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Discussion

Carry on winning: No selection effect

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ABSTRACT

The methods proposed by Demaree, Weaver and Juergensen (2014) are not the most appropriate for testing for the presence of a selection effect. We use a simple and straightforward method to demonstrate that the data are not consistent with such an effect.

1. Introduction

Demaree, Weaver, and Juergensen (2014) point out that it would be sensible to investigate whether the results reported by Xu and Harvey (2014) arose from a selection effect that occurred because "participants on winning or losing streaks may have already been choosing safer and riskier wagers". They used the information available in the original paper (Xu and Harvey 2014) to show that the probability of winning in groups which had won consecutively was significantly higher than the probability of winning in the entire population. Conversely, the probability of winning in groups which had lost consecutively was significantly lower than the probability of winning in the entire population. They argue that these results indicate the presence of a selection bias.

This interpretation is not correct. Because the comparison groups were grouped according to the number of consecutive wins or losses, the probability of their winning was bound to be different from that of the entire population. Demaree et al.'s (2014) analysis is fully consistent with our original account.

Grouping the bets by the number of consecutive wins or consecutive losses is not an appropriate way to test for a selection effect. Instead, bets need to be organized by the safeness of the strategies that individual gamblers used. This is what we did to examine the validity of Demaree et al.'s (2014) arguments.

The account of our results in terms of a selection effect comprises the claim that the probability of winning after winning streak reflects the fact that the gamblers who remain in the sample as streaks get longer are those who consistently use safer strategies. Thus we examined whether gamblers with longer winning streaks are safer gamblers. If they are, they should select lower mean odds than gamblers who did not have such long winning streaks. These lower mean odds need to be extracted not only from the bets in the long winning streaks but also from all the other bets placed by gamblers experiencing winning streaks. If all the gambles placed by those with winning streaks do not have lower mean odds than the mean odds in the sample as a whole, then we can eliminate the selection account of the results reported by Xu and Harvey (2014).

2. Analysis

First, we identified all the gamblers who had won six times consecutively at least once. Second, we identified

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all the bets placed by those gamblers. By using all the bets in our analysis, we were able to measure the overall risk propensity of the gamblers rather than just their risk propensity when they were winning. After that, we repeated these two steps for gamblers who had won a maximum of five times at least once. In the same way, we identified all the bets made by gamblers who had won a maximum of four times, three times, twice and just once. As a result of this procedure, we were able to organize the bets according to the maximum length of the winning streaks of the gamblers who made them.

If the selection effect postulated by Demaree et al. (2014) exists, gamblers with longer winning streaks should have selected bets with lower odds than those with shorter winning streaks. They should have selected safe bets all along rather than only after winning streaks. Hence, we should find that gamblers with longer winning streaks selected lower mean odds *on all the bets they placed*, not just on the bets that they placed after their winning streaks.

We carried out the same procedure on losing bets. If a selection effect was in operation, gamblers with longer losing streaks should select bets with higher odds than those with shorter losing streaks. They should have selected risky bets all along rather than only after losing streaks. Hence, we should find that they selected higher mean odds *on all the bets they placed*, not just the bets that they placed after their losing streaks.

In addition, we carried out a within-participants analysis to examine the relation between the lengths of streaks experienced and the odds then chosen. Our original interpretation predicts that the length of streaks should have significant effect on the odds chosen *within the same person*.

3. Results

3.1. Do gamblers who experience longer winning streaks select safer mean odds across all bets?

One-way between-groups analyses of variance were carried out to determine whether the odds that gamblers selected depended on the longest winning or losing streak that they had experienced. Separate analyses were performed for winning and losing streaks in each of the three currencies (Fig. 1). None of these six analyses showed a significant effect of maximum streak length.

3.2. Replication of the original effect within each gambler

We then performed analyses to replicate our original effect *within each gambler*. Thus, our question was whether individual gamblers tend to select safer odds after experiencing longer winning streaks and riskier odds after experiencing longer losing streaks. We used repeated measures analyses of variance to examine the effect of the length of the winning streak experienced by a gambler on the odds selected by that gambler. These showed the expected effects for GBP ($F(1, 396{,}845) = 4.73$; $p = 0.03$), EUR ($F(1, 161{,}791) = 17.21$; $p < 0$ .001), and USD ($F(1, 32{,}483) = 4.48$; $p = 0.04$). A similar repeated measures analysis for losing streaks showed the expected effects for GBP ($F(1, 365{,}226) = 21.65$; $p < 0.001$) and EUR ($F(1, 161{,}788) = 9.17$; $p = 0.003$) but not for USD ($F(1, 32{,}480) = 0.45$; NS). As in our original study, we attribute the failure to obtain a significant losing streak effect for USD to the relatively small sample size.

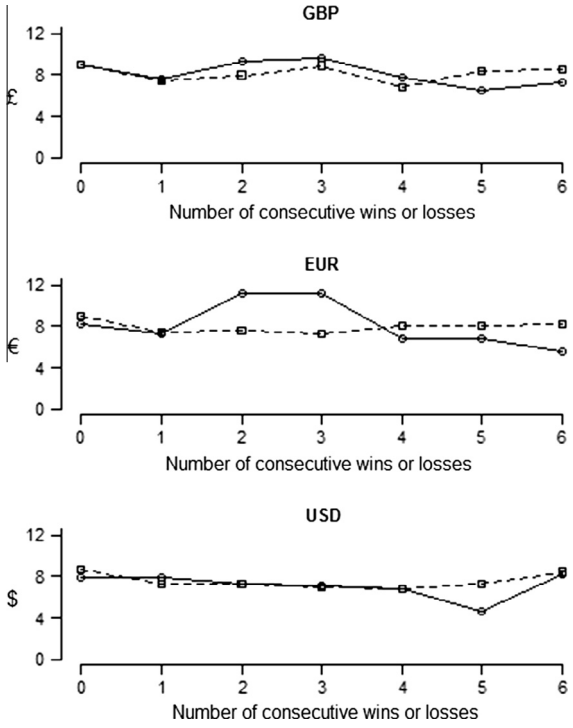

Fig. 1. Mean odds plotted against streak length. The continuous line with the "o" symbol shows data for consecutive wins and the dotted line with the "□" symbol shows data for consecutive losses.

4. Summary

In our original paper (Xu and Harvey, 2014), we measured the mean odds after winning and losing streaks. We found that mean odds decreased after winning streaks and increased after losing streaks. In the first of these new analyses, we took *all the bets* placed by a gambler into account. Results show no sign that gamblers who experienced longer winning streaks generally placed safer bets or that gamblers who suffered longer losing streaks generally placed riskier bets. In other words, there was no evidence of a selection effect. There is no conflict between these new findings and our original ones.

In the second new analysis, we showed that, *within individual gamblers*, increasingly safe odds are selected as winning streaks increase in length and increasingly risky odds are chosen as losing streaks increase in length. This reinforces our original conclusions but is not consistent with a selection effect.

We see these additional analyses as a worthwhile addition to our original paper. In prompting them, Demaree

et al. (2014) have made a useful contribution to research on this topic and we thank them for it.

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