

## **PROPOSAL: RISK AND RETURN IN PROFESSIONAL GOLF**

**Tony Smith, Professor, Department of Economics**

The goal of this project is to study how the structure of incentives in professional golf tournaments affects the willingness of golfers to take risks.

Because rewards in golf tournaments are a convex function of rank (that is, monetary payoffs decline very rapidly and then flatten out as a golfer's finishing position in the tournament increases), golfers have strong incentives to play risky strategies, especially when they are close to the top of the field. This project seeks to measure the quantitative effects of these incentives on the riskiness of golfers' strategies, taking into account the strategies of other golfers. A larger objective of this project is to shed light on how firms can design incentives to encourage its employees to take risks. Because the rules and payoffs of professional golf tournaments are clear and unambiguous, golf provides a natural laboratory in which to study the effects of incentives on risk-taking behavior.

The first stage of the project is to gather and organize data on the outcomes of professional golf tournaments around the world over the past ten years. The second stage of the project is to use this data to estimate a statistical Model of golfers' abilities that accounts for differences in field strength and in course difficulty. This part of the project will also evaluate the ability of this statistical model to forecast the outcomes of golf tournaments. The third stage of the project is to use this statistical model to measure how the riskiness of a golfer's strategy---measured, for example, as the variance of the golfer's score distribution in the final round of a tournament---varies with the incentives that he faces. In light of the convex payoff structure of a typical tournament, these incentives become stronger as the golfer approaches the top of the field. The fourth stage of the project is to use game theory to study the equilibrium implications of a game in which golfers simultaneously choose the riskiness of their strategies. This stage of the project makes predictions for the distribution of scores in a golf tournament, and these predictions will be compared to actual outcomes.

Students engaging in this project will gain experience in the collection and analysis of large data sets using ideas from statistics and economic theory. Students interested in this project should have strong quantitative skills, including a basic knowledge of statistics and a working knowledge of a programming language such as Matlab or Fortran. Knowledge of golf is not required!

### **SUMMARY**

**Adam Clark-Joseph, Class of 2007**

This research project attempted to analyze game-theoretic behavior among professional golfers in tournament settings. In particular, the project was intended to analyze the relationship between the variability (riskiness) of golfers' play, and that golfer's ranking in a given round of a tournament. The results of the study are as yet inconclusive.

Unfortunately, the intended data set ceased to be available shortly before the study began. Consequently, most of my time was spent collecting, organizing and formatting an appropriate data set, which consisted of the round-by-round scores and earnings for all of the major golf tournaments from the last year (roughly 270). Since there is no longer a central source of such data available, I had to acquire the data from a wide variety of sources, then put all of the data into a uniform format that could be read easily by computer programs. The data collection and preparation process was quite time-consuming, and nearly all of my time was devoted to this task.

Nevertheless, although I did not get the opportunity to delve deeply into the analysis of the data, I feel that I learned a great deal. From a purely technical standpoint, I learned a considerable amount about using various applications, particularly Excel/VBA, to format large batches of text. In a broader sense, I gained a new appreciation for the both the importance and difficulty of data collection in economic research. While I am sorry that I did not have the opportunity gain more experience with advanced statistical techniques, I feel that my ROME experience was edifying and worthwhile. I feel that I come away from my project with a much better grasp of the enterprise of economic research.