

What Impacts a Poker Player's Earnings? Evidence from a Survey of Online Poker Players

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THE TWO THINGS THAT MAKE POKER INTERESTING relative to most other wagering opportunities are that players are pitted against each other and that skill is a critical factor in the game.¹ Experienced poker players can earn money over time, and there are many individuals in the United States and around the world who are professional poker players. These individuals obtain incomes (sometimes large incomes) based on their skill in a number of areas, including strategic and tactical decision making, an understanding of statistics, and interpersonal acumen. Rather than solely depending on the turn of a card (although some degree of chance, as in many endeavors, is a factor in poker), winning poker players must employ analytic and social skills in order to anticipate events, "read" the competition, make sound investments in the short and the longer terms, and respond to changing table (i.e., operating) conditions.

Therefore, professional poker players, semi-professional poker players (players who consistently earn money but do not consider poker as their main job), and serious amateurs must possess several skills to earn money over time. A number of studies have examined poker playing skills. For example, Fiedler and Rock² outlined ten skills needed by poker players, which included mathematical understanding, strategic thinking, and the ability to exert self-control and consistently monitor one's own behavior. Other studies have attempted to identify or

quantify the amount of skill in various poker games. Hendrickx et al.³ used a game theory approach to examine a simplified version of poker they called "straight poker." On a zero-to-one scale, they determined that a game needed to have a relative amount of skill of 0.2 or higher to be considered predominantly based on skill. Their simplified version of poker exceeded this easily, with skill levels ranging between 0.25–0.45 depending on which specific assumptions were employed. Croson, Fishman, and Pope⁴ examined results from poker tournaments. They found that when a player had a good finish in a previous tournament, they were then more likely to finish higher in following tournaments. They compared these results with those from golf and found similar levels of skill versus luck needed across the two games. Other studies have analyzed actual hands played on Internet poker sites.⁵

One can see that all of these studies suggest poker is a game predominantly based on skill. However, even though this research has outlined some of the skills that appear to be involved in winning poker, and how such skills impact one's play, no research has examined how individuals come to possess

¹ This contrasts with games like blackjack, slot machines, and roulette, where a player always plays against the casino or "house." Unless one violates the rules (e.g., counting cards in blackjack), it is statistically impossible to earn more money than the house over the long run in these games.

² Ingo C. Fiedler and Jan-Philipp Rock, *Quantifying skill in games-theory and empirical evidence for poker*, 13(1) GAMING L. REV. & ECON. 50–57 (2009).

³ Ruud Hendrickx, Peter Borm, Ben van der Genugten, and Pim Hilbers, *Measuring skill in more-person games with applications to poker*, Tilburg University Working Paper No. 2008-106 (2008).

⁴ Rachel Croson, Peter Fishman, and Devin Pope, *Poker superstars: Skill or luck?*, 21(4) CHANCE 25–28 (2008).

⁵ Fiedler and Rock, *supra* note 2; Hope, Paco and Sean McCulloch. 2009. "Statistical Analysis of Texas Hold'Em." Working paper. Cigital, Inc.

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The authors would like to thank Matthew Hilger and Albert Sands of internettexasholdem.com for assistance running the survey, and Susquehanna University Committee for Faculty Scholarship for a grant to help fund this project.

poker skills. This article addresses this gap in the literature by examining factors related to possessing poker skills with actual online poker players. By considering these factors, we will have an opportunity to assess how actively studying poker skills impacts winnings, which characteristics and processes may allow someone to benefit from such study, and whether our data suggest, as do the findings from other studies, that poker is predominantly a game based on skill rather than chance.

METHOD

Participants

Volunteers for the study were recruited from an Internet-based poker forum, *Internet Texas Holdem* (ITH, found at <<http://www.internettexasholdem.com>>), where interested individuals register for information and Web-based discussion about matters related to playing poker online. Members of this forum are individuals from around the world, of varying ages and backgrounds, and with different motivations to play. To qualify for participation in the current study, individuals needed to 1.) be registered members of ITH, 2.) have made at least ten postings to the ITH forum before enrolling in the study, 3.) be at least 18 years of age, and 4.) play online poker for actual monetary gain and/or loss.

The owner of ITH was approached as a community partner for conducting this research project. He was involved in reviewing the informed consent documents, developing incentives, and approving survey items. He posted an advertisement for the project on the ITH Web site and allowed the investigators to send two recruitment e-mails to all registered ITH members with more than ten forum postings. Recruitment e-mails were sent to 1,505 e-mail addresses, yielding 209 responses, a return rate of 13.9%. The advertisement and recruitment e-mails contained information about the project, its purpose and procedures, and a clickable link to the study's Web page.

Materials and procedures

Participants completed an Internet-based survey through the *Survey Monkey*TM Web service, an online company which charges a small fee to format and administer questionnaires. Participants were informed that a donation (US\$2.00) would be made

to a children's charity (Colombianitos, a group providing assistance to children and families in Colombia and supported by the ITH owner) for each person enrolling in the study. Additionally, individuals reaching the end of the survey would be able to register for a small stake in any winnings earned by a well-known player during an upcoming online poker tournament. For this incentive, participants needed to enter their ITH screen name so that they could be contacted should the player win. Screen names were stored in a file separate from the survey data. No personally identifying information was collected about participants and all screen names were deleted upon completion of the tournament.

Over a three-week period, 209 ITH members completed the survey. Fifteen of these participants self-identified as professional poker players and were excluded from data analysis, resulting in an adjusted sample size of 194 individuals.⁶ The survey consisted of a series of Web pages soliciting information regarding demographics, online poker-playing behavior, drug and alcohol use, perceived benefits and difficulties associated with Internet poker, monetary aspects of playing online, and personality characteristics.⁷ Participants verified that they played online poker for "real" money.

After confirming that they currently played online poker for actual stakes, participants were asked a series of questions about when they started playing, when they began to play for actual money, and the amount they had won or lost during the past six months. They were then asked to rate their confidence in estimating winnings and losses on a Likert-type scale ranging from one (not at all confident) to seven (extremely confident).

Participants indicated the amount of time they spent studying poker-related skills by reporting the approximate number of hours per week they worked to improve their poker game by reading books on poker, watching poker-related videos, or engaging in other such activities. We added together all the hours

⁶ We excluded those as we believed professional players may exhibit qualitative differences from non-professionals on our variables of interest. We did, however, run all the results with the entire 209 person sample, and those results are available from the authors upon request.

⁷ Note that we allowed an individual to state his or her income in terms of the currency value used in his or her home country. We converted all of these values to U.S. dollars using the exchange rates on Nov. 12, 2008 (approximately the mid-point of our survey).

spent on these activities and defined this as the total number of hours studying poker.

On the next series of questions, participants indicated how much time they played poker online and the amount they wagered on Internet poker during a "typical" week, both overall and for four different types of online poker games:

1. *Limit*: players are limited in the amount they can wager in any round of betting;
2. *No-limit*: players are not limited in the amount they can wager;
3. *Multitable tournaments*: players compete against dozens, hundreds, or even thousands of players in a contest where the prize money is awarded to the top finishers; and
4. *Sit-and-go*: a tournament that typically only has one table of players where prize money is awarded to the top finishers.

RESULTS

Table 1 contains information about our sample. Most people in the sample were men ($n = 189$, 97.4%) in their late 30s (mean age 38.4 years, $SD = 10.51$). They were typically employed full-time ($n = 169$, 87.1%) and earned a median yearly income of

US\$70,000.00 ($SD = US\$85,111.00$, ranging from no income to US\$600,000.00 per year). About 20% of participants had been self-employed in the past, with another approximately 20% of the sample currently self-employed. Participants also reported high levels of education, with 86.1% ($n = 1867$) completing at least some college and 63.4% ($n = 123$) having attained a college degree or higher. Eight participants (4.1%) were currently enrolled in college classes. Only two (1%) had not completed their high school diploma. The majority of participants resided in the United States ($n = 118$, 60.8%), with the second and third most frequent countries of residence being the United Kingdom ($n = 46$, 23.7%) and Canada ($n = 12$, 6.2%), respectively (these three countries accounted for 90.7% of the total sample). Sixteen percent of respondents aspired to become professional poker players.

The median winnings during the past six months for all participants were US\$250.00. However, the range of winnings and losses was quite large, with ten (5.2%) participants reporting losses equal to or greater than US\$1,000.00 (the maximum reported loss was US\$20,000.00). Fifty-one (26.2%) participants reported winning at least US\$1,000.00, with nine (4.6%) of this group reporting gains of US\$10,000.00 or more (to a maximum of US\$50,000.00) in the past six months.

TABLE 1. DEMOGRAPHIC CHARACTERISTIC OF SURVEY RESPONDENTS ($N = 194$)

	Mean	Std. Deviation
Age	38.4	10.5
Male	0.97	
Education level	16.1	2.4
From United States	0.61	
From United Kingdom	0.24	
Full-Time Employment	0.73	
Part-Time Employment	0.19	
Either formerly or currently self-employed	0.40	
Annual Income (in U.S. Dollars)	\$90,888	85111
Amount of earnings playing poker during the past 6 months	\$1,532	5322
Percentage of participants that earned a positive amount of money during the past 6 months	0.72	
Number of years playing online poker	4.93	1.71
Number of hours/week studying poker by books, videos, coaching, etc.	5.29	3.12
Not a professional, but have a goal of becoming a professional poker player	0.165	
Used to play for money, but do not anymore	0.09	
Plays for high stakes at least some of the time	0.12	

We utilized two types of models to examine factors associated with a poker player's earnings. We first employed a profit model to examine the probability that a person earned money playing poker in the past six months. These results are presented in Table 2. Several results are particularly worth noting. First, the more hours someone played in a week, the more likely they were to have earned money playing poker. Second, the older someone was, the less likely they earned money playing online poker. Third, the number of years someone had been playing online poker reduced the probability they earned money from online poker. Fourth, those who also wagered online on sporting events, blackjack, or any other game were less likely to have won money playing poker. Finally, although the coefficient for a player's income was positive and statistically significant, the absolute value was so small (less than 0.000) that it did not appear economically significant and has been excluded from further discussion.

Table 3 presents the results from our second modeling method. We employed an ordinary least squares (OLS) regression analysis to examine factors affect-

ing poker earnings and losses (as opposed to simply determining whether players won or lost money). Hours per week playing online poker was statistically significant in four of the five models, providing modest evidence that the number of hours played increased a participant's earnings from poker. Similar to results presented in Table 2, the coefficient for age was negative and statistically significant: older individuals were more likely to lose money.

If someone played for higher stakes, they were likely to earn more money. Combining this with the results from Table 2, it shows an interesting overall result for those who played for higher stakes. Someone who played higher stakes did not have a higher *probability* of winning money than other players. However, while the probability of winning was the same for higher-stakes players, those higher-stakes players who won money had greater winnings than the losses from those who lost money.

Table 3 also shows that the weekly number of hours spent studying poker was associated with increased earnings from poker. Results showed that hours per week studying the game was positive and

TABLE 2. PROFIT MODEL—WHAT IMPACTS THE PROBABILITY AN ONLINE POKER PLAYER EARNED MONEY?

	Model 1	Model 2
Intercept	1.06 (1.53)	1.61* (3.01)
Hours per week studying poker	-0.01 (0.02)	-0.11 (0.91)
Education level*hours per week studying poker	0.015 (0.43)	0.036 (2.05)
Hours per week playing online poker	0.110* (3.29)	0.124* (3.81)
Age	-0.020** (4.33)	-0.023** (5.30)
Education level	-0.01 (0.00)	-0.10 (0.56)
Plays for higher-stakes	-0.13 (0.17)	-0.41 (1.39)
Years playing online poker	-0.096 (2.53)	-0.111* (3.15)
Gamble on activities other than poker		-0.50** (4.71)
Income		0.000* (2.88)

Dependent variable = 1 if player earned money

N = 194

(Chi-squared value in parentheses)

Note: Several characteristics were not statistically significant and are not reported.

*** $p < 0.01$

** $p < 0.05$

* $p < 0.10$

TABLE 3. OLS REGRESSION—EARNING FROM POKER?

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Intercept	2096 (1.24)	481 (0.22)	4881 (1.59)	5281 (1.64)	4883 (1.58)
Hours per week playing online poker	405* (1.86)	427* (218)	377* (1.73)	371* (1.69)	269* (1.26)
Age	-125*** (-3.61)	-121*** (-3.50)	-121*** (-3.53)	-119*** (3.40)	-113*** (3.35)
Hours per week studying poker (through books, video training, etc.)	404*** (3.18)	411*** (3.23)	-356 (-0.91)	-351 (0.88)	-127 (-0.33)
Education level		254 (1.11)	-569 (-1.24)	-551 (-1.18)	-338 (-0.74)
Education level*hours per week studying poker			155** (2.06)	153** (2.01)	96 (1.28)
Gamble on activities other than poker				-79 (-0.10)	260 (0.33)
Years Playing				-103 (-0.47)	-236 (-1.12)
Plays for higher-stakes					4557*** (4.11)
Income					-0.001 (-0.01)

Dependent variable = Earnings from playing poker in the past 6 months

N = 194

(*t*-values in parentheses)

*** *p* < 0.01

** *p* < 0.05

* *p* < 0.10

statistically significant, providing evidence that a player who studied more would earn more playing poker. However, the findings for hours invested in skill development were more complex than a simple bivariate association might suggest. When an interaction variable for participants' overall education level was included, the univariate term for studying poker was no longer statistically significant. Instead, the interaction coefficient for education level by hours per week studying poker assumed statistical significance in two of the three models. This provided evidence that although studying poker seems to have value on its own, its value was primarily for those possessing higher education attainment. Thus, one's degree of formal education multiplied the economic return on investment in studying how to improve poker playing skills.

CONCLUSION AND IMPLICATIONS

Given similarities between the skills needed to succeed in poker and a number of other occupations, studying poker players can be valuable. Examining

factors associated with success in poker may provide insight into what factors are associated with success in other fields employing similar skill sets. Using a survey of poker players from a poker forum, we find several factors associated with earning money from the game.

Increased age was associated with lower earnings from poker. Findings regarding age seemed contradictory to the ideas that increased experience should increase human capital, and that older players should be more experienced in the game (which, however, may or may not have actually been the case). Older individuals may have relied less on poker as a means to earn income, and instead may have been playing more for relaxation or pleasure—providing less intrinsic incentive to pursue monetary winnings and encouraging a more relaxed, social form of play. Given that older individuals tend

⁸ U.S. CENSUS BUREAU, CURRENT POPULATION SURVEY: ANNUAL SOCIAL AND ECONOMIC (ASEC) SUPPLEMENT, (Aug. 28, 2007), available at <http://pubdb3.census.gov/macro/032007/hhinc/new06_000.htm>.

to have more income and other economic resources than younger age groups,⁸ they could presumably either afford to lose more and/or may not have been as motivated to make money, which would in turn mean that they were playing poker more for the sport of it, rather than any economic benefit. In addition, the skills required to beat poker games may have changed over time,⁹ leaving those who have played longer with a skill set that is not adequate to succeed in the current playing environment.

Importantly, we found that time spent studying had a positive effect on earnings from poker. Thus, making money through online poker might not have as much to do with experience or age *per se* as with effort in learning the game. Mere exposure over time may not be enough to increase earnings; our data instead suggest that one must actively learn a poker skill base needed for success. A number of studies have found a positive and substantial relationship between education and increased earnings;¹⁰ our findings suggest that this relationship also appeared to hold for those who invest time in studying poker to improve their play. However, this positive effect was concentrated among those with higher education levels. Thus, it seems that the study, analytic, and information-utilization skills developed in higher education were important preconditions to either 1.) acquire playing benefits from self-instruction, and/or 2.) employ skills developed during self-instruction. A college educated individual, it appears, would have a significant advantage over a non-college -educated individual in learning poker and improving play, even if both studied poker for the same amount of time.

These results provide additional support for the position that poker is a game of skill, a conclusion supported by other research.¹¹ This could have public policy implications beyond understanding analogous business skills. Many U.S. states have laws indicating that a game is illegal if it is predominantly based on chance. Historically, most jurisdictions have typically considered poker as a game based on chance rather than skill,¹² thus making it illegal to organize tournaments for money or for such Web sites to be based in the U.S. A reclassification of poker as a skill-based game could affect the regulatory regime.

Furthermore, individuals more accustomed to playing online games that were based on pure chance (e.g., Internet roulette) did not do as well when they played Internet poker, which we have as-

serted to primarily be a game of skill. The other games (with the possible exception of sports betting) are all gambling activities where individuals are playing against the "house" or casino and statistically cannot win in the long run (i.e., these games have a negative expected value). It seems reasonable that individuals who wagered on other games were less likely to be intent on earning money from playing poker, as they may group poker with other types of recreational gambling. Further, these individuals may not have developed the requisite skill set, as they might have done had they focused on poker. Differences in other personal characteristics (e.g., self-monitoring) may also have played a role in this finding—suggesting that players may self-select into various types of games (e.g., skill vs. chance) which better meet their goals and pre-existing predilections.

This survey contains a non-random convenience sample of poker players as all respondents participated in a poker forum. This has advantages and disadvantages. Two disadvantages are first, that we relied on self-reporting by participants, and second, that members of this particular poker forum may not have characteristics that match the overall poker community. An advantage, however, is that these players, by being members of a poker forum, all showed some effort in learning how to play well.

⁹ *Poker players finding tougher game at World Series*, GAMING TODAY (2009), available at <<http://www.gamingtoday.com/poker/story.bv?storyid=22017>>.

¹⁰ See, e.g., Paul Miller, Charles Mulvey, and Nick Martin, *What do twins studies reveal about the economic returns to education? A Comparison of Australian and U.S. Findings*, 85 AM. ECON. REV. 586-599 (1995); Thomas J. Kane and Cecilia E. Rouse, *Labor-market returns to two- and four-year college*, 85 AM. ECON. REV. 600-614 (1995).

¹¹ Hendrickx et al., *supra* note 3; Croson et al., *supra* note 4; Anthony Cabot and Robert Hannum, *Poker: Public policy, law, mathematics, and the future of an American tradition*, 22 T.M. COOLEY L. REV. 443-513 (2005).

¹² Andy Vuong, *Colorado poker group to appeal ruling*, DENVER POST, Aug. 18, 2009, available at <http://www.denverpost.com/headlines/ci_13048749>; Tom Jenkins, *Pennsylvania poker ruling appealed to state superior court*, POKER NEWS DAILY, Feb. 8, 2009, available at <<http://www.pokernewsdaily.com/pennsylvania-poker-ruling-appealed-to-state-superior-court-1016/>>; Martin Harris, *S.C. poker players guilty, though judge agrees poker is skill*, POKERNEWS, Feb. 19, 2009, available at <<http://www.pokernews.com/news/2009/02/poker-skill-but-defendants-guilty-SC-case-1138.htm>>; Paul Peirce, *Poker a game of skill, professors say in lawyer's trial*, PITTSBURGH TRIB.-REV., Aug. 13, 2009 available at <http://www.pittsburghlive.com/x/pittsburghtrib/news/westmoreland/s_638010.html>.

Therefore, the motivation to win would likely be present for these respondents. This lends additional support to our conclusion that hours studying poker improves earnings, as all players have shown effort in learning to play well. Our finding that studying improves performance provides evidence that poker is a game more based on skill than on chance. To our knowledge, this is the first research using a survey of poker players that has been able to draw this conclusion, as other papers that have examined the amount of skill in poker have used other methods. Our finding that poker is a game of skill is important, as noted above, inasmuch as many jurisdictions have different laws for wagers when a game is based on skill rather than on chance.

Future work in this area is needed. Because this sample is not random and should not be construed

as such, the ability to generalize its findings beyond our study is limited. An expansion that attempts to obtain insights into behavior with a random sample of players would be useful by facilitating greater external validity. Further, an additional study with a larger sample size would allow researchers to determine differences in behavior of North American, European, and Asian players, as well as players from other continents. We also need to further clarify the relationship between educational attainment and development of the business-related skills seen in poker: What is the specific nature of this relationship, and could we develop programs for a more general population based on a better understanding of it? All of these projects could be conducted if an online poker site sponsored them in the future.