

The Research on Association Between Anomalous Behavior in Basketball Games and Betting Market



ADVISOR
Yean-Fu Wen



ADVISOR
Yen-Chun Lin



AUTHOR
Chia-Yang Lu

1 Background



- Match-fixing occurs in professional sports, **threatening the integrity of competitions**.
- Traditional detection methods rely heavily on **manual investigation** (video analysis and communication record) review.
- Existing studies focus mainly on baseball, football, and tennis; **basketball-related research remains limited**.
- The rapid growth of sports betting markets increases the **potential risk of game manipulation**.



2 Motivation

- Most current detection methods are lack **scientific explanation**.
- Few studies integrate all 3 critical variables: **odds data, player performance, and bettor behavior**.
- Failure to detect fixing early can damage the **credibility of professional leagues** and hinder prevention efforts.

3 Objective



- Develop an operational, **data-driven anomaly detection system** for basketball match-fixing.
- Combine real-world data and simulated betting behavior to **identify suspicious performance patterns**.
- Provide investigators with a scientific tool** for evaluating.
- Introduce a **multi-dimensional model** applicable to future research and real-world monitoring.

4 Methodology



Data Sources:

- Odds data
- Player performance
- Simulated betting records to represent bettor decisions



Data Processing:

- Normalize key metrics such as EFF, TM_EFF, and odds gap
- Apply decision tree logic and Likert-scale scoring for anomaly evaluation



Simulation Design:

- Generate randomized bet directions and amounts
- Create 4 scenarios: WW, LL, WL, LW



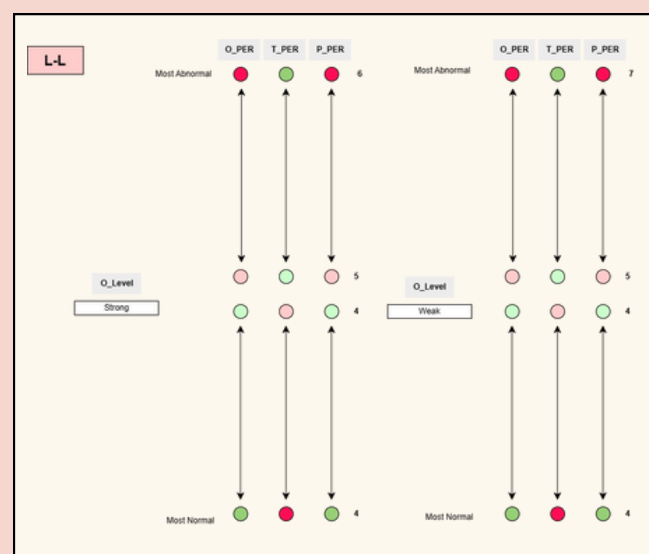
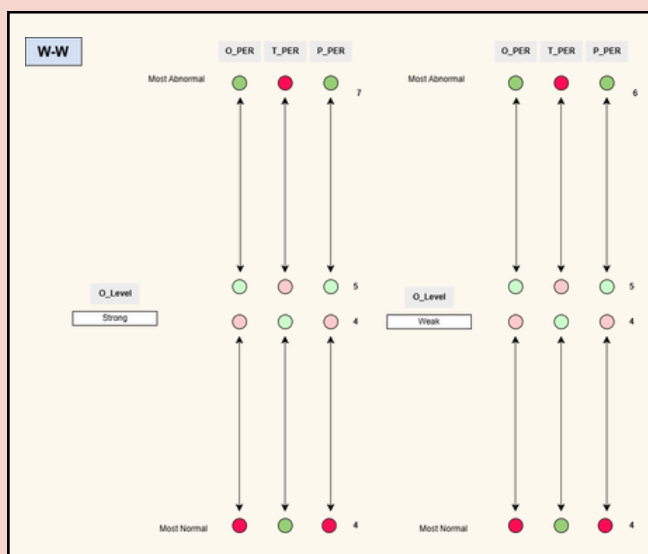
Analysis:

- Match betting profit patterns with player performance to assess suspicious behavior

5 Result



- Successfully built a quantifiable **anomaly detection model** linking player behavior to potential betting manipulation.
- Identified combinations of high betting profit with unusual player performance, signaling **possible Match-Fixing**.
- Provides a **scalable framework** for future applications with real-time data and multi-league compatibility.



PLAYER	EFF	BET AMOUNT	PROFIT	DIMENSIONS	ASSOCIATION	CV
A	34.7	480	33.5	5.0	Higher	0.071
B	30.5	579	-264.0	4.8	Uncertain	0.057
C	39.7	474	114.5	5.1	Higher	0.040
D	42.1	445	-90.0	4.4	Uncertain	0.044
E	31.5	679	-76.8	4.6	Uncertain	0.090
F	36.6	617	-615.3	2.7	Low	0.058
G	33.2	509	-414.9	4.1	Uncertain	0.057
H	38.7	617	166.9	4.0	Uncertain	0.065
I	35.9	584	-557.8	4.2	Uncertain	0.087
J	32.3	426	-161.0	4.9	Uncertain	0.050
K	34.9	591	-450.7	4.2	Uncertain	0.033
L	41.8	421	345.0	6.6	Very High	0.027
M	36.1	388	-88.4	4.3	Uncertain	0.094
N	30.8	555	-518.4	4.0	Uncertain	0.022