

Sports-Related Crime: A Game Theory Approach

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Abstract Sports-related crime is a variant of white-collar crime, one of the modern day versions of this can be seen in the phenomenon of match-fixing. This chapter uses the Game Theory approach to analyze the problem of sports-related crime. Game theory is applied to gain insight regarding the conflict between thoughtful and deceitful adversaries and is employed to analyze the interactions between law enforcement and defendants who commit sports-related crimes. The Prisoner's Dilemma will be employed to gain further insight into the dynamics that ensue amongst the various players – law enforcement, prosecutor, and players. After examining the levels of sports-related crime, formulating a cognitive valence map along with its approximations, and estimating its legal parameters and implications, the author suggests some preventive legal strategies. It concludes by highlighting the crucial need for more data at a global level that could assist researchers, law enforcement, and academics to get a better insight into this problem. It further calls for the creation of a Global Database on Sports-Related Crime.

Introduction

This chapter seeks to examine the problem of sports-related crime as a variant of white collar crime by employing the Game Theory approach. In 1907, Ross alluded to this problem of white-collar crime by referring to the criminaloid – a business leader who, while enjoying immunity from the law, victimized an unsuspecting public (Ross 1907). Later, in 1939, criminologist Edwin Sutherland defined white collar crime as one that is committed by a person of respectability and high social status, during the course of their occupation (Sutherland 1940, 1985).

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Though white collar crimes do as much damage to the moral and economic fabric of society, white collar criminals are not as rigorously pursued and prosecuted. Due to the fact that most white collar crimes are committed by persons from the upper and upper middle class of society, their inherent power in society does not render them open to punishment as is the case with respect to lower class criminality. It is due to this immunity or the low probability of being caught and prosecuted that most white collar criminals thrive and benefit from their criminal acts. This paper will use the insights of game theory in order to analyze, interpret and suggest preventive measures for sports-related crime. It will first examine the nexus between white collar crime and game theory.

Basics of Game Theory

Game theory was originally developed by John von Neumann, a Hungarian-born American mathematician, along with his Princeton University colleague, Oskar Morgenstern, a German-born American economist, in order to solve problems in economics. In their book – *The Theory of Games and Economic Behavior* (Von Neumann and Morgenstern 1944), they argued that the mathematics developed for the physical sciences, describing the workings of a disinterested nature, was a poor model for economics. They observed that economics was very similar to a game, where players anticipate each other's moves, and therefore calls for a new type of mathematics, that they referred to as Game theory (Dixit and Nalebuff 1991; Dixit and Skeath 1999; Straffin 1993).

A branch of applied mathematics, Game theory looks at tools for the analysis of situations where parties, called players, make decisions that are interdependent. The interdependence leads each player to consider the other player's possible decisions, or strategies, while formulating the individual's own strategy. The solutions to a game delineates the optimal choices of the players, who may have similar, opposed or mixed interests, as also the outcomes that could result from these choices.

Though initially used to analyze parlor games, its applications are much broader. Presently, Game Theory is applied to a wide variety of situations where the choices of players interact in order to affect the outcome. While emphasizing the strategic aspects of decision-making, or aspects controlled by the players rather than by pure chance, the theory both supplements and goes beyond the classical theory of probability. Some of the applications of this theory have been used to determine: (1) What political coalitions or business conglomerates are likely to form; (2) The optimal price at which to sell products or services in the face of competition; (3) The power exercised by a voter or block of voters; (4) Whom to select for a jury; (5) The best site for a manufacturing plant; and (6) The behavior of certain animals and plants in their struggle for survival.

It would be preposterous if any one theory could address such an enormous range of 'games,' as such, there is no single game theory. Various theories have been

proposed, with each applying to different situations along with its own concepts of what constitutes a solution.

Games may be classified according to certain unique features, the most obvious of which is the number of players. A game may be designated as being a one-person, two-person, or n-person (n greater than two) game. Games in each of these categories have their own distinctive features. Further, a player need not be an individual – this could be a corporation, a nation, or a team having many individuals with shared interests.

Types of Games: The types of games could be based on the following criteria:

- (a) Information, which could be either perfect or imperfect;
- (b) Goals, that either coincide or lead to conflict. These could be constant-sum games or variable-sum games that are cooperative or non-cooperative.
- (c) Quantum, which could either be finite or infinite.

Games could also be classified in one of three ways and these forms could also be combined and be referred to as the theory of moves:

- (a) Extensive: parlor games are an example of the extensive form of games using game trees.
- (b) Normal: two-person games are normal form games. These games use the strategic payoff matrix.
- (c) Characteristic Function: these games have more than two players.

Game theory is a study of conflict between thoughtful and deceitful adversaries. According to this theory, a game is any situation where two or more parties find themselves competing over interests that they cannot share amongst themselves. For our purposes, the interests are the sentences of white-collar criminals (Poundstone 1993). The prosecution seeks higher sentences, whereas defendants are desirous of lower ones.

Game theory can be employed as a means to analyze the interactions between law enforcement and defendants who commit sports-related crimes. This theory is useful for the purpose of analyzing myriad situations, though many of these may not initially resemble a game (Dresher et al. 1964; Axelrod 1984, 1997; Moulin 1986; Chess 1988).

White-Collar Crime and Game Theory

The recent spate of highly publicized corporate fraud schemes has led to a dramatic shift in white-collar crime prosecutions. These incidents have also resulted in the demise of the image of victimless crime with respect to corporate crime and white-collar crime. They have also revealed the amount of physical and financial damage that can be perpetrated by corporations that tolerated, engage in, or encourage illegal acts (Katz 1988). The perception that white-collar crimes are victimless or an

Table 1 Prisoner's dilemma

	B refuses deal	B turns state approver
A refuses deal	1 year, 1 year	3 years, 0 years
A turns state approver	0 years, 3 years	2 years, 2 years

exception to the rule is now history. As such, penalties for white-collar criminals are gradually increasing and appellate courts have been reversing light sentences with greater frequency (Calvita and Pontell 1990). Many commentators have demanded stricter sentences because the economic character and the rational, cool, and calculated intent of white-collar criminals make them ideal candidates for general deterrence. They argue that by raising the expected cost of white-collar crime it would become unprofitable and therefore cease (Bibas 2005; Posner 1986).

Game theory defines games in many different ways. A simple introductory game of cake-cutting may be taken as an example. Two children vying for the same piece of cake, need to split it between themselves. According to game theory this interaction is referred to as a zero sum game. As there is only one slice of cake, whether it is cut at the 50 % mark or the 99 % mark by one child, the other child will get the remainder. In essence, the children split the sum between them. The solution to this problem is to apply the traditional Solomonic parental method: one child is tasked with cutting the cake and the other chooses the slice. If only one child cuts the cake and chooses a slice unilaterally then, there is good reason to believe that the largest slice will be carved up. When the cutting and choosing responsibilities are divided, it does not permit either of the two to act in a unilateral manner. It forces the parties to cooperate, not based on altruistic motives, but in their own self-interest. The one who cuts the cake will endeavor to divide as equally as possible so as to prevent the other from getting a larger slice. The rules of the game give each party an incentive to act in a mutually beneficial manner. The interests of the parties are at equilibrium, since having exactly half a slice of cake is an outcome that neither party regards as their personal maximum result, but it is the best outcome that can be accomplished in the given situation. According to game theory, the point at which two players' interests balance is referred to as a "Nash Equilibrium," (Nash 1950) or a "saddle point."

However, not all games have saddle points and one can invent a game with any number of rules. Non-zero sum games, for example, do not have saddle points (Rapoport 1970). While players in zero sum games compete for a set amount of interests, there is not a set amount of interests in non-zero sum games. As there is no set sum to divide, both players can simultaneously make gains or incur losses. In zero sum games, every choice always benefits one player at the expense of the other. However, in non-zero sum games a particular strategy could, by itself, be better for both players. Though this initially simplifies the analysis, on closer scrutiny it reveals exactly how complicated non-zero sum games could be.

The Prisoner's Dilemma is a good example of the complications that ensue from non-zero sum games, Table 1 above illustrates, this game. According to the

scenario, two men, charged with a joint violation of the law, are held in separate locations by the police. Each of them is informed that:

- (a) If one confesses and the other refrains, then the former will be rewarded and the latter will be punished.
- (b) If both confess, then they will both be fined/punished.
- (c) Both of them, simultaneously, have good reason to believe that if neither of them confesses, both will be cleared.

One can appreciate the implications that games of this kind have on the issue of white-collar crime. According to this game, punishments or rewards are approximately equal to the outcomes available for modern day criminal defendants. Though criminal defendants do not face exactly the same scenario laid out in the Prisoner's Dilemma, they face a similar choice between alternatives that are less than desirable. Consequently, in this situation, they are competing not only with the other defendant, but also with the prosecutor, an entity that has two main interests – in the amount of the defendant's information, and the length of the defendant's sentence. This game was developed by Merrill Flood who called it the "Non-Cooperative Pair." Later on, his colleague, Albert W. Tucker formulated this hypothetical scenario in order to illustrate this game, giving it the name "Prisoner's Dilemma" (Isenhour 2007).

The problem of the scenario formulated in the Prisoner's Dilemma is that it is a real dilemma – a predicament that defies a satisfactory solution. The best mutual outcome is the upper left cell in Table 1 where both refuse to deal with the prosecutor. The best individual outcome is that of the lone cheater. The worst outcome is when one is suckered into sticking with the bargain (not to cooperate with the prosecutor) while the other person cheats. The best overall strategy is to cooperate with each other (not to be a rat) by being silent. This gives optimal results for both the parties. In this situation what course need a rational person follow, or alternatively, does every situation have a rational course of action?

In order to drill rationality into game theory, John Nash (1950) formulated a theory of 'equilibrium' in order to judge the outcome of the game. This can be evaluated by adopting the *Monday Morning Quarterback* analysis (Poundstone 1993). The post-game analysis survey is conducted by hypothetically asking both players regarding their satisfaction with the result. When the outcome satisfies both parties, it results in what is referred to as the Nash Equilibrium (Moulin 1986).

The Prisoner's Dilemma presents an interesting application of the Nash Equilibrium. Should both players have cooperated, then they both would have wished to have been the lone defector. If one party defected while the other cooperated, then the cooperator would wish to also have defected. However, if they both defect, then they will have achieved the Nash Equilibrium (Nash 1953). In the short term one-iteration game, the Nash theory proves that neither player can do better than to defect. However, the failure to acknowledge the mutually beneficial outcome that cooperation offers, leaves one with the feeling that something is amiss in the state of game theory.

Dissatisfied with the odd prediction of the Nash Equilibrium, researchers decided to further study this hypothetical game. They hoped that games with many iterations, would offer solutions to the dilemma if the players were allowed to develop behavioral patterns. According to Axelrod (1997) the Prisoner's Dilemma offers an interesting insight into the intricate dynamics of human behavior. What it encapsulates so well is the tension between the advantages of selfishness in the short run compared to the need to elicit cooperation from the other player in the long run. The pure simplicity of the Prisoner's Dilemma is very valuable in helping discover and appreciate the deep consequences of the fundamental processes while dealing with this tension.

Through the medium of computer simulations, academics from various fields studied the behavior of players of the Prisoner's Dilemma. The most interesting results were obtained by Robert Axelrod (1997) and his colleagues from computer simulations and tournaments. A computer simulation was set up with a limited set of rules. Each outcome was assigned a point value instead of a number of years of imprisonment. The researchers further solicited contributions of strategies (rules) from academics and professionals. The rules were then matched against one another to decipher what rules would garner the highest scores. The researchers found that the most successful strategies were those that elicited cooperation from the other player. Those strategies that leaned towards defection did not elicit as many points.

The lessons drawn from these tournaments were that players who are allowed to develop patterns of behavior tend to cooperate more often. The short term benefits of defection decrease as players realize that they stand to gain more from setting up mutually beneficial relationships of cooperation.

Axelrod (1997) and his colleagues further examined these tournaments by examining the rules from an evolutionary perspective. Axelrod found that cooperation was necessary for survival and that mutual cooperation fared much better than mutual defection. This study proved that initially, poor programs and good programs are represented in equal proportion. However, with the passage of time, the poorer ones atrophy and the good ones thrive. Though defection is near universal in the short term, long term strategies emerge when players react to each other through repeated iterations.

Though these computer simulations were very helpful to researchers in evaluating strategies between perfectly rational players, when these simulations were conducted on humans they did not fare that well. Computers tend to be logical opponents, having a perfect memory of past moves, with a perfect understanding of the rules, and any possible ramifications of actions. People, on the other hand, tend not to be any of the preceding. People tend to act randomly, competitively, altruistically, collusively, and according to notions of chivalry. They also tend to act according to their superstitions, premonitions, prejudices, and all other ways that cannot be imagined by a rational computer. This element of non-rationality adds a completely new dimension to the real life Prisoner's Dilemma. If a game is played between two completely rational players, then they will always come to the same result. However, when played against a person, there is no guarantee that the other party will act in a rational manner. Even if one acts rationally, they cannot be assured of any particular

result. According to Axelrod (1997), this randomness and uncertainty in action was referred to as ‘noise.’ Comprehension of the effects of iterations on the rationality of cooperation, coupled with the non-rationality of noise is crucial to understanding the application of game theory in concrete situations.

Game Theory and Law Enforcement

Game theory can become useful to law enforcement when Game theorists realize that what they can get from the Prisoner’s Dilemma is one of the main functions of the government – to ensure that when individuals do not have private incentives to cooperate, they will opt for the socially useful thing anyway. The government can then step in and change the effective payoffs. As such, game theory becomes relevant to the law from a public policy perspective. Through its knowledge of the rules that are likely to promote beneficial choices in different situations, the government is facilitated in structuring the laws. Game theory enables the government to predict which laws will encourage cooperation among parties, and also the laws that will disincentivize cooperation. If the payouts and the structure of the game lead to an incentive to perform the governments’ desired action, then the policy can be considered sound. However, if the game deters the desired conduct, then the government policy is faulty. Ascertaining whether a stated policy encourages the desired result is difficult.

The decisional matrix of the average criminal defendant can be quite complex (Richman 1995). For the participants, the problem is that the prosecutor tends to be the one who determines the payoff for the game. Standen (1993) narrates how a prosecutor can manipulate the overlap of sentences under the guidelines to expand or reduce the sentence at will. According to the sentencing guidelines, any amount of charges could cover a defendant’s criminal actions, and the prosecutor can then charge bargain with the defendant. The current trend of disallowing downward departures for white-collar sentencing gives the prosecutor even more leverage now that the defendants know that ‘what *they* charge is what *you* get.’

According to this scheme, prosecutors have been defined as ‘monopsonists,’ those who are the sole buyers of information that is offered by criminal defendants (Standen 1993). Within this monopsonistic market, the prosecutor (the sole buyer), is the one who sets the price and is at liberty to discriminate based on factors that are totally unrelated to the desire and ability to sell, and the relative value of the information. Standen (1993) argues that the legislative rules structuring sales of convictions do not appear to protect against this monopoly, but instead tend to encourage prosecutors to monopolize their superior bargaining position. This leaves the defendant in a quandary. The only prospect for the defendant to get leniency is by selling information, however, the price that is going to be paid for this information is dependent on the prosecutor.

In response to this unbalanced situation there is a countervailing factor that assists in stabilizing the monopsonist market. Within the arena of a criminal trial,

every prosecution constitutes an independent game that is played between two individual adversaries. According to Weinstein (1999), in these parlays, Game theory predicts that in these exchanges, the government will always win, because by offering such low prices, both the players are more than likely to defect. The defendants cannot shift the risk back to the government, because as an individual supplier, the defendant is a one shot player, who cannot engage in collective bargaining, and is therefore compelled to sell a commodity to the prosecutor who enjoys a superior negotiating position (Weinstein 1999).

However, within this dynamic there is another game that is in motion – this is a macro game taking place between the defense bar and the government. With respect to white-collar crime, defense attorneys play a role that is disproportionate to their roles when dealing in the trials of common criminals (Weisburd et al. 1991). According to Stuntz (1989) the disproportionate presence of private defense counsel transforms the game from being a one shot bargain, into one that is an iterated Prisoner's Dilemma. The defense attorneys, being part of the courtroom workgroup, are repeat players with whom the government has to deal with on an ongoing basis. In this situation, Game theory predicts that the disproportionate presence of defense counsel tends to turn the game in favor of the defense bar. As a consequence, among well-represented white-collar criminals, defection (turning state's evidence) is much lower than in cases of common criminals who do not have the benefit of privately retained counsel. These defense attorneys have good reason to push for cooperation as defection (turning state's evidence) damages the interest of their client base at the macro level. In the uphill battle against the arbiter/player of the game, the defense attorney represents a formidable adversary to the prosecutor (by itself, this counterbalancing factor could stabilize prices, but is not sufficient to tip the scales in favor of cooperation among defendants).

Levels of Operation for Sports-Related Crime

This table seeks to analyze the problem of match-fixing using a Game theory perspective. As a very simple example it will analyze the problem using five different dimensions for a game that has two teams. The first dimension could be that of the two teams which are to some degree cooperators as well as competitors when it relates to the game at hand. On the next level would be the judge/referee, who determines the outcome of the game. At this level there could be corruption of the game when the judge/referee is bribed by external factors to force a result. The third dimension would examine the spectators and the role that they play regarding the ongoing games. The fourth dimension focuses on the role the gambler/bettor plays in this dynamic. Finally, the fifth dimension examines the media and how it interprets the ongoing game and its reporting about it (Table 2).

Table 2 Dimensions of match fixing

Dimensions	Part	Part
I	Team A	Team B
II	Referee	Financier
III	Spectator	Spectator
IV	Bettor/Gambler	Bettor/Gambler
V	Media	Media

Cognitive Valence Map for Sports Related Crime

Table 3 draws upon a cognitive valence map to explain the logistics of match-fixing. This table analyzes match-fixing on three different variables.

- (a) Action taken by law enforcement;
- (b) The level of interest by the participants; and
- (c) The reasons for game participation.

At the law enforcement level it will be hypothesized that players would be more likely to act appropriately by following the law when law enforcement adopts a proactive policy. If law enforcement takes on a reactive policy, players will be more likely to indulge in cheating. With respect to the other two variables, level of interest and reason for playing – at the interest level we examine the various parties such as the players, referees, bookies, gamblers, spectators, and the media. So far as the third variable is concerned, we examine the reason why various parties take an interest in the game. These could be either for profit, entertainment, or satisfaction in playing the game. A questionnaire/survey could be formulated to estimate this empirically. The survey/questionnaire could be formulated so as to address all the cells of this $2 \times 6 \times 3$ table.

Cognitive Value Approximations

In Table 4 this researcher seeks to formulate an approximation of values for each of the 36 cells in this $2 \times 6 \times 3$ table. A further analysis of each of these cells needs to be conducted and empirically tested in order to determine the values for each cell. Upon empirical validation for each of these cells, law enforcement resources could be appropriately marshaled to deter the crime of match-fixing.

Legal Aspects of Sports-Related Crime

Match-fixing can be regarded as a variant of sports-related crime, it violates the ethics and integrity of sport. Whether related to influencing betting or to sporting objectives, it is a form of corruption and as such prohibited by national criminal law.

Table 3 Cognitive valence map

Action	Level	Profit	Entertain	Satisfaction
Reactive	Player (H)	3	2	1
	Referee	3	2	1
	Bookie (M)	3	0	0
	Gambler	3	2	1
	Spectator (L)	0	3	2
	Media	3	2	0
Proactive	Player (H)	1	2	3
	Referee	1	2	3
	Bookie (M)	3	1	2
	Gambler	3	2	1
	Spectator (L)	1	3	2
	Media	3	1	2

Table 4 Cognitive value approximations

Action	Level	Profit	Entertain	Satisfaction
Reactive	Player (H)	.6 (r1c1)	.3 (r1c2)	.1 (r1c3)
	Referee	.6 (r2c1)	.3 (r2c2)	.1 (r2c3)
	Bookie (M)	.8 (r3c1)	.1 (r3c2)	.1 (r3c3)
	Gambler	.8 (r4c1)	.1 (r4c2)	.1 (r4c3)
	Spectator (L)	.1 (r5c1)	.8 (r5c2)	.1 (r5c3)
	Media	.7 (r6c1)	.2 (r6c2)	.1 (r6c3)
Proactive	Player (H)	.1 (r7c1)	.2 (r7c2)	.7 (r7c3)
	Referee	.1 (r8c1)	.2 (r8c2)	.7 (r8c3)
	Bookie (M)	.7 (r9c1)	.1 (r9c2)	.2 (r9c3)
	Gambler	.7 (r10c1)	.2 (r10c2)	.1 (r10c3)
	Spectator (L)	.1 (r11c1)	.8 (r11c2)	.1 (r11c3)
	Media	.8 (r12c1)	.1 (r12c2)	.1 (r12c3)

International criminal networks play a nefarious role in match-fixing associated with illegal betting. Due to the worldwide popularity of sport and the trans-frontier nature of betting activities, the problem often goes beyond the territorial jurisdiction of national authorities. Sport stakeholders have been working with public and private betting companies to establish early warning systems and educational programs, with mixed results. The European commission has been cooperating with the council of Europe in analyzing the factors that could contribute to more effectively addressing the issue of match-fixing at the national, European and international level. Integrity in sport is also one of the issues that is addressed by the Commission with consultation on the provision of online gambling services in the EU.

At the European level, match-fixing is determined by examining the expression “manipulation of sports results” which covers the arrangement of an irregular alteration of the course or the result of a sporting competition or any of its particular

events (e.g. Matches, races) in order to obtain an advantage for oneself or for others and to remove all or part of the uncertainty normally associated with the result of a competition.

Sports-Related Crime Pertaining to India

So far as sports-related crime in India is concerned a majority of the crimes pertain to football (soccer), cricket and field hockey since these tend to be the most popular games for the Indian masses. With respect to football (soccer), most of the teams that play football are in the north-eastern part of the country. The major venues that host the football teams are the Nehru cup, Mohan Bagan and Mohammedan sporting in Bengal. In 2012, the Gauhati Town Club (GTC) opted to disband its senior team and not participate in any football tournaments for 3 years due to allegations of match-fixing by its players. According to the GTC general secretary, the abominable element of match-fixing had found its way into Indian football and had ruined the sport. Even the star footballer, Bhaichung Bhutia, was accused of being involved in match-fixing. In yet another case, a complaint had been lodged with the All India Football Federation alleging that United Sikkim had bribed its key players to lose a match. With respect to the Cuttack leg of the tournament, there were serious allegations of match-fixing. The Football Federation found out that two of the matches against leading Calcutta teams had been fixed. An investigation revealed that players had been bribed to throw the matches (Ahmed 2012).

So far as cricket is concerned, there have been many serious complaints about issues of match-fixing, spot-fixing and throwing of matches by players in the Indian Premier League (IPL) and the One Day Internationals (ODI). Cricket players from countries such as South Africa, India, Pakistan, and Australia have all been involved in sports-related crime (see note 1 regarding some of the major scandals in cricket).

Recently, the chairman of the Board of Control for Cricket in India (BCCI) was forced to step aside pending an investigation, due to allegations of spot-fixing scandal that negatively affected the game in India. It led to the arrest of his son-in-law. In May 2013, three cricketers were arrested due to allegations that they had taken money to concede a pre-determined number of runs in the IPL matches (ABC news 2013).

The next sport, field hockey, one of the most popular national sports in India has also been hit by scandal by allegations of match-fixing. A former coach of the Indian Hockey team, Harendra Singh, accused players of match-fixing (Sports Betting 2013).

Most of the problems regarding sports-related crime began in the 1990s due to the advent of sports-betting sites on the Internet (see note 2). The influx of unregulated money into sports has led to a corruption of the game. Though gambling is highly restricted in India, this is not the case with online gambling. In spite of prohibitive legislation (Gambling Act 1867), the Indian gambling market is worth \$60 billion per year. Half of this amount is spent on illegal betting (Thompson 2009).

Some Indian officials are in favor of legalizing sports betting because of the belief that profits generated by the underground bookies are used to fund drugs and terrorism. In May 2011, India passed the Information Technology Act, which is supposed to control Internet gambling. This act covers gambling sites and tasks the Internet Service Providers with blocking offshore betting sites (Lakshmi 2013).

Preventive Strategies for Sports-Related Crime

Some of the preventive strategies that could be instituted in order to control the problem of sports-related crime are:

- Increase the salaries of the players;
- Increase the salaries of the referees/umpires;
- Have a proactive law enforcement approach to look out for irregularities by bookies and financiers;
- Adopt an ongoing, compulsory, ethics education course that should be taken by all persons involved with the game.
- Publicize lists of persons who have committed irregularities with respect to sports-related crime.
- Determine whether there are any irregularities with respect to the betting process when it relates to a game;
- Institute a time delay in the broadcast signals when a popular game is being broadcast live.
- Institute stringent and quick prosecutions against any actor who commits a sports-related crime.

Conclusions Recommendations

There should be a Global Database on Sports-Related Crime (GDSRC) that needs to be set up at the international level. An International law enforcement agency such as Interpol should be tasked with setting up this project. This GDSRC should be set up as a one stop clearing house for all matters pertaining to sports-related crimes. The data set should be easily available to scholars, academics, and law enforcement officials at the international level.

At the initial compilation stage, care should be taken to compile and code all the various games along with the appropriate coding for these games. A penal law format that aggregates all the national codes and their violations should be aggregated into the database. Individual country, region, and international factors should also be taken into account when constructing this dataset. Once the data has been compiled and populated it should be assembled into a machine-readable format so as to be accessible to scholars using standard statistical packages such as SAS or SPSS. When this dataset has been completed it can be used for analysis, validation,

prediction, learning and prevention purposes. This dataset, once it is populated with sufficient data points, could also be used to run simulations with various Game theory scenarios in order to evaluate and improve law enforcement processes and policies. The new data and further research would offer interesting new insights into this new area of white-collar crime.

Notes

1. There were six famous match-fixing scandals in India with respect to cricket.
 - (i) Hansie Cronje of South Africa was charged by Delhi Police with fixing the One Day International (ODI) on April 4, 2000. He was also charged with taking money from bookmakers.
 - (ii) Azharuddin was found guilty of match-fixing on 11/27/2000 and Kapil Dev was charged with under performing in the game of cricket on 5/24/2000.
 - (iii) Salim Malik of Pakistan was charged with match-fixing in cricket during a match between Pakistan and Australia. In 1994, he asked the Aussie players to bowl badly and lose the Karachi test. On 5/24/200 he was found guilty of match-fixing.
 - (iv) Wasim Akram of Pakistan was charged with match-fixing in a game between Pakistan and New Zealand. In 1998 he asked the Kiwis (New Zealand) to bowl badly. On 5/24/2000 he was found guilty.
 - (v) On 11/3/2011, the following players were charged with the no ball scandal: Salman Butt, Mohd. Asif, Mohd. Aamer.
 - (vi) In 1998 Warne and Waugh passed on weather and pitch information to Indian bookies. Both of them were fined.
2. Some of these Indian betting sites are:
 - (i) Bet365
 - (ii) Bodog
 - (iii) William Hill
 - (iv) Ladbrokes

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