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LOSS AVERSION IN WOMEN'S PROFESSIONAL GOLF: RESULTS FROM THE 2023 U.S. OPEN AT PEBBLE BEACH, CALIFORNIA

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Abstract

There have been three significant loss-aversion studies involving professional golfers; all focused exclusively on men. Each study found significant loss aversion in these real-world settings, in response to suggestions that loss aversion would disappear if the stakes were high enough and decision makers had a chance to learn from previous mistakes. Together, these three studies cast significant doubts on the validity of those caveats. But they also beg the question: How would results for professional women golfers compare? The current study focuses on loss aversion in women's professional golf in what was the highest-staked competition in Ladies Professional Golf Association (LPGA) history: the 2023 U.S. Women's Open at Pebble Beach, California. Results from that within-subject study, reported herein, show similar levels of loss aversion, and at a highly significant level. Implications are discussed.

Keywords

Gender, Loss Aversion, Prospect Theory

JEL Codes: J16, C93, D01, D81, D91

1. Introduction

There are relatively few, experimental loss-aversion studies that have explored the issues with women subjects only. The initial studies of the Endowment Effect / Loss Aversion involved mostly student subjects in mixed gender settings (Knetsch, 1989; Kahneman, Knetsch and Thaler, 1990). The decisions studied initially were of relatively low consequence – which was seen as important by the authors because loss aversion was so easily induced. Loss aversion in these studies was highly significant overall but gender differences in the results were not specified. It is fair to assume from those highly significant results, in mixed gender studies, that the authors concluded loss aversion to be a hard-wired factor for all.

Utilizing a large-scale, longitudinal survey of gender attitudes towards risk in the United Kingdom, Dawson (2023) reports that women were more risk averse than men but suggests that there are reasons to believe that this may not translate to risk seeking behaviours following a loss because women were more cautious when making risky choices thereby avoiding many situations that stimulate risk-seeking behaviours to offset losses. Dawson goes on to report that women also express less optimism about the future than men. From the perspective of Prospect theory, this may lead to a more rapid reset of reference-states after experiencing a loss, which would reduce the willingness to make risky choices to offset preceding loss.

Another recent empirical study of real-world decisions with high stakes involved the risk-taking behaviour of contestants playing *The Price is Right*, in Portugal. That study found contestants to be risk averse but found no difference between genders (Pacheco, Lobao & Coelho, 2023). The authors indicate that while survey studies suggest that women are more risk-averse than men, findings from laboratory experiments are less conclusive.

With sufficient ambiguity regarding loss aversion in women, and the lack of studies in settings with high stakes and the ability to learn from previous decisions, the following study was conducted.

2. Why the Focus on Professional Golf in Loss Aversion Studies?

Economists often site the absence of significant real-world outcomes as the primary flaw in early loss aversion studies (see List, 2003). List's claim is that with repetition involving high stakes, in real-world settings, decision makers would learn to eliminate loss aversion. Professional golf offers an ideal environment to investigate these claims.

Major golf tournaments are played for life altering stakes by players who have sharpened their skills through many thousands of swing repetitions and in hundreds of previous tournaments. The three studies involving men's professional golfers - mentioned in the abstract - all showed significant loss aversion in high-stakes environments with opportunities aplenty to learn from experience (Pope and Schweitzer 2011; Elmore and Urbaczewski, 2020; Bukszar 2021).

There is one additional element in professional golf that makes it an ideal setting to study loss aversion, as articulated by Bukszar: the asymmetric reward structure in stroke-play golf.

The best golfers in the world make *mistakes* – poorly hit shots – in every round of golf, which often lead to scores of bogey-or-worse (+1 to par, +2, +3 and higher). On the other hand, good shots may produce birdies (-1), but it is unusual for those good shots to produce scores better than birdies (-2 compared to par) and nearly impossible to produce a score of -3 to par.

This asymmetrical reward structure induces cautious play to avoid potential big-numbers, caused by a bad shot, which can ruin one's stroke-play round of golf (18 holes), as well as one's total score in a 72-hole, stroke-play golf tournament. [2]

Accordingly, golfers routinely guard against errors by playing away from out-of-bounds markers, water hazards, trees and treelines, sand traps, by playing to the center of greens, below the hole, thus avoiding downhill puts, and by lagging putts so that a missed putt stops close enough to the hole for an easy tap-in putt.

Against this backdrop, scores of bogey-or-worse on a hole create naturally occurring negative-frames that, according to Prospect Theory, should induce loss-averse behaviour. More precisely, Prospect Theory states that when a decision maker faces a risky choice *following a loss*, and thus from a negative frame, that individual is likely to act in a risk-seeking manner to eliminate the loss (Kahneman & Tversky 1979; Knetsch 1989; Kahneman, Knetsch & Thaler 1990).[3]

This provides the opportunity to test for the presence of loss aversion amongst women professional golfers by investigating the following hypothesis:

H1: Players make birdies more frequently on holes following bogeys.

If players were not loss averse, they would play that subsequent hole the same regardless if it followed a bogey or not.

The belief that players make a higher rate of birdies following bogeys is known colloquially as the ***bounce-back effect***. Investigation into the bounce-back effect requires the tracking of individual-player performance during their competitive rounds using a *within-subject* design. As such, evidence of loss aversion would be grounded in the ***varying perceptual frames*** that ***each*** player faces during their competitive rounds of golf.

This paper searches for evidence of a bounce-back effect by examining the individual scorecards of players competing in the 2023 U.S. Women's Open, played at Pebble Beach, California, using the same methodology as Bukszar (2021).

The 2023 U.S. Women's Open at Pebble Beach was selected because it provides several key elements that enable direct comparisons to preceding loss-aversion studies: It was played on the same iconic golf course as the men in their 2019 U.S. Open championship; it was the first time an LPGA event was held at Pebble Beach [4]; the tournament was played for the highest purse in a women's golf-tournament history - the $11,000,000 purse was nearly double the size of the purse in 2021 (the winner earned $2,000,000); it had the best field of competitors for an LPGA event; and, it was setup in a similar manner to the previous Men's U.S. Open tournaments - with narrow fairways, relatively deep rough and fast, small, contoured greens.

To accommodate the differences in swing speeds between professional men and women golfers, the course was set up at a shorter length, 6509 yards for the women in 2023 compared to 7075 yards for the men in 2019, and

[2] In stroke-play it is the lowest total score that prevails. All strokes count and a single bad shot can put players in a deficit that is too great to overcome.

[3] As Kahneman and Tversky (1984) observed: "The assumption of risk aversion has played a central role in economic theory. However, just as the concavity of the value of gains entails risk aversion, the convexity of the value of losses entails risk seeking" (p. 342). Accordingly, people will weigh the reduction of a loss greater than a commensurate gain.

[4] It is rare for major PGA and LPGA tournaments to play the same golf courses, even years apart. Major PGA events are typically held on very long, iconic golf courses (7500+ yards) that have yet to hold major LPGA events.

it played as a Par 72 compared to the Men's Opens when the course played to a Par 71. (The 2nd hole played as a par 4 for men but as a par 5 for women.)

3. Empirical Analysis

A total of 156 players began the 2023 U.S. Women's Open. After 36 holes the field was reduced to the top 60, plus ties. Fifteen players tied for the 60th position. (All data publicly available on the *ESPN* Website.)

For the 74 players who made the cut, and played all 72 holes of the tournament, there were 799 birdie-or-better holes (15%), and 1190 bogey-or-worse holes (22%). Against this backdrop, the frequency of four, two-hole score combinations – named below for easy recall – illuminates the bounce-back phenomenon. The hypothesis being tested:

Following bogey holes, players will make a higher rate of birdies on the ensuing hole.

The overall frequency of birdie holes for the tournament = 15%
The overall frequency of bogey holes for the tournament = 22%
Hot-Hand: A birdie hole followed by another birdie hole = 13%
Regression: A birdie hole followed by a bogey hole = 21%
Bounce-Back: A bogey hole followed by a birdie hole = 18% (z = 3.01; p < .01) [5]
Bogey-Train: A bogey hole followed by another bogey hole = 21%

Results show a significant bounce-back effect: After making a bogey, players made birdies on the ensuing hole at a significantly higher rate (18%) than the overall rate for the tournament (15%), providing clear evidence of loss aversion.

Results also show that the gain from the bounce-back effect was not accompanied by an offsetting loss; meaning that players made bogeys at the overall average rate following a bogey (actually a nominally lower rate of 21% v 22%).

These results are very similar to those reported for men at the 2019 U.S. Open; copied below and shown in italics (p. 14, Bukszar 2021).

The overall frequency of birdie holes for the tournament = 19%
The overall frequency of bogey holes for the tournament = 19%
Hot-Hand: A birdie hole followed by another birdie hole = 19%
Regression: A birdie hole followed by a bogey hole = 19%
Bounce-Back: A bogey hole followed by a birdie hole = 23% (z = 2.88; p < .01)
Bogey-Train: A bogey hole followed by another bogey hole = 18%

4. Discussion

This within-subjects study tracked individual player performance, longitudinally, over their competitive rounds at the 2023 U.S. Women's Open played at Pebble Beach, California. Loss aversion was naturally induced by the negative-framing that occurred following scores of bogey-or-worse. These women professional golfers made more birdies on holes immediately following bogeys. *Had they not been loss averse, they would have made birdies at the same rate as for the tournament overall.*

These results show a near equivalence in loss aversion between men and women in a major championship, played on the same course. This adds to the disconfirming evidence of List's claim that loss aversion would vanish with the chance to learn from experience, particularly when dealing with decisions involving very high stakes.

As suggested in Prospect Theory, it is the change in reference state that precipitates loss aversion. Having experienced the recent feeling of loss from a bogey, players valued a potential loss-eliminating birdie more, momentarily increasing their risk-tolerance to achieve it. In simple terms, players threw bits of caution to the wind to recoup their loss.

The increase in birdies following bogeys – absent an offsetting increase in bogeys – also suggests better player-calibration of risks and rewards followed bogeys. But, for both men and women, this improved calibration was short-lived; after making bounce-back birdies, the hot-hand data shows a return to normal scoring averages.

[5] To facilitate a quick visual comparison, the overall averages provided above are rounded to the nearest percent. The double-sided z-test for the 2023 U.S. Women's Open was performed by comparing the exact percentage of bounce-back birdie holes (17.9%) with the exact percentage of all other birdie holes (14.2%). These two groups are complements. Combined they equal the overall average (15%).

This speaks to an important element of Prospect Theory: the notion that negative framing occurs because decision makers do not immediately reset their frames to normal after experiencing a loss.

Natural Experiments, like this golf course study, provide great opportunities to measure individual behaviour, especially when compared with survey data that ask for opinions about risk rather than measuring it directly in individuals. The overall consensus in those studies is that women are significantly more risk averse than men. The large-scale UK study measured risk attitudes from 1991 through 2008 (Dawson, 2023). However, this impressive study, and its very significant literature review, reads like a collection of stereotypes of women derived from the past. Perhaps those attitudes still prevail. But those findings should be examined in within-subject, real-world studies, that directly measure sequential, individual decisions involving significant outcomes. When a single decision can make a $1,000,000 difference, the subjects' focus is likely to be orders-of-magnitude greater than when answering Likert scale survey questions.

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