have responded with, "If you're so rich, why aren't you smart?" [4]

The above exchange of dialog has since been interpreted to imply that the money managers need not be knowledgeable of the market at all, since they make money from fees and brokerage commissions and a slew of other charges even when their market calls fail miserably. Distressing bear markets caused many to doubt whether money managers are even worth the fees they charge at times and has fostered rapidly spreading interest in the index fund; which instead of trying to outsmart the market basically tries

to emulate it, just without the exorbitant fees.

As a casual player and investor this type of information had a significant influence on me as I had already made the connection between the sports wagering community and the open market long ago. The turning point for me was when UCLA graduate, Stanford professor, Nobel Laureate and one of the most impactful of the efficient-market proponents William Sharpe states in reference to the markets efficiency; " On the other hand, we've certainly learned from cognitive psychology that ordinary human beings need to have alternatives framed in ways that can help them make right decisions rather than wrong decisions." [15]

The wrong decisions are obviously bad investment choices. In the wagering community these bad decisions are what are considered to be bad bets. Fox explains that behavioral research has shown that the majority of the wrong decisions that investors choose to make are a result of the audaciousness that we think we know more than we really do about a future outcome based on the current situation. As novice investors, we trade too much, we don't diversify enough, and we extrapolate from the recent past to make assumptions about what we guess will happen next.

Well . . . considering what was ingrained into the annals of extremely limited capacity in my encephalon by countless math and science teachers

on my journey to mathematical prominence, I had to wonder why there was no consideration or even mention of the seemingly common place concepts of independent random variables, conditional independence, stochastic processes and the markovian property in regards to market movement and even more relevant to me, sports wagers.

For the longest time I believed that a better team would always beat the competing team in a contest, unless a key player was either not playing, or was simply hurt or suspended during or prior to the game. I would always take the obvious favorite when the points made sense and stayed away from the parlays and sucker bets and seemed to be doing fairly well. After loosing several, what seemed to be 'sure thing' wagers with teams with winning records and "on a roll" winning streaks, I began to take note of what the highly acclaimed economist were purporting, since it seemed to be happening that the favorite teams were loosing a little more often than I thought they should.

After extensive research I stumbled upon the Random Walk theory accredited in part to Karl Pearson and Louis Bachelier, who wrote "The Theory Of Speculation" in 1900 as a doctoral thesis at the Academy of Paris.[2] His work was said to not have been received to well by the faculty at the time. However many of his declarations, one of which being: "There is no

useful information contained in historical price movements of securities. . .  
” was taken seriously by another Nobel Laureate Paul Samuelson. Samuelson not only unearthed his findings, as well as did Cootner, but also greatly elaborated on his conclusions. Eugene Fama also appreciated the ‘random walk of stock prices’ notion and furthered elaborated to increase the acceptance of efficient and not-so-efficient markets in his work *Foundations of Finance*. [8]

It’s all this elaboration that introduced me to the possibility of defining an effective Martingale with the idea that if the prices of companies’ stocks are proven to fluctuate randomly on the open market, then the prices, or more accurately the position (which determines the price,) of wagers could be subject to the same phenomenon.

After the great stock market crash of the late eighties, the highly acclaimed efficient-market Professor W. Sharp, after nearly two decades of advanced specialized study in the field of economics and finance education, describes the event to a news reporter as ”weird.” This inability to explain the crash after insisting the market is efficient has given rise to a different belief about the open securities market, and definitely sent me on a personal quest for answers or at the very least a mathematical work-around.

It’s believed by many behaviorist professors such as Yale’s Robert Shiller

and Nobel Laureate Daniel Kahneman with collaborator Richard Thaler, that the market can be beat.[16] The notion is that the changes in stock prices are not random, but the news regarding the stock is random. Since news, according to Answers.com is defined as: new information about hitherto unknown events and happenings, then the price fluctuations are believed to be rational reactions to the new information about the stock offerings, and thus prices only appear to behave in a random fashion.

My understanding of Shiller's findings from summarized research conducted after the crash was that many investors' decisions are driven more by emotions and less by balanced and coherent mathematical calculations. This seemed to be the underlying premise to how wagers are placed, and more importantly how the determining winning line ( point spread ) is set by those either financing or facilitating the wagers, mainly sports books and casinos.

When there is news about a team or a league in general odds makers adjust the line on a contest accordingly. Nevertheless, the position of the line at the time you place your wager is honored at the conclusion of the contest. So then players who place bets for the underdog early before it's announced that a key player on the favorites team was just traded to the underdog in the contest will obviously benefit from better odds resulting in

a lower or positive money line and an positively advantaged point spread. This is similar to you getting in on a good stock early.

Those who placed early wagers on the favorite to win will now be at an obvious disadvantage as their expected outcome of the event has changed and their perceived value of the wager is now either very low or of no value, which may ultimately be a loss as the favorite has now become the underdog. This is similar to just buying bad stocks.

The Casinos and Sports Books after the announcement will now certainly adjust the line in reaction to what the perceived player's reaction to the news about the contest to be. This is the seemingly random movement of the odds, money line and point spread on a single contest or the variations in any of the three from one contest to the next. The line moves constantly. The movement is mostly due to player's activity. Rarely does the line move in conjunction with the actual possible outcomes of the contest.

Think of how company announcements cause stock prices to go up and down prior to the company's actual loss, or gain and their ability to do either. When either the loss or gain has actually occurred with the company, it's considered too late to act because the stock price is no longer attractive.

Analogous to sports wagering, after any key announcements and right at game start time, one might say the line has moved too much in either

direction and deem the bet no longer safe to take. This is simply being behind the wave and missing out on a great opportunity due to a lack of timely information.

## 1.2 Turning Point

I'd witnessed so many people being taken in by the handicappers who claim to provide the expert picks based on computer driven mathematical models of these simulated in-game scenarios and/or critical statistical analysis who were never better than sixty percent in any given season and just over fifty percent in overall picks. The only thing that kept them alive is that they only need be just above fifty percent to be profitable with a ninety percent return. Their earnings records benefited by the fees being already factored into the initial price of the wager so there was nothing to deduct at payout and thus in their virtual publicized world the handicappers seemed to be fairing better than the wall street money managers, enough so to lure potential investors to gamble their savings away.

Assuming my lifelong admiration, playing experience and general knowledge of the top three popular American team sports gave me a competitive edge; then my personal winning record and mounting bankroll psyched me

into believing I uniquely had what it takes to pick winners. I was relieved to read an online article of an interview of professor Sharp by Investment Advisor who after he began a consulting firm to help investors state " I would be the last to say there are not superior predictors out there because there are, but it is just that there are not a whole lot of them, they are not spectacularly superior and they are hard to find." I imagined he considered himself one of those few. Well I definitely did.

Upon gaining a more sophisticated mathematical insight about reality and an unintentionally increasing grasp of probability theory, discrete math, logic and computer science in particular, I made a simple observation. Stock prices have only one of two states to move into from their current state: either up or down. Wagers similarly have but two options: either win or loose. Was I or any of the handicappers sports-picking-odds-beating-geniuses, or just lucky as Sharp and other efficient-market professors were insisting.

The accepted law of efficient economist is that you cannot beat the market. Well since the expectation is exactly average, then the benchmark to beat is simply to be slightly above average. With the open market, this is easily measurable with the several international exchanges. Wagers on the other hand were traditionally collected independently by bookies, sports

books and casinos around the world all with their own money lines, point spreads and odds. The problem with this is that even though there was one outcome to a contest one player may win and another may lose on the same contest based on the options he chooses to lay stake against.

The advent of the internet which enabled instantaneous international publishing made possible a universal line to be established; thus setting a reference value to the positions of national and international contest. So then a person in Europe, another in China, another in Australia and yet another person in the Americas could essentially take the same position on the Superbowl for the same price, considering exchange rates, with the same expected return as if they were all independently buying a stock in Microsoft or Wal-Mart for example.

Anyone who knew the universally expected outcome of the event could just watch the game and know immediately if the prediction held or failed, and by what measurable margin. It was easy then for me to just go to a website such as stats.com and check the winning records for any team in any season in any league against the universal expectation and say "Yeah they covered. . . I would have picked that game." But the more I attempted to somewhat find a winning strategy for picking winners the more I realized that the market could be beat, but not by very much. Most of

the against the spread results were rarely over fifty percent for any sport, even in cases with the exceptional league dominating super teams with long winning streaks and undefeated records. But to beat the sports wagering market a success rate of only 53 percent or better is needed.[6]

Fox explains further that efficient-markets theory has a dirty little secret. That secret is that for the market to remain efficient, there have to be lots of rational investors who believe enough in the market's inefficiency to try and beat it. That accounts for the betters who constantly flip-flop from either side of the line in attempts to catch the odds makers and casinos off guard in search of the next big winner. This is much like investors on the open market.

The infamous John Maynard Keynes is accredited with the aphorism that "markets can remain irrational longer than you can remain solvent." [1] This has been interpreted by many to mean there's a limit to the riches that can be dredged from market anomalies as you will run out of money before you hit it big. This shifted my focus away from discovering the next best computer-based predicting system for all sports, such as did Steven Skiena for jai alai,[17] who I've since learned also naturally modeled his odds beating system after a stock market exchange.

Knowing that the odds makers and sports books are constantly adjusting the universal lines in wagering; it seemed pointless to me to even try the feeblest of attempts to beat them. Acting on the admonition of Keynes, and not satisfied with the approach kelley's criterion takes with the maximization of the geometric mean,[11] I decided to develop instead a mathematical answer to loosing in the market, rather than the obvious necessary activity of risking capital of investments for a great promise of return. Anyone can buy stock and lay steak on a wager, I needed more to know instead how often to expect to loose, and more importantly what to do next when I did loose.

I recorded only the wagering results of wagers placed on favorites (favorable bets with higher expected positive results) in a series to determine the central tendency of wins and losses against the spread relative to my personal selection strategy. The attempt was to see exactly ( approximately exactly ) how long you must remain solvent in an irrational market to achieve a positive outcome.

### 1.3 Statement Summary

I believe I found the answer to remaining solvent long enough to outlast the irrationality through a geometric progression. The resultant equation I call the Investment Bettors Algorithm (IBA).

$$\beta = 2\sigma \sum_{i=0}^n (\rho^i)$$

Simply taking a position on either side of the line, either for the favorite or underdog guarantees a wining play in any contest over time. Pre-determining your sustainable number of losses and increasing your coverage of each instance of those losses over a discrete interval of plays, while factoring in all accumulated fees and incurred losses of capital with your successive geometric steak calculator (IBA), significantly reduces your chance of ruin and clearly generates the greatest progressive exponential growth of capital.

This win loss analogy can be compared to any dilemma with choices that are of a binary state. Utility is maximized when risk is calculated relative to the set of acceptable unfavorable outcomes vice the expected outcome and the actual outcome of any event in the series, while systematically rectifying any detriment occurred on previous events at any current decision state.

# Chapter 2

## Philosophy

### 2.1 Background

Gaming has typically carried with it a very negative connotation. This is due to many of the popular Monte Carlo casino style games that are stochastic or non-deterministic by nature. Many of these games, including but not limited to Baccarat, Caribbean Stud Poker, Casino war, Craps, Roulette and versions of Keno and Pachinko, are played in a way in which a player at any state of the game does not have a chance of determining his next state. The nature of the game itself generally produces a negative expectation regardless of how few or how many games someone plays.

Other types of casino styled games such as Blackjack, dealer dealt Pai Gow Poker and Tiles and different variations of Card Poker and Video poker are generally accepted as actual games of skill, where a player at times, although to a very small degree in most cases, can determine the outcome of the game. Surprisingly, Slot machines, where progressive jackpots or

when bonuses reach a certain break-even point, [10] Sports Wagering, and Pari-mutuel (group jackpot) betting are also recognized as games of skill when proper pay tables, card counting and other predictive algorithms and deterministic techniques are utilized.

My concentration for this study will be primarily on sports wagering as I believe it has the closest resemblance to a fair game, thus giving the player a definite advantage over non-deterministic, often called non-beatable, casino styled games and a slight advantage over traditional skilled, often called beatable casino styled games, whereby with proper strategy, a smart player can create a positive mathematical expectation. The clear probabilistic advantage in the position of this study is however, the realization that is there is no clear advantage needed, only a fair chance each time to win.

Lets consider a typical sporting event with both teams or either athlete's abilities and experience being even played on neutral grounds. I'll compare the odds to roulette and craps to illustrate my conviction. Consider the following table where you and Team A be the same player and let the

house and Team B be the opponent.

	<b>Sporting Event</b>	<b>Roulette</b>	<b>Craps</b>
<b>Team A Winning or You hitting the winning proposition</b>	$\frac{1}{2} = 50\%$	$18 / 38 = 47\%$	$8 / 36 = 22\%$
<b>Team B Winning or You not hitting the winning proposition</b>	$\frac{1}{2} = 50\%$	$20 / 38 = 53\%$	$28 / 36 = 95\%$
<b>Advantage</b>	Even	House	House

Blackjack has been considered by many mathematicians to give the player the best advantage of most popular casino games but the house still has a clear advantage. Despite this slight players advantage and almost even odds of wagering, millions of people have still lost billions of dollars and additionally suffered sever emotional and social consequences. To make matters worse for the case of gaming, several religious sectors forbid the activity all together usually associating the very act itself to all things evil. [5] In the majority of civilized countries it is either illegal or very highly regulated.

Even with all the legal scrutiny and 'fear of god' being preached from the mountain tops, several individuals, corporations and government entities have earned billions of dollars throughout history in the process, all from people playing the once thought harmless games of chance; legally and illegally. As a result gaming has been studied by many noted mathematicians in the areas of probability, combinatorics, statistics, and optimization

with the intent to beat the house.

With the advent of the internet and its ever increasing technological advances in communication and abilities to facilitate worldwide seemingly immediate exchanges of funds via credit or debit card, bank wire transfer and electronic checks, online gaming has grown into a viable international industry with great economic impact on the world's economy. It's the gaming's industry recent fast growing economic significance that has created a resurgence of research on its relativity to mathematical, computer science and economic topics and continues to draw critical analysis from leaders in these respective fields.

As a mathematician and computer scientist I can appreciate the view of gaming from an economic perspective and believe it is actually, quite simply: short term investing with immediate returns. It would then naturally have a risk of loss involved as with any financial investment also involving risk. I personally regard the online wagering enterprise as a network of individuals trading contractual agreements which assume the same economic characteristics of a share market. Share values are adjusted between contests as the forms of odds of their payout, just as values of individual shares are adjusted between individual traders which pay dividends.

So I visualize a new virtual universe with wagering where the traders are

the bettors, and the shares are the individual stakes that are laid against a contest. The professional, pro-amateur and college athletic teams and organizations are the corporations and enterprises offering the seemingly immediately redeemable shares at the conclusion of the contests, and the online casinos and e-bookies are the stock brokers. So naturally Vegas would then be Wall Street and Monaco, Atlantic City, the Caribbean, Europe and the Far East being competing exchanges. The individual sport itself, such as: soccer, boxing, football, tennis, baseball, golf, basketball etc, would compile the various indexes.

I consider the advantage to wagering over traditional games of chance to be the reality that there is always a guaranteed winner between the players. So I am careful to make the distinction between gambling and wagering (laying a wager,) which both involve betting on an event to happen, but the two are often used interchangeably creating a very dangerous state of ambiguity.

In traditional gambling activity with dice, cards and other "casino" style games like keno and with the recent invent of the virtual slot machines and video poker and roulette, the advantage is usually for the house or sponsoring casino of the game. There is a chance that your card or number may never 'come up,' which often results in the casino keeping the profits

every time there is no winner. With sports wagering someone will win every contest and the casinos keep only a small portion of what the casinos would like you to believe is the loser's steak. Thus most gambling activity is covered under a "Casino" and Wagering activity is covered by a different division, often of the same casino, called the "Sportsbook." The explanation of this process follows.

With a wager two people invest, which is commonly called lay, a certain amount with the intention to receive the total amount investment, commonly called the 'jackpot' or the 'pot'. The casino acts then as a middle man which holds the pot until the conclusion of the event and allows the winner to collect their earnings less their fees, which are usually between ten to fifteen percent.

Let's look at an example. Person 1 lays 100 usd for team A to win a contest with team B. Person 2 lays 100 usd for team B to win the same contest with team A. So then the jackpot = 200 usd.

<b>Player</b>	<b>Wager</b>
Person 1	\$100
Person 2	+ \$100
<b>Jackpot</b>	<u>\$200</u>

In the case where team A wins, person 1 will collect \$190. This is their

original \$100 that was at 'steak' refunded, plus \$100 - \$10(10% casino's commission) = \$90 from person 2 who lost their steak because team B lost the contest. It is the reverse case for person 2 if team B wins and so on.

	<b>Original Steak</b>	<b>Loosing Wager</b>	<b>Casino's Commission</b>	<b>Total</b>
<b>Payout =</b>	<b>100</b>	<b>+100</b>	<b>-10</b>	<b>= 190</b>

It appears the loser pays the commission to the casino, yet it is actually averaged into the original laying price for both sides. See the appendix for further explanation if you are interested.

So then the result is a 90% return on your investment.

	<b>Payout</b>	<b>Original Steak</b>	<b>Total</b>
<b>Earnings =</b>	<b>190</b>	<b>- 100</b>	<b>= 90</b>

Well although this looks great, I'm fairly certain you know it doesn't go this way every time. But because it is very possible, it has become very attractive to players to be willing to wager against the probability of loosing \$100 to win \$90. Thus with a strong demand, a market is created with suppliers, being the casinos, willing to either back the bets directly

or providing the medium of exchange as I just described for players to sell their wagers to each other for a current 10% commission.

One of the key mathematical and probability theories behind the perceived advantages of wagering is the principle of randomness. We typically like to say things that are random are not predictable. In contrast, the defined axioms of set theory and some applications to logic along with our physical understanding of the universe allow us to predict that some things thought of as classically random will indeed happen. Let's say that we pick a number from one to six at say, random. We know that there is a  $\frac{1}{6}$  chance in fact, that any one of the numbers from the finite set  $\{1,2,3,4,5,6\}$  will be chosen, where the set is defined by the probability mass function

$$f_X(x) = \left\{ \frac{1}{6}, x \in \{1, 2, 3, 4, 5, 6\} \text{ and } 0, x \notin \{1, 2, 3, 4, 5, 6\} \right\}.$$

We understand also that there is a 100% chance that exactly one of the numbers will be chosen.

So in the larger logical picture, it's not really so random at all. People are killed by a stray bullet, planes, trains and ships wreck, batters hit home runs, people are at banks during a robbery, people win the lottery and a golfer will birdie three to seven of eighteen holes. All these things are considered rare and random and may not ever happen to you or me in

our lifetime, but you can bet, pardon the pun, that any one or even most of them, if not all them, happened yesterday, will happen today and may happen again tomorrow.

We then understand probability as these random events being not perfectly or absolutely predictable. Meaning that over time and in the long run these events have some regularity that can be quantified and repeatedly explained mathematically. This differs from say the Katrina flooding, although there are several hurricanes and tsunamis of equal magnitude that have happened actually too often to be acceptable, yet they are not as consistent as a baby being born to have a non-relative or universal quantifying probability measure. So consequently we tend to restrict events that can have all possible parameters of their outcomes specified to be considered probabilistic.

## 2.2 Empirical Mathematical Basis

Let's consider the classic example of tossing a coin. We naturally cannot predict if it will be heads or tails; yet if we flip the coin enough times, ( which is also relative as to how much is enough ) we have learned that the

chance of getting either will eventually level out to about even, or what we consider to have a probability of  $1/2$  or a fifty percent (50%) chance. That means that it is equally likely to get heads or tails, and so we will say that a coin toss is random. It is due to this predictable randomness that the progressive unforgiving controlled wagering system I developed is possible.

A formal description of this probability as the limit of how often an outcome of an event happens in repeated, experiments, usually under identical or at least very similar conditions, has been labeled as the frequency theory of probability and it's formal definition attributed to German philosopher and mathematician Richard von Mises [12]. So we can with that say that the chance that a coin lands heads is 50% or that the probability that Team A will beat Team B is 50% given again granted they are equally skilled. The Law of large numbers proved us with this expectation as

$$\bar{X}_n = \frac{1}{n}(X_1 + \dots + X_n)$$

where  $X_n \rightarrow \mu$  as  $n \rightarrow \infty$ . in our case  $\mu = 1/2$  so then we expect that if you toss a coin over and over again, or Team A plays Team B, the ratio of the number of times the coin lands heads to the total number of tosses, or the ratio of the number of times Team A beats Team B or vice versa in either case respectively, to the total tosses or matches, approaches a limiting

value of  $\frac{1}{2}$  as the number of tosses or matches grows. This expectation is summarized as

$$\lim_{n \rightarrow \infty} P(|\bar{X}_n - \mu| < \varepsilon) = 1$$

So since we know the casinos are acting as simple middlemen with the sports books, a novice mathematician or statistician would have a field day with analyzing team or player data along with all the possible scenarios and conditions in which a player would have the advantage in picking a winner since there is a simple contest between Team A and B. Many conditions have been taken into account, including but not limited to a team's or athlete's past winning record, average performance, predicted weather conditions, health, recent coaching or personnel changes or personal distractions, location of contest, number of previous wins or losses and so on. Winners of particular matches and contest have been consistently predicted for many years to accuracies as high as 80%.

So often has the winning team or athlete of a match or contest been predicted, that when teams are believed to win a match they have come to be labeled the 'favorite' of the contest or match. The other team or athlete that would be expected to lose the match or contest has been labeled the 'underdog,' or often simply called the 'dog'. So one might say " Team A is

favored in the contest.” or ” This athlete is the dog. ”

So since many teams and individual athletes have definite advantages in contests and matches, payout odds are often adjusted to compensate for the reduced risk. For example If team A is the favorite then instead of a 90% return on your investment in them to win, you may only receive a 67% return on your investment or a 23% return on your investment if they are highly favored and so on. This also works inversely. Since the dog in the case has a perceivably low probability to win the contest or match the return is thusly higher. Many times this could be create returns of 300% to even 600% on your investment in extreme cases.

This obvious advantage also lends to the credence of the subjective theory of possibility which quantifies a ”degree of belief” that an event will occur, on a scale of zero percent to one hundred percent. Subjective theory is particularly useful in assigning meaning to the probability of things that may or may not ever happen. It is difficult to state the probability, which is a makeshift prediction, that there is a particular percentage of lightning striking you on right ear on your 21st birthday at 3:14am, although it may happen as may the several events I listed earlier, but what is the actual numerical percentage between zero and one hundred percent.

I mention this here because many odds makers set payout rates based on

this subjective degree of belief, which is why we see exaggerative returns of say 1000 to 1. The more amazing thing about it is that some players actually take action on the seemingly impossible because they believe in their team or in the fighter or whatever to that degree. These propositions are usually called sucker bets and are created often times by parlays and combination bets that require the correct prediction of three or more events, usually to a max of ten to twelve events on one bet or action card. In the case of all the events happening as predicted one can enjoy a high return on their investment

Another attempt to keep the payout fair when the probability of either team or athlete winning a contest or match is not fair is to add conditions to how the favorite may win. The most common is by adding points to the final score that they must win by which is commonly called the point spread or by limiting a win to a knock out only, calling a Technical Knock Out (TKO) a draw or requiring a win to be a knock out within a certain round and so on.

I will not spend a considerable amount of time on this process. Although it is a key component to the entire wagering schema, for what I intend to show its importance is negligible. However, it is beneficial to show so you will understand why, that even though it may appear a team or athlete

has an undeniable advantage over the other in a contest or match, with this adjustment, each team or athlete has at least a fair chance to win the match or contest based on the stipulations and the wagers accepted or either side resultantly yield an equal return.

After loosing a considerable amount of bets after my team, which was highly favored, actually did win as predicted but did not cover the point spread, I was compelled to consider one of the oldest theories of probability originating for the study of games of chance such as dice games and card. The essence of this theory is the consideration of symmetries and, according to a noted Berkley professor [*cite forthcomming*], the indistinguishability of outcomes. It asserts that when a given experiment or trial has  $n$  possible outcomes among which Nature should show no preference, they are equally likely. The probability then of each outcome is then  $100\%/n$ .

So according to the Theory of Equally Likely Outcomes, the probability that the coin lands heads is equal to the probability that the coin lands tails or the probability of Team A beating Team B or Team B beating Team A because of the adjusted point spread is again equal to each other or mathematically, since  $n = 2$ , we see that  $\frac{100\%}{2} = 50\%$

So with the probability of a win for either team  $P(x_i = 0) = P(x_i = 1) = \frac{1}{2}$ , we can now conclude that the expected outcomes of any two contests

when adjusted by a point spread is one win and one loss, or say in ten contests the expected outcomes are five wins and five losses and so on. So we can say that the mathematical expectation, or the mean result of any one contest is also  $\frac{1}{2} = .5$ .

In real life this  $p = .5$  is unlikely because there is usually a favored winner. This is compensated for by sports such as hockey and soccer where there is a win, loose and draw condition, or rare occasions in other sports that have a no score outcome to a contest or match ending in a tied match. In this case your wager is refunded on both sides and the house earns no commission. So therefore it is still a theoretical 'always a winner' condition with wagering and the values can still hold true.

So now with wagering say \$1 on an event and winning .9 back, we can say the expected value :

$$\begin{aligned}
 E(x) &= (-1 \times .5) + (.9 \times .5) \\
 &= \text{earning one dollar to lose one half of the times} \\
 &, \quad + \text{earning ninety cents to win one half of the times} \\
 &= -.5 + .45 \\
 &= -.05
 \end{aligned}$$

So it seems you can expect to lose a nickel on every one dollar wager. Now you understand why the ten percent house commission split eventually gets split between both player's wagering side.

So then if  $E(x) < 0$ , meaning you can expect to lose if you wager, then why wager? One simple answer is, which I explained earlier with the subjective theory of probability, is that most players expect to win. Under the Subjective Theory, we can differ about the probability of something happening and both be correct. This is commonly unacceptable in a pure scientific setting, however the highly debated theoretical dimension of mathematics make this relative (both party is right) disagreement very possible, and has also made billions of dollars for the gaming industry worldwide as well countries with an open stock market.

similarly you might buy a two dollar square in an office pool or a one dollar lottery ticket. You know that you are basically wasting your money, but you will not think twice about losing two dollars, because winning could mean extra gas money for a week if you win the office pool or a complete life change if you will the lottery. So then the probability of winning ( or losing for that matter ) is a non-issue relative to the possibility of winning.

But It would seem if the expected value is negative and it takes such

an advanced computational mechanism to participate in a system that is so negatively regarded by society and involves such a considerable amount of risk, even as a competent mathematician and computer scientist, why bother in the first place. Well . . . because the return is so high at about 90% and the risk is so balanced at about an even at 50%, it becomes, subjectively, worth the effort for those who experience even very few wins.

To illustrate; lets consider the Central limit theorem which explains that the expected value of a sum  $S_n$  of  $n$  identical independent random variables with a mean being  $E(x) = \mu$  as from above, can be defined by  $n\mu$  and its standard error is  $\sigma\sqrt{n}$ . So then evaluating the following inequality with  $\sigma^2 = E(X_i - \mu)^2$  for  $S_n$  less than some  $x$  which in this case defines the upper bound of the sample size of the normal distribution

$$\frac{S_n - n\mu}{\sigma\sqrt{n}} \leq x$$

yields us the following conclusion which we use for the estimation of the results of taking a large number of plays, thus :

$$S_n \approx n\mu + \sigma\sqrt{n}$$

So then lets define a random variable  $\rho$  that can define our chances of being ahead after  $n$  number of plays and re-express our value of the sum of

our series of plays as:

$$S_n \approx n\mu + \sigma\sqrt{n}\varrho$$

Now that we have a working formula to use, we can easily rearrange the equality to provide us with the information we are looking for relative to our position after talking  $n$  plays to be  $P(\varrho < x)$ . We obtain this information by solving for  $\varrho$  as follows with the hopes that our probability of being financially solvent is greater than 0 :

$$P(\varrho < 0) = P(n\mu + \sigma\sqrt{n}\varrho < 0) = P(\varrho \leq \frac{n\mu}{\sigma\sqrt{n}})$$

We can find  $\sigma$  specifically by evaluating

$$\sum_{i=1}^n p_i(X_i - \mu)^2 = \frac{1}{2}(.9 - (-.05))^2 + \frac{1}{2}(-1 - (-.05))^2 = \frac{(.95)^2}{2} + \frac{(-.95)^2}{2} = \frac{2(.90)}{2} = \frac{1.80}{2} = .9$$

Using this information we can evaluate our constant position with the central limit theorem, where we are interested in finding  $S_n$  after  $n = 10$  plays as follows :

$$S_{10} = 10(-.05) + .9\sqrt{(10)}\varrho = -.5 + .9(3.16)\varrho = -.5 + 2.84\varrho$$

This yields us  $P(\varrho \geq .176) = .5636$  So we can conclude here, though only theoretically, that we have a 56% chance of being ahead. An interesting observation is that we have only lost .5 which after 10 plays is roughly the house commission that we have to pay in either case.

## 2.3 The next worse thing

The next best thing is to invest any discretionary income into FDIC insured Securities like Certificates of Deposits or IRAs and Bonds or T-Bills and other popular so-called ' high-return ' investments, which promise a five to ten percent annual interest rate or returns in the low teens at best. Any security promising more than a ten percent return on average again is not usually insured against loss, such as Stocks and Mutual Funds and it carries the same amount of risk of you loosing your entire investment, just not as immediate as the loss of a wager. Yet the loss is equally devastating.

Because of the exceedingly high returns possible with wagering, the initial investment needed to not only match but beat traditional investment

opportunities is considerably lower. Wagers are usually placed in the tens and hundreds of dollar increments vice the several thousands of dollars needed by professional investors and venture capitalist earning a much lower return.

The return is also much quicker. Online credits are posted to credit cards and accounts and available for withdrawal within minutes after the conclusion of a contest, such as a playoff or championship game or a boxing or tennis match, which usually lasts the duration of a few hours as opposed to months and years as with traditional bank sponsored securities or broker offered investments.

Because of this immediate and much higher return and low required initial investment on what seems to be a sure thing, you can see why people flock to Las Vegas by the millions every weekend with hopes of returning with a much fatter booty than when they left.

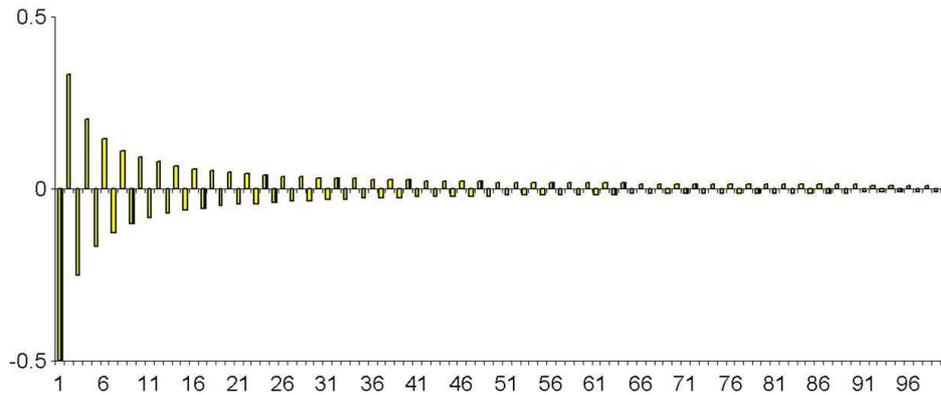
The few problems with this is:

First of all, most people are not mathematicians, and have a very small understanding of probability theory. They understand that there is a possibility they may win, as they see so many others do. They just really don't understand that all the games they are going to play in the casino have odds that greatly favor the house and the possibility they might win any

one of them is infinitesimally close to zero, while the probability they will lose in the long run is infinitesimally close to one, leaving you bankrupt.

Second of all, most people don't start off with enough money. You will eventually win at any one of the games you play, but it is more likely that you will run out of money before you do. If and when you finally do win, you usually have not won enough to cover what you have lost. At this rate you win and lose on an alternating sequence between being up(wins) and down(losses) and eventually you converge to zero(bankrupt).

Consider the following graph and notice how the bankroll converges to zero as the wagers decrease each time a player loses. The first loss is for fifty dollars scaled as one half of one hundred dollars (-.5) so reduce the size of the graph. The streak is reduced by a factor of about thirty percent of the bankroll and analyzed and plotted over 100 bets. Around the thirtieth bet we see that even if we were to bet the whole bankroll at even odds we are so close to zero that the win that doubled the last lost will easily be overcome by the successive lost that eventually takes us into a bust or stopping point with an unrecoverable loss.



Another major fallacy to their strike it rich quick endeavor is they don't have an effective betting schema. Even with a large bankroll, careful management of your stake is vital to being successful. Wagering the same amount again and again will never cover your losses, although if you win more than you lose immediately you will be ahead. If you recall however, that we expect to lose with casino games, then you will understand that it is unlikely in the long run that you will leave with any of your bankroll. Simply betting less when you start losing or more when you start winning is, although what is mostly done, very counterproductive. As you win and increase your bets you lose more as you lose and by cutting your bets back. Adversely, when you lose you are not taking advantage of earning back more of your losses as you eventually do win again by wagering with smaller stakes. You simply play yourself into debt and an eventual

unavoidable bankrupt.

So . . . it's no secret and definitely no great discovery, that Vegas odds favor the house. But again the Frequency theory of probability provides an exploit that makes this endeavor profitable. The comparative frequency with which an event occurs in repeated trials is assumed to converge to a limit [18]. But what is that limit in reality ? Reconsider the coin toss, frequency theory says that for any positive number  $a$  ( greater than zero if it's not clear by the positive requirement), there is some number  $M$ , which can depend on  $a$ , such that

$$\left| \frac{[\text{Heads or Tails}] \text{ in } n \text{ tosses}}{n - .5} \right| < a$$

whenever the number of tosses  $n > M$ .

However, not every relative string of heads or tails conforms to this assertion. So if you get heads on your first try. The relative frequency of heads is 100%. GREAT ! You just won. But if you then get three tails in a row, the relative frequency of heads is now 25% and you are losing. Now let's assume you get 100 heads in row next, the relative frequency of heads is now at about 97% and you should take your winnings and go home. But say for some reason you stay at the table and get 5000 straight tails. Now the relative frequency of heads is close to 20% and you should have

left weeks ago. But you have learned that the relative frequency of heads or of Team A or Team B winning never approaches a specific limit when considered on these sporadic intervals. But I'm sure if you tell your math professor of your experience and he may give you some extra credit.

So we use the Empirical Law of Averages to have the confidence that play against the chance that these long runs of losses ( or wins equally ) will not persist. SO we find an  $M$  that is relatively reliable over a discrete number of plays. The law of large numbers also provides us with an assurance that with a large enough sample of tosses we can equally pick out a head or tail, or at least a few wins from the favored team. From that we are confident a  $M$  though it may be small will be discovered. So then although you will loose, and possible loose quite often, even more so than you will win, you can still come out ahead in your winnings by utilizing a geometric wager determining algorithm based partly of the idea conveyed earlier by the central limit theorem, meaning that as we approach a standard normal distribution defined as

$$\Phi(x) = \int_{-\infty}^x \frac{1}{\sqrt{2\pi}} e^{-\frac{y^2}{2}} dy$$

in the long run we will get an even number of wins and losses as we say evaluate the function at  $\Phi(.176) \approx .57$ .

The model I propose will help you determine the optimal beginning wager amount, called the stake, to consistently lay for each wager. After determining your starting wager value my system will even insure that based on the type of wagering that is most attractive to you, you can calculate a starting bankroll value that insures you have enough to ultimately bet yourself out of a growing deficit and actually end at a stopping point that leaves you not only even with you starting bankroll, but better off, even after your worse last series of losing wagers.

I will outline a mathematical proof that will show that because of the law of large numbers in association with the expected value of any given game using an effective geometric sequence you can not only beat the house and return profits greater than most commercially offered securities, but you can actually mathematically do it with any game. Though the initial investment may be prohibitive and the stake unattractively low the possibility may exist that you can beat the market by gaming, although I am in no way recommending it, as playing the market is a gamble enough. I am presenting an Investment Betting Algorithm ( IBA ) that when used with fair games produces favorable returns.

The questions it will address are:

1. Which type of wager has the highest possibility of a positive outcome for the player with the greatest return on investment?
2. How much should be wagered on each contest given the previous event's outcome?
3. What is the required bankroll to insure a recovery on all losses?
4. Are you better off than choosing your next best investment alternative?

## Chapter 3

### What's at stake ?

#### 3.1 Which Wager

Sports wagering has several bet options to choose from which offer different payouts as the complexity of the bet increases, which means the probability of you winning the bet decreases. So as the risk increases, so does the payout. These bets include combination bets and parlays which combine the outcome of several events into one bet. For example, a four team parlay would include any combination of outcomes of four contests or matches. This one wager would include eight teams or athletes and a claim that a particular team will either win or lose in each one of the contests or matches. Usually up to twelve teams are allowed and payouts of up to 1000% are possible when combining points per side and contest total scores between both sides and straight or outright win bets all together in one wager. Though many people have won these types of wagers it is obviously very improbable that you will as the complexity grows exponentially with

each additional stipulation. These wagers are risky and are simply not advised for anything than sheer entertainment.

I will say that although the moneyline is the safest wager to take, as it usually requires the team you specify to win the match outright without conditions, it is still not the best wager for long term success. With highly favored teams it pays better than 60% of the time. In my personal experience with researching it's payout over the past 5 years, it has paid over 80% with extremely high favorites. The problem with this wager is the payout varies from contest to contest is about 5% on average. That's about even with or just slightly higher than investments that are fully insured against lost. So even though the wins are frequent, the few occasional losses usually quickly eliminate any profits and put you in a worse off position than if you would have left the money in a certificate of deposit. Note the following scenario:

Event	Result	Wager	Return	Payout	Balance
0					10000
1	win	2500	.05	125	10125
2	win	3000	.07	210	10335
3	win	5000	.045	225	10560
4	loss	4200	.08	0	6360
5	win	3500	.0625	218.75	6578.75
6	win	5250	.05	265.5	6844.25
7	win	2600	.07	182	6926.25
8	win	4500	.0375	168.75	7095
9	loss	3750	.04	0	3340
10	win	5200	.06	312	3652

So using an average steak of just under \$4000 and an average return of just over 5%, we see even with eight wins and only two losses, any chance of recovering your losses with the same average steak and the same minuscule returns after only ten trials are futile.

Without explaining any further the inner-workings of a sports book I will just declare the straight wager we considered earlier with points as the best wager for long term success as it provides a 90% return on your investment with a 50% chance to win. Consider the above scenario again, but this time with a return of 90% using a straight wager.

Event	Result	Wager	Return	Payout	Balance
0					10000
1	win	2500	.9	2250	12250
2	win	3000	.9	2700	14950
3	win	5000	.9	4500	19450
4	loss	4200	.9	0	15250
5	win	3500	.9	3150	18400
6	win	5250	.9	4725	23125
7	win	2600	.9	2340	25465
8	win	4500	.9	4050	29515
9	loss	3750	.9	0	25765
10	win	5200	.9	4680	30445

So not only have we not incurred as substantial a loss, but after the same two failures in the ten trials we are still very much ahead, as it should be for us to be solvent at the culmination of our wagering activity. This is of course only a mathematical model to illustrate the extreme differences between the two wagering schemas, so remember that the expected value is

only five wins of ten and placing such varying wagers are also not advised. So since we have determined our preferred type of wager we need now determine the optimal amount to consistently wager.

### 3.2 How much to Wager

Since we have determined the probability of winning a sports wager on either team to win, or cover a given point spread as it is generally called, to be .5, we would think that we need only take at least three wagers as we need only two wins of the three to be ahead. If it were this easy I would not be devoting this entire study to the possibility of being successful, and all casinos would be out of business. However we can get a mathematical prediction and use that number as a starting point.

So we know that the probability of loosing a bet is  $\frac{1}{2}$  So then the probability of loosing two in a row is  $(\frac{1}{2})^2$  and three in a row is  $(\frac{1}{2})^3$  and so on. So we then solve for the number of times when the probability of losing the  $n$ th time is = 0. So now we just need to determine approximately how many trials that would take.

<b><i>n</i>th Wager</b>	<b>Chance of loosing</b>
0	1
1	0.5
2	0.25
3	0.125
4	0.0625
5	0.03125
6	0.015625
7	0.0078125
8	0.00390625
9	0.001953125
10	0.000976563

So looking at the table above we can see that with a decimal precision of four ( a naturally conceivable zero to most, it appears unlikely to loose over five, in a row, of ten wagers with a 50% to win in any event. This makes logical sense as  $p = .5$ . We further see seven is the most optimal number of tries to use as a reliable constant of a succession of losses, and that ten tries nearly numerically guarantees ( so to speak ) a success.

So now that we have an estimated number of successive losses we can calculate our bank roll using a geometric sequence. So lets let  $\sigma =$  our steak that we will wager each time. Lets let  $\rho =$  the common ratio between consecutive terms in our wager sequence relative to the payout required to recuperate our previous steak when losses are occurred, and we will let  $n = \omega_n$  which is the total number of wagers taken. This gives us the

equation which will equal the required bankroll we'll call  $\beta$ . So then again we have the IBA equation of :

$$\beta = 2\sigma \sum_{i=0}^n (\rho^i)$$

If we conduct Bernoulli trials with each wager with  $p = .5$  and consider the geometric distribution where the probability that there are  $k$  failures before the first success with the Probability mass function:  $p(1-p)^k$ , then we have  $.5(1-.5)^k = 0$  and we can solve for  $k$  to see how many wagers we need to expect to loose with  $p = .5$  to see how realistic our estimate of 7 - 14 actually is. When  $k = 9$  we have  $.5(.5)^9 = .5(.00195) = 0.00097$ . So we can expect at least one, but maybe not more than nine losses before the series yields a success after the tenth trial. Since ten is between seven and fourteen we are ok with that number as a good estimator for n number of wagers needed to produce at least one success.

So now we can define our optimal stake amount by the following equation:

$$\sigma = \frac{\beta}{2 \sum_{i=0}^n (\rho^i)}$$

For an example: If your bankroll is only \$5 000 with  $\rho = 2.1$ , the common ratio between steak needed to recover successive lost straight wagers, and  $n = 10$  (I will explain why I chose  $\rho = 2.1$  later in detail), then we have:

$$\sigma = \frac{5000}{2(2.1)^{10}} = 1.5$$

So then by using my IBA with a bank roll of \$5000, you should continue to wager \$1.50 until you loose and then increase your successive wager to the next value in the progression until you win again and then begin wagering again at \$1.50. As your bankroll is growing you can continue to recalculate your

### 3.3 How much bankroll do you need

Similarly we can naturally find the required bankroll based on a given steak that we choose by using the original equation and simply solving for  $\beta$  with the equation:

$$\beta = 2\sigma \sum_{i=0}^n \rho^i$$

where this is the calculation of the total losses for all the previous loosing

wagers plus twice that much in reserve to win it all back. So we can just take the value found by our stake calculator and multiply that figure by two. For an example: If your steak  $\sigma$  is \$1.5 and again with  $\rho = 2.1$ , the common ratio between steaks needed to recover successive losses on straight wagers, and  $n = 10$ ; then we have:

$$\begin{aligned}\beta &= 2[1.5(2.1)^{10}] \\ &= 2[1.5(1667.98)] \\ &= 2[2501.97] \\ &= \$5003.94\end{aligned}$$

So how did I calculate  $\rho$  you ask ? Well Let's just say our initial wager  $\omega_0$  was a steak of \$2 to win \$2 - \$0.10 = \$1.90 and the wager is lost. To recover that \$2 loss we would need to wager  $\frac{\$2}{.9}$  or ( $\$2 \times 1.1$ ) = \$2.22 back. But if we only wager \$2.22, then we stand to only win enough to get out of debt but are no better off financially after all that wagering activity. So in addition to the \$2.22 we need to also wager the original \$2 which was the determined steak we intended to lay for the win for a second wager  $\omega_1$  of  $\$2.22 + \$2 = \$4.22$ . This gives us a wagering sequence of :

$$\{\omega_0, \omega_1, \dots, \omega_n\} = \{2, 4.22, \dots, x\}$$

So now by solving for  $\rho$  with the equation  $\frac{\omega_n}{\omega_{n-1}}$  we get  $\frac{4.22}{2} = 2.1$ . When

I calculate each term of the sequence similarly, then I find this ratio to be fairly consistent.

Note how the value of  $\rho = 2.1$  in the following table holds through  $x < 5$ , which is equal to  $E(x)$  of the number of wins in 10 games and within our range of values for  $n$ .

Current Wager $n$	Steak Current	=	Stake Initial S	Steak $n-1(1.1)$	Stake $n-2$	Stake $n-3$	Stake $n-4$	Stake $n-5$	Stake $n-6$	$r = n / n-1$
0	1.00	=	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2.11	=	1	1.1	0.0	0.0	0.0	0.0	0.0	2.1
2	4.35	=	1	2.3	1.0	0.0	0.0	0.0	0.0	2.1
3	8.94	=	1	4.8	2.1	1.0	0.0	0.0	0.0	2.1
4	18.39	=	1	9.9	4.3	2.1	1.0	0.0	0.0	2.1
5	37.83	=	1	20.4	8.9	4.3	2.1	1.0	0.0	2.1
6	76.82	=	1	42.0	18.4	8.9	4.3	2.1	1.0	2.0
7	155.86	=	1	85.4	37.8	18.4	8.9	4.3	2.1	2.0
8	316.15	=	1	173.2	76.8	37.8	18.4	8.9	4.3	2.0
9	641.18	=	1	351.3	155.9	76.8	37.8	18.4	8.9	2.0
10	1300.08	=	1	712.4	316.2	155.9	76.8	37.8	18.4	2.0
11	2635.55	=	1	1444.5	641.2	316.2	155.9	76.8	37.8	2.0

Notice above the current steak at  $n = 10$  when using only 1 as the initial steak. Imagine an initial steak at \$25 or even \$100, which is the average sports wager and often the minimum betting amount for most games of chance.

Wagering is obviously not for the faint of heart. It is definitely not for those with limited investment capital. As is most investment situations that are designed for those to have the capital to risk to begin with, betters as

well as investors cannot be scared to take risk. A major focus of the mathematics of finance is how to effectively maximize risk in order to maximize returns. Portfolio managers using the active management strategy strive to achieve the highest possible returns [3] while at the same time retain as much of the original capital as possible in the case of loss.

You can see that it takes nearly \$3000 to bet your way out of 10 straight losses just starting with an original stake of \$1. Understand that a guarantee against ruin requires double that in total bankroll, which is approximately \$6000, to cover the losing wagering sequence. I'm sure this has you wondering . . .

# Chapter 4

## Advantages

### 4.1 Better off with IBA

Better off with IBA ?

So now we have our game of choice which is sports wagering, our wager of \$3 and our bankroll of \$10000. We need now to run few simulations based of real life stats of gaming events vice published high yield rates to see what our outcome would have been if we followed the proposed investment wagering scheme or simply deposited the money in an investment account for a similar length of time. We will look at the month, 6 month and year time frame, and project the outcome of a five and ten year span. We will also consider ways to maximize the number of wins using probability theory, combinatorics and integration in a later section.

I have listed the top rates directly from bankrate.com, without permission of course, and see what would \$10000 earn in today's Nationally FDIC insured Certificate of Deposit (CD) market.

Top Five(5)1 Year CD rates.

INSTITUTION				
GMAC Bank - Midvale, UT				
DATE	RATE	CM	APY	MIN. DEPOSIT
12/1	4.16	D	4.25	500
INSTITUTION				
ING - Wilmington, DE				
DATE	RATE	CM	APY	MIN. DEPOSIT
2/1	3.93	M	4.00	1
INSTITUTION				
Palladian - Chicago, IL				
DATE	RATE	CM	APY	MIN. DEPOSIT
12/1	3.80	S	3.80	10000
INSTITUTION				
Capital One Direct - Glen Allen, VA				
DATE	RATE	CM	APY	MIN. DEPOSIT
12/1	3.44	D	3.50	5000
INSTITUTION				
Zion's Bank - Salt Lake, UT				
DATE	RATE	CM	APY	MIN. DEPOSIT
12/1	3.40	Q	3.44	1000
AVG	3.74		3.79	

So we can calculate the average high-yield return at the time of this writing to be 3.79% as reflected in the above table.

We can determine the average value of the \$10000 CD after a year with daily compounded interest set at 3.79 APR ( according to online calculators provided by World Savings and verified by myself in Excel ) as follows :

Future Value of \$10000 Investment		
Interval	Value	APY
1 Year	1038	3.79
6 Months	1019	3.81
1 Day	1000	3.86

To beat, or at least to fair better than, the next best investment alternative with insured risk, we simply need to earn more than \$50 a month or approximately \$600 in a year with a \$10,000 bankroll. I have often earned over 3 and 4 times this much on a single game. Before ever studying higher level mathematics I calculated this to be a much favorable return.

Wagering nightly on thousands of sporting events a year with a \$10,000 bankroll and an initial steak of only \$3, you can see how Bernoulli's law of large numbers will prevail to literally double the \$3 steak thousands of times over throughout the year, greatly superseding the \$600 earning goal by a remarkable amount.

By simply taking five plays a day and an additional ten bonus plays on Friday, Saturday and Sunday, you can make approximately  $7(\text{plays}) \times 365(\text{days}) + 30(\text{plays}) \times 52(\text{weekends}) = 2555 + 1560 = 4115$  plays annually. Winning at least 1 of 10 of those plays, which is only half of the expected outcome and a meager  $p(x) = .10$ , still equals just over 400 wins.

So then with the very conservative, and close to the expected, value of the winning plays at approximately  $400(\text{plays}) \times [(\$3 - (\$3(.10))(\text{winnings per steak minus casino's commission})] = 400(\$2.70) = \$1080$ . So even with an exaggeratively low winning percentage and low number of daily plays the investment betting algorithm still beats the next best investment alternative by nearly twice as much.

I will show later with my personal research that the central limit theorem prevails in this case along with other factors, to produce a winning percentage of actually about fifty percent. Higher numbers than this can be easily verified by STATS and VegasInsider.com. So then with winning much more than one of ten wagers returns of up to 300% are highly likely.

This also makes perfectly logical and practical sense, because if it weren't even probability on the win and losses of contest, the casinos and sports books could not survive in the long term and would have all folded. Players

can easily detect a trend and start to bet only on the favorite or underdog and be ahead even at only a fraction of a percent over fifty, say fifty three(53)% or even just fifty point seven (50.7)% advantage leaning favorably either way. Remember the lines are set by humans so they can, and certainly will, always be adjusted if the favorites are winning too frequently or the underdogs are losing too often.

Also there are hundreds of sporting events a week, so ten or more plays a day are not uncommon, and actually a low average. I have made up to an average of thirty five plays a day on College Game week days and weekends during Basketball tournaments, March Madness, Playoffs and during overlapping professional and NCAA sporting seasons etc. With mixed martial arts and US soccer gaining popularity and the advent of the Arena Football League, Women's Basketball Association and now sports books offering action on everything from international reality TV and game shows, to Oscar and Grammy winners and political candidates, thousands of plays are possible nearly on a continuous basis. Now keep in mind, this is not like playing the slots or betting the horse races.

Most of these propositions offer fifty / fifty odds, meaning if you just play the same play enough, and plan just several wagers ahead to cover each previous losing wager, you will still pull ahead in your earnings.

So then why not just apply this wagering system to any and all betting and gambling situations, since you will eventually win at some point you should be ok playing anything right? Well consider the probability of just getting one pair in a hand of five cards from a well shuffled deck of fifty-two cards.

Get one similar face of 13 Faces	Get at least 2 of 4 Similar Suits for 2 face cards.	Pick 3 of 5 of other different faced Cards of the 12 Remaining Faces	Get a different or similar Suit for the other 3 cards	Product
${}_{13}C_1$	${}_4C_2$	${}_{12}C_3$	$({}_4C_1)^3$	$13 \times 6 \times 220 \times 64$
13	6	220	64	1098240
Choosing this hand of 5 from one deck of 52 $\approx$				$1098240 / {}_{52}C_5$ 42.3%

So we see, with approximately a forty percent chance of getting exactly one pair in a five card hand, that we are potentially worse off than just betting on any game with either team covering some point spread. Imagine trying to get two pairs, three of a kind or a full house or royal flush.

In either of the above cases the chance of winning any money in return is inversely proportionate to the probability of winning with a better and better hand. Of course the payout has been adjusted relative to the likelihood of you getting a winning hand. So in any case the odds favor the player the casinos can always adjust the payout to balance the risk, or chance of you leaving with a considerable amount of their money.

So in the case of an athletic contest, with the point spread adjustment or other odds balancing technique, you at least have a 'fifty/fifty' chance to win or lose, so you can bet either way and essentially still come out ahead of playing any game of chance.

Now that I have beat that horse to death, I will mention some key advantages to using this steak determining algorithm over the Kelly criterion and traditional martingale betting systems and note certain key advances that have minimized the drawbacks to using the system.

## 4.2 Advantages to Kelly

If we look again at prior work on this similar problem we find a formula described by John L. Kelly, Jr, in a 1956 issue of the Bell System Technical Journal which has been since labeled the Kelly Criterion. His formula prescribes the immediate value of the current bankroll to be wagered at each play of a particular game. The formula has been accepted by many as legitimately maximizing the growth rate in the long run, as well as never allowing a complete (100%) loss of the bankroll on any wager.

The most general statement of the Kelly criterion is that long-term growth rate is maximized by finding the fraction  $f$  of the bankroll that

maximizes the expectation of the log of the results.

So for simple wagers with only two outcomes like the kind we are considering, in which one outcome involves losing the entire wager and the other involves winning the bet amount multiplied by the stated payoff odds, then the following formula can be derived from the super simplified statement of the criterion :

$$f = \frac{(bp - q)}{b}$$

Where

$f$  = fraction of the current bankroll to wager

$b$  = odds received on the wager

$p$  = probability of winning

$q$  =  $1 - p$  = is the probability of losing

Applications of the Kelly criterion can be found at [jimgeary.com](http://jimgeary.com) illustrated by Tom Weideman. He also notes that for even-money bets (i.e. when  $b = 1$ ), the maximization formula can be simplified to:  $2p - 1$ , which is exactly your percentage advantage. since the  $bs$  in the fraction educe to 1, this scenario is also straightforwardly:

$$f = p - q$$

Problems with the formula is that one of its assumption is that currency

and bets are infinitely divisible, which is actually satisfied for practical purposes if the bankroll is large enough, but in the real world bank rolls are not. Further, most casinos and sports books have a minimum wage stipulation that is also not divisible. With a clear advantage in the game the Kelly works quite well. For example : If you have a 30% chance of winning ( $p = 0.30, q = 0.70$ ), and a win pays 3 to 1 ( $b = 3$ ), you are encouraged by the Kelly to wager  $f^* = \frac{(.9-.7)}{3} = .06$ , in order to maximize the long-run growth rate of the bankroll.

The biggest problem with this is there is no assumed advantage with the straight wager, so if  $p = .5$  and  $q = 1 - p = .5$  then we are encouraged by the formula,  $f^* = .5 - .5$  then to wager zero. Although you won't lose on this play, you will definitely not maximize your bankroll, as you can't win if you don't play.

Another issue I see with the Kelly is the factor of the bank roll you are suggested to wager is always calculated on a new value of the current bankroll. This is an optimal strategy as long as you are winning because the wagers increase as the bankroll increases. So then whether you are losing or winning the stake is dynamic, but not necessarily proportionate to your losses.

A stake only relative to your bankroll and one that does not consider

your losses will not insure a positive outcome when the bankroll shrinks as the steak is also shrinking. It's my conviction that your steak should remain constant, and then adjust relative to your losses so that each winning steak will potentially put you better off than the last win or loss.

The benefit in using Kelly's system lies in its ability to maximize the advantages that lie in a proposition. So if you are given a tip on a race or the answers to a quiz show in advance, as explained by W. Poundstone in his book *Fortunes Formula: The Untold Story of the Scientific Betting System That Beat the Casinos and Wall Street* [14], or even say . . . inside information on a hot stock offering from Martha Stewart or Mark Cuban, you can adjust the amount you wager, usually increasing it, or number of option you take on that particular proposition.

The drawback to that is you must have some type of advantage in the game. We have shown that the advantage is clearly for the house and against the player in casino games and there is virtually no player's advantage in wagering for the favorite or underdog at sports books. In this case the Kelly will suggest never to play a casino game, for profit anyway, which is not bad advise, and a zero steak is prescribed for sports wagering. So then Kelly suggests not to wager on sports, or events with even odds, which can indeed be profitable, and so a very lucrative exploit can be overlooked. In

this situation Kelly provides no benefit to a player.

Another problem with Kelly, as I expressed earlier is that it makes suggestions relative to the bankroll. As the bank roll decreases the suggested steak decreases and as a player wins the suggested steak increases. This is due partly to Kelly calculating the steak relative to the bankroll, so the fluctuation is inevitable, but the result is still of no value to the player as the players advantage determines the percentage of the bankroll to be wagered.

Consider the situation where a player is loosing. In this case Kelly suggests cutting back the streak. As the player's bankroll is diminishing the negligible payout from wins of the reducing steak is ineffective at reversing the perpetuation of diminish of the bankroll. In the case the loosing streak is due to bad information or unreliable tips, Kelly suggest an even greater reduction in the percentage of the bankroll to wager, resulting in a stagnation of any significant capital gains.

My conviction is that as you loose money becomes more important and thus the steak must be increased to wager yourself out of a potential long cascading plummet to paucity of payout. As your winnings increase to avoid unnecessary losses of capital, which is stagnation, the steak should remain at a level sufficient to produce only steady returns, yet take advantage of maximizing your return on the favorable outcome.

Using the IBA we can avoid recalculating each steak for every wager as it will accurately determine the initial amount to use and dictate the amount of each successive wager required to return the bankroll to a balance greater than the last highest balance. Increasing the steak requires a cascading increase in successive wagers required to cover losses that have not yet been incurred. This could potentially cause a reduction in the number of possible losing wagers the bankroll can withstand as the slight increases are depleting the overall bankroll's reserves. Thus the dynamic stake prescribed by Kelly is unfavorable even when there is a perceived advantage held by either team in a contest.

Additionally, because the  $n$  exponent of the IBA equation can be adjusted to a player's taste for their individual comfortable number of successive losses, the steak is always less than an amount that, if lost, could not be covered by a successive bet of the remaining bankroll. Meaning if a player takes action on only Moneyline plays he will have a higher win to loss ratio and thus  $n = 5$  may be acceptable. On the other hand if a player takes action on say, soccer matches with the possibility of ties occurring which are counted as losses, or on plays requiring point spreads where winning teams may still be considered losers by not covering the spread, then  $n = 9$  may yield greater returns.

This notion that you can vicariously play yourself out of debt without strategy, is actually the attractive feature of the martingale betting money management system that has lured many to play by its dictates into a quick and substantial deficit. This creates an inverse relationship between bankroll and stake, where you use a doubling strategy of betting, for example : \$1 then \$2 then \$4 then \$8 then \$16 then \$36 and so on... until you win and ultimately recoup all your previous losses.

### 4.3 Advantages to Martingale

The martingale is most simply and formally defined by David Siegmund, for a brief treatment of the original ideas of Paul Lvy and Joseph L. Doob for encyclopedia Britannica, as follows : Suppose that  $X_1, X_2, \dots, X_n$  is any stochastic process and, for each  $n = 0, 1, \dots$ ,  $f_n = f_n(X_1, \dots, X_n)$  is a (Borel-measurable) function of the indicated observations. The new stochastic process  $f_n$  is called a martingale if  $E(f_n | X_1, \dots, X_{[n-1]}) = f_{[n-1]}$  for every value of  $n > 0$  and all values of  $X_1, \dots, X_{[n-1]}$ .

So this simply means that if the sequence of the  $X$ s are the results of a series of wagers with  $f_n$  being our bankroll, then immediately following the  $n$ th trial, we can expect to have as much as we started with.

Kim Le discusses the martingale on [bjmath.com](http://bjmath.com) and notes a popular argument to martingales, which is in summary; they are successful only if you have infinite wealth and infinite time. This may be the case, but recall that we have calculated the probability of losing seven bets in a row to be infinitesimally close to zero. So we then need at least enough money and enough time to win twice as many as seven bets as we have a 1 in 2 chance of losing anyone of them. So trying seven wagers twice gives us fourteen tries to expect at least one win. This is significantly less than infinity, and clearly won't take that much time.

However tempting this may sound, doubling your stake after each loss is a great way to return all your previous losses on the next winning play, yet without a strategic plan it is also a great way to lose a lot more of your bankroll exponentially as well. Simply doubling your stake returns you to a state not much better off than exactly where you started in most cases, and that granted your first play was a win to begin with.

Let's look at the typical martingale of an initial stake of one dollar and a series of twelve losses. The wager column is the actual count of the successive loss. The stake column is the amount at stake at that wager count and the Total Lost column is the running sum of the previous wagers to that wager count.

The A Payout and A Earned columns are the actual amounts paid out after fees and the net earned after the deduction. I placed an effect column next to the wager count column so it would be easy to see immediately what was happening to the bank roll.

So then with using the traditional Martingale after doubling six consecutive lost bets and spending over one hundred percent of our initial steak we have only earned one dollar (notice the soft green column). That's actually only a theoretical dollar earned in a perfect world. In reality the Actual earnings would be a loss of over seven times our initial steak.

Actually we will only be profitable through our third wager at which point we will be at about an equilibrium point of gains and losses. At our fourth wager we will match our initial steak in losses and there after begin to loose at an exponential rate, which is startling because we are actually winning wagers all along the play timeline.

Wager	Effect	Steak	Total Lost	Payout	Earned	A Payout	A Earned
0	+	1	1	2	1	1.87	0.87
1	+	2	3	4	1	3.74	0.74
2	+	4	7	8	1	7.48	0.48
3	-	8	15	16	1	14.96	-0.04
4	-2X	16	31	32	1	29.92	-1.08
5		32	63	64	1	59.84	-3.16
6	-7X	64	127	128	1	119.68	-7.32
7		128	255	256	1	239.36	-15.64
8		256	511	512	1	478.72	-32.28
9		512	1023	1024	1	957.44	-65.56
10	-100X	1024	2047	2048	1	1914.88	-132.12
11		2048	4095	4096	1	3829.76	-265.24
12		4096	8191	8192	1	7659.52	-531.48

If you recall the chart used earlier to calculate the common ratio between wagers produced a series of wager that looked more like this :

1.00,    2.11,    4.35,    8.94,  
18.39,    37.83,    76.82,    155.86,  
316.15,    641.18,    1300.08,    2635.55

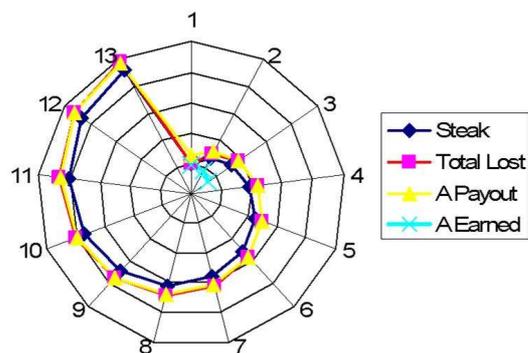
The slightly higher than exactly double suggested steak values produced by the IBA essentially account for the commissions associated with the wager type and are factored right into the equation for determining the steak. This way you don't have to subtract them out later or wage slightly higher than each suggested wage in the series to stay ahead of the fees and commissions.

This fee is substantial when totaling international bank wires and money

orders, sports book per wage commissions, currency conversion fees and inherent losses associated with the process of doing international business.

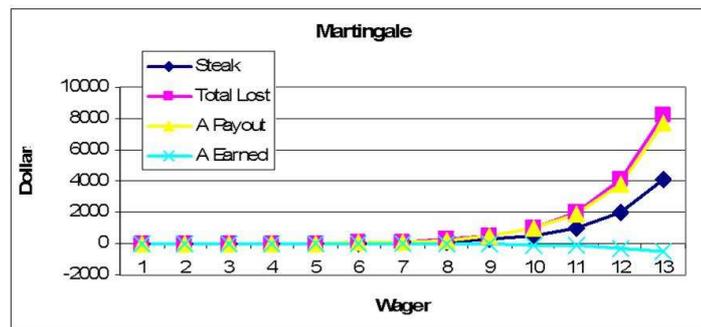
The following spiral plot illustrates the drawback to using the traditional martingale as in the table above for twelve consecutive wagers. The center of the plot is zero and the values increase as you move out from the center. The steps of each wager increase in a spiral clockwise manner and are labeled accordingly along the circumference.

Notice how the steak and total losses seem to spin quickly out of control after the sixth wager. Notice also, how even though the payout values are close in proximity to the total losses, the actual earned amount has vanished after the fourth iteration as in the table above.



Another way to look at the detriment of using the traditional martingale betting system with a \$10,000 bankroll and \$1 steaks is in a linear

progression of the wages as in the following table. I kept the color of the data series consistent as with the spiral plot above. Notice again not only does the amount earned disappear after the fourth iteration but it actually takes on negative values. This translates into considerable losses for the player over time. Even though the payout is nearly twice as much as the amount streaked, which gives the impression of positive capital gains in the short-run, the total losses catch the payout and are always increasing at a rate just slightly higher than the immediate payout thru infinity.



Notice on the linear graph above, how initially the Square ( Pink ) , Triangle ( yellow ) and X ( turquoise ) share point location and values, but tend to disconnect after the seventh consecutive loss and diverge inversely thereafter. I let the distance from 0 on the (wager) axis to the turquoise X simply represent the value of the distance from the immediate payout at that

wager count, to the total loss at the same wager count. This is the amount earned immediately after the payout of the last wager and unfortunately it will continue to fall further and further below 0 as the distance from the payout and Total Lost continue to increase.

Using the IBA gives the player the advantage of not playing through seven or eight consecutive losses to simply be ahead by a factor of only one, relative to the initial calculated stake, after an eventual win. This is a substantial waste of time and use of capital when you figure each contest takes on average two and one half hours. A player could play under these conditions for several weeks and, although he may not have lost any capital, experience a capital gain of merely one dollar to the initial bankroll.

Another IBA advantage to Martingale is that the  $r$  value can be adjusted to account for sliding fees and wagering promotions offering no fee wagers or fee doubling in special matches like championship games and title fights or playoff series and so on. This varying  $r$  value feature of the IBA accommodates special situations when just doubling wagers will not be advantageous to the player, or opposite cases where doubling is not necessary as there may be odds that pay higher than even and double the last bet is not required to earn back your previous losses.

For example, if two teams are going to play the best of three or best of

five to determine a winner, you obviously need only to have enough bankroll to cover those three or five consecutive losses. If you pick the team that is highly favored then the payout may be adjusted lower accordingly. So for that short series you can recalculate your steak amounts relative to the bankroll, or portion of it you wish to invest in the series, with a higher than normal ratio between lost bets since the payout is less in this series than the payout of a typical season match. If you were to take the underdog in the same series, they might be paying out higher odds, so a  $r = 1$  value may eliminate the ratio from effecting the steak value, or a  $r > 1$  value will actually reduce the steak required on consecutive wagers as the payout is higher than typical even money wagers.

## 4.4 General Advantages

Occasionally sports books offer what is called free promotional bets. These are bets that have no fees attached to the wager and thus no deduction at payout. These are usually weekly promos for a whole season, or say for Monday Night Football or for Sunday Baseball Games, or any deemed 'Hot' Game of the Week, such as Playoffs and etc.

With promos an  $r$  value of 2 can be used in the IBA for the weekly

proposition eliminating the fees creating a super martingale for the season of that sport with the final contest of the season, say the championship game for example, being the stopping point.

In this special cases  $n =$  total weeks of the season, for the last game will naturally be the last wager possible and the season itself the entire sample space. The  $r$  value will equal exactly 2 since there is no fee and  $B$  will equal to the portion of Bankroll you are willing to risk on the proposition.

To further demonstrate this advantages of the IBA, consider the results of the 2006/2007 NFL( American football )season.[13] Kelly's system will say do not bet at all because of the even advantage set by the point spread, which simply means zero advantage for the player. This would also mean no return from such a potentially lucrative season. Kelly's advise is good as there is no advantage to the player, yet this also means there is theoretically no advantage for the sports book as well. This creates a situation that can easily be exploited by the IBA.

Notice the top nine teams lost no more than ten games the whole season against the spread, which pays even odds less the sports books commission. Notice also that sixteen teams lost no more than ten games outright the whole season. Deeper analysis of the season's results reveal that none of the teams listed in the top ten lost these game consecutively.

So then a bankroll equaling your steak times two point one five to the tenth power  $(\sigma x 2.15)^{10}$  would have been sufficient to cover any losses incurred and allowed you to be fairly profitable by choosing nearly any team at any given point in the season.

Consider the entire column of the against the spread results. Notice that only four of the thirty two  $\frac{4}{32} = \frac{1}{8}$  teams actually lost twelve games the whole season against the spread.

So if you were betting for outright wins throughout the season you would have had been in fairly bad shape if you had chosen any teams other than those in the top ten.

However nearly any other bet would have left you profitable using the IBA. No team in the entire league lost more than ten games in a row against the spread and less than half, actually fifteen of the thirty two teams ( $\frac{4}{32} = 47\%$ ), actually had losing records against the spread.

Exactly sixteen of the thirty two teams in the league had a literal losing record, which is considered less than .500 in sports talk. This can be easily verified by considering the first column in the table. So then the league's winning average is exactly 50

This means the league as a whole did better by 3% against the spread relative to wins and losses. This translates into a definite player's advantage

that Kelly would have missed by considering only the per-game odds of winning with each contest. IBA averages your return over the interval of the series, which is usually the first to the last bet or from 0 to  $n$  in the equation.

Team	Straight-Up			Against The Spread			Over/Under		
	Total	Home	Away	Total	Home	Away	Total	Home	Away
<u>Chicago</u>	17-6-0	9-4-0	8-2-0	13-10-0	13-10-0	0-0-0	15-7-1	10-3-0	5-4-1
<u>New England</u>	17-7-0	8-3-0	9-4-0	13-9-2	13-9-2	0-0-0	11-13-0	4-7-0	7-6-0
<u>Indianapolis</u>	17-7-0	10-2-0	7-5-0	13-10-1	13-10-1	0-0-0	11-13-0	6-6-0	5-7-0
<u>San Diego</u>	16-5-0	10-1-0	6-4-0	11-10-0	11-10-0	0-0-0	12-9-0	6-5-0	6-4-0
<u>Baltimore</u>	15-6-0	8-3-0	7-3-0	12-9-0	12-9-0	0-0-0	7-13-1	3-7-1	4-6-0
<u>Phila.</u>	14-9-0	9-3-0	5-6-0	12-7-4	12-7-4	0-0-0	10-12-1	3-8-1	7-4-0
<u>Cincinnati</u>	12-8-0	6-4-0	6-4-0	12-6-2	12-6-2	0-0-0	9-11-0	5-5-0	4-6-0
<u>Dallas</u>	12-8-1	5-4-1	7-4-0	12-9-0	12-9-0	0-0-0	9-9-3	4-5-1	5-4-2
<u>Carolina</u>	12-8-0	6-4-0	6-4-0	8-10-2	8-10-2	0-0-0	7-13-0	3-7-0	4-6-0
<u>Denver</u>	12-8-0	6-4-0	6-4-0	7-12-1	7-12-1	0-0-0	10-10-0	6-4-0	4-6-0
<u>New York-N</u>	12-9-0	5-5-0	7-4-0	13-8-0	13-8-0	0-0-0	9-11-1	3-7-0	6-4-1
<u>New York-A</u>	12-9-0	5-5-0	7-4-0	12-9-0	12-9-0	0-0-0	12-9-0	6-4-0	6-5-0
<u>New Orleans</u>	12-10-0	5-6-0	7-4-0	9-11-2	9-11-2	0-0-0	11-10-1	6-4-1	5-6-0
<u>Seattle</u>	12-10-0	7-4-0	5-6-0	9-11-2	9-11-2	0-0-0	14-8-0	6-5-0	8-3-0
<u>Jacksonville</u>	11-9-0	7-3-0	4-6-0	11-7-2	11-7-2	0-0-0	11-8-1	6-4-0	5-4-1
<u>Kansas City</u>	11-10-0	8-2-0	3-8-0	10-11-0	10-11-0	0-0-0	8-12-1	4-6-0	4-6-1
<u>Tennessee</u>	9-11-0	4-6-0	5-5-0	12-7-1	12-7-1	0-0-0	13-5-2	6-3-1	7-2-1
<u>Houston</u>	9-11-0	6-4-0	3-7-0	10-8-2	10-8-2	0-0-0	10-10-0	5-5-0	5-5-0
<u>San Fran.</u>	9-11-0	6-4-0	3-7-0	10-9-1	10-9-1	0-0-0	12-8-0	7-3-0	5-5-0
<u>St. Louis</u>	9-11-0	5-5-0	4-6-0	9-11-0	9-11-0	0-0-0	10-9-1	6-3-1	4-6-0
<u>Green Bay</u>	9-11-0	4-6-0	5-5-0	8-11-1	8-11-1	0-0-0	10-10-0	4-6-0	6-4-0
<u>Atlanta</u>	9-11-0	4-6-0	5-5-0	7-11-2	7-11-2	0-0-0	7-12-1	5-4-1	2-8-0
<u>Buffalo</u>	8-12-0	4-6-0	4-6-0	10-8-2	10-8-2	0-0-0	9-11-0	6-4-0	3-7-0
<u>Minnesota</u>	8-12-1	4-7-0	4-5-1	10-11-0	10-11-0	0-0-0	9-11-1	5-5-1	4-6-0
<u>Miami</u>	8-12-0	5-5-0	3-7-0	7-11-2	7-11-2	0-0-0	8-12-0	4-6-0	4-6-0
<u>Pittsburgh</u>	8-12-0	5-5-0	3-7-0	7-11-2	7-11-2	0-0-0	9-10-1	6-3-1	3-7-0
<u>Arizona</u>	7-13-0	4-6-0	3-7-0	10-10-0	10-10-0	0-0-0	12-8-0	6-4-0	6-4-0
<u>Cleveland</u>	6-14-0	3-7-0	3-7-0	10-10-0	10-10-0	0-0-0	8-11-1	3-7-0	5-4-1
<u>Oakland</u>	6-16-0	5-6-0	1-10-0	9-12-0	9-12-0	0-0-0	4-16-1	2-8-0	2-8-1
<u>Tampa Bay</u>	5-15-0	4-6-0	1-9-0	7-10-3	7-10-3	0-0-0	8-12-0	4-6-0	4-6-0
<u>Washington</u>	5-15-0	3-7-0	2-8-0	5-13-2	5-13-2	0-0-0	9-9-2	4-5-1	5-4-1
<u>Detroit</u>	4-17-0	3-7-0	1-10-0	7-13-0	7-13-0	0-0-0	10-10-0	3-7-0	7-3-0

Consider further the same table and create two new columns of just

the wins and losses against the spread. We can then calculate the winning percentage in an adjacent column and take the average of the averages against the spread.

WINS	LOSSES	PERCENTAGE
13	10	57%
13	9	59%
13	10	57%
11	10	52%
12	9	57%
12	7	63%
12	6	67%
12	9	57%
8	10	44%
7	12	37%
13	8	62%
12	9	57%
9	11	45%
9	11	45%
11	7	61%
10	11	48%
12	7	63%
10	8	56%
10	9	53%
9	11	45%
8	11	42%
7	11	39%
10	8	56%
10	11	48%
7	11	39%
7	11	39%
10	10	50%
10	10	50%
9	12	43%
7	10	41%
5	13	28%
7	13	35%
		1593 / 32 = 50 %

I highlighted the teams with an above .500 winning average in green, and those with a less than winning average in red. Those teams who's

wining average was exactly .500 I did not highlight.

Notice how there are exactly 15 teams each that did better and 15 teams exactly that did worse and there are exactly two teams that had exactly .500 winning records against the spread. The two .500 teams are tie breakers and cancel out each other, thus they even out the against the spread average.

Here we see nearly all the axioms of probability theorems at work. Notice the total of all the averages is 1593. Taking now the arithmetic mean of thirty two teams we get approximately fifty percent. This is exactly the expected outcome of the exactly fair game against the spread.

Either a wager placed for the favorite or a wager placed for the underdog is a winner. This fairness created by the point spread on the individual contests evens out the action for the sports book.

Right now at the time I'm reporting these results we are in week ten of the 2008 NFL season. There are 16 of the 32 teams above .500 against the spread (ATS). Coincidence ? I think not. By season's end I bet those numbers will be consistent. The 2005/2006 season shows similar consistency. This is how the bookmakers must keep it.

I chose to present the analysis of the current football season here solely for space considerations as they have the fewer amounts of games in a season. But broader analysis of the gaming industry as a whole returns

similar results for Hockey, Baseball, Soccer, Volleyball, Basketball, Cricket, Rugby, Lacrosse, , and other international 'scoring' team oriented sports.

Further exploits of this exact fairness also exist in other national and international 'contest' based sports; such as Tennis, Boxing, Mixed Martial Arts, Bowling and others as I may have mentioned earlier. Because these contests rely less on points scored and more on the individual abilities of the player, degrees of fairness are often difficult to calculate. They are however still achieved, but with less favorable payouts to the player.

Because there are a lot less things that can usually go wrong with fewer players involved, these sports are more predictable and the outcomes of the matches are less random. Such is the case with Tennis phenomenon Roger Federer and his extensive winning streaks. It's assumed he will win at each match so because of the high probability of him winning the odds are not in the players favor.

To illustrate this player's disadvantage, consider the following distribution with the contestant having a eighty percent chance of winning. In this case

$$P(1) = 1 - q = 1 - .2 = .8, \quad P(0) = 1 - p = 1 - .8 = .2$$

.10		
.09		
.08		
.07		
.06		
.05		
.04		
.03		
.02	\$1 / \$3	
.01		
<Pr>	Loss (0)	Win (1)

So naturally the white area is an automatic no pay area. The green area pays very little on your investment, exactly fifteen cent for every dollar. Although its eighty percent likely the outcome will land in that area; there is still no absolute guarantee of the win. Essentially you are throwing dollars after dimes or dollars after pennies in most cases with highly favored contestants.

So the only reasonable pay area then is the red area. But this is still not all that reasonable, as even though you will earn three dollars for every dollar invested, you only have a  $\frac{1}{5}$  chance of wining a wager placed in this area, as opposed to a  $\frac{4}{5}$  chance of loosing the same wager placed in that area. Recall now that these wager with a clear advantage are the only wagers that the most popular waging ( betting ) many management system

prescribes.

So again Kelly suggest wager a lot on  $\omega_0$  to earn just a little on the favorite. In the case you loose Martingale says wager a factor of seven dollars on  $\omega_1$  to win back every dollar that you have lost on  $\omega_0$ .

Now on wager  $\omega_1$  Kelly says wager a lot again on the favorite, which is actually less than  $\omega_0$  because you bank roll just shrank considerably, and so you win even less on  $\omega_1$  than you would have won on  $\omega_0$  even with the same high[eighty(80)] percent of winning. In the case you loose again, Martingale suggest a wager again of a factor of seven dollars on  $\omega_2$  to win back every dollar that you have now lost on  $\omega_0$  and  $\omega_1$ .

The following table charts this unfortunate sequence of losses with these two systems on the afore mention proposition with a bankroll of \$1000 and 1 : 4 odds.

	$\omega_0$	$\omega_1$	$\omega_2$	$\omega_3$	. . .	$\omega_{499}$
<b>Kelly</b>	2	1	1	1		<b>0</b>
B = \$1000 P(1)	\$1000.5	\$997.25	\$996.25	\$995.25		
B = \$1000 P(0)	\$998	\$997	\$996	\$995		\$500
<b>Martingale</b>	2	14	112	896		
B = 1000 P(1)	\$1000.5	\$1001.5	\$1012	-		
B = 1000 P(0)	\$998	\$984	\$872	<b>- \$24</b>		

Notice that Kelly prescribes only a two dollar wager even with  $P(1) = .8$  simply because the payout is so low. It suggests a wager equal to two

percent (2%) of the bankroll which is great as long as you are winning. But once the balance of the Bankroll falls below one thousand, which is after the very first loss, the suggested wager becomes one dollar. It then stays at one dollar unfortunately until nearly your five hundredth consecutive loss, because when the bankroll falls below five hundred it says to quit wagering.

I used the same value for  $\omega_0$  with the martingale just to have a relative starting point and we see clearly by the third wager we are either busted or at a point where recovering our losses with the martingale is impossible and it seems highly unlikely you will ever regain your losses with these or any other system. At that point you will have to accept a substantial loss of capital.

Even trying to begin Kelly after  $\omega_2$  using the martingale is not possible because not only is the suggested wager now below one dollar which is the universal lowest minimum wager, but with the low bankroll value and the 1:4 odds, even with  $p(1) = .8$  Kelly concludes you have no true advantage.

Well . . . Great! The IBA says what's wrong with that? It's actually the lack of advantage that I'm proposing makes the IBA so advantageous to these most popular systems.

Consider the following distribution of the same game evened out by a form of point spread. So then  $P(1) = 1 - q = 1 - .5 = .5P$  and  $P(0) =$

$1 - p = 1 - .5 = .5$ . There no longer exist an advantage by the favorite and the green area has been reduced. By the same token then on the other side the red area has been increased by the exact amount. Now since the odds are even the payouts are also evened out inversely at ninety cents for every dollar invested. So the increased probability of  $P(0)$  lowered the payout and the decreased probability of  $P(1)$  increased the payout on their sides respectively to exactly the same.

.10		
.09		
.08		
.07		
.06		
.05		
.04		
.03	\$1 / .9	\$1 / .9
.02		
.01		
<Pr>	Loss (0)	Win (1)

As we have established, the sports books are typically indifferent as to which wager is placed as they know the probability of either team winning against the spread is even. So using the IBA provides the greatest possible return when there is no inherent advantage to the book.

Essentially the spread has increased the reasonable pay area from an

area representing only twenty percent to exactly one half of the total area. This is not to say that you will win every bet placed, but it is to say that now either bet you place becomes reasonable as the outcome of either side potentially reaches the expectation of the entire contest.

It may seem like I made this point many times over, but this lack of advantage or intrinsic randomness to the point adjusted sports wager is necessary to meticulously demonstrate that you may clearly understand why there will be no extensive streaks of either loosing or winning wagers and thus see why the IBA clearly guarantees the most lucrative gain relative to sports wagering.

The randomness created by the point spread now insures the exact fairness of the sports wager itself. This fairness is the necessary condition that must be present for the IBA to be successful.

Many may feel that there is still an exception to the rule of theoretical probability called real life. A person's predictions and guess-timations always seem very absolute on paper, and elaborate calculations and projections are usually convincing, if not at least impressive, to even the most incredulous scientist. Nevertheless, when experiments are conducted either in the laboratory or in a real world environment, the results can prove to be devastating to the validity of the proponent's claims.

With the IBA there is a possibility, however very small that a runaway series of losses can occur between wins that will cause a significant loss of capital. Applying the IBA to random investment choices on the open market seems to present the greatest risk of such an occurrence next to a trip to Las Vegas and the \$250 minimum bet poker tables, partly due to the fact that investment options are relatively limitless.

The major detriment to experiencing more consecutive losses that you anticipated is not so much the exponentially growing debt you are accumulating with using the IBA, although not a good feeling, but it is the fact that you eventually reach the casinos or sportsbook's maximum wager total limit. That is usually the casino's or sportsbook's way of protecting themselves against someone playing themselves back out of debt.

Casinos attempt to avoid the obvious statistical regularity which has been validated over time which is the fact that the favored team will usually win. Occasionally exaggerating the point spread in either direction seems to make would be anomalies much more prevalent and has many sports wagers confused as to which plays to take.

To explain this mathematically we let  $n$  be any play a player may take. So then  $\sum_{i=1}^n = N$  which is total amount of the accumulating  $n$  plays. If in any case  $\frac{n_i}{N} > \frac{1}{2}$  or  $\frac{n_i}{N} < \frac{1}{2}$  then a pattern can be detected and the favorite

either winning or losing against the point spread will be considered to be the norm. Assigning the function  $f_i = \frac{n_i}{N}$  either to track  $P(n = \textit{cover})$  or  $P(n = \textit{upset})$  we can successfully determine the more attractive play in the general sense through experimental probability.

The sportsbook safeguards against this possibility by not allowing large wagers to be placed. They know that players will eventually get a good prediction system so limiting the wagers prevents players from ever completely betting themselves out of the hole, even when they still may have money enough to do so.

The internet provides the greatest safeguard for the player against such a situation having potentially devastating effects. Multiple accounts can be established at unrelated online sportsbooks. With the additional accounts established, even though you may be at a maximum wager total limit at one online establishment, you can place the same wager at another or several other sportsbooks at the same or even better odds.

The obvious advantage is that you can place different wager amounts at the different online establishments. Tiering your wagering amount on the same proposition. This is like buying shares in the same company simultaneously at different prices. This balances your risk by averaging out the probability of a success between the variables of the proposition while

the event itself has not changed. This ultimately maximizes your return. This is a significant advantage to capital management provided by the IBA, and is an option not often available to open market investors.

It's easy to see how this extremely advantageous feature of using my IBA system is impossible with games of chance. You could not place a Roulette wager of say \$5,000 ( most casino's maximum online wager ) on either red or black at multiple casinos at different odds, as they are not all spinning the exact same wheel nor basing the outcome of the event to a common wheel, as in a via satellite broadcast of a state lottery spin for example. Also the Payouts are fairly consistent, as they are attached to the game itself, not usually the casino, although there are sometimes small exceptions as with teaser odds and house special payout promotions.

Still yet the probabilities of winning in any of these scenarios can be calculated and ultimately hedged with enough time, computing resources and capital. The payout is not, however, contingent on a single happenstance, .

The upside to this grim reality is you could for example place three \$5,000 wagers at three different online casinos on the Superbowl or World Cup Finals or a Boxing Match for example, for a simulated single \$15,000 wager that may cover previous losses unrecoverable from any one casino due to the \$5,000 maximum wager stipulation.

With just a few casinos you can virtually eliminate the max wager stipulation that has long been the criticism of necessary requirements for the original Martingale System to work. We would agree that no one has infinite wealth, but starting with a low enough initial wage and using the IBA with even odds setting  $n = 15$ , we can accumulate a bankroll large enough to survive an entire football season and the anomalous excessively long event streaks that are typically eliminated by odds makers around the world.

My attached summary reports actual results of wagering activity which better demonstrates the utility of the IBA in a real wagering environment.

# Chapter 5

## Results

### 5.1 Outcome of Algorithm Implementation

Throughout this semester I recorded the plays taken at three different online sport's books using my general selection strategy to determine the win to loss ratio of my prediction system. I was curious to see if I was at least above fifty percent with my selection, yet the more important endeavor was to determine an average consecutive loss streak for plays I would actually take.

If I'm above fifty-five percent against the spread with my selections, I will ultimately be profitable with a ninety percent return on investment whether using my IBA or not. But if I find I have a losing average selection record or if I fair just about even on winning and losing my selections, then the algorithm will definitely have to be accredited for sustaining my existence in the black.

With a positive selection record well above five-hundred and a correlating short losing streak average, then the IBA can be adjusted and utilized in more aggressive wagering activity. Taking plays with higher risk and above one hundred percent returns will increase capital at an exponential rate. With information regarding actual vice expected outcomes of selected contest; the IBA provides a reliable mathematically determined acceptable loss parameter which can regulate irresponsibility in emotional wagering ( as well as investing / day trading ) activity.

The positive result to the above mentioned would be that the IBA can also encourage the more hardliner to take a more relaxed position toward plays that would otherwise not be taken for a fear on losing an unrecoverable amount of capital.

Several different online sports books were chosen because different types of wagers and plays are offered by each sport's book. There are different minimum and maximum wager limits and other restricting betting rules that may not allow the same bet to be placed at two different sport's book. Some sport's books only offer action on American Sports for example and other sport's books offer half time line updates and in game wagering options. Others may offer non-sports propositions and one sport's book may

restrict money line options to certain leagues and accept only straight point-spread wagers on other leagues and etcetera.

Choosing multiple sport's books also increases the reliability of the study. The results of the different types of plays will be averaged between the different sport's book overall to establish a general effective rate of the selection process of contestants in matches across all leagues. Similarly the losing streaks will be averaged between the sport's books as well to see if the consecutive losses are close to the estimate. However the focus is more on the value of the single longest losing streak as this is the situation we must model and strategize against to ultimately overcome stagnation to the increase of our bankroll, a gradual elimination of capital gains or worse an abrupt development of a severe financial deficit.

Initially twenty five thousand dollars was placed in an online 'above-average' interest earning market access account to have an exact record of what the actual monthly earned interest would be. This value was to be compared with the amount earned through the wagering activity with an opening account balance of twenty-five hundred and it's appropriately scaled return rate. It was clear after the first month that it was not necessary to make this comparison as the wagering account earned and sometimes loss on a daily basis five times the monthly earned interest of the capital

placed in the market access account.

Due to a withdrawal policy I was unaware of at one of the more attractive sport's books, which required that the total amount of the account be wagered three times over before the first withdrawal, I decided to adjust my focus of the experiment just a bit.

My algorithm suggests multiple wagers of very small amounts. An original bankroll of only \$2500.00 would yield a calculated steak of less than one dollar. Upon realizing that I would have to place a minimum of 2500 bets to get my money back, I figured I would not be making a withdrawal this semester at that rate. I then chose to raise the steak on each wager. In less than a week of extremely modest plays, I nearly doubled my initial deposit, gaining a balance of over \$4100.

So confident in the algorithm, and in the fact that it didn't really matter, at least from a financial perspective, if I won or lost because of the even odds, I took extremely large wagers after a few weeks into the experiment on extremely risky propositions. My reasoning was that after actively wagering daily, I should be able to regain any lost amounts of my capital by the end of the semester ( or soon after into the summer.)

This would also afford me a chance to literally start over at some point, or at many points, with a zero or very close to it balance resulting from

incurring significant losses. This will add to the significance (and dramatic appeal ) of the experiment and provide me an opportunity to demonstrate how one might systematically bet their way to riches with my IBA that I used myself solely with sports wagering to beat the Casinos and the average return of the popular publicly offered savings instruments, annuities, government securities and the open market .

## 5.2 Earning Capabilities of IBA

Cash Balance data tables : Online Sports Book A ( OSBA )

From 3/19/2007 To 3/25/2007

Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total of Week	Won/Lost	0	0				
0	0	650	7.65	-223.12	-215.47	Cash In/Out	0	0	0	0	0	3,150	0	3,150	Balance
2,500	2,500	2,500	2,500	3,150	3,157.65	2,934.53	2,934.53								

From 3/26/2007 To 4/1/2007

Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total of Week	Won/Lost	-					
277.6	-155.57	-224.72	165.5	350	99.29	299.25	256.15	Cash In/Out	0	0	0	0	0	0	0
0	0	0	Balance	2,934.53	2,656.93	2,501.36	2,276.64	2,442.14	2,792.14	2,891.43	3,190.68	3,190.68			

From 4/2/2007 To 4/8/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost  
 540.05 512.44 -1567.2 -2013.07 -257 167.26 -139.67 -2757.19 Cash In/Out 0  
 0 0 0 0 0 0 Balance 3,190.68 3730.73 4243.17 2675.97 662.9 405.9 573.16  
 433.49 433.49

From 4/9/2007 To 4/15/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost  
 189.68 -155.57 -224.72 165.5 350 99.29 299.25 256.15 Cash In/Out 0 0 0 0  
 0 0 0 0 Balance 433.49 623.17 588.67 635.46 670.31 611.42 360.87 209.87  
 209.87

From 4/16/2007 To 4/22/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost 9.59  
 -38.52 21 -35 -43.14 3.41 0.76 -81.9 Cash In/Out 0 0 0 0 0 0 0 0 Balance  
 209.87 219.46 180.94 201.94 166.94 123.8 127.21 127.97 127.97

From 4/23/2007 To 4/29/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost -47  
 -61.84 -1 1.23 -9.38 -0.28 9 -109.27 Cash In/Out 0 0 0 0 0 0 0 0 Balance  
 127.97 80.97 19.13 18.13 19.36 9.98 9.7 18.7 18.7

From 4/30/2007 To 5/6/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost 5.35  
 0.04 -0.32 6.65 1 -4.41 6.39 14.7 Cash In/Out 0 0 0 0 0 0 0 0 Balance 18.7

24.05 24.09 23.77 30.42 31.42 27.01 33.4 33.4

From 5/7/2007 To 5/13/2007

Beginning Mon Tue Wed Thu Fri Sat Sun Total of Week Won/Lost 9.87

11.2 12.86 5.23 14.2 21.9 36.56 111.82 Cash In/Out 0 0 0 0 0 0 0 0 Balance

33.4 43.27 54.47 67.33 72.56 86.76 108.66 145.22 145.22

From 5/14/2007 To 5/20/2007

The above chart of the progressive balance seems discouraging when considering the lowly balance after a few short weeks. However upon closer investigation, weeks one, two, six, seven and eight actually provide remarkable findings. The careful micro analysis of these discrete intervals speaks to the power of the IBA to grow the bankroll exponentially.

Notice on the chart above how at a point during week six, after purposefully vicariously wagering away the bankroll, the balance of the account had dropped to eight dollars. Starting with less than ten dollars, the account balance was eighteen dollars at end of week six. So the entire bank roll doubled using the IBA that week.

During week seven IBA nearly doubled the bank roll again going from eighteen dollars to thirty three dollars.

During week eight the bank roll increased from thirty three dollars to sixty seven dollars by mid week using the IBA. Notice again using the IBA

the bankroll more than doubled by weeks end with payouts for the week of over one hundred dollars and a total bankroll balance of one hundred and forty-five dollars.

This is no unrepeatable lucky streak, but rather indicative of the IBA. Notice that initially the account was opened with twenty five hundred dollars. The IBA increased the account by over twenty percent in two days to over thirty one hundred dollars. By day six the balance had fallen to two thousand and two hundred dollars. By the end of the first week IBA had earned one hundred percent of the lost capital back plus profit. The closing balance after week one was twenty nine hundred and thirty four dollars for an initial return of twenty percent.

By the end of week two the IBA had earned twenty eight percent and the ending account balance was just under thirty two hundred dollars. From day six to day twelve the IBA also doubled the bankroll. The ability to essentially earn at will and double capital at any scale and at any point in a wagering sequence demonstrates the IBA's earning veracity.

#### Win / Loss Ratio and Frequency of SureBet Prediction System (SBPS)

Of course the seemingly guaranteed earning potential of the IBA would not be possible without the reliability of the wagering sequence to produce winning propositions and to limit consecutive losing propositions. This is

accomplished by the point spread attached to wagers which produces an even chance for any player to win a wager placed on either side of the line.

The following is the data set for over two hundred wagers placed at OSBA on all different types of sporting contest. The favorite ( better ) team was chosen in each case. The summary succeeds the dataset.

### 5.3 DataSet Wagering of Activity

Ticket : 3409651 CBB STRAIGHT BET 11.5/10 -11.5 LOSE 3/24/2007 18:43  
 Ticket : 3410086 CBB STRAIGHT BET 21.85/19 -21.85 LOSE 3/24/2007 20:03  
 Ticket : 3410314 NBA STRAIGHT BET 57.4/41 41 WIN 3/24/2007 21:24  
 Ticket : 3412216 NBA STRAIGHT BET 12./10 -17.25 LOSE 3/25/2007 15:19  
 Ticket : 3412177 NBA 2 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5 pts 17.25/16 -12 LOSE 3/25/2007 15:02

Ticket : 3412359 CBB STRAIGHT BET 5.75/5 5 WIN 3/25/2007 15:44  
 Ticket : 3412555 NBA STRAIGHT BET 28.75/25 -28.75 LOSE 3/25/2007 16:36  
 Ticket : 3411776 CBB 2 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5 pts 60/50 -60 LOSE 3/25/2007 13:56  
 Ticket : 3412818 CBB STRAIGHT BET 34.5/30 -34.5 LOSE 3/25/2007 18:03  
 Ticket : 3413151 NBA 3 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5 pts 101.33/152 -101.3 LOSE 3/25/2007 19:46

Ticket : 3413298 NBA STRAIGHT BET 108/25.71 25.71 WIN 3/25/2007 20:41  
 Ticket : 3413770 MLB STRAIGHT BET 90/50 50 WIN 3/26/2007 11:43  
 Ticket : 3414971 MLB STRAIGHT BET 327.6/234 -327.6 LOSE 3/26/2007 21:12  
 Ticket : 3415290 NBA STRAIGHT BET 25.3/23 23 WIN 3/27/2007 3:43  
 Ticket : 3415685 MLB STRAIGHT BET 135/100 100 WIN 3/27/2007 15:53  
 Ticket : 3416121 NBA STRAIGHT BET 402.5/350 350 WIN 3/27/2007 18:49  
 Ticket : 3416473 NBA PARLAY (2 TEAMS) 375/310.19 -375 LOSE 3/27/2007 20:01  
 Ticket : 3416515 NBA STRAIGHT BET 50/45.45 -50 LOSE 3/27/2007 20:12  
 Ticket : 3416696 NBA STRAIGHT BET 35/33.33 33.33 WIN 3/27/2007 21:24  
 Ticket : 3416778 NBA STRAIGHT BET 412.5/275 -412.5 LOSE 3/27/2007 22:22  
 Ticket : 3416770 NHL STRAIGHT BET 375/104.17 104.17 WIN 3/27/2007 22:16  
 Ticket : 3416895 NBA STRAIGHT BET 75/71.43 71.43 WIN 3/27/2007 23:42  
 Ticket : 3416933 NBA STRAIGHT BET 50/43.48 -50 LOSE 3/28/2007 2:38  
 Ticket : 3416934 NBA STRAIGHT BET 50/43.48 43.48 WIN 3/28/2007 2:40

Ticket : 3416935 NBA STRAIGHT BET 50/45.45 -50 LOSE 3/28/2007 2:40  
Ticket : 3418158 NBA STRAIGHT BET 33/30 -33 LOSE 3/28/2007 20:50  
Ticket : 3418200 NBA STRAIGHT BET 440/400 -440 LOSE 3/28/2007 21:00  
Ticket : 3418317 NBA STRAIGHT BET 470/335.71 335.71 WIN 3/28/2007 21:58  
Ticket : 3418366 NBA STRAIGHT BET 230/209.09 209.09 WIN 3/28/2007 22:18  
Ticket : 3418412 NBA STRAIGHT BET 240/200 -240 LOSE 3/28/2007 23:08  
Ticket : 3418468 NHL STRAIGHT BET 75/65.22 -75 LOSE 3/29/2007 4:54  
Ticket : 3419916 NBA STRAIGHT BET 159.5/145 -159.5 LOSE 3/29/2007 23:17  
Ticket : 3419946 NBA STRAIGHT BET 440/400 400 WIN 3/29/2007 23:52  
Ticket : 3420089 MLB STRAIGHT BET 425/250 250 WIN 3/30/2007 12:01  
Ticket : 3421341 NBA 3 Team Special Teaser Football 10 pts; Basketball 7 pts 300/250 -300 LOSE 3/30/2007 21:01  
Ticket : 3421351 MLB STRAIGHT BET 312.5/250 250 WIN 3/30/2007 21:09  
Ticket : 3421635 NBA STRAIGHT BET 225/150 150 WIN 3/30/2007 22:33  
Ticket : 3421863 NHL STRAIGHT BET 250/200 200 WIN 3/31/2007 5:13  
Ticket : 3422705 MLB STRAIGHT BET 337.5/250 250 WIN 3/31/2007 15:32  
Ticket : 3423744 NBA STRAIGHT BET 500/357.14 -500 LOSE 3/31/2007 19:27  
Ticket : 3424119 NBA STRAIGHT BET 355/338.1 -355 LOSE 3/31/2007 20:44  
Ticket : 3424100 CBB STRAIGHT BET 300/214.29 214.29 WIN 3/31/2007 20:41  
Ticket : 3424300 CBB STRAIGHT BET 110/104.76 -110 LOSE 3/31/2007 21:56  
Ticket : 3424390 NBA STRAIGHT BET 420/400 400 WIN 3/31/2007 23:15  
Ticket : 3424473 NBA STRAIGHT BET 275/250 250 WIN 4/1/2007 5:52  
Ticket : 3424904 NBA STRAIGHT BET 300/200 200 WIN 4/1/2007 12:24  
Ticket : 3425452 NBA STRAIGHT BET 175/159.09 -175 LOSE 4/1/2007 14:14  
Ticket : 3426740 NBA STRAIGHT BET 22/20 -22 LOSE 4/1/2007 19:22  
Ticket : 3426710 NBA STRAIGHT BET 28.75/25 -28.75 LOSE 4/1/2007 19:19  
Ticket : 3426913 NBA STRAIGHT BET 112.5/75 75 WIN 4/1/2007 20:29  
Ticket : 3427733 Apr-02, 2007 01:05p MLB STRAIGHT BET [966] DET -103 ( ACTION ) 41.2/40 -41.2 LOSE LOSE  
Apr-02, 2007 12:26:00p  
Ticket : 3427740 Apr-02, 2007 01:10p MLB STRAIGHT BET [964] NYY -190 ( ACTION ) 47.5/25 25 WIN WIN Apr-02,  
2007 12:28:31p  
Ticket : 3428468 Apr-02, 2007 07:05p MLB STRAIGHT BET [962] HOU -215 ( ACTION ) 53.75/25 -53.75 LOSE LOSE  
Apr-02, 2007 05:24:31p  
Ticket : 3428415 Apr-02, 2007 09:25p CBB STRAIGHT BET [702] FLORIDA -2-160 (B+2) 80/50 50 WIN WIN Apr-02,  
2007 04:59:56p  
Ticket : 3428419 Apr-02, 2007 09:25p CBB STRAIGHT BET [702] FLORIDA -245 1225/500 500 WIN WIN Apr-02,  
2007 05:01:11p  
Ticket : 3429415 Apr-02, 2007 10:05p MLB STRAIGHT BET [976] LAA -147 ( ACTION ) 88.2/60 60 WIN WIN Apr-02,  
2007 09:59:13p  
Ticket : 3429534 Apr-03, 2007 09:20a MU STRAIGHT BET [10002] SOUTH AFRICA -3400 250/7.35 7.35 WIN WIN  
Apr-03, 2007 02:21:24a

Ticket : 3430002 Apr-03, 2007 02:30p NBA STRAIGHT BET [559] TAU CERAMICA (ESP) -9-110 16.5/15 15 WIN WIN Apr-03, 2007 02:22:04p

Ticket : 3430004 Apr-03, 2007 02:45p NBA STRAIGHT BET [561] UNICAJA (ESP) -1-110 18.7/17 17 WIN WIN Apr-03, 2007 02:23:39p

Ticket : 3430076 Apr-03, 2007 04:35p MLB STRAIGHT BET [901] SDG -109 ( ACTION ) 27.25/25 25 WIN WIN Apr-03, 2007 03:01:16p

Ticket : 3430832 Apr-03, 2007 07:35p NBA STRAIGHT BET [1506] 1H MIAMI -2-110 55/50 50 WIN WIN Apr-03, 2007 07:00:21p

Ticket : 3431034 Apr-03, 2007 08:40p CBB STRAIGHT BET [306] TENNESSEE (WOMENS) -5-105 125/119.05 119.05 WIN WIN Apr-03, 2007 07:42:02p

Ticket : 3429990 Apr-03, 2007 07:05p Apr-03, 2007 08:05p Apr-03, 2007 10:05p NBA NBA NBA 3 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5 pts [503] DETROIT PK-105 (B+1) [511] PHOENIX -5-105 (B+1) [513] DALLAS -2-105 (B+1) 20/30 16 WIN WIN PUSH WIN Apr-03, 2007 02:18:20p

Ticket : 3430677 Apr-03, 2007 07:35p Apr-03, 2007 10:05p NBA NBA PARLAY (2 TEAMS) [506] MIAMI -220 [513] DALLAS -320 300/263.04 263.04 WIN WIN WIN Apr-03, 2007 06:40:32p

Ticket : 3431848 Apr-04, 2007 01:05p MLB STRAIGHT BET [951] FLA -150 ( ACTION ) 250/166.67 -250 LOSE LOSE Apr-04, 2007 12:16:44p

Ticket : 3432399 Apr-04, 2007 03:35p MLB STRAIGHT BET [974] LAA -145 ( ACTION ) 150/103.45 103.45 WIN WIN Apr-04, 2007 03:25:20p

Ticket : 3433024 Apr-04, 2007 07:05p NBA STRAIGHT BET [3702] 1Q ORLANDO -1-115 120/104.35 104.35 WIN WIN Apr-04, 2007 06:42:17p

Ticket : 3433125 Apr-04, 2007 07:05p NBA STRAIGHT BET [702] ORLANDO -220 1100/500 -1100 LOSE LOSE Apr-04, 2007 06:53:03p

Ticket : 3433139 Apr-04, 2007 07:05p NBA STRAIGHT BET [701] TORONTO +6-155 (B+1) 465/300 300 WIN WIN Apr-04, 2007 06:55:14p

Ticket : 3433493 Apr-04, 2007 08:10p MLB STRAIGHT BET [978] MIN -133 ( ACTION ) 99.75/75 75 WIN WIN Apr-04, 2007 08:04:46p

Ticket : 3433806 Apr-04, 2007 10:05p Apr-04, 2007 10:05p NBA NBA PARLAY (2 TEAMS) [718] DENVER -400 [719] UTAH -380 500/274.81 -500 LOSE PEND LOSE Apr-04, 2007 09:54:50p

Ticket : 3433877 Apr-04, 2007 10:05p MLB STRAIGHT BET [980] SEA +138 ( ACTION ) 300/414 -300 LOSE LOSE Apr-04, 2007 10:04:39p

Ticket : 3434148 Apr-05, 2007 09:00a SOC STRAIGHT BET [201] AALBORG +114 115/131.1 -115 LOSE LOSE Apr-05, 2007 05:48:54a

Ticket : 3434149 Apr-05, 2007 09:00a SOC STRAIGHT BET [222] BRONDBY +109 250/272.5 -250 LOSE LOSE Apr-05, 2007 05:50:53a

Ticket : 3434680 Apr-05, 2007 02:05p MLB STRAIGHT BET [911] CLE -113 ( ACTION ) 150/132.74 -150 LOSE LOSE Apr-05, 2007 01:44:14p

Ticket : 3434695 Apr-05, 2007 02:10p MLB STRAIGHT BET [913] BOS -183 ( ACTION ) 160/87.43 87.43 WIN WIN Apr-05, 2007 01:51:04p

Ticket : 3435015 Apr-05, 2007 07:10p MLB STRAIGHT BET [916] NYY -305 ( ACTION ) 1525/500 -1525 LOSE LOSE

Apr-05, 2007 05:20:44p  
Ticket : 3435844 Apr-05, 2007 10:15p MLB STRAIGHT BET [907] SDG -121 ( ACTION ) 60.5/50 -60.5 LOSE LOSE  
Apr-05, 2007 10:09:49p  
Ticket : 3436422 Apr-06, 2007 02:05p MLB STRAIGHT BET [967] BOS -107 ( ACTION ) 43/40.19 -43 LOSE LOSE  
Apr-06, 2007 01:50:19p  
Ticket : 3437419 Apr-06, 2007 07:05p NBA STRAIGHT BET [702] CHARLOTTE -1-150 (B+2) 200/133.33 -200 LOSE  
LOSE Apr-06, 2007 06:53:26p  
Ticket : 3437802 Apr-06, 2007 08:35p NBA STRAIGHT BET [1718] 1H HOUSTON -4-110 19/17.27 -19 LOSE LOSE  
Apr-06, 2007 08:34:46p  
Ticket : 3438066 Apr-06, 2007 10:35p NBA STRAIGHT BET [1723] 1H DALLAS -2-105 5.25/5 5 WIN WIN Apr-06,  
2007 10:00:47p  
Ticket : 3438391 Apr-07, 2007 07:45a SOC STRAIGHT BET [381] CHELSEA -1-120 120/100 0 PUSH PUSH Apr-07,  
2007 05:55:47a Ticket : 3438392 Apr-07, 2007 07:45a SOC STRAIGHT BET [381] CHELSEA -230 230/100 100 WIN  
WIN Apr-07, 2007 05:57:14a  
Ticket : 3439266 Apr-07, 2007 02:10p MLB STRAIGHT BET [919] DET -120 ( ACTION ) 4/3.33 3.33 WIN WIN  
Apr-07, 2007 02:03:32p  
Ticket : 3439499 Apr-07, 2007 05:13p MLB STRAIGHT BET [903] LOS -125 ( ACTION ) 13/10.4 10.4 WIN WIN  
Apr-07, 2007 03:36:36p  
Ticket : 3440147 Apr-07, 2007 07:05p MLB STRAIGHT BET [909] ARI -150 ( ACTION ) 19/12.67 12.67 WIN WIN  
Apr-07, 2007 06:47:24p  
Ticket : 3440784 Apr-07, 2007 10:05p  
Apr-07, 2007 09:05p MLB PARLAY (2 TEAMS) [916] SDG -145 ( ACTION ) [930] LAA -132 ( ACTION ) 11/21.22  
21.22 WIN WIN  
  
WIN Apr-07, 2007 09:01:45p  
  
Ticket : 3440870 Apr-07, 2007 10:05p MLB STRAIGHT BET [916] SDG -145 ( ACTION ) 13/8.97 8.97 WIN WIN  
  
Apr-07, 2007 09:29:43p  
  
Ticket : 3440860 Apr-07, 2007 10:35p NBA STRAIGHT BET [517] DENVER +6-150 (B+2) 16/10.67 10.67 WIN WIN  
  
Apr-07, 2007 09:26:13p  
  
Ticket : 3441149 Apr-08, 2007 06:30a NBA STRAIGHT BET [136] UNICAJA MALAGA -3-115 52/45.22 -52 LOSE  
  
LOSE Apr-08, 2007 06:06:25a  
  
Ticket : 3442583 Apr-08, 2007 03:30p NBA STRAIGHT BET [703] PHOENIX -210 210/100 100 WIN WIN Apr-08,

2007 03:08:01p

Ticket : 3442576 Apr-08, 2007 03:35p MLB STRAIGHT BET [978] LAA -150 ( ACTION ) 120/80 -120 LOSE LOSE

Apr-08, 2007 03:06:24p

Ticket : 3443047 Apr-08, 2007 07:00p SOC STRAIGHT BET [121] HOUSTON -105 80/76.19 -80 LOSE LOSE Apr-08,

2007 06:57:13p

Ticket : 3443147 Apr-08, 2007 07:27p NBA STRAIGHT BET [2706] 2H MIAMI -8-115 21/18.26 -21 LOSE LOSE Apr-

08, 2007 07:25:35p

Ticket : 3443370 Apr-08, 2007 09:05p NBA STRAIGHT BET [711] HOUSTON -2-150 (B+2) 50/33.33 33.33 WIN WIN

Apr-08, 2007 09:03:14p

Ticket : 3443428 Apr-09, 2007 07:45a SOC STRAIGHT BET [102] PORTSMOUTH +135 30/40.5 -30 LOSE LOSE

Apr-09, 2007 04:24:06a

Ticket : 3443822 Apr-09, 2007 01:16p MLB STRAIGHT BET [902] NYM -130 ( ACTION ) 155/119.23 119.23 WIN

WIN Apr-09, 2007 12:43:41p

Ticket : 3444515 Apr-09, 2007 07:15p MLB STRAIGHT BET [920] TOR -220 ( ACTION ) 221/100.45 100.45 WIN

WIN Apr-09, 2007 05:46:26p

Ticket : 3445679 Apr-10, 2007 02:05p MLB STRAIGHT BET [966] BOS -200 ( ACTION ) 7/3.5 3.5 WIN WIN Apr-10,

2007 12:04:31p

Ticket : 3446444 Apr-10, 2007 07:05p MLB STRAIGHT BET [972] TOR -150 ( ACTION ) 16/10.67 -16 LOSE LOSE

Apr-10, 2007 05:13:59p

Ticket : 3446689 Apr-10, 2007 07:11p NBA STRAIGHT BET [707] NEW JERSEY -150 7.5/5 5 WIN WIN Apr-10, 2007

06:14:23p

Ticket : 3447376 Apr-10, 2007 10:05p MLB STRAIGHT BET [962] SDG -133 ( ACTION ) 27/20.3 -27 LOSE LOSE

Apr-10, 2007 09:50:51p

Ticket : 3449192 Apr-11, 2007 07:35p MLB STRAIGHT BET [910] ATL -1-140 ( J WILLIAMS-R / C JAMES -L )

48/34.29 34.29 WIN WIN Apr-11, 2007 07:13:13p

Ticket : 3449704 Apr-11, 2007 10:35p NHL STRAIGHT BET [58] ANAHEIM PK-160 20/12.5 12.5 WIN WIN Apr-11,

2007 10:30:21p

Ticket : 3449994 Apr-12, 2007 01:05p MLB STRAIGHT BET [956] CLE -129 ( ACTION ) 25/19.38 19.38 WIN WIN

Apr-12, 2007 11:46:38a

Ticket : 3450487 Apr-12, 2007 04:25p MLB STRAIGHT BET [958] BOS -175 ( ACTION ) 30/17.14 0 NO BET N/A

CANCEL Apr-12, 2007 04:00:42p

Ticket : 3450725 Apr-12, 2007 08:15p NBA STRAIGHT BET [702] CLEVELAND -265 41/15.47 15.47 WIN WIN Apr-

12, 2007 05:38:18p

Ticket : 3452372 Apr-13, 2007 02:20p MLB STRAIGHT BET [902] CUB -170 ( ACTION ) 18.7/11 -18.7 LOSE LOSE

Apr-13, 2007 02:18:54p

Ticket : 3452987 Apr-13, 2007 07:10p MLB STRAIGHT BET [908] NYM -210 ( ACTION ) 22/10.48 10.48 WIN WIN

Apr-13, 2007 06:05:58p

Ticket : 3452983 Apr-13, 2007 08:20p NBA STRAIGHT BET [511] DENVER +2-120 (B+) 25/20.83 20.83 WIN WIN

Apr-13, 2007 06:04:59p

Ticket : 3452996 Apr-13, 2007 08:05p Apr-13, 2007 08:35p NBA 2 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5

pts [510] MIAMI -2-110 (B+1) [516] DALLAS +-110 (B+1) 25/20.83 -25 LOSE WIN LOSE Apr-13, 2007 06:09:03p

Ticket : 3453811 Apr-13, 2007 09:40p MLB STRAIGHT BET [914] ARI -180 ( ACTION ) 27/15 -27 LOSE LOSE

Apr-13, 2007 09:21:45p

Ticket : 3451724 Apr-14, 2007 10:00a SOC STRAIGHT BET [174] LIVERPOOL -130 19.5/15 -19.5 LOSE LOSE Apr-13,

2007 03:39:22a

Ticket : 3454273 Apr-14, 2007 12:30p NBA STRAIGHT BET [116] MMT ESTUDIANTES -2-110 60.5/55 0 NO BET

N/A CANCEL Apr-14, 2007 04:44:15a

Ticket : 3454990 Apr-14, 2007 02:00p NBA STRAIGHT BET [122] GRAN CANARIA GRUPOS DUNAS -4-110 50/45.45

45.45 WIN WIN Apr-14, 2007 01:24:40p

Ticket : 3455647 Apr-14, 2007 08:05p NBA STRAIGHT BET [705] DENVER -255 296/116.08 -296 LOSE LOSE Apr-14,

2007 05:02:22p

Ticket : 3456976 Apr-15, 2007 11:00a NBA STRAIGHT BET [530] VIRTUS BOLOGNA (ITA) -1-110 5.5/5 5 WIN WIN

Apr-15, 2007 10:51:32a

Ticket : 3458259 Apr-15, 2007 02:21p NBA STRAIGHT BET [2506] 2H WASHINGTON -2-105 5.25/5 -5.25 LOSE

LOSE Apr-15, 2007 02:12:20p

Ticket : 3458238 Apr-15, 2007 02:30p NBA STRAIGHT BET [563] BENETTON TREVISO -6-110 5.5/5 -5.5 LOSE

LOSE Apr-15, 2007 02:09:22p

Ticket : 3458589 Apr-15, 2007 03:35p NBA STRAIGHT BET [3504] 1Q LA CLIPPERS -3-115 5.75/5 -5.75 LOSE LOSE

Apr-15, 2007 03:32:52p

Ticket : 3459163 Apr-15, 2007 07:20p NBA STRAIGHT BET [2514] 2H DETROIT -6-110 79.5/72.3 -79.5 LOSE LOSE

Apr-15, 2007 07:14:14p

Ticket : 3459365 Apr-15, 2007 09:35p NHL STRAIGHT BET [22] DALLAS PK-150 60/40 -60 LOSE LOSE Apr-15,

2007 08:08:12p

Ticket : 3459719 SOC STRAIGHT BET 6/6 6 WIN 4/16/2007 12:09

Ticket : 3459585 SOC STRAIGHT BET 6/10.2 10.2 WIN 4/16/2007 3:28

Ticket : 3459586 SOC STRAIGHT BET 7/9.8 -7 LOSE 4/16/2007 3:30

Ticket : 3460997 MLB STRAIGHT BET 4/3.39 3.39 WIN 4/16/2007 21:00

Ticket : 3461002 MLB STRAIGHT BET 2-Mar -3 LOSE 4/16/2007 21:02

Ticket : 3461232 NBA STRAIGHT BET 3/2.73 -3 LOSE 4/17/2007 9:02

Ticket : 3462713 MLB STRAIGHT BET 9.52/7 -9.52 LOSE 4/17/2007 20:08

Ticket : 3463010 NHL STRAIGHT BET 26/20 -26 LOSE 4/17/2007 22:03

Ticket : 3465217 MLB STRAIGHT BET 52.65/45 45 WIN 4/18/2007 21:55

Ticket : 3465484 NBA STRAIGHT BET 24/20.87 -24 LOSE 4/18/2007 23:41

Ticket : 3466974 NHL STRAIGHT BET 35/25 -35 LOSE 4/19/2007 20:13

Ticket : 3467370 MLB STRAIGHT BET 3/3.6 -3 LOSE 4/20/2007 12:40

Ticket : 3467356 MLB STRAIGHT BET 34.5/25 -34.5 LOSE 4/20/2007 12:36

Ticket : 3468761 MLB STRAIGHT BET 26/23.42 -26 LOSE 4/20/2007 19:46

Ticket : 3468765 MLB STRAIGHT BET 3/1.94 1.94 WIN 4/20/2007 19:48

Ticket : 3468969 MLB STRAIGHT BET 35/18.42 18.42 WIN 4/20/2007 21:56

Ticket : 3470103 MLB STRAIGHT BET 20/13.79 -20 LOSE 4/21/2007 13:00

Ticket : 3470112 MLB STRAIGHT BET 4/2.35 2.35 WIN 4/21/2007 13:00

Ticket : 3470820 NBA STRAIGHT BET 5/4.35 0 PUSH 4/21/2007 16:23

Ticket : 3471241 MLB STRAIGHT BET 46/27.06 27.06 WIN 4/21/2007 18:31

Ticket : 3471246 MLB STRAIGHT BET 4-Jun -6 LOSE 4/21/2007 18:33

Ticket : 3473917 NBA STRAIGHT BET 7/4.67 -7 LOSE 4/22/2007 15:06

Ticket : 3474013 MLB PARLAY (2 TEAMS) 10/15.9 -10 LOSE 4/22/2007 15:42

Ticket : 3474140 NBA STRAIGHT BET 15/12 12 WIN 4/22/2007 16:15

Ticket : 3474503 MLB STRAIGHT BET 3.54/2 2 WIN 4/22/2007 18:42

Ticket : 3474506 MLB STRAIGHT BET 1.3/1 1 WIN 4/22/2007 18:43

Ticket : 3474420 NHL STRAIGHT BET 4/2.76 2.76 WIN 4/22/2007 18:24

Ticket : 3475794 MLB PARLAY (2 TEAMS) 18/20.65 -18 LOSE 4/23/2007 18:12

Ticket : 3476129 NBA STRAIGHT BET 4.6/1 1 WIN 4/23/2007 18:51

Ticket : 3476769 MLB STRAIGHT BET 30/20 -30 LOSE 4/23/2007 21:58

Ticket : 3477517 MLB STRAIGHT BET 27/24.55 -27 LOSE 4/24/2007 14:44

Ticket : 3477519 MLB STRAIGHT BET 3/1.71 1.71 WIN 4/24/2007 14:45

Ticket : 3478801 MLB PARLAY (2 TEAMS) 35/44.83 -35 LOSE 4/24/2007 20:06

Ticket : 3479098 MLB STRAIGHT BET 1.55/1 -1.55 LOSE 4/24/2007 22:06

Ticket : 3481472 MLB PARLAY (2 TEAMS) 1/1.6 -1 LOSE 4/25/2007 21:19

Ticket : 3481956 MLB STRAIGHT BET 1.55/1 1 WIN 4/26/2007 11:06

Ticket : 3481960 MLB PARLAY (2 TEAMS) 1/1.43 1.43 WIN 4/26/2007 11:07

Ticket : 3483279 NBA 2 Team Teaser Football 6, 6, 7 pts ; Basketball 4, 4, 5 pts 1.2/1 -1.2 LOSE 4/26/2007 18:30

Ticket : 3485608 MLB STRAIGHT BET 8/4 -8 LOSE 4/27/2007 19:04

Ticket : 3486096 MLB STRAIGHT BET 1.38/1 -1.38 LOSE 4/27/2007 21:48

Ticket : 3487864 NBA STRAIGHT BET 1.2/1 0 PUSH 4/28/2007 16:29

Ticket : 3487790 NBA STRAIGHT BET 1.5/1 1 WIN 4/28/2007 16:13

Ticket : 3488274 MLB STRAIGHT BET 3/1.82 1.82 WIN 4/28/2007 18:41

Ticket : 3488289 MLB STRAIGHT BET 1.55/1 -1.55 LOSE 4/28/2007 18:42

Ticket : 3488935 MLB STRAIGHT BET 1.25/1 1 WIN 4/28/2007 21:44

Ticket : 3488922 NBA STRAIGHT BET 1.55/1 -1.55 LOSE 4/28/2007 21:32

Ticket : 3490366 MLB STRAIGHT BET 6/3 3 WIN 4/29/2007 13:25

Ticket : 3490397 MLB STRAIGHT BET 2.1/2 2 WIN 4/29/2007 13:28

Ticket : 3491060 MLB STRAIGHT BET 3.4/2 2 WIN 4/29/2007 16:39

Ticket : 3491510 NHL STRAIGHT BET 3.1/2 2 WIN 4/29/2007 19:48

Ticket : 3493298 MLB STRAIGHT BET 4/2.35 2.35 WIN 4/30/2007 20:05

Ticket : 3493338 NBA STRAIGHT BET 1.1/1 1 WIN 4/30/2007 20:18

Ticket : 3493613 MLB STRAIGHT BET 2.9/2 2 WIN 4/30/2007 21:57

Ticket : 3493957 NHL STRAIGHT BET 1.1/1 1 WIN 5/1/2007 11:54

Ticket : 3495619 MLB STRAIGHT BET 1.24/1 -1.24 LOSE 5/1/2007 21:31

Ticket : 3495624 NHL STRAIGHT BET 2/1.43 1.43 WIN 5/1/2007 21:32

Ticket : 3495824 NBA STRAIGHT BET 1.15/1 -1.15 LOSE 5/1/2007 23:11

Ticket : 3496287 MLB STRAIGHT BET 3/2.03 2.03 WIN 5/2/2007 12:50

Ticket : 3496694 MLB STRAIGHT BET 1.26/1 1 WIN 5/2/2007 15:19

Ticket : 3497791 NHL STRAIGHT BET 4.35/3 -4.35 LOSE 5/2/2007 20:59

Ticket : 3498100 NBA STRAIGHT BET 1.55/1 1 WIN 5/2/2007 22:32

Ticket : 3498835 MLB STRAIGHT BET 4.3/2 2 WIN 5/3/2007 14:12

Ticket : 3499680 MLB STRAIGHT BET 6.6/4 4 WIN 5/3/2007 19:07

Ticket : 3499949 MLB STRAIGHT BET 3/2 2 WIN 5/3/2007 20:20

Ticket : 3500326 NBA STRAIGHT BET 1.35/1 -1.35 LOSE 5/3/2007 22:32

Ticket : 3500516 NBA STRAIGHT BET 1.05/1 1 WIN 5/4/2007 0:03

Ticket : 3503861 MLB STRAIGHT BET 2.76/2 -2.76 LOSE 5/5/2007 12:03

Ticket : 3508103 NBA STRAIGHT BET 1.4/1 -1.4 LOSE 5/5/2007 17:34

Ticket : 3512152 MLB STRAIGHT BET 17/6.39 6.39 WIN 5/6/2007 13:19

Ticket : 3514964 MLB STRAIGHT BET 4/3.08 3.08 WIN 5/7/2007 19:59

Ticket : 3515451 NBA STRAIGHT BET 1.5/1 1 WIN 5/7/2007 22:35

Ticket : 3517739 MLB STRAIGHT BET 5/5.2 5.2 WIN 5/8/2007 22:14

Ticket : 3518187 MLB IF WIN ONLY 10/5 5 WIN 5/9/2007 11:35

Ticket : 3518187 MLB THEN STRAIGHT BET 7.1/5 5 WIN 5/9/2007 11:35

Ticket : 3520002 NBA STRAIGHT BET 4/2.86 2.86 WIN 5/9/2007 20:55

Ticket : 3521632 MLB STRAIGHT BET 1.74/2 2 WIN 5/10/2007 18:47

Ticket : 3521640 NBA STRAIGHT BET 5/3.23 3.23 WIN 5/10/2007 18:48

Ticket : 3524078 MLB STRAIGHT BET 7/5.7 5.7 WIN 5/11/2007 21:27

Ticket : 3524080 MLB STRAIGHT BET 13/6.5 6.5 WIN 5/11/2007 21:28

Ticket : 3525588 MLB STRAIGHT BET 14.95/13 13 WIN 5/12/2007 15:22

Ticket : 3525593 MLB STRAIGHT BET 3.08/4 4 WIN 5/12/2007 15:24

Ticket : 3526073 MLB STRAIGHT BET 10/6.9 6.9 WIN 5/12/2007 17:58

Ticket : 3527743 MLB STRAIGHT BET 10/4.11 4.11 WIN 5/13/2007 12:21

Ticket : 3527814 NBA STRAIGHT BET 7.8/6 -7.8 LOSE 5/13/2007 12:31

Ticket : 3528916 MLB STRAIGHT BET 35/40.25 40.25 WIN 5/13/2007 16:02

## 5.4 Data Analysis

The data was collected daily from the online sport's book and imported into excel. I programmed an if then macro to place a zero (0) in a cell of the row of wager record if the payout result was negative and a one(1) if the result was anything else. Anything else includes zero, which meant a push or tie and is paid out as a no loss wager. This made is very easily to count the wins and losses and compute an average.

There were two hundred and eight wagers (208) placed over the eight weeks at OSBA.

There were one hundred and nineteen (119) wins. There were eighty

nine (89) losses.

The favorite won fifty seven percent (57%) of the time.

I then assigned a value of -1 to the losses and 1 to the wins so I could produce the following graph of consecutive losses and wins.

There were forty five total streaks. This is one half the amount of times the values changed from positive to negative.

I was pleasantly surprised to find that there were more consecutive wins than losses and of higher frequency.

This not only means my prediction system was correct more than half the time, but when there are losses they don't last for long. More importantly the actual expected frequency of losses was consistently less than actual. The following chart displays the graph of the frequency of wins and losses. The Y axis represents the total number of streaks. The X axis represents the in-a-row number of losses.

Notice for example there were no losing streaks of greater than five in a row. There was one winning streak of eight, nine, eleven and fifteen in a row. There were more losing streaks of one, three and five in-a-row than winning streaks of the same lengths respectively. There were more winning streaks of two and four in a row than losing streaks of the same lengths respectively and so on.

The average losing streak =

$$\frac{(25 + 2(6) + 3(8) + 4(2) + 5(4))}{45} = \frac{89}{45} \approx 2$$

.

This average although accurate is less important than the fact that you can expect at least one loss on every contest, so the twenty five losses are irrelevant to the frequency count. This leaves only the two, three, four and five consecutive loss streaks to consider. Three consecutive losses, with eight streaks, and five consecutive losses, with four streaks, occurred with a greater frequency than two and four consecutive losing streaks did. So then taking the  $n$ th root of the product of the streaks we get the geometric mean of the most frequently occurring losing streaks of 3 and 5. Now by using

$$\left(\prod_{i=1}^n a_i\right)^{\frac{1}{n}}$$

We find:

$$\Gamma(3, 5) = \sqrt{3 \cdot 5} \approx 3.8 < 4$$

.

So the experiment finds the max losing streak of five consecutive losses occurred just under ten percent ( 10% ) of the time. The number of expected losses on average is then about four in this case.

So then using the IBA with an expected consecutive loss count of  $[7 < n < 10]$  proves to be a extremely reliable investment instrument in which to maximize capital and safeguard against premature financial ruin with sports wagering and quite reasonably the open securities market given an even chance for a stock to take a random walk in any direction.

# Chapter 6

## References

### 6.1 Links and Resources

*E – m – h.org* - Efficient Markets Hypothesis website with links additional links to the historical development and key papers by significant theorist.

*Economyprofessor.com* - An online Dictionary of Economic Terms, Concepts, Theories and significant Theorists.

*Probability.net* - Online Probability Tutorial including an introduction to the field of study and several related links to Definitions and Theorems.

*Probability.infarom.ro* - A comprehensive website on Probability Theory and its Applications published by Infarom Publishing with a great book link section relative to the mathematics of games of chance.

*Sportsbook – watch.com* - Betting Terms Glossary including sportsbetting lingo, casino terminology and poker jargon and definitions.

*Sportspool.com* - Comprehensive list of beatable and non-beatable casino games, non-casino based games and fixed-odds gambling and Parimutuel betting options.

*Stats.com* - A worldwide portfolio of sophisticated sports information, content and statistical analysis of 234 commercialized sports.

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