To: Tony Stiers

From: Robbie Pittman

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Subject: Analysis of Golf Data

The performed analyses address the following two issues:

--how well do the handicaps reflect the likelihood of who wins
the various prizes in the club's Monday tournaments

--how well do the 'tees played' reflect the likelihood of who wins the
the various prizes in the club's Monday tournaments

Coordinators for this year's tournaments were contacted about submitting results for the various tournaments each had coordinated. Data were received for the following tournaments: 11/21/16, 02/13/17, 02/17/17, 03/27/17, 04/24/17, 05/22/17, 05/29/17, 06/12/17, 06/19/17, 07/31/17, 08/27/17, 09/04/17, 09/18/17, 09/25/17, 10/02/17, and 10/16/17. These were used to address the question regarding the extent to which the handicaps were tied in with tournament results. Data from the 3/27/17 tournament and then the most recent six commencing with 8/27/17 were employed to determine tee placement in addressing the 'tee' question. The smaller number in this set for determining a golfer's tee placement reflected the fact that those were the only tournaments in which 'tee' information was recorded for the various winners.

The first step in the analyses was to identify the golfers to include. Only the golfers who had won a prize (front 9, back9, overall, skin, or closest-to-pin) in a Monday tournament or who I had seen participating in one of these tournaments was included. This excluded golfers who play with the club, but do not participate in the tournaments. There were 37 club members who met this 'tournament play' criterion. Of these 37 individuals, 31 had won at least one prize. Therefore, approximately 84% of those participating had won a prize in a Monday tournament. With that said, five club members won 43% of the 242 prizes earned at the Monday tournaments used in the analysis. DISCLAIMER: Some golfers participate more often in the Monday events and one might expect these individuals to win more prizes. From the provided data there is no way to determine the extent to which participation rate accounts for the higher concentration of prizes among a small number of golfers.

Conclusion 1: A very high percentage (84%) of the individuals who participated in the Monday tournaments won a prize (at some point). Correspondingly, a large percentage (43%) of the Monday tournament prizes was won by a small group of club members.

Individual handicap and its link to winning at a Monday tournament: This issue was addressed by first dividing the sample of participating club members (the 37 mentioned above) into four equal-sized groups based upon handicap. Since handicap may change somewhat over the course of the year, an average handicap index was created for each golfer. This average index reflected the average of the golfer's handicap on 4/10/17 and 10/2/17. These two dates were used because

handicap sheets for those two dates were available to me. The following table provides a breakdown of the club 'tournament' golfers by handicap index.

Distribution of Participating
Club Membership by Average Handicap Index

Handicap Group	Number of Members	Corresponding Handicap Index Range
1	9	less than 19
2	9	19 -- 22.5
3	9	22.51 -- 26.9
4	10	27 or greater

Once this was achieved, the frequency of winning one of the tournament prizes was broken down by handicap group. The rationale for this was that if the handicapping system was working as expected, there would be an even distribution of prizes across handicap groups, since the purpose of the handicapping adjustment is to 'equalize' golfers of different abilities. There are potentially eight (8) different prize categories awarded in the Monday tournaments. These are front 9 first place, front 9 second place, back 9 first place, back 9 second place, overall first place, overall second place, skins, and closest to the pins. The table on the following page provides the breakdown of prize winnings by handicap group.

Breakdown of Monday Tournament
Winnings by Handicap Grouping

Handicap Group	Prize Category							
	Front 9 First	Front 9 Second	Back 9 First	Back 9 Second	Overall First	Overall Second	Skins	CTP
1 (24%)	6 (29%)	1 (9%)	8 (35%)	1 (10%)	7 (32%)	1 (20%)	47 (53%)	23 (39%)
2 (24%)	5 (24%)	4 (33%)	6 (26%)	4 (40%)	5 (23%)	2 (40%)	21 (24%)	21 (36%)
3 (24%)	7 (33%)	4 (33%)	5 (22%)	4 (40%)	9 (41%)	1 (20%)	18 (20%)	12 (20%)
4 (27%)	3 (14%)	3 (25%)	4 (17%)	1 (10%)	1 (5%)	1 (20%)	2 (2%)	3 (5%)
Total	21	12	23	10	22	5	88	59

Note. The numbers in parentheses represent the percentage of the total number of golfers in that group. The percentages have been rounded up, so the percentages in a column may not total to exactly 100%. Data from 16 tournaments were used in the analyses, but due to ties, the total for front 9, back 9, and overall may be more than 16.

If the handicapping system were working perfectly, we would see approximately 25% of each handicapping group winning the front 9, the back 9, and the overall. Skins and closest-to-the-pin scorings are not adjusted for handicap and therefore one would not expect to see the same even distribution.

Conclusion: Concentrating upon the prize categories for front 9 (1st), back 9 (1st), and overall (1st) to address the issue of how well the handicapping 'levels the playing field' for tournament participants, several points can be made. What we would like to see is approximately 25% of the winners for these prizes being in each of the handicap groups. That is not the case. For the first three handicap groups, one could make the statement that these golfers win their share and more, while those in the highest handicap group do not. So the handicapping system is not sufficient to even things up enough to allow those with the highest handicaps to be competitive with club members with lower handicaps.

When considering the skins and CTP prizes, the picture is even clearer. Those club members with the lowest handicaps dominate the skins prizes and overall the golfers in the two lower handicap groups win 75% of the skins and CTPs. This is as one might expect. The better golfers have the lower handicaps; the better golfers are likely to make more good shots; therefore in a

contest in which handicap does not play a part, the better golfers will win the vast majority of the prizes. In comparing the percentage of prizes won by the club members with the highest handicaps across the different prize categories, it should be noted that they win more often in the contests in which handicaps affect the identification of the contest winner, so handicap does help, but not to the point of being competitive.

A last point to this is that one could argue that the first and last handicap groups cover a wider range of ability as reflected in the handicap index than is the case for handicap groups two and three. Essentially, seven shots separate the lowest handicap index from the highest handicap index across these two groups. Therefore, there is a smaller skill difference in the two middle groups than in the top and bottom groups. As such, the argument could be made that the water is muddied by creating groups at artificial points, just so that we wind up with equal numbers in each handicap group. This can be clarified mathematically by calculating a correlation coefficient. This statistic indicates the degree of relationship between two numerical things (variables). In our case the correlation coefficient represents the degree of relationship between average handicap index and the number of times winning the front 9 by using the individual scores of each golfer rather than a grouping by handicap. The resulting coefficients indicated there was no relationship between handicap and winning the front 9; 6.8% of a perfect relationship between handicap and winning the back 9; 2.6% of a perfect relationship between handicap and winning overall; 43.6% of a perfect relationship between handicap and winning skins; and 7.8% of a perfect relationship between handicap and winning CTPs. These values do not alter substantially the picture seen with the handicap groups. The better golfer you are, the more likely (by a lot) you are to win skins and your chances are better in winning front and back 9s along with CTPs.   Your chances are slightly better for winning overall if you have a higher handicap. This was seen in the group analysis in which 41% of the overall winners were in handicap group 3.

Tee box played and its link to winning at a Monday tournament: The approach used in determining the link between the tee box played and winning at a Monday tournament followed the same approach as was used with handicap and winning prizes. First, it was necessary to determine which tee box was played by club members. As previously stated, information was collected on seven Monday tournaments in which the tee boxes played was listed. These were identified and the tee box played most often by an individual was assigned as that person's tee box for the purposes of the analysis. Most individuals played the same relative tee box regardless of the course, but a few members did play different tee boxes. There were 30 club members for whom it was possible to identify a tee box and who had won at least one prize in a Monday tournament for which I had data. Following is a breakdown of these golfers by the tee box played most often.

Distribution of Participating
Monday Tournament Winners by Tee Box Played

Tee Box Group	Number of Members	Corresponding Percentage
1 (Most Forward)	5	17
2	17	57
3	7	23
4 (Farthest Back)	1	3

From this, it can be seen that a majority of the Monday golfers play next to the most forward tees. As with the analysis of winning prizes by handicap, the assumption is that if tee box has no link to whether a club member wins or loses then we would expect about 17% of the prizes to be awarded to those playing the most forward tees, about 57% of the prizes to be won by individuals in the next most forward tees, etc. Following is a breakdown of the Monday tournament winnings by the tee box played by the winners.

Breakdown of Monday Tournament
Winnings by Tee Box Played

Tee Box Group	Prize Category							
	Front 9 First	Front 9 Second	Back 9 First	Back 9 Second	Overall First	Overall Second	Skins	CTP
1 (Forward) (17%)	2 (10%)		2 (9%)	2 (20%)	1 (5%)		18 (20%)	10 (17%)
2 (57%)	14 (67%)	8 (67%)	12 (52%)	6 (60%)	12 (55%)	4 (80%)	29 (33%)	26 (44%)
3 (23%)	5 (24%)	4 (33%)	7 (30%)	2 (20%)	8 (36%)	1 (20%)	31 (35%)	22 (37%)
4 (Farthest) (3%)			2 (9%)		1 (5%)		10 (11%)	1 (2%)
Total	21	12	23	10	22	5	88	59

In looking at the percentages within each prize category and then doing an eyeball comparison with the expected percentages from the tee box grouping, some small differences are noted. For example, only 10% of the front 9 winners played from the most forward tees, yet 17% of the club members who have won a prize played from the most forward tees. Thus we would have expected 7% more winners to come from the most forward tees. With this said, it must be noted that we are dealing with a relatively small sample size and a change of two additional wins would add approximately 6% to the total (all other things being equal). A 7% shortfall could be considered trivial. The same can be said for most of the other prize categories with the exception of the skins category. For skins, tee box group 2 (the next most forward group and the group containing the largest number of club members) had a 24% shortfall in attaining skins relative to their number (57%) in the playing group. The two sets of 'back' tees had proportionately a larger share of the skins than their numbers would dictate if there existed no relationship between winning and the tee played. On the surface, this last finding suggests that the further back one plays, the greater the likelihood of winning skins. I feel that the true explanation lies with a point made in the analysis of handicaps and winning prizes. That observation was that the lower handicap golfers win a greater proportion of the skins than their numbers would suggest. With respect to the tees played, I feel the same principle is operating. The better golfers are playing tees further back. As a result of being better golfers, they win more skins regardless of the tee box they are playing. A similar argument can be made for the CTP prize category. Tee box group 2 had a lower expected win rate with group 3 having a corresponding higher win rate. Again, in my opinion, this is a function of the better players hitting from the further back tees.

Conclusion with respect to tee box played and winning at Monday tournaments: The available evidence suggests that tee box played is not strongly related to whether one wins at the Monday tournaments, with the possible exception of winning skins and maybe CTPs. These possible exceptions are most likely due to the higher golf skill level of those who play from the 'back' tees.

Combination of handicap and tee box played on winning at a Monday tournament: As a follow-up to the preceding analysis, a final analysis was done to determine if a link existed between tee box played and winning a prize after taking into account the individual's handicap. Several analyses were done that were similar in nature to that reported in the last table of results. The only differences were they were done for each handicap group separately, rather than for the entire group of players simultaneously. Likewise, there were different percentages in the 'tee box groups' because it was done by handicap grouping rather than for the total set of golfers. Eight separate analyses were run and none indicated a link between tee box played and winning at a Monday tournament, once handicap was taken into consideration. What this suggests is that a player with a given handicap would not improve her/his chances of winning markedly by changing tee boxes (assuming the person had the distance off the tee to play that set of tees initially).

Overall Conclusions:

1. Better golfers win proportionately more prizes, regardless of handicap. The handicap system does not completely equalize things for club members with higher handicaps when it comes to competing for prizes determined by a net score at the

Monday tournaments. I suspect the club championship data would reveal the same thing. There were more winners in the first two groups than there were in the other groups.

2. Lower handicap golfers have a decided advantage when it comes to skins and somewhat less when competing for CTPs. Handicapping does not factor in as much on these two prizes as it does for the best net score prizes.

3. Assuming the golfer has the ability to play a particular set of tees, no advantage seems to be gained by moving forward in the tee box system.   Moving up a tee box, in reality, should only impact the tee shot and the distance gained on that one shot.