An Investigation of Equitable Stroke Control

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1 Introduction

Upon a request from Matt MacKay of the Royal Canadian Golf Association (RCGA), this report contains the results of an investigation concerning equitable stroke control (ESC). This work extends the analysis found in Swartz (2009) which proposes a more equitable handicapping system. There are a number of problematic issues involving ESC including:

- many golfers do not understand ESC and do not apply it correctly
- the RCGA and the USGA currently have different rules regarding the implementation of ESC
- the effect of ESC on handicap is not well understood

However, the elimination of ESC is fraught with difficulties including:

- ESC provides a method for assigning a score when a score is not achieved
- ESC is a tool for maintaining pace of play
- ESC provides a partial safeguard against "sandbagging"

In light of the above considerations, the RCGA has requested an investigation into three proposals involving ESC. Although all of the above considerations are important, the analysis presented here concentrates primarily on the effect of ESC on the calculation of handicap. We refer to the three proposals as Methods A, B and C, and their definitions are given below.

Method A: This is the RCGA's current implementation of ESC. On each hole, the maximum allowable score is determined by the golfer's course handicap.

course handicap	max score allowed
scratch and below	bogey
$1-18$	double bogey
$19-32$	triple bogey
33 and above	quadruple bogey

Method B: This is the USGA's current implementation of ESC. On each hole, the maximum allowable score is determined by the golfer's course handicap.

course handicap	max score allowed
9 and below	double bogey
$10-19$	7
$20-29$	8
$30-39$	9
40 and above	10

Method C: This is a hybrid version of the RCGA and USGA systems. On each hole, the maximum allowable score is determined by the golfer's course handicap.

course handicap	max score allowed
9 and below	double bogey
$10-19$	triple bogey
$20-29$	quadruple bogey
$30-39$	quintuple bogey
40 and above	sextuple bogey

2 Data Analysis

In this section, we study an extensive data set of full golf rounds recorded by members of the Coloniale Golf Club from 1996 through 1999. The dataset is useful for assessing ESC as it contains the actual scores on each hole prior to the current ESC adjustment. The Coloniale data is also exceptionally instructive since it is a large dataset encompassing a wide range of golfing abilities.

We reduce the dataset to blocks of 20 rounds by individual golfers. There are 440 such blocks in the dataset. For each block of 20 rounds, we calculate the handicap factor after 20 rounds in four ways:

1. without using ESC
2. using ESC according to Method A (current RCGA approach)
3. using ESC according to Method B (current USGA approach)
4. using ESC according to Method C (Hybrid approach)

This gives us four factor values calculated in four different ways. Accordingly, we are able to compare the effect of the various ESC proposals on handicap. In figure 1, we plot the factor based on Method A on the y-axis and the corresponding factor without ESC on the x-axis for all 440 cases. In figure 2, we plot the factor based on Method B on the y-axis and the corresponding factor without ESC on the x-axis for all 440 cases. In figure 3, we plot the factor based on Method C on the y-axis and the corresponding factor without ESC on the x-axis for all 440 cases. From figures 1-3, we observe that

- Method A (RCGA) provides factors that are smaller than what one would obtain from not implementing ESC.
- Method B (USGA) and Method C (Hybrid) provide factors that do not differ greatly from not implementing ESC.

3 Interpretations and Concluding Remarks

We begin by stressing an important point: Although figures 1-3 show discrepancies in the various ESC proposals, they do not address the broader question, "are the resulting systems any good?" A good handicapping system is one that is fair, interpretable and can be implemented. These issues are discussed in Swartz (2009). However, in interpreting figures 1-3, we see that

- There is not much of a difference in the factors obtained by Method B (USGA) and Method C (Hybrid). Therefore, if one were to adopt one of these two methods, ease of implementation (Method C seems less confusing than Method B) and conformity between the RCGA and USGA are relevant considerations.

- A troubling aspect concerning Method A (RCGA) is the pattern observed in figure 1. ESC does not greatly affect the factor for scratch golfers; they rarely have worse than double bogeys. Then ESC reduces the factor by an increasing amount until the factor reaches 19, at which point the factor is no longer greatly affected by ESC. The same pattern from scratch to 19 repeats itself from 19 to 33. The discontinuities at 19 and 33 are problematic. For example, imagine two golfers who have similar gross scores and have RCGA factors of 18 and 19. The 19-factor golfer retains all of his triple bogeys in his adjusted score whereas the 18-factor golfer retains a maximum of double bogey. Because of this, the discrepancy in factors between these essentially identical golfers becomes unrealistically accentuated. A 15-factor golfer may only be only slightly better than a 20-factor golfer.

4 References

Swartz, T.B. (2009). A new handicapping system for golf. *Journal of Quantitative Analysis in Sports*, 5(2), Article 9.

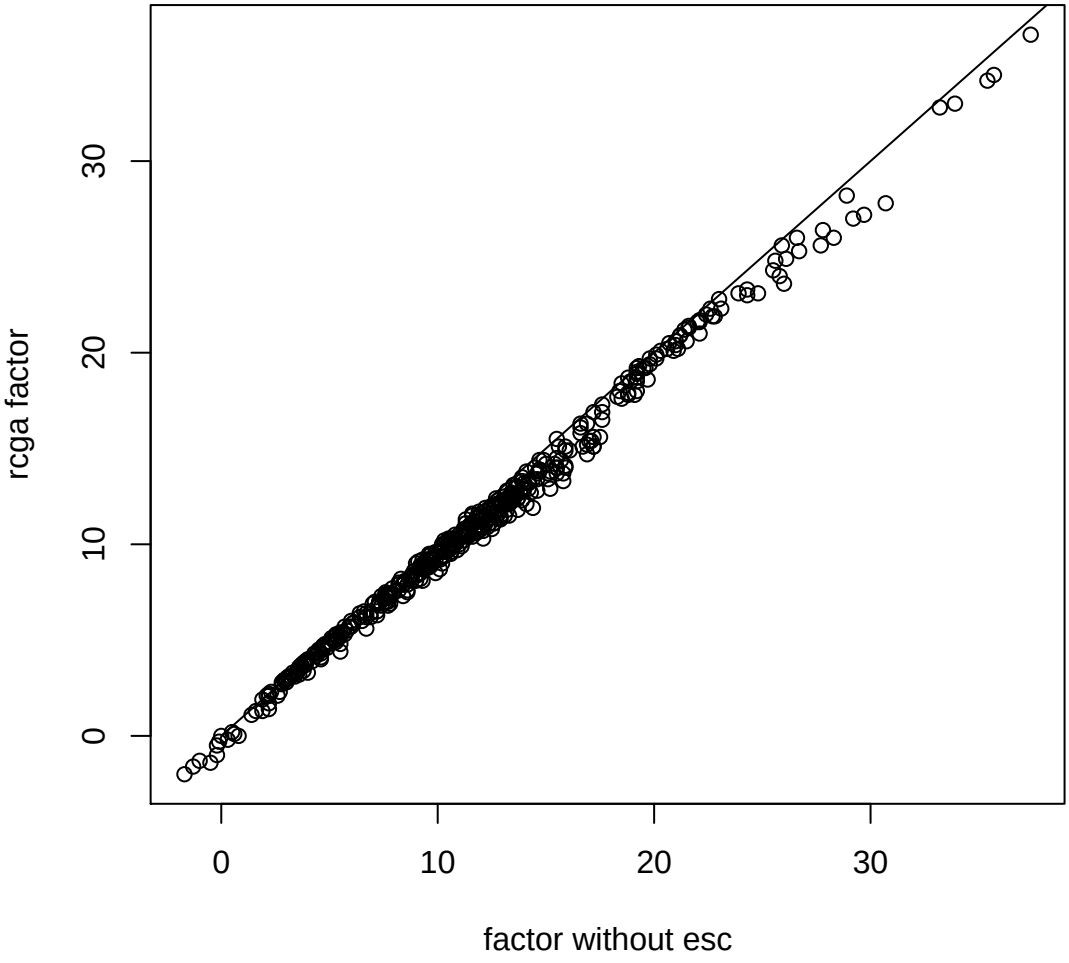

Figure 1: Comparison of rcga factor and factor without esc.

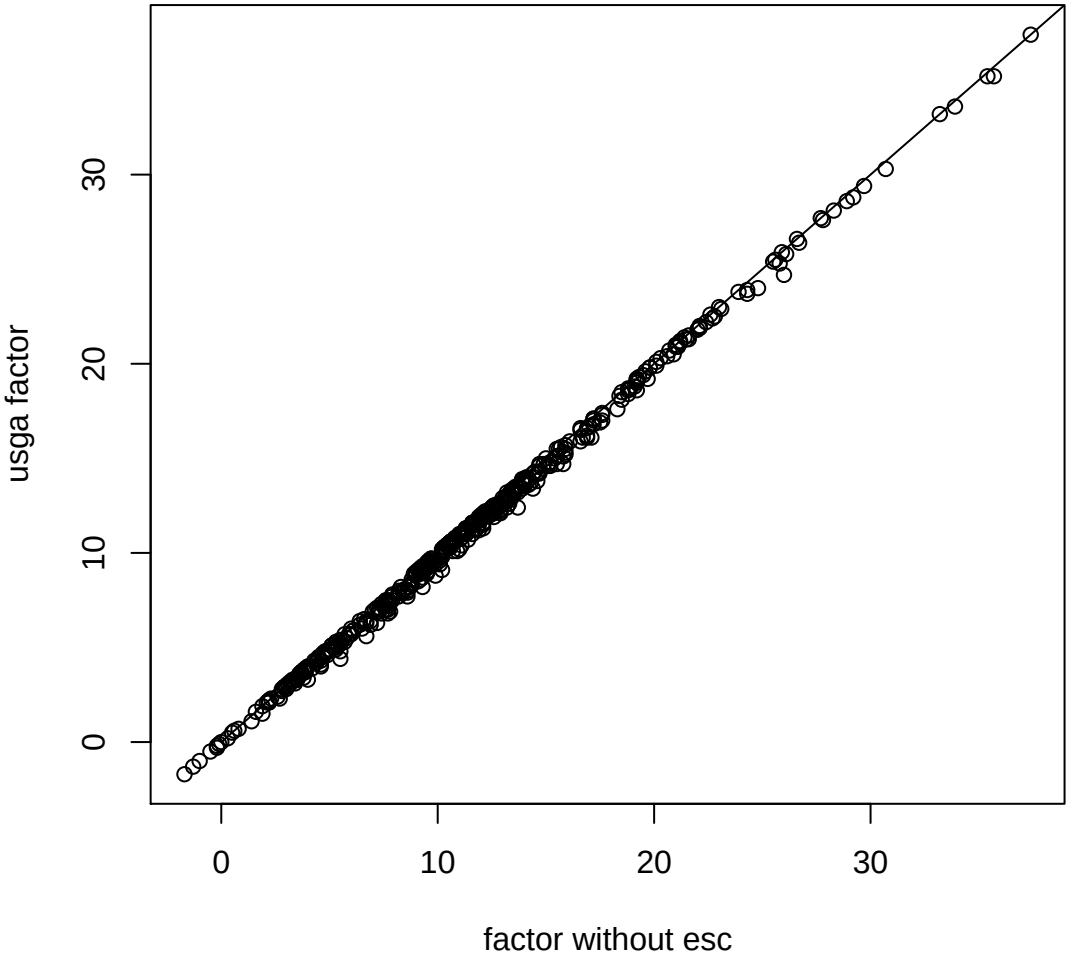

Figure 2: Comparison of usga factor and factor without esc.

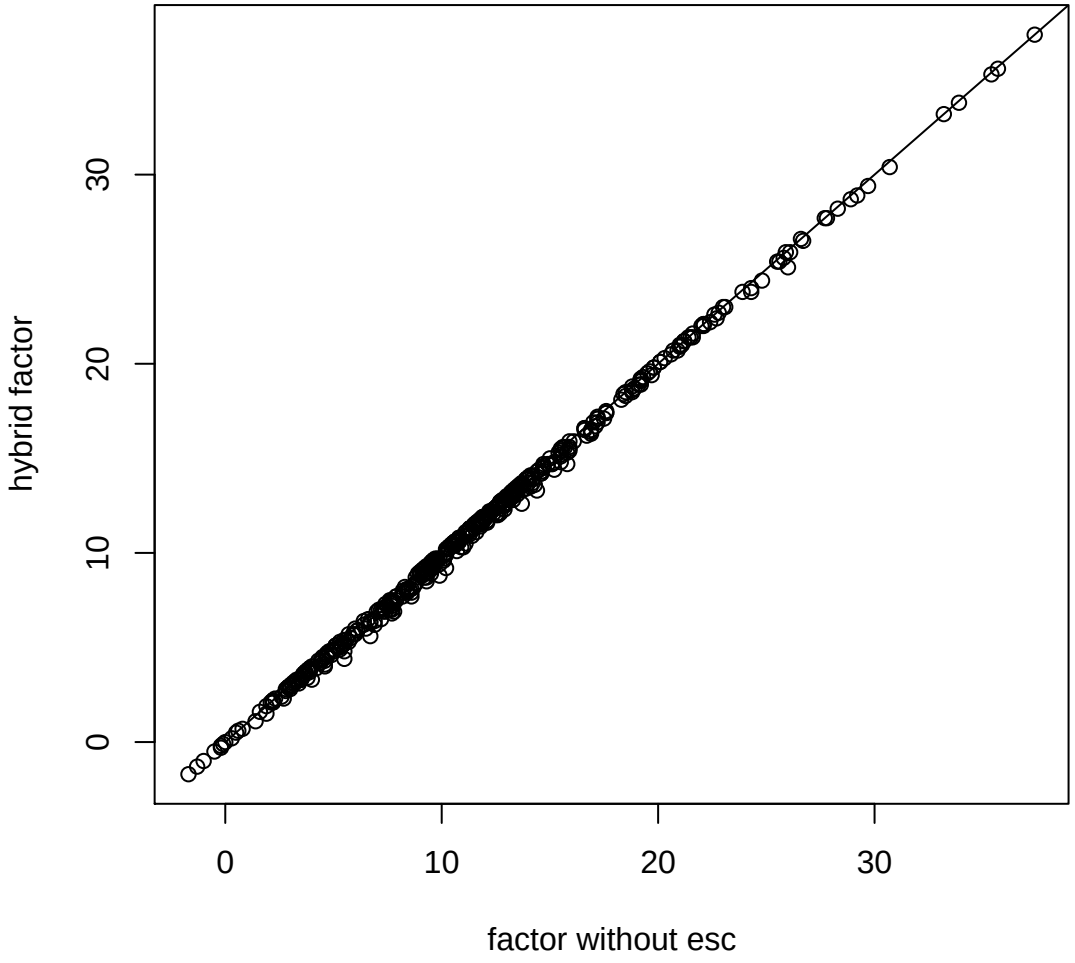

Figure 3: Comparison of hybrid factor and factor without esc.