Working Paper No. 16-03

My Future or Our Future? The Disincentive Impact of Income Share Agreements

My Future or Our Future? The Disincentive Impact of Income Share Agreements

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October 18, 2016

Abstract

Liquidity constraints can distort e cient investment across a variety of domains, for both rms and individuals. While debt nancing is often used to address liquidity

cognitive based job, with poker players placing lower in tournaments when reaping a smaller share of their winnings. Our empirical tests suggest that this is primarily due to incentives. Further, our results support the prediction of tournament theory that larger spreads between prizes induce higher e ort levels from competitors (Eriksson (1999)). This has implications for rms, where promotions often follow a tournament structure with employees promoted based on their performance relative to other employees (Lazear (1992); Baker, Gibbs, and Holmstrom (1993, 1994a,b); Bognanno (2001)). Our results suggest that increasing the marginal value of the prize (the promotion) can be an e ective way to increase productivity, even when output is highly variable as is the case in poker tournaments.

The remainder of the paper is organized as follows. Section 2 brie y describes the features of online poker tournaments and the market for staking that are crucial for understanding our empirical analysis. Section 3 describes the data, while section 4 outlines our empirical framework and central estimation equations. Section 5 presents the results of our analysis, including tests that di erentiate between potential mechanisms. Section

The prize pool is funded by the entry fees of all competitors, with some portion of this fee going to the hosting site (about 8% is typical in our sample). Prizes increase nonlinearly with nish position and follow the general structure seen in gures 1 and 2.[10] Notably, the marginal return from moving up one nish position from 3rd to 2nd is worth 3.4% of the prize pool whereas moving up from 19th to 18th is worth only 0.07%.[11] Across tournaments the structure of prizes based on nish percentile is virtually identical; however, the level of prize money varies across tournaments based on the entry fee and number of participants. The top heavy prize structure and the stochastic component of poker create a high level of variance in the earnings of tournament players.[12] To reduce

the tournament(s) for which staking is being requested and the total amount requested.

distribution, we remain agnostic about the e ect of staking onnishpercentile. Given the payout structure, even if staking disincentives players, changes in lower regions yield no change in monetary outcomes. Evidence of this type of behavior is seen in gures 5 and 6. In Figure 5 we see that unstakednishpercentile outcomes are greater than their staked counterparts in the right-most tail. Figure 6, which is the density of nishpercentile for players that win some amount, yields a similar pattern { unstaked outcomes are greater than staked outcomes at the right-most tail. Thus, while we estimate Equation 2 with OLS to provide a benchmark, it should be noted that average nishing position in our sample is the 58th percentile for unstaked-play and the 57th percentile for staked-play - both of which have a monetary return of $0. In general, monetary returns of greater than $0 only begin happening around the 90th percentile. That is, the conditional expected mean is not closely related to monetary outcomes. Therefore, we also estimate Equation 2 using quantile regression (QREG) to asses how changes in staking status are associated with changes of nishpercentile at di erent nishing rank quantiles. This allows to observe changes in outcomes in the right tail of the distribution ofnishpercentile - where changes in this outcome lead to real monetary di erences.

5 Results

5.1 Main Results

5.1.1 Monetary Outcomes

The main set of empirical results that we present can be found in Table 2. The impact of staking is derived from comparing, within a given entry fee tier, a player's outcomes in tournaments where they received staking to the outcomes in tournaments where they did not receive staking. In Column 1, we nd that tournaments where a player was staked have a return on investment that is 58 percentage points lower than an equivalent tournament where the player was not staked,ceteris paribus This is of similar size to the di erence in results between pro and amateur players in the World Series of Poker (Levitt and Miles (2014)). Columns 2 and 3 show that a player's chance of having a large win are

signi cantly reduced under staked-play. The probability of winning at least 10 entry fees is reduced by .83 percentage points when staked (an almost 40 percent decrease), while the probability of winning at least 3 entry fees is reduced by .87 percentage points (more than a 17 percent decrease). Although both the overall return on investment is negative and the probability of a large win is diminished under staked-play, we do nd that the probability of a small win (a positive return but no more than 3 entry fees won) increases under staked-play. When staked, the probability of having a small win increases by 1.3 percentage points (a 16 percent increase). Finally, in Column 5 we nd no evidence to suggest that the probability of having any monetary return changes under staked-play relative to unstaked-play.

In addition to average return on investment being signi cantly lower under staked-play, we nd a pattern of results for the binary outcomes that conform to the predictions in Section 4.1. Relative to staked-play, we see that under staked-play, 1) the probability of a large win decreases, 2) the probability of a small win increases, and 3) the probability of winning any amount is unchanged. This is evidence in favor of large wins being reallocated into small wins when the player is staked in a tournament. While these results are consistent with a decrease in e ort from a reduction in incentives, at this point we cannot rule out that selection may also play a role in the di erence between outcomes under staked- versus unstaked-play. We attempt to disentangle these mechanisms in Section 5.2.

5.1.2 Finishing Rank Outcomes

Turning our attention to the results in Table 3, we see that the part of the distribution of nishpercentile where the di erence between staked-play and unstaked-play has any statistically signi cant magnitude is in the extreme right tail (95th quantile and higher). That is nishpercentile is lower at the 95th, 97.5th, and 99th quantiles for staked-play compared to unstaked-play within player by entry fee tier. Although these di erences are precisely estimated, the magnitudes of the coe cients are somewhat small. For example, the estimated coe cient onstaked at the 95th quantile is 0:469, less than

half of a percentage point. For reference, the unconditional values of finishpercentile at the 95th and 99th quantiles are 96.40 and 99.29, respectively. However, the convexity of the payout structure does make these small differences more important than they would be in a setting with a linear payout structure. At the 90th quantile we find that finishpercentile is larger for staked-play than unstaked-play; however, given the lack of precision, no difference cannot be ruled out. While these findings are interesting in and of themselves, their main purpose is to complement the results for the monetary outcomes. That is, these results provide further evidence that a reduction in incentives, induced by staking, leads to worse outcomes.

5.2 Addressing Issues of Selection Bias

Adverse selection is a mechanism that has the potential to produce the same results in tournament performance that disincentives do. Thus, additional work is required to disentangle these two mechanisms and to further understand how engaging in an ISA

Panel C we include the lifetime average ability of all tournament entrants.[31] Comparing the results in Panel A to those in panels B and C, we find that the inclusion of tournament difficulty generally reduces the magnitude of the estimated coefficients on *staked*{ which is equivalent to a reduction in the disincentive effect as a component of the overall effect of being staked. Simultaneously we see that, in both panels B and C, our measures of tournament difficulty have a negative and statistically significant relationship with the majority of the outcome variables. The reduction in magnitude of the estimated coefficients on *staked* and the significance of the estimated coefficients on the tournament difficulty measures is an indication that within-person selection is occurring. However, the estimated coefficients on *staked* remain generally significant and of the same sign as both the main set of results in Table 2 and the results found in Panel A of this table. In fact, if we compare the size of the coefficient on *staked* in Column 1 of Panel A to those in Column 1 of Panel B, we see that the including tournament difficulty reduces the size of the coefficient by only 17 percent. That is, the disincentive effect of being staked far outweighs the effect that within-person selection has on the differential outcomes between staked- and unstaked-play. Similar results are true when the probability of a large win is the outcome of interest.

In this section, we have found evidence consistent with the possibility that players are seeking staking for tasks that are more difficult than they appear (i.e. factors beyond tournament characteristics such as the speed at which mandatory bets increase). However, we must remember that within-player selection is only part of the overall effect of being staked, as the results continue to show that the disincentives generated by being staked are an important part of this story.

[31] While we present this set of results, as we proceed we will only focus on lifetime average ROI as a control variable. The reason for doing so is that we are sure of how this variable is created. As for the lifetime average ability score, it is a propriety measure generated by sharkscope.com As mentioned in an earlier footnote, these variables are highly correlated and results that use lifetime ability instead of lifetime ROI are substantively the same.

sample and the results produced in the prior section (Table 4). That is, both selection e ects and disincentive e ects are required to understand the di erences in outcomes between staked- and unstaked-play.

5.2.3 Time Frame

Another threat to our empirical strategy would be if there was some fundamental di erence about the player when they engage in unstaked-play compared to when they engage in staked-play. For example, it is possible to envision a scenario where a player goes on a hot streak and then seeks out staking because they can sell an income share at a markup relative to the entry fee, as their investment appears more attractive than it really is. Upon receiving staking the player returns to their normal results (mean reversion). This would show up in our results in the same way as a negative e ect caused by disincentives. Another potential concern, is that our assumption that unobservable player characteristics are time invariant does not hold. This would be the case if an individual's relative ability was changing across time. While it seems reasonable to assume that ability is fairly constant over a 20 month time frame, it is worth exploring potential violations of our assumptions. If a player is improving across time and seeks staking only towards the end of our time frame, staked results would appear better than unstaked results, independent of any incentive e ect (upward bias). Likewise, if a player is getting worse across time and only seeks staking towards the end of our time frame, staked results would appear worse than unstaked, independent of any incentive e ect (downward bias). To mitigate these concerns, we create a \staking window" where we eliminate observations before a player's rst incident of staking and after a player's last incident of staking.[33] Thus, we create a narrower time frame where a player is playing in both staked and unstaked tournaments to compare performance in staked- versus unstaked-play.

Table 6 presents the results of estimating Equation 1 with only observations that fall inside the \staking window". The results in Panel A provide further evidence that there is a negative relationship between being staked in a tournament and both return

[33] This decreases our sample by over 60%, taking us from 96,371 observation to 34,816 observations.

on investment, and the probability of achieving a large win. Similar to the main set of results, when a player is staked in a tournament the probability of achieving a small win increases and there is no signi cant change in the probability of winning any amount of money. Panel B adds a measure of tournament di culty (the lifetime average return on investment for all tournament players). Coinciding with the results over the full time period, we nd the presence of both a disincentive e ect and a selection e ect induced by staking, as the estimated coe cient ofstakeddecreases in magnitude and we also nd an estimated coe cient on tournament di culty that is both negative and statistically signi cant.

Despite the fact that the coe cient sizes onstakedare smaller than their full sample counterparts, the general pattern is the same: being staked is associated with lower return on investment for a tournament, smaller probability of a big win, larger probability of a small win, and no change in the probability of returning any win. Unfortunately, this sample restriction leads to a large reduction in observations and a corresponding loss in power.[34] In summation, when we compare staked- to unstaked-play inside the \staking window" our results are consistent with the full sample, though noisier. This provides further evidence that engaging in an income share agreement can result in worse outcomes through both disincentive and selection e ects.

6 Conclusion

While individual debt contracts are the most common way to alleviate liquidity constraints, searches for alternatives are ongoing, especially as a means to relax these constraints for individuals with little collateral. Recently, one of these alternatives, income share agreements, has gained some attention. Income share agreements are equity contracts that allow individuals to raise money by selling shares of their future income. This model has been discussed by policymakers as a way to address increasing costs of higher

[34] In Appendix A we consider an alternative method to reduce the concern that player ability, or some other factor, is changing over time and that these changes are causing us to nd a negative e ect of staking when none is present. Using only unstaked tournaments, we compare outcomes in the \staking window" to outcomes not in the window. We nd no evidence to suggest that there is a di erence in player outcomes across these time periods.

the disincentives can be e ectively priced for a functioning market, these contracts could be ine cient from a standpoint of social welfare.

Finally, our results are consistent with the prediction of tournament theory that larger marginal returns to an increase in rank induce higher e ort levels from competitors. This has implications for rms, where promotions often follow a tournament structure with

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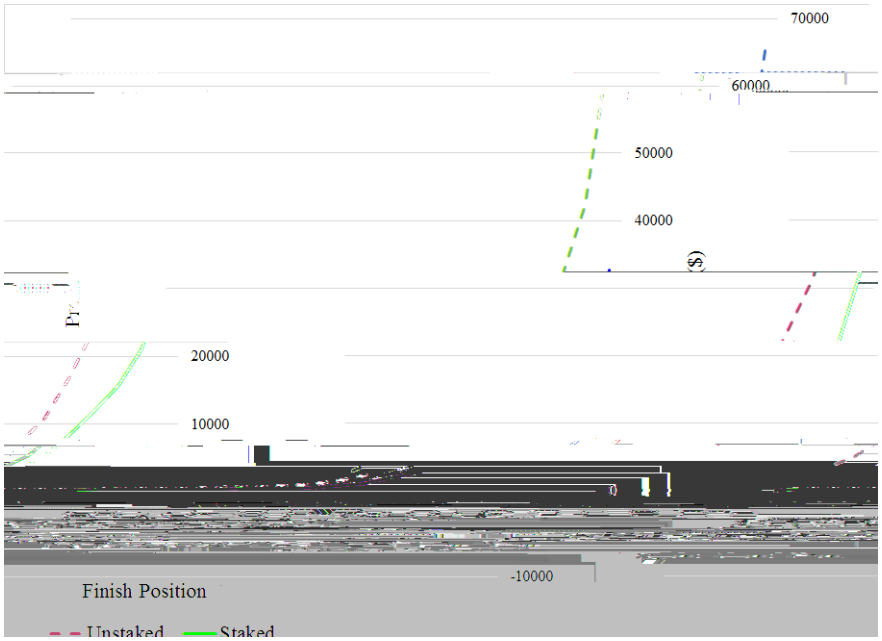
7 Figures and Tables

Figure 1: Payout Structure

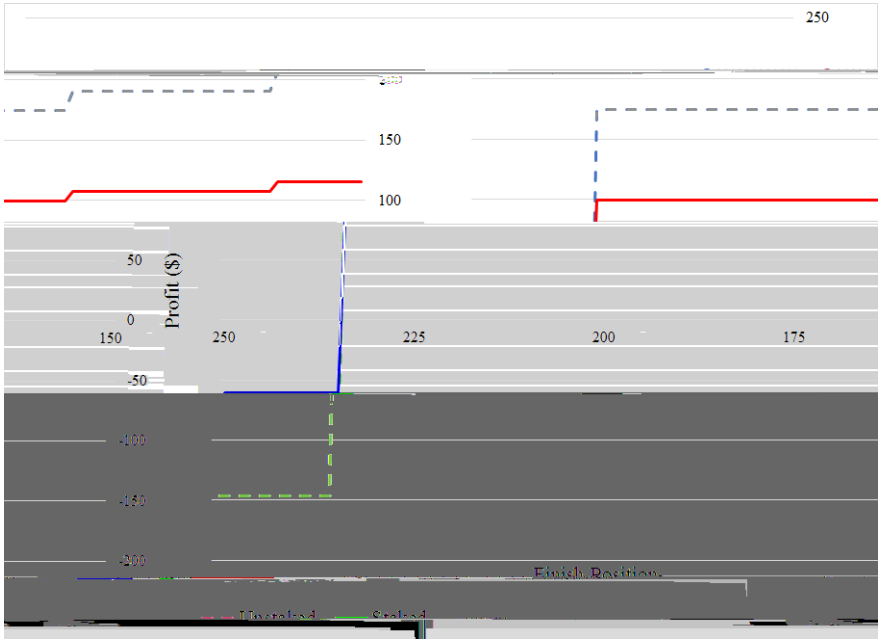
Notes: The blue line represent the payout schedule for a tournament with 2,358 entrants. This is the average field size for a tournament in our sample.

Figure 2: The Impact of Staking on Poker Tournament Prizes

(a) Full Distribution of Prizes



(b) At First Prize Level



Notes: Figure 2a depicts the distribution of pro t for the mean staked tournament in our sample, under the conditions of no staking and staking of 50% with average markup. Figure 2b zooms in on nish positions near the rst prize.

Figure 3: Typical Staking Transaction

(a) Phase 1: Advertisement

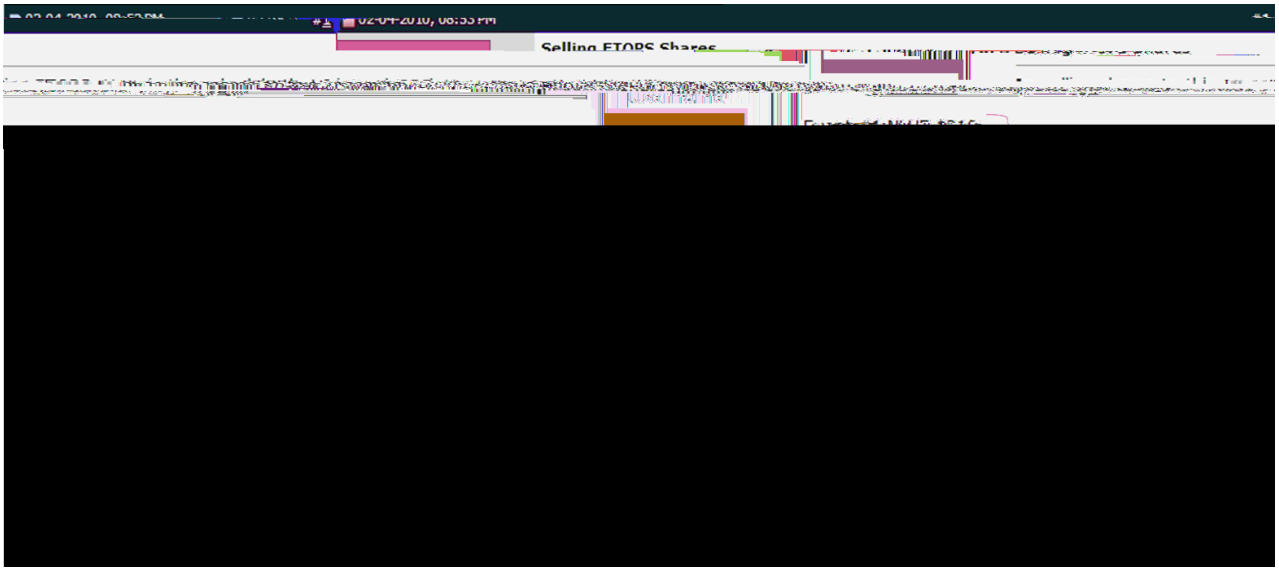
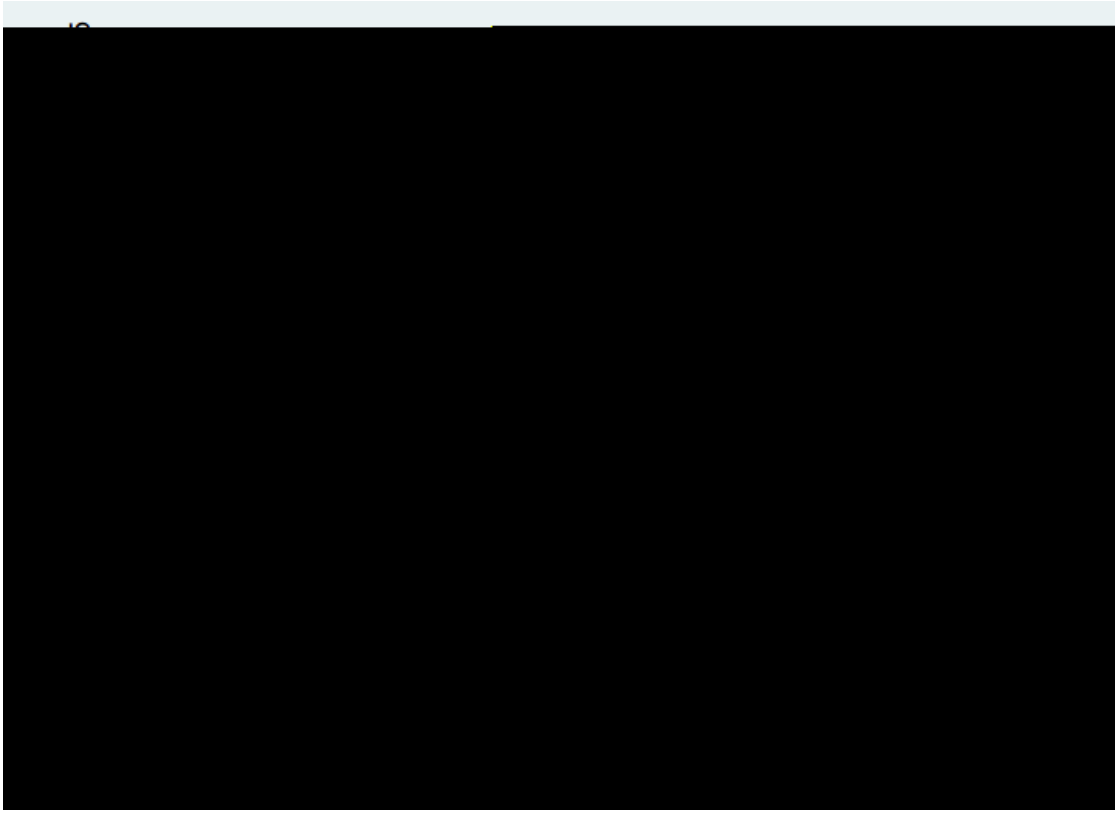


Figure 4: ROI for Staked- versus Unstaked-play Across Entry Fee Tiers

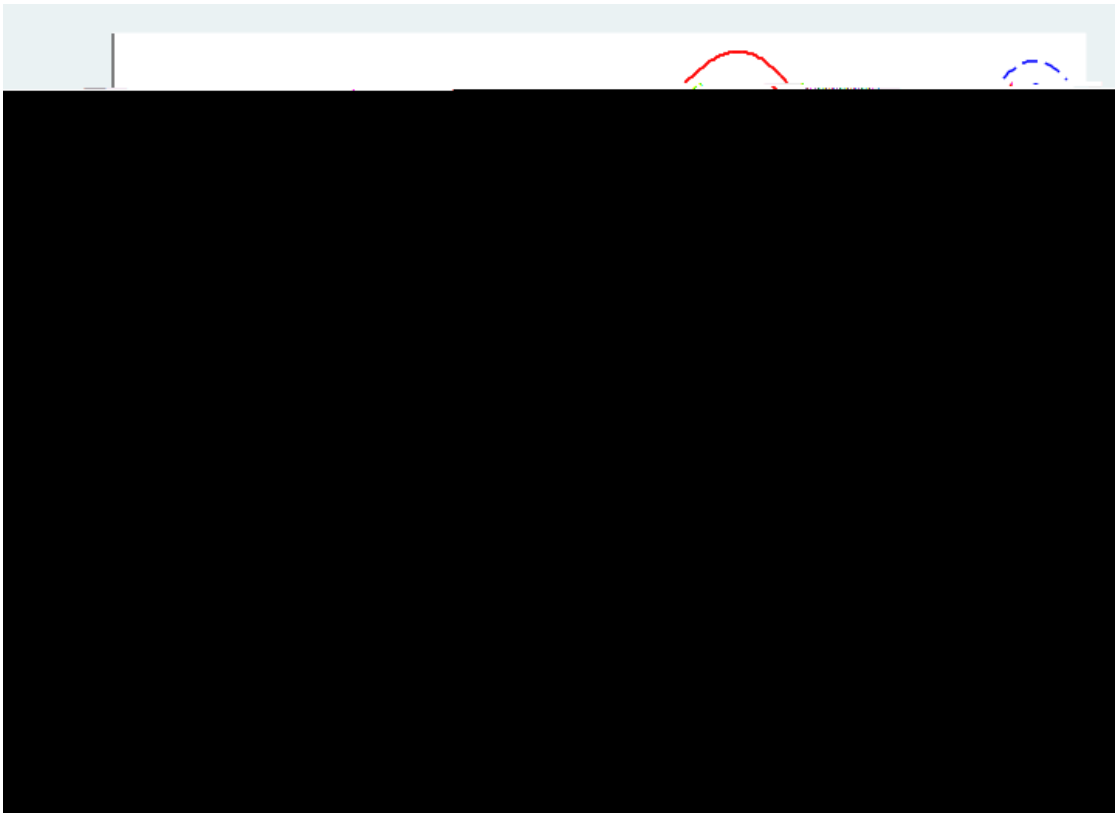
Notes: Figure 4 displays the average ROI by entry fee tier for staked and unstaked-play. Circle size represents the relative number of observations. Entry fee tiers are de ned as $0-22, $22.01-$109, and above $109. These cuto s are based on the quartiles of entry fee.

Figure 5: Distribution of Finish Percentile for Staked and Unstaked Tournaments



Notes: The above kernel density estimations were done using a Gaussian kernel (results were not substantively different under various other kernels). The solid red line represents the density of a player's tournament finishing percentile under staked-play, while the dashed blue line does the same but for unstaked-play. The values chosen for the upper limit and lower limit of the distribution were 100 and 0, respectively.

Figure 6: Distribution of Finish Percentile for Staked and Unstaked Tournaments: Players Finishing the Tournament with Some Amount of Money



Notes: The above kernel density estimations were done using a Gaussian kernel (results were not substantively different under various other kernels). The solid red line represents the density of a player's tournament finishing percentile under staked-play, while the dashed blue line does the same but for unstaked-play. The sample is restricted to those that won some amount of money. The values chosen for the upper limit and lower limit of the distribution were 100 and 85, respectively.

Table 1: Summary Statistics

Variable	Full Sample	Unstaked	Staked	t-Statistic
Retoltment	47.41	49.39	-12.20	3.35
	(3037.22)	(3083.29)	(853.32)	
FlsPerceta	58.55	58.59	57.39	2.56
	(24.78)	(24.75)	(25.63)	
Atleats10 bigav	0.021	0.021	0.011	5.56
	(0.143)	(0.144)	(0.103)	
Atleats3 bigav	0.049	0.049	0.040	2.61
	(0.215)	(0.216)	(0.195)	
Noemar3 bigav	0.085	0.084	0.098	-2.53
	(0.279)	(0.278)	(0.298)	
Wonatobay	0.134	0.133	0.138	-0.70
	(0.340)	(0.340)	(0.345)	
Tanetyfee	81.47	79.04	154.64	-19.58
	(110.48)	(104.44)	(214.05)	
Tanets	1481.7	1452.6	2357.5	-14.61
	(2938.6)	(2917.4)	(3404.6)	
Tanig	95.81	95.59	102.42	-0.42
	(1037.51)	(1042.38)	(878.29)	
LwEtyFee Tier	0.262	0.265	0.170	13.68
	(0.440)	(0.441)	(0.376)	
Mid EtyFee Tier	0.526	0.531	0.389	15.93
	(0.499)	(0.499)	(0.488)	
HgEtyFee Tier	0.212	0.204	0.441	-26.20
	(0.409)	(0.403)	(0.497)	
Weekd Tanet	0.488	0.481	0.697	-25.68
	(0.500)	(0.500)	(0.460)	
Avag ROI fotanet ets [a]	6.584	6.467	9.949	-23.68
	(6.915)	(6.884)	6.942	
Avag abtyfo tanets [a]	73.151	73.07	75.47	-15.50
	(7.206)	(7.188)	(7.330)	
Package Details:				
Mak [b]	16.74	20.80	16.68	-
	(10.77)	(6.51)	(10.81)	
PercnReeps [b]	55.44	53.17	55.47	-
	(17.42)	(9.86)	(17.50)	
PercnStak	1.69	-	52.59	-
	(9.92)	-	(19.58)	
Observations	96,371	93,274	3,097	

Standard deviations appear in parentheses below the mean.

The t-statistics are from the null hypothesis that there is no di erence between the unstaked mean and the staked mean, and that the variances of the two samples areunstaked Perce9112.045

Table 2: Monetary Outcomes

VARIABLES	(1) Return on Investment	(2) At least 10 entry fees won	(3) At least 3 entry fees won	(4) No more than 3 entry fees won	(5) Won some money
Dependent Variable Mean	49.39	0.021	0.049	0.084	0.133
staked	-58.024***	-0.0083***	-0.0087*	0.0136**	0.0049
	(20.667)	(0.0018)	(0.0046)	(0.0056)	(0.0068)
Tournament Characteristics:					
entry fee	-0.171*	-0.0000	0.0000	0.0000**	0.0000
	(0.102)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
entrants					

Table 3: Finishing Position Outcomes

		Dependent Variable: [illegible] (unstaked mean: 58.59)						
Estimation	OLS	Quantile						
Quantile	n/a	25	50	75	90	95	97.5	99
[illegible]	-0.0119	-0.6631	-0.4709	0.7919	0.1761	-0.4689**	-0.3246***	-0.1888***
	(0.7162)	(0.5887)	(0.6296)	(0.6748)	(0.2910)	(0.2071)	(0.1072)	(0.0489)

Tournament Characteristics:

Table 4: Monetary Outcomes: Including Tournament Di culty

VARIABLES	(1) Return on Investment	(2) At least 10 entry fees won	(3) At least 3 entry fees won	(4) No more than 3 entry fees won	(5) Won some money
Dependent Variable Mean	110.3	0.030	0.069	0.12	0.187
Panel A: Restricted Sample					
staked					

Table 5: Monetary Outcomes: Matched Tournaments

VARIABLES	(1) Return on Investment	(2) At least 10 entry fees won	(3) At least 3 entry fees won	(4) No more than 3 entry fees won	(5) Won some money
Dependent Variable Mean	111.8	0.027	0.063	0.113	0.176
Panel A: Restricted Sample					
staked	-112.25**	-0.0088***	-0.0037	0.0209**	0.0172
	(54.63)	(0.0032)	(0.0069)	(0.0097)	(0.0111)
Panel B: Including Tournament Difficulty					
staked	-100.93*	-0.0063*	-0.0013	0.0209**	0.0196*
	(54.98)	(0.0035)	(0.0070)	(0.0094)	(0.0109)
Average ROI for all entrants	-9.282**	-0.0021***	-0.0020***	0.0001	-0.0019**
	(3.911)	(0.0004)	(0.0005)	(0.0008)	(0.0010)
Observations	14,666	14,666	14,666	14,666	14,666

Standard errors are clustered at the player level
*** p < 0.01, ** p< 0.05, * p< 0.1

Notes: Panel A restricts the sample to only observations where tournament difficulty is known. Panel B includes the lifetime return of investment of all tournament entrants as a control. All regressions include player by matched tournament fixed effects and indicators for whether or not the tournament was part of special tournament series, and whether or not the tournament was played on the weekend. All regressions also include controls for the entry fee, a quadratic polynomial in the number of entrants, indicators for rebuy structure and indicators for tournament speed.