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Tennis Serve Data May Elude Some as Serves Get Too Fast

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LINK TO ABSTRACT

We are grateful for the opportunity to reply to Michal Krawczyk's (2019) comments on our two papers, Anbarci, Arin, Okten, and Zenker (2017) and Anbarci, Arin, Kuhlenkasper, and Zenker (2018), hereafter AAOZ17 and AAKZ18, respectively. Using different methodologies, our papers each show that loss aversion plays a major role in tennis serves and that gender is an important demographic characteristic in understanding loss aversion. Krawczyk (2019) criticizes our papers as follows:

1. Our theoretical models are "simple,"
2. Loss aversion is nonexistent in tennis,
3. A stronger serve means less effort, and
4. There is an omitted variable bias due to not incorporating the receiver.

In our reply below, we will address each of his criticisms.

Alleged shortcomings of our theoretical models

While Krawczyk (2019, abs., 114) claims that we sketch "simple" theoretical

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models, in reality we fully incorporate Devin Pope and Maurice Schweitzer's (2011) model and apply it to the tennis setting by also embedding a Tullock contest function (the most popular analytical tool in modelling any strategic contest), which takes the effort levels of the server and the receiver into consideration. Our theoretical model in AAKZ18 also incorporates the location of the serve, where placing a serve closer to sidelines of the service box would give an advantage to the server but would also entail additional cognitive effort as well as additional risk taking for him.

Moreover, Krawczyk (2019, 116) mistakenly argues that we treat all tied points jointly. In reality, we focused on crucial points and to that end we stated that: "In particular, a serving player derives the following expected utility when he/she has an advantageous score (e.g. 40–30) while serving for the game (or set or match);that is, when it is a game (or set or match) point favoring the server, where *W* denotes this state" (AAOZ17, 3550). Likewise, we do the same when the player faces a disadvantageous score. Then, we also indicated that similar value functions could be constructed for other (i.e., uncrucial) scores as well (AAOZ17, 3550 n.3).

Alleged lack of loss aversion in tennis

Interestingly, Krawczyk (2019) acts as if there is no loss aversion in tennis and it is a scandal to state that there is one, giving the impression that we are the only ones to do so. First of all, we are not the only ones; a recent paper by Graham Mallard (2016) studies loss aversion and decision fatigue at the Wimbledon tennis championship. More importantly, we would like to emphasize that Krawczyk (2019) ignores our empirical results that clearly show a strong behavioral pattern. Our two papers, using different empirical methodologies (one linear, one non-parametric), repeatedly show that players, both male and female, serve faster when they are behind in score compared to when they are ahead, although the timing of this aforementioned behavior differs between male and female players.

Stronger serve purportedly meaning less effort

Here, we believe Krawczyk (2009) is confusing 'effort' with 'risk.' We would like to emphasize again that our empirical results have repeatedly shown that both male and female players serve faster when behind in score. Krawczyk (2019, 118) claims: "In particular, if players were to hit the ball on the second serve as strongly as they do on the first serve, they would save on effort." We find this claim particularly irrelevant, given the fact that it is common knowledge that tennis

players almost always hit second serves considerably slower, and this is also evident in our empirical results, with the regression coefficient of second serve being negative and statistically significant at 1 percent, in both papers.

Other unsubstantiated blanket claims by Krawczyk include: "Thus in most matches they do not try to economize on effort but simply give their best in every point. The observed non-trivial within-match within-player variance of the (first) serve speed may be best explained in terms of random variations of performance and the use of mixed strategies" (2019, 118). This claim, like many of his other claims, is not supported by any data or previous research. Further, our empirical results are completely contrary to this claim. There is a systematic increase in the serve speed and change in the placement of serve for players who are behind in score.

Receiver also being there and other potential omitted variable biases in the empirical analysis

Krawczyk (2019, 118) contends: "Most importantly, the authors implicitly assume that the receiver's effort does not depend on current score. This is a very questionable assumption." In reality, we use a Tullock contest function in our theoretical model, which incorporates the effort levels of both the server and the receiver at the same point. Moreover, the panel nature of our dataset allows us to control for unobserved heterogeneity at the player and at the match level by adding fixed effects at both levels. Therefore, Krawczyk's claim is, once again, unsubstantiated.

Krawczyk (2019, 121) furthermore argues that there are other important omitted variables in the empirical analysis, such as a player being left-handed, which may give such players an advantage when serving at the ad side while the righty players would have an advantage when serving at the deuce side. This seems rather trivial as a server serves an approximately equal number of times from both sides. Moreover, while in AAOZ17 we do not control for the location of the serve, in AAKZ18 we do.

We should once again emphasize that our results are robust to the inclusion of both match and player dummies which control for unobserved heterogeneity on both levels. While we agree that there is some merit in adding "number of rallies" as an additional control variable (Krawczyk 2019, 12) and exploring the interaction of the aforementioned variable with other variables, we believe that this is an avenue for future research and beyond the scope of our paper.

Finally, Krawczyk (2019) claims a dummy should be included for the first player to serve in the current set. Jan Magnus and Franc Klaasen (1999) did some research on the topic, and they established that: "Overall only 48.2% of the sets played in the men's singles are won by the player who begins to serve in the set. In the ladies' singles the percentage is 50.1%. The standard errors of the two estimates are 1.6% and 2.2%, respectively." We believe these results show that not including a dummy for the player serving first does not create a significant omitted variable bias.

Other criticisms and our responses

We are genuinely surprised by Krawczyk's (2019) claim that we have excessive citations to Pope and Schweitzer (2011). It should not be too surprising that we mention that paper as often as we do (nine times in AAOZ17, and six times in AAKZ18) since our papers build on the Pope and Schweitzer article, not to mention the fact that it was published in the *American Economic Review*—the top journal in the field—and has already gathered more than 350 citations within eight years of publication. On the other hand, Krawczyk (2019) cites M. Daniele Paserman (2010)—an unpublished paper—six times in his comment, when Paserman's document is not even half the length of either of our papers.

Krawczyk (2019) repeatedly highlights the differences between golf and tennis. We do not deny that indeed tennis and golf are very different in their competitive nature. As we mention in AAOZ17, "in golf one competes against the whole field ('open play'), while in tennis one competes against only one opponent/team at a time ('match play')" (p. 3547). In addition, in AAKZ18 we also add that "contrary to golf where a player has full control of every shot, in tennis the only action where a player has full control is the serve" (p. 2). That's actually why we focused on serves in our studies. Nevertheless, both golf and tennis are both high-stakes, competitive sports, and players may be loss averse, and choose riskier options. Further, in both papers, we consider "the natural and well-defined 'reference point' in tennis—as the counterpart of 'par' in golf. It is the 'tied score'" (AAOZ17, 3547; see also AAKZ18, 3).

Krawczyk (2019, 119, 120) claims that in our theoretical models there are mistakes in the calculation of some probabilities (in AAOZ17) and some other inconsistencies in some notation (in AAKZ18). We admit that they were overall caused by our own typos; nevertheless, they are not consequential in that all of our theoretical results are still intact.

Lastly, Krawczyk (2019) claims that there are inconsistencies between our two papers concerning differences in loss aversion between male and female

players. In both papers, we find that loss aversion influences the behavior of both genders over a longer time horizon (i.e., within a match), while for male players it also holds in the shorter run (i.e., within a set and within a game).

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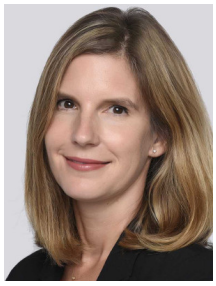

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