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Psychological momentum in contests: The case of scoring before half-time in football[☆]

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ABSTRACT

We study the existence of a psychological momentum commonly believed to exist in a real world contest: the effect of scoring just before half-time in association football (soccer). Using high quality data on football matches, we isolate a quasi-experimental situation to identify the effect of scoring on later performance. We carefully select shots toward the goal, taken from a similar location on the pitch, which landed on the goal posts. Using the non-goal shots as counterfactuals to the scoring shots, we estimate the causal effect of scoring at different times in the first half. We do not find any evidence of an effect of scoring before half-time. This result contributes to the debate on whether psychological momentum exists in contests.

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1. Introduction

Dynamic contests are both omnipresent in social life and very hard to analyze formally. Contests are dynamic whenever agents competing for a prize interact over repeated periods or in continuous time. In such cases, strategic decisions depend on past actions and expected future actions of both players. The decision space is typically large and equilibrium strategies are complex. For dynamic contests without perfect information on ability, optimal strategies are often yet to be found from a game theoretic point of view. In such situations, the social scientist can be uncertain about the exact nature of the strategic dynamics taking place. Folk psychology interpretations of such dynamics are widespread. Unfortunately, the validity of laymen intuitions is most often hard to assess both analytically and empirically.

In the present paper we investigate a common intuition in a dynamic contest: the idea that getting an advantage just before a break can grant a psychological advantage. We look at this question specifically in the context of football (soccer) where it is said that scoring before half-time gives a boost for the rest of the game (Aytton and Braennberg, 2009). As goals are not randomly occurring events, the causal effect of the timing of goals is difficult to assess. We argue here that the alleged effect of the timing of the goal before half-time is an illusion. Simple statistics may suggest that a team scoring before half-time is more likely to perform well in the second half. However, using a quasi-experimental setting we are able to show that, controlling for teams' ability, there is no evidence of a causal effect of scoring before half-time. To control for teams ability we compare situations when a team scored to situations when a team did not score from a very similar scoring opportunity. Specifically, we use a large data set of shots where the ball hit the post. Shots ending outside the goal

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provide a natural counterfactual to shots ending in a goal. Our identification assumption is that conditional on hitting the post, the variations in performance between shots going in and shots bouncing off are so small that the quality of a team scoring will be very similar to the quality of a team not scoring.¹ Using this approach, we find that the effect of scoring vs not scoring in such situations does not increase at the end of the first half.

This study contributes to the empirical study of strategies and behavior in dynamic contests. The literature on dynamic contests is characterized by a tension between standard models assuming rational agents playing equilibrium strategies and a more psychological approach looking at behavior not necessarily rationalizable with standard assumptions (Mago et al., 2013). The complexity of dynamic contests in the real world is often imperfectly represented by formal models due to tractability constraints. As a consequence there is a hiatus between the intuitions formal models can give and those we can get from the observation of real world contests. It is often not clear whether this hiatus simply reflects gaps to be filled by future theoretical refinements or fundamental and irreconcilable contradictions between standard models assumptions and how behavioral agents play in dynamic contests.

While standard models are limited in the understanding they provide for dynamic contests, the prevalence of such contests comes with widespread psychological intuitions about human behavior. The notion of momentum is a good example; it is widely thought that performance in contests varies over time as a function of past performance. A good performance is generally believed to enhance future performance (positive momentum) though in some cases it is said that it can lead to a decrease in performance (e.g. choking) or that it can raise the performance of a player trailing (back to the wall effect). Standard economic models of dynamic contests typically predict a positive momentum for strategic reasons. Such a strategic momentum presents substantial differences with the idea of a psychological momentum. It is purely determined by the state variables of the competition (e.g. scoreline, time left to play) and, typically, whether a player is ahead or behind. It is not path dependent in that it is not influenced by how this state was reached. Conversely, ideas about psychological momentum often suggest a path dependent phenomenon whereby the timeline of past performance matters for future performance. The case of the assumed effect of scoring before half-time is one of such path dependent momentum. It purports that for similar scorelines at half-time, the timing of the last goal will matter for the future development of the game.

If path dependent momentums are a reality, it would suggest that existing models of contests are missing some fundamental aspects of the behavioral dynamics in contests either because their assumptions are too simple² or because agents' behavior departs too much from standard models' assumptions.

In the present study we rigorously investigate whether such an effect of the timing of scoring matters for the outcome of the game. Our results indicates that it has no such causal effect. We show that variations in the quality of the teams scoring at different times creates a spurious correlation between late goals in the first half and future performance. We suggest that such variations in quality can be explained by contests models where teams with different quality allocate strategically their effort over time. Our results contribute to the debate about how dynamic contests should be modeled in general. They indicate that standard economic models of strategic behavior in contest are not undermined by this widely-believed psychological effects of the timing of past performance.

2. Economic models of dynamic contest and the challenge of psychological momentum

Most economic models of dynamic contests produce a positive momentum whereby the player ahead exerts more effort than the player behind (Konrad, 2009). This pattern arises from the asymmetry of incentives between a leading and a trailing contestant. A leading contestant is nearer to the end of the game and therefore has potentially less effort to expand to win the contests prize. On the contrary, the trailing contestant must exert effort to first catch up with the leading contestant and then to win the contest. As a consequence, given the larger amount of effort required to win the game, the trailing player has de facto a lower net prize than the leading player.

As players' incentives are strictly determined by their relative position in the contest, their strategy should depend on the state of the competition but not on the specific way by which this state was reached. For this reason, existing models of dynamic contests do not generate path dependent strategies and performance. In the case of a football match, the strategies should depend on state variables such as the scoreline and the time left to play (see for instance Palomino et al., 1998). But it should not depend on how this scoreline was reached.

On the contrary, the idea of path dependency in performance has been the origin of a large strand of research in psychology. A large literature on “psychological momentum” has studied the effect of position/recent performance on current performance (Cornelius et al., 1997; Iso-Ahola and Mobily, 1980). There is however still a huge uncertainty about the reality and reasons for such a phenomenon (Bar-Eli et al., 2006; Burke et al., 1997). The idea of psychological momentum is also a robust element of folk psychology which emerges from laymen interpretation of behavioral dynamics in contests (Markman and Guenther, 2007; Miller and Weinberg, 1991). The belief about psychological momentum is also shared among players, noticeably by football players (Jones and Harwood, 2008). And Ayton and Braennberg (2009) found, in a survey of professional football players, that a majority of them believed in the positive psychological effect of scoring just before half-time.

¹ Note that this assumption is also made for the team who faces the shot. We provide a range of balancing tests in Section 5 supporting this assumption for the two teams.

² For instance, existing models of dynamic contests assume common knowledge of ability. We suspect that more general models with imperfect information may be able to generate path dependent momentum because the timing of the unveiling of information may affect belief updating.

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