Labor Supply on the PGA TOUR

The Effect of Higher Expected Earnings and Stricter Exemption Status on Annual Entry Decisions

THOMAS A. RHOADS
Towson University

The unique nature of the PGA TOUR allows exempt players to have a large measure of discretion in the number of tournaments they enter in a given year. Recent policy changes on the PGA TOUR suggest that TOUR players may be responsive to exemption status and expected earnings. Using the previous year's real earnings per event as a proxy for expected earnings and controlling for player effects and exemption status, ordinary least squares results indicate that players' annual entry decisions change with an exemption status change but not with higher expected earnings. An exempt, non-elite PGA TOUR player whose exemption is set to expire in at least 2 years enters slightly fewer tournaments, whereas an increase in expected earnings has no effect on tournaments entered. This suggests that the PGA TOUR would do well not to ignore possible effects of future policy changes on player annual entry decisions.

Keywords: *individual sports; labor supply; golf*

INTRODUCTION

Sports economists most often examine the cartel nature and competitive balance issues of team sports leagues (Fort & Quirk, 1995). But attention is increasingly given to the unique structural and design features of individual sports leagues. Szymanski (2003) has noted that individual and team sports differ primarily in the distinctiveness of the competitors' marginal productivity, so that incentives generated by the prize distribution and structure of individual sports tournaments

are important and have an effect on absolute and relative player performance (Ehrenberg & Bognano, 1990a, 1990b; Lynch & Zax, 2000; Maloney & McCormick, 2000). Comparisons have even been made to the similarity of the prize structure in golf tournaments and executive compensation (Martin, 2001).

However, Cottle's (1981) observation that competitors in individual sports leagues have unique opportunities not available in team sports leagues because they maintain a large measure of discretion in their provision of labor highlights yet another distinct difference between the two types of sports leagues. Although this freedom in determining which contests to enter can lead to challenges for the league in attracting strong fields and eliciting optimal effort (Szymanski, 2003), it nevertheless provides a unique forum to examine the labor supply decisions of competitors in these sports leagues. It is surprising that this feature of individual sports leagues has been left largely unexamined in the literature. This article adds to the relatively small but growing body of research probing the unique aspects of individual sports leagues by examining the labor supply decisions of PGA TOUR professional golfers.

As with most individual sports leagues, the unique nature of the PGA TOUR allows professional golfers on TOUR with exempt status to largely control the number of tournaments they enter during the year. Each year, each exempt PGA TOUR player is assigned a position on the all-exempt tour priority ranking system. Players earn a particular position in this fairly complex system that accounts for recent tournament wins and tournament earnings from the previous year. For the purposes of this article, those players in this system with a recent qualifying win in a PGA TOUR event or with a ranking in the top 125 money winners in the previous year are defined as having exempt status. Because this means that for the most part they may play in any tournament they desire, their annual entry decision—the number of PGA TOUR events entered in any given year—is not exogenously imposed on them in the same manner that it would be for a football player in the NFL or a basketball player in the NBA who is contractually obligated to play in a certain number of games throughout the season.[1] Conversely, players not exempt for PGA TOUR play as defined above may have entry decisions exogenously imposed on them because these decisions can be a function of how many openings are available in a particular tournament.

In this article, I highlight two significant recent policy events on the PGA TOUR that may be expected to have an effect on annual entry decisions for exempt PGA TOUR players. First, in 1998, the PGA TOUR instituted a change in the number of years of exemption a player could earn from winning certain top tournaments.[2] For example, winning the U.S. Open prior to 1998 earned a player a 10-year exemption on the PGA TOUR, meaning that that player could enter any tournament he desired for the next 10 years. This exemption rule was changed such that a win in a major tournament such as the U.S. Open now only results in a 5-year exemption for a player. Thus, Lee Janzen, who won the U.S. Open in 1993 and in 1998, received an exemption from both wins to play through 2003. It is expected that decreasing the

TABLE 1: PGA TOUR Events and Nominal Earnings

Year	Total Events	Total Prize Money (in millions of dollars)	No. Players > $1 Million	Leading Money Earnings (in dollars)	125th Ranked Earnings (in dollars)
1995	44	62.25	9	1,654,959	149,280
1996	45	69.10	9	1,780,159	167,852
1997	45	77.68	18	2,066,833	179,273
1998	45	96.15	26	2,591,031	228,304
1999	47	135.81	36	6,616,585	326,893
2000	49	164.03	45	9,188,321	391,075
2001	49	185.35	56	5,687,777	406,352
2002	49	198.00	61	6,912,625	515,445

number of years of exemption earned from top tournament wins will create an incentive for players to enter more tournaments than otherwise because securing future years of exemption—only possible by playing more tournaments to achieve tournament wins or a ranking in the top 125 money winners—will now be increasingly necessary. Thus, it is reasonable to examine the effect that exemption status can have on decisions of PGA TOUR players to enter tournaments.

Second, television and corporate sponsorship revenues increased dramatically beginning in 1998, partly resulting from increased fan interest with the presence of Tiger Woods on the PGA TOUR. This translated into much larger tournament purses as seen in Table 1. In nominal terms, total prize money available more than tripled from 1995 to 2002. Expected earnings for exempt players on the PGA TOUR thus increased, and depending on the relative strength of the substitution and income effects in a player's decision to supply labor, these additional expected earnings could affect the number of tournaments an exempt player enters in a year. Ex ante, it is not clear whether or not the substitution effect will dominate the income effect; so examining this feature of a player's annual entry decision could lend insight to this issue. Overall then, it would seem that as a policy issue, the PGA TOUR would want to be aware of the effect stricter exemption status and increased purses have on the decisions of exempt players to enter tournaments.

This article presents an empirical examination of the number of tournaments exempt players on the PGA TOUR enter for the years 1995 to 2002 so that this time period bookends the two policy events. This examination is expected to provide insight into how some of the recent events taking place on the PGA TOUR may be expected to influence the annual entry decisions of exempt PGA TOUR players and could lead to a better general understanding of how competitors in individual sports leagues supply labor. The results indicate that an exempt PGA TOUR player whose exemption is set to expire in at least 2 years enters slightly fewer tournaments, whereas a change in expected earnings has no effect on the number of tournaments

entered. This suggests that the PGA TOUR would do well to not ignore possible effects of future policy changes on player annual entry decisions.

The remainder of this paper is arranged into three sections. Section 2 links this research to the existing literature and describes the data that measure player earnings, performance, and labor decisions. Section 3 presents a model of the labor decision and the empirical analysis of the role that expected earnings and exempt status plays in the labor decision. Section 4 concludes and offers extensions.

LITERATURE AND DATA ON PGA TOUR PLAYERS

Empirical research on the PGA TOUR has mainly been limited to examining the effect of skill on earnings and the effect of contest design and prize distribution on outcome. Shmanske (1992) pioneered the statistical analysis of the relationship between golf skills and earnings for PGA TOUR players. Tournament earnings of PGA TOUR players are determined by their relative performance in a pure prize economy. Skills such as driving distance and driving accuracy, greens in regulation, and putting are all significant determinants of relative performance in PGA TOUR events and thus in earnings (Alexander & Kern, 2005; Moy & Liaw, 1998; Nero, 2001). In addition, absolute skill level is rewarded equally across gender (Shmanske, 2000) but not necessarily across age (Rishe, 2001).

As expected, empirical research indicates that contest design and prize distribution affect outcomes and earnings on the PGA TOUR. Top players typically perform better in a match-play setting like a tennis tournament than in an open-competition setting like a golf tournament (Laband, 1990). Subsequently, top players on the PGA TOUR do not dominate competition, as do the top tennis players on the ATP, so unique labor supply incentives are thus available to those exempt golfers on the PGA TOUR. The total purse available and the structure of the prizes in PGA TOUR events influence absolute and relative performance (Ehrenberg & Bognanno, 1990a, 1990b) and cause substantial inequalities in earnings among PGA TOUR members (Scully, 2002). Overall then, it seems that the incentives provided by the total available purse and potential earnings are quite important in determining a player's performance in a PGA TOUR event and suggests that the number of tournaments an exempt PGA TOUR player enters in a season is perhaps guided by similar principles (see Cottle, 1981). That is, players with better skills can expect to make more money in each tournament they enter than those players with a lower skill level, and this could affect the number of tournaments entered during the year.

As with other major professional sports leagues, the PGA TOUR maintains an outstanding collection of data for players and available purses on tour. Data for this article were collected from each of the 1995-2003 annual PGA TOUR Media Guides. Total prize money available on TOUR is largely generated from corporate sponsorship and television revenue and increased to $198 million in 2002 from $62 million in 1995 (approximately $73 million in 2002 dollars). In 2002, 61 players

earned at least $1 million in prize money, up from 9 PGA TOUR players in 1995 (12 players meet this criteria using 2002 dollars). Table 1 shows the general increase in the purses available on the PGA TOUR from 1995 to 2002. This is clearly demonstrated, for example, in the earnings of the 125th-ranked player on TOUR each year. The 125th-ranked player earned $515,445 in 2002, a substantial increase from $149,280 in 1995 ($176,217 in 2002 dollars). Note that the top 125 money winners for the year are given exempt status for playing the next year even without winning any tournaments.

Careful attention is made to include only exempt players in this examination likely to be subject to labor-leisure tradeoffs on the PGA TOUR. Two qualifications on those players that are included must be made at this point. First, some exempt players, like Tiger Woods and Phil Mickelson, are elite and cannot be included here because their labor decision is presumably based to a much greater degree on labor-labor tradeoffs instead of the labor-leisure tradeoffs isolated in this examination and characteristic of non-elite players.[3] Ex ante, it is not clear how elite status should be defined; so two specifications of elite status are examined. Players finishing in the top 10 or the top 30 money winners in 3 of 4 consecutive years may be elite because these distinctions generate the most interest among PGA TOUR players and fans.[4] An elite player consistently in the top 10 or the top 30 may face a labor-labor tradeoff that is not likely to be affected by the policy events in question because of substantial compensation from off-course contracts and sponsorships that is generally only available to elite players. The only significant stipulation required of PGA TOUR member players in this regard is that they play a minimum of 15 tournaments during the season.[5]

Top 10 money winners are considered because U.S. players finishing in the top 10 in the points categories that determine the Ryder Cup and President's Cup teams automatically become eligible for play in these very prestigious events, reflecting the importance of consistent top play. Players finishing the season within the top 30 money winners are eligible to play in the limited field and season ending TOUR Championship tournament. As a result, players in either of these elite player designations may not make annual entry decisions based on their expected earnings or on exemption status. Elite players on the PGA TOUR likely provide a large portion of the revenue generation that makes tournament purses relatively high largely by helping create much of the fan interest, pointing to a potentially fruitful research avenue (see Berri, Schmidt, & Brook, 2004; Hausman & Leonard, 1997).

The second qualification on exempt players included in this examination is that they have been exempt for at least 4 consecutive years on the PGA TOUR. This qualification allows an examination of the effect on annual entry decisions for only those players who could realistically be affected by the stricter exemption status rules and the higher available purses primarily by eliminating the player that moves in and out of exempt status from one year to the next because he is not expected to be sensitive to policy changes.[6] Specifically, this player is likely to face a labor-leisure trade-off that is not restricted to providing labor only on the PGA TOUR

because he could split his time playing on the PGA TOUR and the Nationwide Tour or other mini-tours. Thus, a player moving in and out of exempt status would have an annual entry decision that is a function of unobservable characteristics in addition to expected earnings and exemption status.

Data were collected for 74 non-elite exempt players who had at least 4 consecutive exempt years of play on the PGA TOUR from 1995 to 2002.[7] Exemption was possible by having an extended exemption for more than 2 years earned by winning a top tournament or through an exemption for 2 years by winning any other tournament. Players can still earn exemption for a year by finishing in the top 125 of all money winners the previous year on tour. A summary of these data is presented in Table 2.

Mean and median real earnings per event for those players included in the study are larger in each of the years in the latter 4-year block of time than in each year in the earlier 4-year time period. Using t tests, an unconditional analysis of the data shows a significant increase in real earnings per event for those players included in the data set from the earlier time period to the later ($t = -6.63$). Also, the players from the more recent years entered more events than those players from the earlier years ($t = -3.19$). Figures 1 and 2 show the pooled annual entry decisions for the two time periods studied. Note that in the 1995-1998 time period, an observation of 15 events entered only occurred four times, suggesting that the minimum requirement of 15 events per year is not a binding constraint for most exempt players in this data set.

It seems reasonable to assume that the PGA TOUR desires to understand how stricter exemption status rules and higher available purses affect annual entry decisions of players fitting the designation to be studied because PGA TOUR policies may indeed influence annual entry decisions for these players and not others. Again, because changing exempt status cannot directly change the optimal entry choice for nonexempt players, it is not reasonable to include nonexempt players in the examination. Thus, from a policy perspective, building the data set in this fashion seems to be of most interest to the PGA TOUR in better understanding annual entry decisions for this particular group of players.

Because no data exist that provide a player's known earnings in advance of playing in any given tournament, data must be collected to serve as a proxy for the wage (or salary) of the players so they can make their decisions about how many tournaments to enter.[8] I assume that golfers use adaptive expectations to estimate their expected earnings for each tournament they enter so that last year's real earnings per event serves as an estimate for next year's real earnings per event. An adjustment factor of the ratio of current year purse size to previous year purse size is meant to account for the increased purse size seen during this time period. Thus, when controlling for exemption status and player-specific characteristics, the relationship between expected earnings (serving as a proxy for earnings) and the number of tournaments entered in a year is estimated. Because the decision about how many tournaments to enter includes an implicit tradeoff between labor and leisure,

TABLE 2: Descriptive Statistics for Non-Elite Players in Data Set

|	1995	1996	1997	1998	1999	2000	2001	2002	All
Mean real earnings per event in prior year (in 2001 dollars)	22,535	25,090	26,820	26,922	35,242	37,713	41,572	45,514	33,083
Median real earnings per event in prior year (in 2001 dollars)	18,949	21,935	22,613	18,360	28,849	33,534	29,499	38,685	25,431
Mean events entered	25.4	24.6	24.6	24.5	26.0	25.7	25.8	26.6	25.4
Median events entered	25	24	25	25	26	26	26	27	26
Already exempt next year	29	34	30	26	29	28	29	29	234
n	51	51	51	51	57	57	57	57	432

89
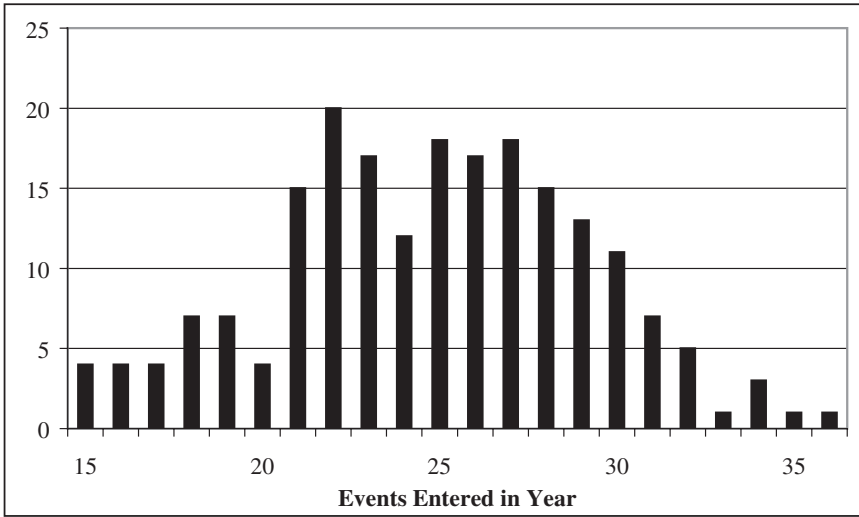
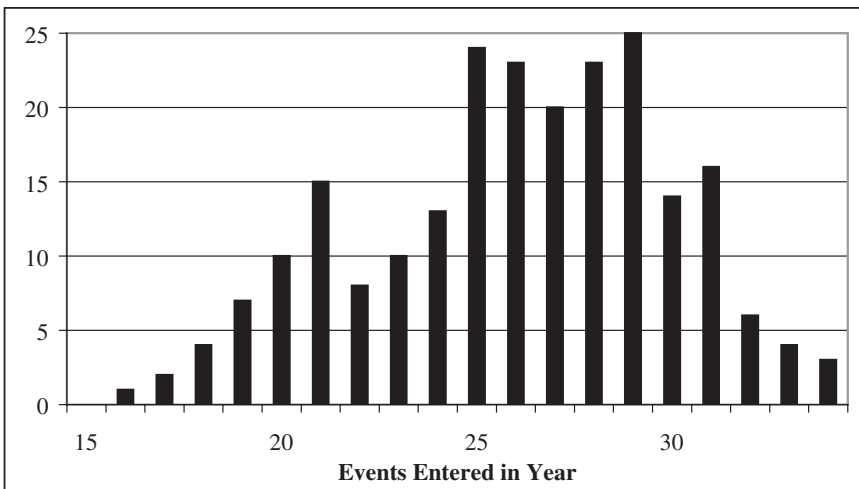Figure 1:   Non-Elite Players' Pooled Annual Entry Decisions, 1995-1998

Figure 2:   Non-Elite Players' Pooled Annual Entry Decisions, 1999-2002

only PGA TOUR players that do not regularly play events on another tour (i.e., Nationwide Tour or European Tour) are in the data set. In addition, players included in the data had a full year of play on the PGA TOUR in the year prior to their first year appearing in the data set. Including observations where earnings in prior years did not come from the PGA TOUR would provide unsuitable expected earnings under an adaptive expectations framework. Earnings and the degree of competition can differ significantly between the PGA TOUR and other professional tours, and it is unclear that expected earnings from a previous year on another tour could predict earnings on the PGA TOUR. Eliminating this allows a better examination of the labor-leisure tradeoff that PGA TOUR players actually face and that the PGA TOUR may have some control over with the incentives it provides and the policies it implements.

METHODOLOGY AND ANALYSIS

To model exempt PGA TOUR players' decisions to enter tournaments, some assumptions are made. The first assumption is that exempt PGA TOUR players decide before the season begins to enter particular events for the year and then commit to playing in just those tournaments. At least anecdotally, this assumption seems feasible for exempt players on TOUR because all exempt players know the dates and venues for each tournament on the PGA TOUR schedule prior to the start of the season.[9] Admittedly, modeling the exempt player's different decision of whether to play in each individual tournament is compelling and merits study.[10] However, this type of decision-making process is perhaps best examined and yields the most insight into how players make entry decisions if there is a switch occurring in the player's decision-making process. For example, a player can go from committing to playing in a tournament to pulling out of a tournament and not playing.[11] But these data are unlikely to be reliable because exempt players can make a commitment to playing in a tournament as late as the Friday before the tournament begins even though they may have committed long before then. As a result, players may pull out of a tournament without ever having officially committed.

The second assumption that I make in modeling the player's annual entry decision is that a relationship exists between expected earnings and the number of tournaments entered in a year. Specifically, an adaptive expectations paradigm is assumed whereby exempt TOUR players make their annual entry decision partly based on their earnings per event entered from the previous year. Thus, I assume that any player's decision for how many tournaments to enter in 2001, for example, is based in part on his earnings per event from 2000. Because golfers do not have contracts like athletes that have a guaranteed salary in most other major professional sports leagues, this seems to be a reasonable manner by which to proxy earnings.[12] As such, I model the annual entry decision as being one made before the beginning of the season and is based partly on expected earnings.

Finally, I assume that exemption status for the following year may have an effect on a player's annual entry decision. All players in the data set are exempt to play in any tournament they desire in the current year. But because some players won a tournament in a previous year and earned a multiyear exemption, these players enter a year knowing they are already exempt for playing in the following year. Subsequently, this may decrease the number of tournaments an exempt player enters in the current year because playing enough tournaments and securing enough earnings to retain exemption status is not required of them (see Ehrenberg & Bognano, 1990a, 1990b). Thus, a model of annual entry decisions is expected to depend partly on exemption status for the following year.

Before introducing a model of an exempt PGA TOUR player's annual entry decision, I present a simple utility function for player j in year t as $U_{jt} = U_{jt}(C_{jt}, L_{jt})$, where C_{jt} and L_{jt} represent consumption and leisure—measured as the number of weeks in a year not playing in a tournament. The exempt player is assumed to select C_{jt} and L_{jt} to maximize U_{jt}. At this point in the analysis, only the player's selection of the optimal level of L_{jt} is of interest because this will allow a determination of the optimal number of tournaments player j will enter in year t. To do this, let $EVNT_{jt}$ be the number of events entered for player j during year t, so that $L_{jt} = 52 - EVNT_{jt}$. Thus, $EVNT_{jt}$ serves as a choice variable and is a measure of player j's annual entry decision in year t. Now, let $EVNT_{jt} = EVNT_{jt}(EXPERN_{jt}, XMPT_{jt}, EVNT_{jt-1}, NEWERA_t, AGE_{jt})$, where $EXPERN_{jt}$ is the expected real earnings for player j in year t and is determined by dividing the real earnings for player j in year $t-1$ by $EVNT_{j(t-1)}$ and multiplied by the purse growth adjustment factor discussed earlier. $XMPT_{jt}$ is a dummy variable taking a value of one if the exempt player is exempt for playing in year $t+1$ and zero otherwise. $EXPERN_{jt}$ and $XMPT_{jt}$ are isolated to estimate the effects on annual entry decisions expected to accompany the much larger purses and stricter exemption status. $EVNT_{jt-1}$ is the number of events entered in year $t-1$ for player j and serves as a proxy for the unique facets of a player's character that would lead to some inherent number of tournaments entered per year (some players just play in more tournaments than other players). To take into account the discrete policy changes that took effect beginning in 1998, $NEWERA_t$ is a dummy variable taking a value of one for years 1999 to 2002 and zero otherwise.[13] Finally, AGE_{jt} is the age in years for player j in year t. The golfer's age may affect annual entry decision positively to use depreciating human capital or negatively to cut back on playing time to remain fresh for competition. Endorsements and equipment contracts are no doubt important in determining annual entry decisions for PGA TOUR players but are very difficult to estimate with accuracy. It is assumed that endorsements and equipment contracts remain stable throughout the time period for each golfer and are expected to roughly cover competition costs (Scully, 2002).[14]

Player j selects $EVNT_{jt}$ to maximize his utility in year t, so observations of $EVNT_{jt}$ are assumed to be optimal for player j. The analysis now examines the effect that exemption status and expected earnings have on exempt players' annual entry decision while controlling for the other variables that have been noted. Rela-

TABLE 3: Estimated Coefficients of the Ordinary Least Squares (OLS) Model

	All		Non-Elite 10		Non-Elite 30		Elite 10	
Constant	1.106***	(7.49)	1.078***	(7.13)	1.076***	(6.70)	2.334**	(2.68)
LNEXPERN	−.0119*	(−1.72)	−.00802	(−1.08)	−.00809	(−1.01)	−.0816**	(−2.08)
XMPT	−.306***	(−2.80)	−.0283**	(−2.54)	−.0281**	(−2.38)	—	
LNEVNT$_{t-1}$	.716***	(22.65)	.719***	(22.24)	.717***	(20.75)	.443**	(2.56)
NEWERA	.0400***	(3.59)	.0367***	(3.22)	.0408***	(3.36)	.194***	(3.30)
AGE	−.00194*	(−1.88)	−.00245**	(−2.23)	−.00230**	(−1.91)	.00662	(1.41)
n	464		432		388		32	
Adjusted R^2	.618		.623		.613		.553	

NOTE: T-statistics are in parentheses.
*, **, and *** indicate statistically significant at the 10%, 5%, and 1% level, respectively.

tionships are estimated by applying ordinary least squares (OLS) to the data just described.[15] The model to be estimated is

$$LNEVNT_{jt} = \beta_0 + \beta_1 LNEXPERN_{jt} + \beta_2 XMPT_{jt} + \beta_3 LNEVNT_{jt-1}$$
$$+ \beta_4 NEWERA_t + \beta_5 AGE_{jt} + u_{jt}, \tag{1}$$

where $LNEVNT_{jt}$ measures the natural logarithm of $EVNT_{jt}$ and is used because changes in the explanatory variables are more likely to impart a constant percentage effect on the annual entry decision across exempt players than a constant absolute increase. $LNEXPERN_{jt}$ measures the natural logarithm of $EXPERN_{jt}$. Expected real earnings per event are transformed to natural logarithms because of the large variation for players and are intended to help reduce heteroscedasticity. $\beta_i, i = 1, \ldots,$ 5, are coefficients, and u_{jt} is an error term.

Given these organizational parameters, OLS is applied to the data. Results from the OLS model are presented in Table 3. OLS estimates are presented for four specifications overall. The "All" specification includes all the elite and non-elite exempt players in the time period from 1995-2002 with at least 4 consecutive years of available data. With regard to the effect of expected earnings on annual entry decision, this specification will demonstrate the importance of splitting out the elite players from the analysis. The "Non-Elite 10" and "Non-Elite 30" specifications do not include elite players finishing in the top 10 or top 30 money winners for 3 of 4 consecutive years. For comparison purposes, results are presented in the "Elite 10" specification for only the elite players finishing in the top 10 money winners for 3 of 4 consecutive years as a comparison. Although the Elite 10 specification suffers from a small sample size, the results offer some suggestions for further research on this matter that will be taken up later.

The fit of each of the first three specifications is fairly good, with an adjusted R^2 of about .62. The focus of the interpretation of results will be on Non-Elite 10

because this specification includes the largest number of exempt, non-elite players and matches most closely with the earlier discussion of the data. As expected, the coefficient on the variable XMPT is negative and is significant. But this coefficient (−.0283) indicates that already being exempt for the following year results in only 2.83% fewer tournaments entered than if the player was not already exempt for the following year. A player that generally plays at least 35 tournaments in a year would be expected to play in one less tournament when he is already exempt to play in the following year. Because only 2 of 432 observations were for at least 35 tournaments, lengthy exemption status by itself seems to provide just a marginal effect on annual entry decisions. PGA TOUR players do not appear to be all that responsive to stricter exemption status.

The natural logarithm of real earnings per event from year $t-1$, LNEXPERN, does not have a significant effect on the number of tournaments entered in year t. This suggests that the labor supply curve for these exempt, non-elite players is vertical. Alternatively, the coefficient on LNEXPERN for the Elite 10 is negative and significant, and although caution should be applied in interpreting results from this specification, it suggests that there may be a backward bending labor supply curve for PGA TOUR players. To summarize the effect of expected earnings on labor supply, the income and substitution effects offset each other for exempt, non-elite players in the data set, whereas the income effect appears to become more dominant for exempt, elite players.

PGA TOUR players generally play about the same number of tournaments from year to year, but heterogeneity among players exists and $LNEVNT_{t-1}$ controls for this unique feature of exempt PGA TOUR players. The coefficient on $LNEVNT_{t-1}$ is significant and, as expected, indicates that annual entry decisions of exempt, non-elite players move largely with the past year's annual entry decision. The coefficient on AGE is significant and negative and suggests that annual entry decision drops with age. Players seem to be cutting back at the margin on the number of tournaments entered in a year to stay fresh for competition. Evaluated at the mean of the number of tournaments entered per player (25.4), an increase in age of 6 years will lead to a drop of one in the number of tournaments entered in a year.

The dummy variable NEWERA is significant and positive. At .0367, NEWERA indicates that players entered 3.67% more tournaments in the years after 1998 because of the various changes that took place on the PGA TOUR at that time. Thus, the average player entered one more tournament per year in the latter time period characterized by stricter exemption status and higher expected purses.[16] The coefficient on NEWERA must be interpreted cautiously because it incorporates all the changes that took place starting in 1998. Although there is initial evidence that the policy changes that took place on the PGA TOUR beginning in 1998 may have had a slight effect of getting exempt, non-elite players to enter more tournaments, more than just stricter exemption status and higher purses became evident in the years after 1998. Tiger Woods became a dominant player on the PGA TOUR and the World Golf Championship events began in 1999, so the additional entered tourna-

ments predicted by NEWERA cannot be solely attributed to the policy changes expanded on in this article. In fact, these other considerations suggest a future research agenda to better understand the effect that scheduling additional elite tournaments and that annual entry decisions by elite players have on the rest of the PGA TOUR.

CONCLUSION

As a tax-exempt membership organization, the PGA TOUR's stated goal of substantially increasing player financial benefits can be accomplished in a number of ways, including increasing marketing opportunities, TV revenue, corporate sponsorship value, and maintaining or enhancing competitive balance. The process of increasing revenues in this manner is similarly seen in professional sports leagues, but typically ownership and players collectively bargain to establish a mechanism by which revenues are shared. Although this type of bargaining is uncharacteristic on the PGA TOUR, exempt players nonetheless have an incentive to support a system of prize offerings and exemption status that favors them and the PGA TOUR.

The unique nature of the PGA TOUR suggests that total prize money is maximized when exempt PGA TOUR players make socially optimal annual entry decisions in such a manner that provides the optimal level of competitive balance and "star power." Exempt golfers have a large measure of discretion in the number of tournaments they enter in a given year and must be assumed to be primarily concerned about maximizing their own utility. It follows that the unique nature of annual entry decisions on the PGA TOUR would allow maximum revenue generation by providing incentives for exempt players to enter the number of tournaments that would provide optimal utility for them while also attracting a strong field of players and eliciting optimal effort.

The results of this article demonstrate that after stricter exemption status lasting at least 2 years, there is a slight dip in annual entries for exempt, non-elite players. But this effect seems minimal at best, so PGA TOUR players generally do not appear to be all that responsive to lengthy exemption status. Further, these same players are not responsive to increased expected earnings. Taken together with the responsiveness of elite players to increased expected earnings, there seems to be initial evidence suggesting a backward bending labor supply curve for PGA TOUR players. This suggests that PGA TOUR policy makers should not ignore the effect these factors have on annual entry decisions and subsequently on revenue generation. The results further suggest that examining labor supply decisions in other individual sports like tennis (ATP) could lead to a more general theory of labor supply in individual sports that could aid in assessing the effectiveness of policy events or changes in these sports leagues.

NOTES

1. Of course, professional golfers on the PGA TOUR do have contracts with equipment companies that could influence decisions to play. Scully (2002) estimates that these sponsorships and contracts roughly cover the costs of competition for most of these players.

2. Prior to 1998, a 10-year TOUR exemption was given to each winner of the PGA Championship, U.S. Open, The Players Championship, Masters Tournament, and British Open. In 1998, these exemptions were cut to 5 years. The TOUR exemption for winning the World Series of Golf (now the WGC-NEC Invitational) was 10 years prior to 1998 and has since become only 3 years. Finally, a lifetime TOUR exemption was given to winners of the PGA Championship and U.S. Open prior to 1970.

3. Because contracts and sponsorships are likely to be relatively high in value for these elite players, the decision concerning the number of tournaments to enter in a year would be driven largely by these labor-labor considerations (i.e., meeting demands of contracts with sponsors, etc.) instead of being driven by the expectations of earnings from entering a tournament and attaining or maintaining exemption status. Thus, it is assumed that elite players may not enter tournaments to earn a living but may enter them to satisfy an obligation to a sponsor's contract and expected earnings and exemption status would not be a reasonable determinant of tournaments entered.

4. Other designations for elite players were tried but did not produce different results from the designation included here.

5. This minimum number of tournaments requirement of the PGA TOUR seems to be aimed to enhance revenue generation because it is likely only a constraint for elite players. That is, elite players may possibly play fewer than 15 tournaments in a year without this requirement. The requirement demonstrates the potentially inconsistent goals of enhancing revenue generation (more appearances by elite players) and enhancing competitive balance (preventing elite players from playing too much and thus leading to contests that are too often won by them).

6. When a player is not exempt to play in any tournament he desires, he is not able to make an annual entry decision at the start of the season because he may not be eligible to play in all the tournaments he desires. Thus, even though a player is willing to supply his labor for a specific tournament, he may not be able to enter that tournament because of limits placed on him by PGA TOUR rules (i.e., the field for a particular event may already be full).

7. Using only the subset of players who are active during the entire period from 1995 to 2002 yields similar results. These results are not reported in the article because creating the sample in this fashion does not provide as much variation in the explanatory variables.

8. No player appearing in a PGA TOUR event receives an appearance fee, unlike some other professional tours around the world.

9. Deane Beman, the commissioner of the PGA TOUR from 1974-1994, said of the entry decisions of TOUR players in years prior to the 1982 season when only the top 60 players were fully exempt, "They could plan their schedules, when they were going to be with their families, be set for a full year." Rocco Mediate essentially affirms this with comments he made about taking time off to be with his family: "If I win back-to-back events, and I have scheduled two weeks off. Guess what? I'm taking two weeks off" ("Mediate a Hit at Hometown Event," 2003). Of course, commitments may amount to little more than cheap talk, because a player committed to playing in a tournament can withdraw because of poor play or injury whereas still other players can add a tournament to their schedule to continue playing to press a hot-hand advantage. In addition, players close to the threshold of ending the season within the top 30 or 125 money winners on TOUR may schedule additional tournaments to provide a better chance of finishing with that status because of the special perks—such as retaining TOUR playing privileges and being invited to the TOUR Championship—that are available to those threshold status players.

10. A study like this would no doubt account for the location, expected field, prestige, and purse of a tournament. In this study of annual entry decision, it is assumed that a player fills his schedule first with those events offering optimal location, expected field, purse, and prestige until the golfer reaches his optimal number of tournaments to enter in the year.

11. One example of this case is when Vijay Singh pulled out of his commitment to play in the 2003 Bank of America Colonial. Reportedly, he promised his family that if he won the previous week's tournament, he would not play the Colonial. As an elite player, Vijay Singh is not included in this study, but this scenario and others like it raise the issue of how long an exempt player had been committed to playing the tournament (i.e., 1 year, 1 month, etc.) before pulling out and suggests that it may not be unreasonable to assume that players make an annual entry decision at the start of the year. Although it is the rare case for a player to pull out of a tournament commitment, further study is warranted.

12. This assumption was noted as being reasonable for exempt players on TOUR in a conversation the author had with a national golf writer.

13. Only a shift dummy variable is included in this analysis. Although interacting the dummy variable with the slope coefficients would allow a richer analysis by providing a direct reading of the magnitude of the effect of specific institutional changes on labor supply for the PGA TOUR, multicollinearity among these interaction terms becomes a problem that cannot be overcome in the model. Further research in this area would seem natural.

14. The desire to control for endorsement income is one that cannot be satisfied completely at this time because accessible data for the time period in the analysis do not exist. In 2004, *Golf Digest* magazine began publishing an annual list of the top 50 endorsement earners in professional golf. This data set generally includes elite players and older players like Arnold Palmer and Jack Nicklaus. The data seem reliable but are not sufficient for use in this study.

15. The minimum requirement of 15 events entered in a year could be considered a constraint pointing to the need to use a Tobit model, but the very low number of observations of the annual entry decision variable taking the value of 15 (4 out of 432 total observations) suggests that the Tobit model is not needed.

16. For comparison purposes, the coefficient on NEWERA for the Elite 10 specification is much larger than for the Non-Elite 10 specification. On average, the Elite 10 players entered about four more tournaments in 1999-2002 than in 1995-1998.

REFERENCES

Alexander, D. L., & Kern, W. (2005). Drive for show and putt for dough? An analysis of the earnings of PGA TOUR golfers. *Journal of Sports Economics*, *6*(1), 46-60.

Berri, D. J., Schmidt, M. B., & Brook, S. L. (2004). Stars at the gate: The impact of star power on NBA gate revenues. *Journal of Sports Economics*, *5*(1), 33-50.

Cottle, R. L. (1981). Economics of the Professional Golfers' Association Tour. *Social Science Quarterly*, *62*(4), 721-734.

Ehrenberg, R. G., & Bognanno, M. L. (1990a). Do tournaments have incentive effects? *Journal of Political Economy*, *98*(6), 1307-1323.

Ehrenberg, R. G., & Bognanno, M. L. (1990b). The incentive effects of tournaments revisited: Evidence from the European PGA TOUR. *Industrial and Labor Relations Review*, *43*, 74S-88S.

Fort, R., & Quirk, J. (1995). Cross-subsidization, incentives, and outcomes in professional sports leagues. *Journal of Economic Literature*, *33*(3), 1265-1299.

Hausman, J. A., & Leonard, G. K. (1997). Superstars in the National Basketball Association: Economic value and policy. *Journal of Labor Economics*, *15*(4), 586-624.

Laband, D. N. (1990). How the structure of competition influences performance in professional sports: The case of tennis and golf. In B. L. Goff & R. Tollison (Eds.), *Sportometrics* (pp. 133-150). College Station: Texas A&M University Press.

Lynch, J. G., & Zax, J. S. (2000). The rewards to running: Prize structure and performance in professional road racing. *Journal of Sports Economics*, *1*(4), 323-340.

Maloney, M. T., & McCormick, R. E. (2000). The response of workers to wages in tournaments: Evidence from foot races. *Journal of Sports Economics*, *1*(2), 99-123.

Martin, J. (2001). Golf tournaments and CEO pay—Unraveling the mysteries of executive compensation. *Journal of Applied Corporate Finance*, *14*(3), 22-34.

Mediate a hit at hometown event. (2003, September 26). *GolfWorld Magazine*, p. 32.

Moy, R. L., & Liaw, T. (1998). Determinants of professional golf tournament earnings. *The American Economist*, *42*(1), 65-70.

Nero, P. (2001). Relative salary efficiency of PGA TOUR golfers. *The American Economist*, *45*(2), 51-56.

PGA TOUR Media Guide. (1995-2003). *Annual guides*. Ponte Vedra, FL: PGA TOUR.

Rishe, P. J. (2001). Differing rates of return to performance: A comparison of the PGA and senior golf tours. *Journal of Sports Economics*, *2*(3), 285-296.

Scully, G. (2002). The distribution of performance and earnings in a prize economy. *Journal of Sports Economics*, *3*(3), 235-245.

Shmanske, S. (1992). Human capital formation in professional sports: Evidence from the PGA TOUR. *Atlantic Economic Journal*, *20*(3), 66-80.

Shmanske, S. (2000). Gender, skill, and earnings in professional golf. *Journal of Sports Economics*, *1*(4), 385-400.

Szymanski, S. (2003). The economic design of sporting contests. *Journal of Economic Literature*, *41*(4), 1137-1187.

Thomas A. Rhoads is an associate professor of economics at Towson University. His teaching and research interests focus on sports economics and environmental economics.