Exploring Equity in the Golf Skins Game

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Introduction

Unlike in most other sports, in golf, the player with the lowest score wins. The game involves completing each of the 18 holes in a course in as few strokes as possible. Each hole has a par—the average number of strokes a professional is expected to take to complete the hole. To make the fame fair among golfers of different skill levels, player handicaps are used. A handicap is the total number of strokes a player is expected to play over par. This total is converted to a course handicap based on the particular course. In a normal golf game, the player subtracts their course handicap from their total score at the end of the 18 holes for a net score.

However, when playing skins, handicaps do not always help balance skill disparities. In the golf skins game, each hole is an independent competition. Since the results on one hole do not affect the next, players' handicaps must be applied differently. To use player handicaps in skins, one point is applied to each of the most challenging holes on the course until there are no more player handicap points to apply. We believe this method in leads to higher-handicap players having an advantage.

Methods

Since no public database of golf scores is available, we simulated our own games. To create realistic data, we used Hardy's model[1]. Hardy proposes that players make three types of shots:

- A bad shot which makes no progress towards the goal
- A good shot which puts the player two strokes closer to the goal.
- An ordinary shot which moves the player one stroke closer to the goal

Using this model, we used two approaches.

- **The empirical approach.**
  We simulated games between golfers of different skill levels. To analyse the data we performed a stroke by stroke comparisons of the results, making sure to take the handicap into account. We then compare the net scores of each player and see how many rounds they won.
- **The analytical approach**.
  We calculated the probability that each player would win a hole with 2-7 strokes, then added up all of the probabilities for that hole. At the end of the 18 holes we added up all of the hole probabilities to find out how many skins each player will win on average.

Results

When applying our analytical algorithm to several varying competitions, we discovered that the difference in probabilities varies depending on the number of players. In Figure 1, we can see that when using 100% of their handicaps, players with lower handicaps can expect to win far fewer skins than players with higher handicaps.

Handicap	Skins Won (100%)	Skins Won (45%)
10	6.414	7.833
20	7.271	5.452

Figure 1. The results from a game between players with handicaps of 10 and 20. When using 100% of their handicaps, although the 10-handicap player is more experienced, they are at a statistical disadvantage. When using only 45% of their handicap, the lower handicap player performs much better.

Furthermore, in matches with six golfers, we find the player with the highest handicap wins more than twice the number of skins than the best player with the lowest handicap when using 100% of their handicaps. This is shown in Figure 2.

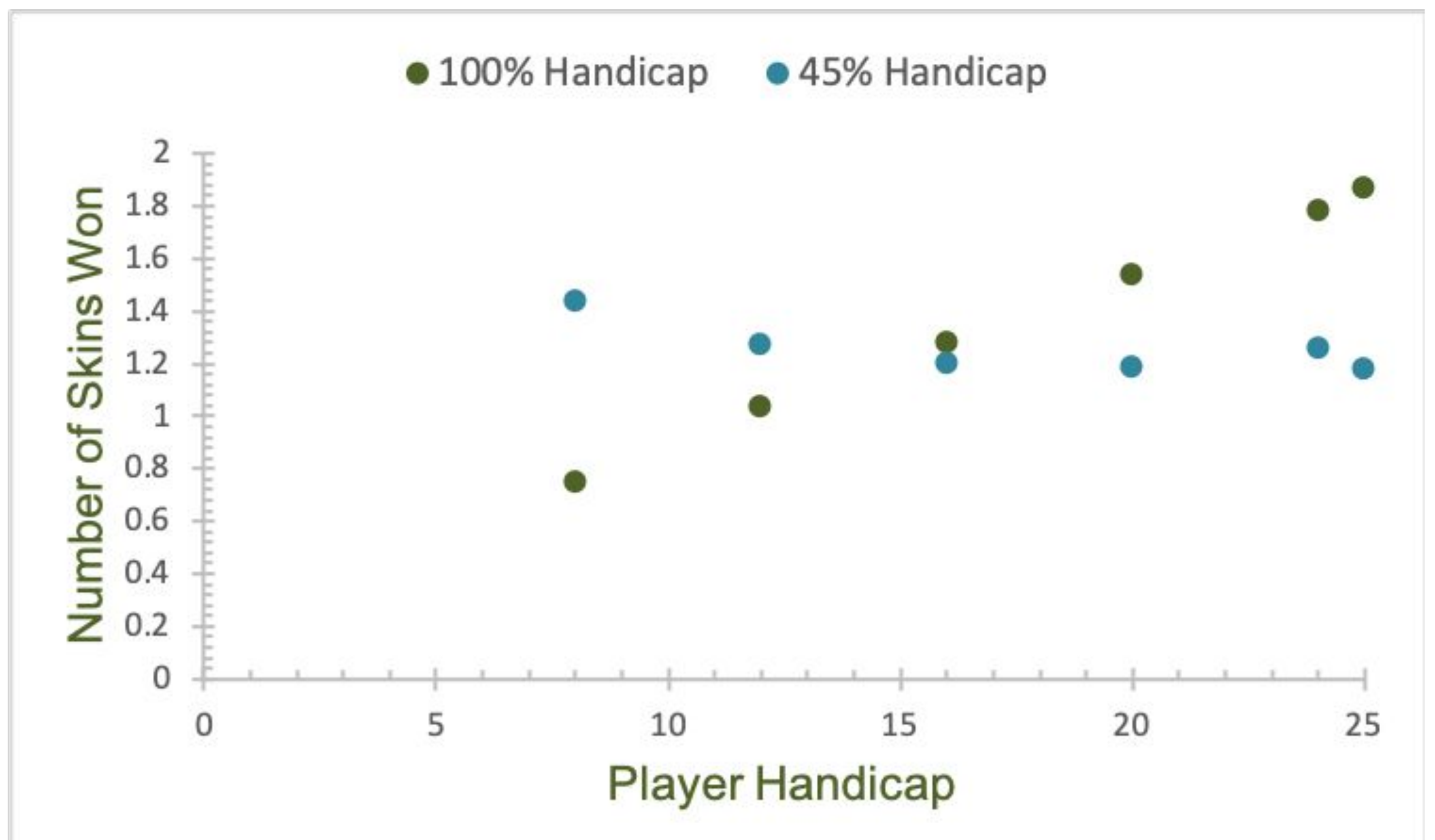

Figure 2. The results of a game between 6 players, The players with higher handicaps win more skins when applying 100% of the players' handicaps. When applying only 45%, we can see this method of equalization is effective for this specific game.

To attempt to solve this disparity, we used percentages of the player handicaps instead of the full amount. This means they will not have as many points to apply to the holes. We tried using 45% of the players' handicaps. The six players' probability sums are much closer after this change, and the better players have a slight advantage. However, when we applied the same handicap percentage to other games, we do not get such promising results. For example, when we simulate the two-player game from earlier, the new handicap percentage actually causes a worse disparity in wins. Even when we generate another six-player game, the win differences vary.

Conclusions

- Skins is clearly inequitable across different skill levels. Players with higher handicaps on average win far more skins than their lower-handicapped counterparts.
- Although using a percentage of player handicaps may seem like a good solution, the method does not work for all combinations of players. There is no single handicap percentage that works for every game.
- For additional research materials, visit https://github.com/ostrasburg/Golf-Research-2020

Future Work

- The method of equalization may vary based on the number of players competing. Furthermore, since our model also only takes three types of shots into account, we worry that it might not accurately capture the nuances of playing golf.
- We have considered a new model consisting of "half-shots" of progress, where we still have good, bad, and ordinary shots, but we also have slightly bad and slightly good shots allowing for half a stroke of progress.

Acknowledgements

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Works Cited

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