Would Increasing the Goal Scoring Area in Soccer Improve the Quality of the Game?

By
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Association football (soccer) is rated as the most popular sport globally with 4 billion fans, yet has one of the highest draw probabilities in sport (after 90 minutes of fixed time of play). In the 2014 World Cup the draw percentage was 26.6% (ignoring qualifying rounds). Sixty-four games were played with a score of 0-0 occurring in 11 matches, score of 1-1 occurring in 4 matches and a score of 2-2 occurring in 2 matches. In the 2016 European Championships a draw percentage occurred in 33.3% of games played and in the 2016-2017 Champions League a draw percentage occurred in 49.6% of matches.
http://www.footballbetting.org.uk/articles/how-often-do-football-matches-end-in-a-draw/

To determine a winner in the Knock-Out stage of the soccer World Cup if drawn after 90 minutes of play, the game continues through all 30 minutes of extra time, whether or not goals are scored. If it's still a draw after the 30 minutes of extra time, both teams will take penalty kicks (known as a penalty shoot-out). A penalty shoot-out could be considered a 50/50 proposition. The underlying concept behind soccer (amongst other team sports with a fixed duration of play) is to determine the winner as the better team on the day. If scoring a goal in soccer is such a difficult proposition (as observed from 11 out of 64 matches played at the 2014 World Cup) then this increases a large amount of random variation in the game. To reduce the random variation and hence determine the better team winning on the day is to increase the chances of teams scoring goals, which amounts to increasing the size of the goal scoring area. The history behind the size of the goal scoring area is somewhat arbitrary in that there was no mathematics involved as to how it would affect the chances of the better team winning and draw after a fixed amount of playing time. "In 1863 the English Football Association decreed that the posts should be 8 yards apart (7.32m), a measurement which has never altered since. In 1875 the wooden crossbar started to replace the tape, at a height of 8 feet (2.44m) above the ground".
http://gdfra.org.au/history_of_goalposts.htm

Increasing the chances of teams scoring goals to increase the chances of the better team winning (and hence reduce the chances of a match finishing in a draw) can be shown mathematically.

Suppose team A is estimated to score a goal in a 1-minute time period of 1.6%
Suppose team B is estimated to score a goal in a 1-minute time period of 1.2%
Then the chances of no score in a 1-minute time period is 100%-1.6%-1.2% =97.2%

Note that these percentages were based on a prediction model by the author on an actual match during a World Cup whilst working for Infoplum.
http://www.infoplum.com/

Then using a Markov Chain model to account for all score lines that could possibly occur over 90 minutes of play, the chances of team A winning the match is 45.4%, the chances of team B winning the match is 28.4% and the chances of a draw is 26.2%.

Now suppose the goal scoring area is increased to allow teams a higher chance of scoring goals and suppose this increases the chances of team A scoring a goal in a 1-minute time period by 1% and the chances of team B scoring a goal in a 1-minute time period by 0.5%.

Then team A is estimated to score a goal in a 1-minute time period of 2.6% and team B is estimated to score a goal in 1-minute time period of 1.7%.

Using a Markov Chain model, the chances of team A winning the match is 55.8%, the chances of team B winning the match is 24.7% and the chances of a draw is 19.5%. This is an increase of team A winning the match by 10.4% compared to a decrease of team B winning the match by 3.7%, and hence a reduced draw percentage of 6.7%.

The mathematics is similar by playing 30 minutes of extra time if scores are level after 90 minutes of play, in that increasing the size of the goal scoring area would increase the chances of the better team winning and reduce the draw percentage (hence minimizing the chances of going to a penalty shoot-out which could be considered a 50/50 proposition).

Note also that playing extra time increases the risks of players becoming injuring and so increasing the size of the goal scoring area reduces the chances of the match actually going into extra time (as shown by the example above as 6.7%).