UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA

Plaintiff,

v.

POKERSTARS ET AL.

Defendants,

ALL RIGHT, TITLE AND INTEREST IN THE ASSETS OF POKERSTARS, ET AL..

Defendants *in rem*.

No. 11 CIV 2564 (LBS)

THE POKER PLAYERS ALLIANCE'S MEMORANDUM IN SUPPORT OF ITS MOTION FOR LEAVE TO PARTCIPATE AS AMICUS CURIAE

The Poker Players Alliance ("PPA") hereby respectfully requests leave of Court to participate as *amicus curiae* in this matter, and if granted, that this Court file the attached Brief (Exhibit 1) in Support of Defendants' Oldford Group LTD, PYR Software Ltd., Rational Entertainment Enterprises LTD., Sphene International Ltd., Stelekram Ltd. (collectively the "PokerStars Defendants") Motion to Dismiss for Failure to State a Claim (Dkt. 201).[1] "District courts have broad discretion to permit or deny the appearance of amici curiae in a given case." *United States v. Ahmed*, 788 F. Supp. 196, 198 n. 1 (S.D.N.Y.1992). The customary role of an *amicus* is to aid the court and offer insights not available from the parties. *United States v. El-*

[1] Numerous defendants in this case have filed numerous motions to dismiss. *See* Dkt. 189 (Motion to Dismiss by Howard Lederer), Dkt. 191 (Motion to Dismiss by Rafael Furst), Dkt 193 (Motion to Dismiss by Telamonian Ajax Trust), Dkt. 195 (Motion to Dismiss by Christopher Ferguson), Dkt 197 (Motion to Dismiss by Oldford Group LTD, PYR Software Ltd, Rational Entertainment Enterprises LTD., Sphene International Ltd., Stelekram Ltd..). The reasoning in the PPA's proposed *amicus* brief supports dismissal pursuant to each Defendant's motion.

Gabrowny, 844 F. Supp. 955, 957 n. 1 (S.D.N.Y.1994). The PPA's participation meets and exceeds this standard.

The PPA is a non-profit organization, whose membership includes over a million professional and amateur poker players and enthusiasts with years of experience playing poker, is in a unique position to help inform the Court fully as to the role of skill in playing poker, which is not available from the parties themselves. The PPA is dedicated to protecting the legal rights of poker players and to provide poker players with a secure, safe, and regulated place to play. In accordance with this mission, one of the PPA's key objectives is to make the public, the political community, and the legal community aware of the fact that poker is a game in which the skill of the player is the predominant factor in determining the outcome of the game. The PPA does so through advocacy work in Washington, D.C. and throughout the United States. It has also regularly appeared as *amicus curiae* in cases affecting its members' ability to play poker, offering a unique perspective on and information regarding the skill required to play poker. *See United States v. DiCristina*, No. 1:11-cr-0414-JBW, Dkt. No. 83 (E.D.N.Y. July 10, 2012); *South Carolina v. Chimento*, No. 98045DB (Mt. Pleasant Mun. Ct. Feb. 19, 2009); *Pennsylvania v. Dent*, Nos. 167-MDA-2009, 168-MDA-2009 (Pa. Super. 2009), and *Kentucky v. Interactive Media Entertainment & Gaming Assoc., Inc.*, No. 2009-SC-000043 (Ky. May 12, 2009). The PPA also ensured the presentation of the body of evidence regarding the predominance of skill in poker in a Colorado jury trial that resulted in a not guilty verdict. *People v. Raley*, No. 08M2463 (Weld County Ct., Colorado Jan. 21, 2009). In connection with this motion, the PPA has consulted with counsel for the PokerStars Defendants, the FullTilt Defendants,[2] the Absolute

[2] The "Full Tilt" Defendants are: Filco Ltd., Kolyma Corporation A.V.V., Mail Media Ltd., Pocket Kings Consulting, Ltd., Pocket Kings Ltd., Ranston Ltd., Tiltware LLC, and Vantage Ltd..

Poker Defendants,[3] Howard Lederer, Chris Ferguson, and Raymond Bittar all of whom consented to or took no position as to the PPA's participation as *amicus*. It has also consulted with the United States Attorney's Office for the Southern District of New York, which takes no position on the PPA's motion.

The indictment directly affects the PPA's interest in assisting its members in continuing to play poker lawfully. Should cases like this one be allowed to proceed, it will prevent PPA members' ability to continue to play poker without fear that their funds will be subject to forfeiture. Consequently, the PPA respectfully requests that the Court grant the PPA leave to participate in the briefing in this proceeding as *amicus curiae*.

Respectfully submitted,

_____/s/____________

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MEMORANDUM OF LAW OF *AMICUS CURIAE* THE POKER PLAYERS ALLIANCE IN SUPPORT OF THE POKERSTARS DEFENDANTS' MOTION TO DISMISS FOR FAILURE TO STATE A CLAIM

Table of Contents

The Poker Players Alliance ("PPA") submits this memorandum as *amicus curiae* in the above-captioned matter. This memorandum describes the nature and history of poker and explains why poker does not constitute gambling under the Illegal Gambling Business Act ("IGBA"), 18 U.S.C. § 1955 and New York Penal Law § 225.00.

I. INTEREST OF THE AMICUS

The Poker Players Alliance is a nonprofit membership organization comprising over one million poker players and enthusiasts from around the United States. The PPA's mission is to defend the rights of poker players and to ensure that poker—a game of skill and one of America's oldest recreational activities—remains free from unnecessary and misguided intervention or punitive measures. To that end, the PPA engages in advocacy and outreach efforts to ensure that poker players have a secure, safe, and regulated place to play. The PPA has participated as an amicus in multiple cases concerning the legality of poker.

II. FACTUAL BACKGROUND

Before describing the unique features of poker that establish its legality, it is useful briefly to set forth the basic premises, terminology, and rules of poker games.[1] The Court can take judicial notice of these facts; they are "not subject to reasonable dispute" because they are both "generally known within the territorial jurisdiction of the trial court," and "capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned." Fed. R. Evid. 201(b).

[1] The word "poker" does not refer to a single game, but rather to a family of games that share certain essential traits. The rules and characteristics of poker described in this brief are common to all poker games.

Poker is a vying game played using standard playing cards and "chips," which are tokens that typically represent money. Poker games are played as a series of "hands," each of which is a contest for a "pot" of chips to which the players contribute.[2] At the start of each hand, some or all of the players pay a small number of chips—known either as an "ante" or a "blind"—into the pot. Antes and blinds are small, *i.e.*, the minimum size bet permitted in a given game. These bets function as a seed contribution to the pot; their presence creates an incentive for players to participate in the hand. Antes and blinds are the only bets that any player is forced to make, and every player must pay them, either because the rules require every player to post an ante every hand, or because for every hand the obligation to pay the blinds rotates to a new set of players so that all players eventually must pay them.

Once the antes or blinds are posted, the players receive cards, and "rounds" of betting occur, during which players make strategic moves designed to influence the size of the pot, the number of players competing for the pot, and their likelihood of winning the pot.[3] Each poker hand involves one or more betting rounds—typically a maximum of four or five. After each

[2] The word "hand" is commonly used to refer both to the contest for an individual pot—*e.g.*, "He won the hand," and to a particular player's holdings—*e.g.*, "I have a strong hand." For the sake of clarity, this brief will use the word "hand" to refer only to the former, and will use the word "holding" to refer to an individual player's cards. However, some of the cited authorities may not follow this convention.

[3] Poker holdings are ranked according to a fixed system. The highest possible holding is a straight flush (five cards of the same suit, in sequential rank order—the highest straight flush is known as a "royal flush"), followed in turn by four of a kind (four cards of the same rank, *e.g.*, four aces), a full house (three cards of one rank and two of another), a flush (five cards of a suit), a straight (five cards in sequential rank), three of a kind, two pairs, one pair, and then the highest individual card. In most games, the highest combination wins the pot. In some games, however, the lowest wins the pot, or the highest and lowest split the pot. Regardless, the cards are only revealed and compared if more than one player stays in the hand through every round of betting—a situation known as a "showdown," which is rare because typically one player bets and induces all of his opponents to fold.

round (except the final one), the players receive additional cards, which alter the composition, and therefore potentially alter the strength, of their holdings.

During betting rounds, the players act in sequence, and must choose which of the available moves to make. If nobody has bet, then the player whose turn it is to act has two options: he may either "check," which means that he chooses not to act, allowing the next player to act; or he can "bet," which means that he wishes to contribute some chips to the pot. The act of betting obliges the other players to at least match the size of the bet if they wish to stay in the hand and retain the ability to win the pot. Once a player has bet, the next player has three options: he can "fold," which means that instead of matching the bet, he discards his cards and forgoes any ability to win the pot; he can "call," which means that he matches the amount of the previous bet exactly; or he can "raise," which means that he augments the size of the bet, and thus imposes an obligation on all of his opponents to call *his* bet in order to remain in the hand. A round of betting ends when either all of the players have called the largest bet, or one player has, by betting, induced all of his opponents to fold. In the latter scenario, the hand ends as well, and the remaining player wins the pot.

The players' decisions are independent of their cards. A player with the strongest holding need not bet, and a player with the weakest holding need not fold. Similarly, no player can be forced to call a bet, or to fold in the face of a bet. And the amounts that players bet are likewise not controlled by the cards they hold. Thus, two players could compete for a very large pot even though both have relatively weak holdings, just as two players could compete for a very small pot even if both have very strong holdings—the size of the pot is a function of what the players decide to bet, and of those decisions alone.

A player can win a hand in one of two ways. First, as noted above, he can induce all of his opponents to fold by making a bet that they are unwilling to call. In this manner, a player can win the hand even without holding the strongest cards (or without believing he holds the strongest cards). Attempting to win without the best cards is referred to as "bluffing," and it is an essential feature of the game. Second, if more than one player stays in a hand through all of the betting rounds, then those players reveal their cards in a "showdown," and the player with the best holding takes the pot. Once a hand ends, another hand begins immediately, with the obligation to pay the blinds typically rotating around the table.

Poker games can take one of two forms. In a "ring game," the chips have cash value, and can be redeemed with the operator of the game. Players can enter and exit the game at their leisure, taking their chips with them. In a tournament, by contrast, players pay an entry fee, and these fees compose the prize pool. At the start of the tournament, each player receives the same number of tournament chips, which do not have any cash value. Players play hands until they run out of chips, at which point they are eliminated from the competition. Play continues until only one player remains—that player is the winner of the tournament, but typically many players receive prizes commensurate with how long they last in the tournament.

Regardless of the variant of poker, or the form of the game, the object of the game is for each player to take chips from the other players, resulting in a monetary gain—in ring games, the gain occurs when the chips are redeemed for value, and in tournaments, the gain occurs when the player is eliminated, and paid in accordance with his overall standing in the competition. Thus, a ring game player's success in poker is measured not by how many hands he wins, but by the total number of dollars he has once the pots he wins are netted against his contributions to the pots he loses. For a tournament player, success is measured by subtracting the entry fee he pays from the tournament prizes he wins. In other words, poker players seek to maximize their profits.

III. ARGUMENT

Poker is different from games traditionally regarded as gambling in several key respects. As a result, it does not fall within the statutory definitions of "gambling" set forth in the IGBA or the New York Penal Law.

A. Poker Is Qualitatively Different from Games Traditionally Regarded as Gambling.

For three reasons, poker is qualitatively different from games traditionally regarded as gambling. First, unlike gambling games, poker is not house-banked. Poker players compete against each other, and not against the casino or house. Second, in poker, the players have a high degree of control over the outcome of the game. Unlike, for example, roulette, slot machines, lotteries, or sports betting, in which players have no control over whether they win or lose, poker players dramatically and directly influence the outcome of the game. Finally, poker has a long and celebrated history in the United States as an unregulated social and entertainment event, and a hobby for millions of Americans. For centuries, players ranging from Presidents and Supreme Court Justices to common citizens have enjoyed the game of poker. These distinctions, individually and together, establish that absent some specific evidence of a contrary legislative intent, poker should not be understood as gambling.

1. Poker Is Not a House-Banked Game.

Unlike a casino or a bookmaker, the operator of a poker room does not make money by playing against its customers. Instead, the operators earn their money by taking a fee for hosting the game, often, but not always, collected as a small percentage of each pot, known as a "rake." Tournament buy-ins typically include two parts: a buy-in, which goes into the prize pool, and an entry fee, which compensates the house for hosting the game. Thus, in both ring games and tournaments, a poker room operator's revenues are not contingent in any way on the outcome of the game.

This is in contrast with casinos and bookmakers, which profit from beating their customers. Because these individuals and organizations have an adversarial relationship with their customers, they invariably retain an advantage for their side of the wagers. Thus, in the long run, the customers invariably lose against casinos—or, as the saying goes, "the house always wins." The same is not true of poker. In poker, the rules and odds afford each player an equal opportunity to win, and over the long run, players can and do win significant sums.

A poker room operator's incentives are also different from a casino's. Unlike a poker room operator, a casino seeks to beat its customers rather than merely provide them with exceptional service. An honest poker room operator has no incentive to manipulate odds the way that a bookmaker does, or to mislead its customers about the nature of the game, as a casino does.[4] Instead, the poker room operator's incentive is to provide the fairest game and most comfortable setting for its customers. It is their continued use of the room's services, rather than the results of the game, that generates profits for the operator.

The distinction between house-banked and peer-to-peer games is recognized in federal law. For example, the Indian Gaming Regulatory Act provides that house-banked card games are

[4] *See Commentary On The Law Of Poker*, 8 Rich. J. Global L. & Bus. 11, 12 (2008) ("It would seem so logical . . . to distinguish games of skill from games of chance. The games of chance are played against the house and the games of skill are played against people around the table. . . . What I hear [some] saying is, beware of the machines, beware of the slots, and beware of this video, audio, visual, musical industry that has as its objective the addiction of the people to poke the button until their wallets are empty. That does not describe poker.") (quoting Prof. Charles Nesson, Harvard Law School). Of course, this is not to suggest that bookmakers and casino operators are universally dishonest, or that poker room operators are universally upstanding—but it does demonstrate why Congress would sensibly have made the judgment that casino and bookmaking operations present greater risks to customers than poker rooms.

always "class III" games, 25 U.S.C. § 2703(7)(B)(i), and thus subject to the strictest regulation, while other card games (including poker) can be "class II" games if they meet other relevant conditions, *see* 25 U.S.C. § 2703(7)(A)(ii). State gambling statutes likewise differentiate between house-banked and non-house-banked games. *See* Cal. Penal C. § 330 (prohibiting "any banking . . . game played with cards, dice, or any device"); Fla. Stat. Ann. § 849.086(1), (12) (prohibiting cardrooms from offering "any banking game"); Mont. Code Ann. § 23-5-311(1) (authorizing "bridge, cribbage, hearts, panguingue, pinochle, pitch, poker, rummy, solo, and whist," but no house-banked card games); Ind. C. Ann. § 4-32.2-2-12 (permitting approved card games for charity game nights, but not permitting, *inter alia*, bookmaking, slots, policy, numbers, or house-banked card games); Okla. Stat. Ann. tit. 3A §§ 262(H), 281(19) (authorizing tribal gaming, but not permitting house-banked card games).

2. Poker Is a Game of Skill.

Poker is a game in which skill predominantly determines the outcome. In poker the players compete against each other on a level playing field, and use an array of talents to influence and indeed control the outcome of the game. Although the deal of the cards is a chance element within the game, it only rarely determines the outcome of a hand, and does not determine the outcome of the game over the long run.

This conclusion finds support in both an analysis of the rules of the game and an analysis of the data regarding poker.[5] Not only do the rules afford all players an equal opportunity to win, but they also provide the players with tools (*i.e.*, bluffing and folding) that enable the players to

[5] This Court can take notice of these facts. *See Neeld v. Nat'l Hockey League*, 594 F.2d 1297 (9th Cir. 1979) (taking judicial notice of the fact that hockey is a rough physical contact sport); *Seminole Tribe of Florida v. Butterworth*, 491 F.Supp. 1015 (S.D. Fla. 1980) (taking judicial notice that bingo was largely a senior citizen pastime); *Driebel v. City of Milwaukee*, 298 F.3d 622 (7th Cir. 2002) (taking judicial notice of a police department's rules manual).

determine the outcome of the game. Thus, in order to prevail in poker, players need not "get lucky" the way that they must in casino games. In poker, unlike casino games, the players can exercise their skills not only to play the odds, but to alter the odds in their favor.

The data regarding poker overwhelmingly demonstrate that skill, and not chance, determines who succeeds at the game.[6] Indeed, the skill level in poker has been compared favorably with that in tennis, golf, baseball, and investment advising—all commonly regarded as being dominated by skill despite the role of chance.[7] In contrast with the litany of studies concluding that skill plays a dominant role in poker, the PPA has seen *no* studies concluding that poker is a game in which chance predominates over skill over any meaningful period of time.

There is a great deal more that can be said about the role of skill in poker, but at this stage, it is sufficient for the Court to acknowledge a point that the Government cannot sincerely

[6] Statistical analyses of large samples of poker hands demonstrate that the vast majority of poker hands are settled without a showdown, and so the players' cards are never even revealed. This data shows empirically that poker results depend on the players' choices and decisions, not on the cards they are dealt. *See, e.g.*, Paco Hope & Sean McCulloch, *Statistical Analysis of Texas Hold 'Em* 5 (2009) (attached as Exhibit A) (considering more than 100 million online poker hands and concluding that 76 percent of hands are resolved without the cards being revealed, and that half of the remaining hands were won by the player who did not hold the best cards because the player with the best cards had folded before the conclusion of the hand). Mathematical models of poker likewise demonstrate that over a series of hands a skilled player's advantage over an unskilled player is "overwhelming," such that poker is "almost entirely a game of skill." Noga Alon, *Poker, Chance, and Skill* 15 (2006) (attached as Exhibit B) (concluding that after 90 hands, the probability that an unskilled player will have done better than a skilled one is approximately .187 percent, and over 140 hands, the number drops to .016 percent).

[7] *See* Alon, *Poker, Chance, & Skill* 15 (2006) (arguing that in poker "the influence of [chance] is not necessarily larger, and in fact appears to be smaller, than the influence of chance elements in tennis"); Rachel Croson, Peter Fishman & Devin G. Pope, *Poker Superstars: Skill or Luck?*, 21 Chance, no.4, at 25, 28 (2008) (Attached as Exhibit C) (comparing poker to golf); Steven D. Levitt & Thomas J. Miles, *The Role of Skill Versus Luck In Poker: Evidence From the World Series of Poker*, NBER Working Paper 17023 (May 2011) (attached as Exhibit D) (comparing poker to major league baseball and investment advising).

dispute: in poker, the players can—and do—exercise their skills to alter the outcome of the game, in a way that is not possible in traditional casino games.

3. Poker Has a Long and Celebrated History in American Culture.

Poker is also different from other gambling games because it is an American tradition. As early as 1875, the New York Times editorial page opined that "the national game is not base-ball, but poker." "The National Game," *The New York Times*, Feb. 2, 1875, *available at* http://tinyurl.com/3kwtdom. And the popularity of poker has only grown. As many as 55 million Americans play the game today. *See* Poker Players Alliance, Poker Facts, http://theppa.org/resources/facts/ (last visited June 27, 2012). Poker enthusiasts have included U.S. Presidents, Members of Congress, and Supreme Court Justices. *See generally* James McManus, Cowboys Full: The Story of Poker (2010) (describing the poker proclivities of presidents including Ulysses Grant, Harry Truman, Franklin Roosevelt, and Barack Obama, among others); "Harvard Ponders Just What It Takes To Excel at Poker," *The Wall Street Journal*, May 3, 2007 (noting that Justice Scalia plays in a regular poker game). Indeed, Richard Nixon, who signed the IGBA into law in 1970, "played poker every free occasion" while in the military, and is reported to have financed his first congressional campaign with poker winnings. *See* Conrad Black, Richard M. Nixon: A Life in Full 61 (2007); Christopher Matthews, Kennedy & Nixon 156 (1998). Moreover, movies and books about poker are ubiquitous, and poker terms such as "calling a bluff," "raising the stakes," "going all in" and "sweetening the pot" are fixtures in the popular vernacular.

B. Poker Is Not "Gambling" Under the IGBA.

Poker does not constitute gambling under the IGBA, 18 U.S.C. § 1955. The IGBA's definition of "gambling" includes a list of nine games,[8] but that list does not mention poker, and poker does not resemble the enumerated games in key respects. Moreover, the legislative history of the IGBA confirms that the statute was enacted to regulate organized crime entities, and primarily their "numbers" rackets, as opposed to foreign Internet poker companies. Because poker is different in kind from the games that Congress enumerated as "gambling," this Court should hold that it does not fall within the statutory definition of the term.

1. By Its Terms, the IGBA's Definition of "Gambling" Does Not Extend to Poker.

The IGBA's definition of "gambling" does not include poker. The ordinary meaning of the word "gambling" is "[t]he action of gamble *v.*" Oxford English Dictionary (2d ed. 1989), online version June 2012, http://oed.com/view/Entry/76450.[9] The statutory definition uses "gambling" without a direct object, *i.e.*, as the gerund of an intransitive verb. *See* 18 U.S.C. § 1955(b)(2). The Oxford English Dictionary defines the intransitive verb "gamble" as "[t]o play games of chance for money, *esp.* for unduly high stakes; to stake money (*esp.* to an extravagant amount) on some fortuitous event." *Id.*, http://oed.com/view/Entry/76447. As explained above, poker is not a game of chance (nor can the outcome of a poker game be described as a

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[8] The enumerated games are "pool-selling, bookmaking, maintaining slot machines, roulette wheels or dice tables, and conducting lotteries, policy, bolita or numbers games, or selling chances therein." 18 U.S.C. § 1955(b)(2).

[9] The American Heritage Dictionary likewise defines the intransitive verb "gamble" is "[t]o bet on an uncertain outcome, as of a contest," or "[t]o play a game of chance for stakes." *See* American Heritage Dictionary of the English Language, http://ahdictionary.com/word/search.html?q=gambling. Of course, it is possible to find other definitions that do not reference the role of chance in gambling. However, the fact that the *first* definition in at least two authoritative dictionaries includes that element is highly probative evidence of the ordinary meaning.

"fortuitous event"), therefore it does not fall within the ordinary meaning of the word "gambling."

The IGBA's definition of "gambling" further provides that the term "includes, but is not limited to" nine enumerated games. 18 U.S.C. § 1955(b)(2). When Congress uses the word "includes" in a definition, it is invoking the canon of "*ejusdem generis*," which means "of the same kind." *Holley v. Lavine*, 553 F.2d 845, 851 (2d Cir. 1977). This canon provides that "where general words are accompanied by a specific enumeration of persons or things, the general words should be limited to persons or things similar to those specifically enumerated." *City of New York v. Beretta U.S.A. Corp.*, 524 F.3d 384, 401 (2d Cir. 2008) (internal quotation marks omitted). Thus, a game cannot be gambling if it is not similar to the enumerated games.

Under this standard, poker does not fall within the IGBA's definition of gambling. Unlike the listed "gambling" games, poker is not a house-banked or lottery game. Furthermore, unlike the enumerated games, poker is not a game in which chance determines the outcome. An examination of the nine enumerated games reveals that they exhibit these traits:

- *Pool-selling* is the selling or distribution of chances in a betting pool—*i.e.*, "[a] gambling scheme in which numerous persons contribute stakes for betting on a particular event (such as a sporting event)."[10] Pool-selling is similar to a lottery in that the players all purchase chances to win a prize. Some, though not all, betting pools are house-banked as well. Pool-selling is a game of chance because players cannot affect the outcome of the underlying event.[11]

[10] Black's Law Dictionary 1181 (7th ed. 1999); *see also, e.g.*, Iowa Code § 725.10 ("Any person who records or registers bets or wagers or sells pools upon the result of any trial or contest of skill, speed, or power of endurance of human or beast, or upon the result of any political nomination or election, and any person who keeps a place for the purpose of doing any such thing . . . shall be guilty of a serious misdemeanor.")

[11] *See, e.g.*, *Nat'l Football League v. Governor of State of Del.*, 435 F. Supp. 1372, 1385-86 (D. Del. 1977) ("chance rather than skill is dominant factor" in betting pool).

- *Bookmaking* is "[g]ambling that entails the taking and recording of bets on an event, such as a horse race."[12] Like pool-selling, bookmaking is a game of chance, because as in pool-selling, the bettors have no way of affecting the outcome of events.[13] In a bookmaking scheme, the bookmaker fixes the stakes and bets against his customers,[14] so bookmaking is a house-banked game as well.

- *Slot machines* are coin-operated mechanical or electronic devices that pay off when random, individually selected symbols match one another on the machine's display. Otherwise, the bet goes to the house. Slots are thus house-banked games of chance.[15]

- *Roulette* is a game in which players bet whether a ball, spun along a revolving wheel, will land on a certain color (black or red) or a certain number (00 through 36). Players make their wagers against the house—hence roulette is a house-banked game—and the outcome is determined purely by the chance that the ball lands on the wagered number or color, a factor that no player can influence or control.

- *Dice tables* are banking games in which players throw dice, usually in pairs, and make wagers against the house, based on the outcome of the throw, and thus they are also games of chance.[16]

- *Lotteries* are "[a] method of raising revenues, esp. state-government revenues, by selling tickets and giving prizes . . . to those who hold tickets with winning numbers that are drawn at random."[17] Because lottery drawings are random, a lottery participant cannot affect the outcome, and lotteries are games of chance.[18] Moreover, because the house keeps any bet that does not pay out, a lottery is a house-banked game.

- *Numbers games* are essentially lotteries. In a numbers game, players wager that on a certain day, a chosen series of numbers will occur in some event to which the numbers

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[12] Black's Law Dictionary 194 (8th ed. 2004).

[13] *See Bayer v. Johnson*, 349 N.W.2d 447, 449 (S.D. 1984) ("The outcome of . . . events [in a bookmaking scheme] in no way depends upon the skill of the bettors. The wagering is therefore a contest in which chance predominates over skill").

[14] *See id.*

[15] *See, e.g.*, *In re Indian Gaming Related Cases*, 331 F.3d 1094, 1104 & n.12 (9th Cir. 2003) (quoting K. Alexa Koening, *Gambling on Proposition 1A: The California Indian Self Reliance Amendment*, 36 U.S.F. L. Rev. 1033, 1041 n.65 (2002)) ("'Las Vegas-style slot machines offer "house-banked" games, which enable the house to collect players' losses.'").

[16] *See, e.g.*, *Kansas City v. Caresio*, 447 S.W.2d 535, 537 (Mo. 1969) (finding that dice game was "game of chance" under local ordinances).

[17] Black's Law Dictionary 966 (8th ed. 2004).

[18] *See, e.g.*, *Womack v. Comm'r of IRS*, 510 F.3d 1295, 1306 (11th Cir. 2007) (describing lottery as "game of chance"); *State ex rel. Kellogg v. Kan. Mercantile Ass'n*, 25 P. 984, 985 (Kan. 1891) (holding that plan for allocation of prizes "by chance" is a lottery).

game is pegged. For instance, a player can bet on the payoff totals of a day's races, and learn of the fate of the wager by checking the newspaper the next day. A banker (the house) guarantees the payoffs to any winners, and "[i]n such a game neither the number of winning players nor the total amount of the payoffs can be predicted in any one day,"[19] making the game one of chance, as well.

- *Bolita* is a form of lottery "in which one attempts to guess a variably determined 2-digit number,"[20] sometimes derived by drawing numbered balls from a hopper,[21] or somehow tied to the results of the state lottery. Because the numbers are "variably determined," bolita constitutes a game of chance.[22] Bolita is a house-banked game because it is a form of lottery.
- *Policy* is similar to bolita or a numbers game, but differs in the method of determining the winning sequence or combination of digits. "In policy, [the winning sequence] is ascertained by the drawing *at random* from a wheel in which tags, each bearing one of the possible combinations of numbers that can be played, have been placed."[23] Like numbers and bolita, policy is a game of chance[24] and a house-banked game.

As noted above, and demonstrated by the accepted definitions of the enumerated games, they share two key features: they are lottery or house-banked games in which the house plays against the customers, and they are games of chance in that the players have no control over the events that determine whether they win or lose.

Poker is qualitatively different from these games. First, as noted in Part II(A), poker is not a house-banked game, but is instead a peer-to-peer game in which the players compete against each other on a level playing field, and the house acts only in the role of a host for the game—not as a participant. Second, as noted in Part II(B), poker involves a sufficient degree of

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[19] *United States v. Baker*, 364 F.2d 107, 112 (3d Cir. 1966).

[20] Webster's Third New Int'l Dictionary 248 (3d ed. 1971).

[21] *See, e.g.*, *United States v. Spino*, 345 F.2d 372, 373 (7th Cir. 1965).

[22] *See, e.g.*, *Santos v. United States*, 461 F.3d 886, 888 (7th Cir. 2006) (describing "bolita" as a lottery), *cert denied*, 550 U.S. 902 (2007), *aff'd*, 128 S. Ct. 2020 (2008); *Ex parte Alvarez*, 94 So. 155, 155 (Fla. 1922) (describing bolita as a "game of chance").

[23] *Baker*, 364 F.3d at 112 (emphasis added).

[24] *See, e.g.*, *Forte v. United States*, 83 F.2d 612, 615-16 (D.C. Cir. 1936) (noting that "policy game is undoubtedly a lottery," defined by D.C. Code as game of chance).

skill that it is different in kind from the games enumerated in the IGBA's definition of gambling. The enumerated games all require the players to play the odds and get lucky in order to win. Poker imposes no such burden on its players—rather, the players have the ability to alter the outcome of individual hands, and to maximize their long-term profitability through skillful play. Finally, as noted in Part II(C), poker has a long and celebrated history in American society that makes it highly unlikely that Congress intended to ban it. At the very least, in light of the widespread popularity of poker and of its prominence in American culture, it simply defies reason to assume that Congress would have banned the game without ever mentioning it.

To the extent that the IGBA's definition of "gambling" is ambiguous on this point, this Court should resolve the ambiguity by applying the rule of lenity, which requires that criminal statutes be strictly construed. The rule of lenity serves two purposes. First, it ensures that "statutes . . . serve as a 'fair warning . . . in language that the common world will understand.'" *United States v. Canales*, 91 F.3d 363, 368 (2d Cir. 1996) (quoting *Babbitt v. Sweet Home Chapter*, 515 U.S. 687, 704 n.18 (1995). *See also McBoyle v. United States*, 283 U.S. 25, 27 (1931) (holding that before criminal judgment is handed down, "the line" between lawful and unlawful conduct "should be clear," even though "it is not likely that a criminal will carefully consider the text of the law" before he acts). Second, it gives force to the principle that "legislatures and not courts should define criminal activity." *United States v. Bass*, 404 U.S. 336, 350 (1971); *McBoyle*, 283 U.S. at 27 (a court should not broaden a criminal prohibition "simply because it may seem to us that a similar policy applies, or upon the speculation that if the legislature had thought of it, very likely broader words would have been used"). The term "gambling," as defined in the IGBA, does not clearly encompass poker. Because poker is qualitatively different from the enumerated games, and because the definition includes no guiding principle that would enable a person of ordinary intellect to conclude that poker falls within the definition, this Court should hold that the IGBA does not regard poker as "gambling."

2. The Legislative History of the IGBA Proves That It Does Not Cover Licensed, Regulated Poker Companies.

The IGBA was enacted as part of the Organized Crime Control Act of 1970 in an effort to deprive criminal enterprises of gambling income, which President Nixon described as "the life line of organized crime." *Measures Relating to Organized Crime: Hearings Before the Subcomm. on Crim. Laws & Procedures of the S. Comm. on the Judiciary*, 91st Cong. 449 (1969) (Message from the President of the United States Relative to the Fight Against Organized Crime) (hereinafter "*Senate Judiciary Hearings*"). The Act provided the Department of Justice with new tools to combat organized crime, including the Racketeer Influenced and Corrupt Organizations Act (Title IX). Title VIII of the Act targeted syndicated gambling and included two parts, the first of which made it a crime to conspire to obstruct local investigations of illegal gambling operations, *see* 18 U.S.C. § 1511, and the second of which became the IGBA.

The focus of the IGBA has always been on organized crime. The IGBA facilitates federal intervention when local authorities prove corrupt or incapable of dealing with syndicated gambling operations within their jurisdictions. But the statute has no provision targeting regulated international businesses like PokerStars, and the legislative history plainly indicates that Congress was not concerned with such businesses when it passed the IGBA. Indeed, there was no discussion or contemplation by Congress in 1970 of proscribing gambling operations conducted from foreign locations, especially if lawful or regulated by such jurisdictions. Moreover, in contrast with other gambling statutes, nothing in the text of the IGBA provides for its extraterritorial application, nor is there any congressional intent manifested in the legislative history calling for such application.

The Department of Justice, which drafted the IGBA, regarded it as necessary to "fill[] a loophole that presently prevents the Federal prosecution of huge gambling rings . . . ." *Senate Judiciary Hearings* 382-83 (Statement of Will Wilson, Asst. Att'y Gen.). The "loophole" was that "[u]nder existing Federal legislation ([the Wire Act, the Travel Act, and the Paraphernalia Act]), interstate travel or use of an interstate facility must be proved as part of each case. Under [the IGBA], the need for such proof would be obviated on the basis of congressional findings that illegal gambling as a whole has an adverse effect upon interstate commerce and its facilities." *Id*. at 383; *see also Organized Crime Control: Hearings Before Subcomm. No. 5 of the H. Comm. on the Judiciary*, 91st Cong. 156-57 (1970) (Statement of John N. Mitchell) (hereinafter "*House Judiciary Hearings*") ("Federal jurisdiction under existing law . . . depends upon the establishment of a specific link to interstate commerce on a case-by-case basis. As a result, many large-scale and lucrative illegal gambling operations, which we have reason to believe are dominated by the Cosa Nostra, escape prosecution."); *id*. at 170 ("Huge gambling rings, whose activities are of legitimate concern to the Federal Government, now flourish in metropolitan areas immune from our law enforcement efforts."). Thus, the IGBA serves a fundamentally different purpose from other federal gambling laws: it does not target foreign businesses or interstate wagering activity, but rather domestic illegal gambling businesses that previously had eluded federal authorities because they lacked interstate components.

In fact, the principal targets of the IGBA were numbers rackets. These were intrastate lotteries—operated by organized crime groups—that offered lopsided odds and thus leached significant sums from poor communities. In his message to Congress on Organized Crime, the President singled out "the numbers racket" as a particularly important and pernicious form of gambling. *See Senate Judiciary Hearings* 444 (Message from the President of the United States

Relative to the Fight Against Organized Crime). The Attorney General did the same in his remarks to the Senate. *See id*. at 108 (statement of John N. Mitchell). And Senators and other witnesses noted that "[t]he greatest single source of revenue for organized crime is its gambling activities, which net an estimated seven (7) to fifty (50) billion dollars a year . . . . A great portion of this is gained through numbers rackets, draining from the poorest inhabitants of our ghettos and slums and their families precious dollars which should be spent for food, shelter and clothing." *Senate Judiciary Hearings* 158 (Statement of Sen. Tydings); *see also House Judiciary Hearings* at 87 (Statement of Sen. McClellan) (expressing concern over the effect of the stilted odds in numbers and its contribution to organized crime revenues); *id*. at 400 (Statement of Vincent L. Broderick, Chairman N.Y. Cnty. Lawyers Ass'n) (similar statement to Senator McClellan's).

Even though numbers rackets clearly implicated the federal interest in eradicating organized crime, they had been difficult to prosecute because many did not involve interstate conduct. *See Senate Judiciary Hearings* 383 (Statement of Will Wilson) ("Very few numbers operations have been prosecuted at a Federal level because very seldom are state lines crossed . . . ."). Through a congressional finding that large-scale gambling operations affect interstate commerce, the IGBA enabled prosecution of intrastate numbers rackets. William Hundley, who had served for seven years as the head of the Organized Crime and Racketeering Section at the Department of Justice, testified that:

> [P]robably the *only* area where [the IGBA] would be helpful would be in getting at big numbers rackets, because in my experience in the Justice Department any gambling operation that was worth Federal concern had an interstate aspect, and that you could proceed under 1953 and the other bills. But some of the really big numbers operations, particularly in a place like New York, can be, by the nature of the operation, self-contained . . . and you could use this new [statute] against those. *I don't see that it would be really of much use otherwise in the gambling area.*

Senate Judiciary Hearings 425 (Statement of William Hundley) (emphasis added).

Of course, syndicated gambling was broader than numbers, and the IGBA was therefore broader as well. But the sponsors of the statute were concerned not with all activities that one might conceivably describe as gambling, but rather with games that generated revenue for organized crime and permitted it to flourish. They identified, in addition to numbers, betting on horse racing, sporting events, lotteries, dice games, and illegal casinos as important forms of syndicated gambling. *See* 116 Cong. Rec. 590 (1970) (statement of Sen. McClellan); *see also* President's Commission on Law Enforcement & Administration of Justice, *The Challenge of Crime in a Free Society* 188 (1967) (noting that organized criminals offered a range of games from "lotteries, such as 'numbers' or 'bolita,' to off-track horse betting, bets on sporting events, large dice games and illegal casinos.").[25] Congress recognized that "[t]he directors and managers of the major numbers, booking, and sports gambling operations across the country are, of course, the same Mafia leaders who engage in extortion, labor racketeering, corruption of legitimate business, and the panoply of other illegitimate enterprises which support organized crime," and so targeted them for enforcement. *House Judiciary Hearings* 105 (Statement of Sen. McClellan). Ultimately, the list of games that Congress used to define gambling, which includes "poolselling, bookmaking, maintaining slot machines, roulette wheels or dice tables, and conducting lotteries, policy, bolita or numbers games, or selling chances therein," 18 U.S.C. § 1955(b)(2), contains games that all generated significant revenues for organized crime. No sponsor of the bill or official in the Department of Justice referred to poker games—let alone licensed, regulated poker games—as a target for IGBA enforcement, and *amicus* does not recall that a desire to criminalize

[25] Citations to the President's Commission's 1967 report were ubiquitous in the record. For example, at the start of the House Judiciary Hearings, the Chairman began by reading a quote from the report describing the harms of organized crime. *See House Judiciary Hearings* 77 (Remarks of Chairman Emanuel Celler).

poker was ever a goal in Congress. Congressional intent was to halt the flow of revenues from illegal gambling activities that were understood to finance organized crime, and that was all.

In light of the IGBA's text, history, and purpose, the federal interest in curbing organized crime is manifestly not served by targeting licensed, regulated poker businesses. Both the text of the IGBA and its legislative history illustrate that the statute does not sweep in all gambling activity, and indeed does not cover even all large-scale, unlawful gambling activity. For example, in an exchange during the House Hearings, *amicus* noted that some states criminalize all lotteries, whether conducted by charitable organizations or not, but that the IGBA does not target charitable lotteries, regardless of state law. Assistant Attorney General Wilson responded, "Yes; that is correct. We want to emphasize that we are not trying to bring the whole gambling enforcement problem into the Federal jurisdiction, the Federal courts." *House Hearings* at 194. The committee reports likewise noted that the statute was not designed to reach all gambling, but was "intended to reach only those persons who prey systematically upon our citizens and whose syndicated operations are so continuous and so substantial as to be of national concern, and those corrupt State and local officials who make it possible for them to function." *Organized Crime Control Act of 1970*, H.R. Rep. No. 91-1549, at 53 (1970); *see also Organized Crime Control Act of 1969*, S. Rep. No. 91-617, at 73 (1969) (Senate Report containing similar language). It cannot reasonably be said that this description applies to licensed foreign poker operators.[26]

[26] To be sure, the statute punishes "[w]hoever conducts" an illegal gambling business. 18 U.S.C. § 1955(a). But *amicus* does not suggest that the statute applies only to members of organized crime organizations. Rather, the point is first, that businesses like the poker companies—which are licensed and regulated abroad, and which have little to no physical presence here—do not fall into the definition of an "illegal gambling business," especially in light of the IGBA's legislative history; and second, that there is doubt whether poker is the sort of "gambling" that the IGBA seeks to regulate.

The Government's decision to seek an indictment under the IGBA in this case is thus at odds with the legislative intent. In seeking to apply the IGBA to licensed, regulated, foreign poker companies, the Government attempts to transform the statute into something it is not. While other gambling statutes—including the Wire Act, the Travel Act, the Paraphernalia Act, and now the Unlawful Internet Gambling Enforcement Act—may well apply to foreign businesses, the IGBA was enacted to serve a different purpose, and its text and legislative history reflect that special mission.

C. Poker Is Not "Gambling" Under New York Penal Law § 225.00.

Poker also does not fall within the New York definition of gambling. The New York Penal Law defines gambling as follows:

> A person engages in gambling when he stakes or risks something of value upon the outcome of a contest of chance or a future contingent event not under his control or influence, upon an agreement or understanding that he will receive something of value in the event of a certain outcome.

N.Y. Penal Law § 225.00(2). A "contest of chance," in turn, is "any contest, game, gaming scheme or gaming device in which the outcome depends in a material degree upon an element of chance, notwithstanding that skill of the contestants may also be a factor therein." *Id*. § 225.00(1).

The Practice Commentary from Donnino to NY Penal Code § 225.00 (quoting Denzer and McQuillan, Practice Commentary, McKinney's Penal Law § 225.00, pp. 23 (1967)) explains that under this definition, when the participants in a game of skill wager on the outcome of that game, that act does not constitute gambling:

> One illustration of the definition of "gambling," drawn from the commentaries of Judges Denzer and McQuillan, is the chess game between A and B, with A and B betting against each other and X and Y making a side bet. Despite chess being a game of skill, X and Y are "gambling" because the outcome depends upon a future contingent event that neither has any control or influence over. The same is

> not true of A and B, who are pitting their skills against each other and thereby, have a material influence over the outcome; they, therefore, are not "gambling."

As discussed in subpart II(B), *supra*, poker constitutes a game of skill under this analysis because, as in chess, the players "have a material influence over the outcome" of the game.[27]

To determine whether a game is one of skill or not, New York law looks to whether skill predominates over chance in determining the outcome. Recently, the criminal court in *People v. Li Ai Hua*, 885 N.Y.S.2d 380 (N.Y. City Crim. Ct. 2009), laid out the test:

> [W]hile some games may involve both an element of skill and chance, if "the outcome depends in a material degree upon an element of chance," the game will be deemed a contest of chance. "The test of the character of the game is not whether it contains an element of chance or an element of skill, but which is the *dominating element* that determines the result of the game?" It follows then that wagering on the outcome of a game of skill is therefore not gambling as it falls outside the ambit of the statute.

Id. at 384 (emphasis added) (citations omitted).

Although some have suggested that a game can involve a "material degree" of chance even when chance does not predominate over skill, the *Hua* court's understanding—that the test is satisfied only when chance predominates over skill—comports with the expert commentary on the matter, which suggests that, read in light of the "legislative history, case law, common sense, and the views of many commentators, it ought to be clear that the 'dominating element' test . . . remains valid law in New York State." Bennett Liebman, *Chance v. Skill in New York's Law of Gambling: Has the Game Changed?* 13 Gaming L. Rev. 461, 467 (2009).

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[27] In chess, as in poker, chance sometimes plays a role. Studies have shown that playing the white side of the chessboard—a designation typically awarded by chance—carries with it a significant advantage. *See* "First-move advantage in chess," http://en.wikipedia.org/wiki/First-move_advantage_in_chess (last visited Aug. 4, 2011) (collecting over 15 studies demonstrating that white scores more than black, on average 55 percent to black's 45). However chess, like poker, is not properly regarded as a game of chance because the players exercise significant influence over the outcome of the game.

Applying the "material degree" test, the *Hua* court dismissed the claim against the defendant for playing mah-jong. In that case, the information "alleg[ed] that people were handing co-defendants money to play mahjong 'which is a game of chance.'" 885 N.Y.S.2d at 385. The court rejected the state's argument, reasoning that the allegation provided "no support . . . for the claim that mahjong is a game of chance." *Id.* While played with tiles, most variants of mahjong share a "shuffle" in common with card games, in that players are dealt tiles which they then use to form melds, in a manner similar to western "rummy" card games.[28] *Hua* thus stands for the proposition that under New York law, the mere fact of a random shuffle of tiles or cards does not introduce a "material degree" of chance into the game.

Under the New York Penal Law's test for gambling, poker does not qualify. Poker, like chess, is a game in which skill can and most often does determine the outcome of the game. In hands involving bluffs, for example, skill counteracts the chance element of the deal of the cards. And even in other hands, a player's skill, manifested as his choices of how much to bet, determines how much he wins (or loses) in a hand, and thus controls the only relevant outcome: the player's profits. Furthermore, when the "outcome" of the game is considered over the span of a series of hands, the role of chance diminishes further. As courts in other states have concluded, poker is not gambling under this test. *See Chimento v. Town of Mt. Pleasant*, No. 2009-CP-10-001551, at 10 (S.C. Ct. C.P. 2009) (holding that the evidence was "overwhelming" that skill predominates over chance in poker), attached as Exhibit E[29]; *Bell Gardens Bicycle Club v. Dept. of Justice*, 36 Cal. App. 4th 717, 744 (Cal. Ct. App. 1995) (poker "predominantly implicate[s] a player's skill"). *But see Commonwealth v. Dent*, 992 A.2d 190, 197 (Pa. Super. Ct. 2010)

[28] http://www.mastersgames.com/rules/mah-jong-rules.htm.

[29] *Town of Mt. Pleasant v. Chimento* (heard Oct. 19, 2010), is currently on appeal to the Supreme Court of South Carolina.

(holding that poker is predominantly a game of chance); *Joker Club, L.L.C. v. Hardin*, 643 S.E.2d 626, 631 (N.C. Ct. App. 2007) (same).

To be sure, some antiquated cases in New York have described poker as gambling.[30] However, these cases are not controlling because none of them included an analysis of the element of skill in poker. Furthermore, the role of skill and chance in a game is a question of fact, not law. *See, e.g.*, *S. & F. Corp. v. Wasmer*, 91 N.Y.S.2d 132, 136 (N.Y. Sup. 1949). As a result, these dated and distinguishable holdings should not be treated as precedential, especially

[30] *See Luetchford v. Lord*, 11 N.Y.S. 597, 597 (N.Y. Gen. Term. 1890) *rev'd on other grounds*, 30 N.E. 859 (N.Y. 1892) (finding, without discussion, that poker was a game of chance); *In re Fischer*, 247 N.Y.S. 168, 178–79 (N.Y. App. Div. 1930) (stating, in an attorney discipline case, that playing cards for stakes was "technically gambling"); *People v. Dubinsky*, 31 N.Y.S. 2d 234, 236 (N.Y. Ct. Spec. Sess. 1941) (finding that a particular variant of stud poker was gambling); *Katz's Delicatessen, Inc. v. O'Connell*, 97 N.E.2d 906, 907 (N.Y. 1951) (poker treated as gambling without discussion).

A more recent case involving a variant of three card monte, *People v. Turner*, 629 N.Y.S.2d 661, 662 (N.Y. Crim. Ct. 1995), stated in *dicta* that poker is a game of chance "since the outcome depends to a material degree upon the random distribution of the cards. The skill of the player may increase the odds in the player's favor, but cannot determine the outcome regardless of the degree of skill employed." Aside from the fact that this statement was pure *dicta*, it was poorly reasoned, as the premise that the players cannot determine the outcome of the game is demonstrably false. The *Turner* court's error stemmed from its reliance on *In re Plato's Cave Corp. v. State Liquor Authority*, 496 N.Y.S.2d 436 (N.Y. App. Div. 1985), *aff'd*, 506 N.Y.S.2d 856 (1986), a case about video poker—which is entirely distinguishable from the peer-to-peer poker games offered here, in that the players in video poker are essentially playing a slot machine: they cannot bluff, their wins or losses are determined solely by the turn of the cards, and the video poker machine retains a house "edge" over the player. *See United States v. 294 Various Gambling Devices*, 708 F.Supp. 1236, 1243 (W.D. Pa. 1989) ("Indeed all the skill elements associated with the ordinary game of draw poker are conspicuously absent in the video version. In video poker there is no raising, no bluffing, no money management skills."); *Collins Coin Music Co. of N.C., Inc. v. N.C. Alcoholic Bev. Control Comm'n*, 451 S.E.2d 306, 308 (N.C. Ct. App. 1994) (same). Moreover, *Turner* is questionable authority even for its holding, as other New York courts have held that three card monte is a game of skill. *See People v. Mohammed*, 724 N.Y.S.2d 803, 805-06 (N.Y. Crim. Ct. 2001); *People v. Hunt*, 616 N.Y.S.2d 168, 170 (N.Y. Crim. 1994).

given the advances made in the understanding of the game of poker over the last several decades.[31]

Because skill predominates over chance in determining the outcome in poker, this Court should hold that poker is not gambling under New York Penal Law § 225.00.

IV. CONCLUSION

The PPA respectfully submits this memorandum to provide the Court with pertinent information regarding the game of poker and to present the perspective of its members regarding the nature of poker, in the hopes that this information will aid this Court in reaching a just decision in the case before it.

Respectfully submitted,

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[31] For instance, at the time these cases were decided, there were no statistical analyses of millions of poker hands, nor had the academy dedicated nearly as much attention to the dynamics of poker games. Instead, these courts considered purely anecdotal evidence to arrive at their conclusions.

Exhibit A

cigital

Statistical Analysis of Texas Hold'Em

March 4, 2009

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This work was performed under contract to:

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Douglas Bay Complex, Onchan

Isle of Man

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Note to the Reader

This document is written to a technical audience. It is assumed that the reader is acquainted with common poker terminology (flop, river, hole cards, board, etc.) It is further assumed that the reader understands the basic mechanics of playing Texas Hold 'Em. This document also uses standard poker notation such as K♦4♣Q♦2♠J♥ or 5c5hKcTd8d to represent hands.

1 Executive Summary

The effect of luck (i.e., the dealing of the cards) in Texas Hold'Em is a subject of much debate in the legal community. This study seeks to establish clear numbers derived from a significant sample of actual play. This study does not quantify the effect that luck has on Texas Hold'Em, but it provides compelling statistics about the way that the outcomes of games are largely determined by players' decisions rather than chance.

Cigital examined 103 million hands of Texas Hold'Em poker played at PokerStars. In the majority of cases, 75.7% of the time, the game's outcome is determined with no player seeing more than his/her own cards and some or all of the community cards. In these games all players fold to a single remaining player who wins the pot. In the 24.3% of cases that see a showdown (where cards are revealed to determine a winner), only 50.3% of showdowns are won by the player who could make the best 5-card hand. The other roughly half of the showdowns are won by someone with an inferior 5-card hand because the player with the best 5-card hand folded prior to showdown.

We use accepted statistical sampling formulas to make the argument that these statistics are generally representative of Texas Hold'Em in Section 2. The findings themselves are presented in Section 3. In order that the artifacts can be reused with confidence, the cryptographic signatures of all contributing data are listed in Section 5.

2 Goals and Methodology

The purpose of this analysis is to determine certain statistical qualities of the game of Texas Hold 'Em as played at PokerStars.com. Given the specific results from analyzing PokerStars.com, we want to generalize the results and say mathematically that they represent the game of Texas Hold 'Em as a whole. It is important that Cigital conduct this analysis independently and without predisposition towards the final outcome.

2.1 Data Acquisition

Cigital acquired data from Rational Entertainment Enterprises Limited (REEL) related to play at PokerStars.com. The log files are archived by Cigital and their SHA-1 signatures are recorded in Section 5. The log files contain descriptions of the play of many hands. Table 1 shows two groups of log file lines that describe two different games. Note that user IDs have been changed and the hand IDs are fictitious to protect the confidentiality of this data.

Game	Blind	Bet	Hand ID	Board	User ID	Pos	Win	Hole	Best Hand	Show
No Limit	100	200	1399167686	8dKcTd9sQd	Player A	0	0	KsQh	KsKcQhQdTd	1
No Limit	100	200	1399167686		Player B	1	0	2s7s	7s2s	0
No Limit	100	200	1399167686	8dKcTd9sQd	Player C	2	1	4d5d	QdTd8d5d4d	1
No Limit	100	200	1399167686		Player D	3	0	Qc8s	Qc8s	0
No Limit	100	200	1399167686		Player E	4	0	5c5h	5c5hKcTd8d	0
No Limit	100	200	1399167686		Player F	5	0	Tc2d	Tc2d	0
No Limit	100	200	1399167686		Player G	6	0	AsKh	KhKcAsTd8d	0
No Limit	100	200	1399167686		Player H	7	0	3h2c	3h2c	0
No Limit	100	200	1399167686		Player I	8	0	Ah6h	Ah6h	0
No Limit	10	25	1299170765		Player A	0	0	5cQs	5c5sAdQsJh	0
No Limit	10	25	1299170765	9s2d5sAdJh	Player B	1	1	2hTh	2h2dAdJhTh	0
No Limit	10	25	1299170765		Player C	2	0	6c3c	6c3c	0
No Limit	10	25	1299170765		Player D	3	0	3h7s	7s3h	0
No Limit	10	25	1299170765		Player E	4	0	5dTd	Td5d	0
No Limit	10	25	1299170765		Player F	5	0	8c6s	8c6s	0
No Limit	10	25	1299170765		Player G	6	0	3sAc	Ac3s	0
No Limit	10	25	1299170765		Player H	7	0	Kh7c	Kh7c	0
No Limit	10	25	1299170765		Player I	8	0	JsQh	JsJhAdQh9s	0

Table 1: Example Log Data

In the first game, 1399167686, both Player A and Player C went to a showdown. This is indicated both by the fact that the "board" column contains the board on both players' rows and by the fact that the showdown column is "1." Player C wins with a flush: Q♦T♦8♦5♦4♦ against Player A's two pair.

In the second game, 1299170765, the board is listed next to the singular winner, Player B. In this case, there was no showdown, even though the entire board (all five cards) were dealt. This indicates that all players still in the game when the river was dealt eventually folded to Player B. It is worth noticing that Player B had a pair of 2's as his best hand. Several players (A, G, and I) would have beaten that hand, had they stayed in.

Cigital analyzed 103,273,484 such hands that had the following characteristics:

Cash Ring No play money games were considered. No

Games	"heads-up" tables were included. That is, there are some two-player games in the sample set, but they are situations where two players sat and played against each other at a table that would allow more than two players.
Blinds 10¢ or higher	So-called "microlimit" games (games with blinds less than $1) are considered too much like play money games, so only a few such games (10¢, 25¢, and 50¢) were included. The 2¢ and 5¢ games were excluded.
December 1, 2008 to January 2, 2009	Cigital selected this timeframe because it needed to independently corroborate a subset of the hands played with the actual players themselves. See Section 2.4.

2.2 Data Analysis

For each hand analyzed, two facts were determined:

1. *Did the hand end in a showdown?* A "showdown" is a situation where all four rounds of betting have been completed and more than one player remains in the game. At least one player must show his cards so the winner can be determined.
2. If there was a showdown, *did the player with the best two cards win the hand?* It is relatively common for the best two cards (i.e., the player who would have made the best 5-card hand at showdown) to fold prior to the showdown.

2.2.1 Showdown Determination

Whether or not there is a showdown is a very simple fact to determine. There is no controversy or explanation necessary. Either there was more than one player in the game after all the betting was complete, or there was not.

2.2.2 Best Hand Win Determination

Determining whether the best hand won the showdown requires assumptions to be made. We are considering whether the player whose hole cards would combine with the board to make the best 5-card poker hand was actually the player who won at showdown.

At least two situations arise occasionally that could be considered a best-hand-win or not.

Equivalent Hands: Assume the board is K♦4♣Q♦2♠J♥, and Player A has A♦T♣ and Player B has A♣T♠. Both have an Ace-high straight. Assuming no other players have better hole cards, both Players A and B would win at the showdown and would split the pot. If Player A folds early, but Player B goes on to the showdown, Player B will win the entire pot. It is arguable that since one of the two equivalent hands did go on and win, that the best hand did win this game.

Board Best Hand: In some cases the board is the best hand. For example, if the board is 8♦8♣8♥2♠2♥, it is quite likely (though not certain) that no player has a better hand than a full house 8s full of 2s. In such a situation, where no player's hole cards improve the board, all players who stay to the showdown will split the pot. If one or more players fold before the showdown, they will not share in the pot. This situation is a special case of the "Equivalent Hands" case, because in this situation all players are equivalent. Again, it is arguable that since some hands win at the end, the best hand did win the game.

Cigital has chosen to count both of these situations as hands where the best two cards **did not** win. Since there were players who folded early, but would have been paid had they stayed in, there were "best hands" that did not win. Using the alternative method and counting such hands would have only a small impact on the final result as such hands are relatively rare.

2.3 Statistical Method

Games in the log data were organized by "game type." Game type is a combination of the game rules (i.e., Limit, No Limit, or Pot Limit), any restrictions on the table size (e.g., 10 players or 6 players) and the blind/bet sizes. For each game type we then performed a statistical analysis of the percentages of showdowns and percentages of showdowns won by the best hand to see how representative they are of Texas Hold 'Em poker hands in general.

2.3.1 Description of the analysis

We are assuming that the distribution of the number of hands that go to showdown and where the best hand won follow the binomial distribution. Specifically, we are treating each hand as a separate independent test, where the results of one hand have no bearing on the results of any other.

When the amount of data is large (as it is in our survey) the distribution of proportions of binomial data fits closely to a normal distribution. This process has several steps:

1) We define X (the number of successes) and N(the sample size). For our purposes, X is the number of hands that went to showdown in the limit we are examining (or, the number of hands where the best hand won). N is the total number of hands surveyed at the limit we're examining.

2) We construct the Wilson Estimate of the proportion:

$$\tilde{p} = \frac{X+2}{N+4}$$

The Wilson estimate is a popular way of adjusting a proportion by acting as if we had two more successes and two more failures. Notice that when the sample size is large (as it is in the majority of our surveys) this adjustment will have almost no effect.

3) We determine the standard error of the proportion (again, assuming that the proportion can be approximated by the normal distribution):

$$SE_{\tilde{p}} = \sqrt{\frac{\tilde{p}(1-\tilde{p})}{n+4}}$$

which is just the standard deviation under the normal distribution under our Wilson estimate.

4) We then determine a desired confidence level C and determine a confidence interval:

$$\tilde{p} \pm z^{*} SE_{\tilde{p}}$$

where z* is the value for the standard normal density curve with area C between $-z^{*}$ and z^{*}. We computed this value for z^{*} in Microsoft Excel as follows:

(a) Given the confidence percentage C, we compute the probability of anything being outside of the confidence interval on the right side of the normal distribution by:

$$p = \frac{1 - C}{2}$$

(b) We then use the Microsoft Excel "NORMSINV" function to find the inverse of the standard normal distribution at probability p. This gives us our z* value. It should be noted that Excel uses an iterative search technique to generate the result, and so the results may not be exactly accurate. However, several checks were made against standard tables and the results of NORMSINV were found accurate to at least three decimal places.

5) Once we have our confidence interval, we can define the margin of error as:

$$m = z^* SE_{\hat{p}}$$

6) If desired, we can also fix a desired margin of error, and compute the required z* (and thus the required confidence level) needed to reach this margin of error by inverting this process.

For the case of determining the number showdowns won by the best hand, we perform the same analysis. We let X represent the number of hands won by the best hand in the limit we are examining. We let N be the total number of showdowns surveyed at that limit.

2.3.2 Assumptions and possible sources of error

As was alluded to above, we made several assumptions during this process. If these assumptions are not valid, that may impact the accuracy of our results.

1) We assume that the data surveyed follows the binomial distribution. Specifically, we assume that each hand is an independent event with fixed probability of a showdown, and that the result of whether one hand went to a showdown has no bearing on whether a subsequent hand goes to showdown.

2) We use the normal distribution to approximate the distribution of the proportions. This is just an approximation, and introduces a potential source of error. However, this is an accepted approximation when $n^*p \geq 10$, and $n(1\text{-}p) \geq 10$ (where n = the sample size, and p = the proportion of hands that go to showdown),

and all of the limits examined are well beyond this lower bound.

3) We assume that December 2008 is a representative month of normal play at PokerStars, and that there is nothing special about it that would cause our extrapolations about how it represents other months in general to be wrong.
4) We assume that the calculations made, both the ones provided by Microsoft Excel functions, and the ones that were made to implement the formulas, are correct. Several entries were checked by hand and found to be correct.
5) We assume that the data collection was accurate, and that PokerStars gave us a complete and accurate representation of all hands played in the requested month, and that the collection of the "number of showdowns" and "total number of hands played" data is correct. Rather than take PokerStars' log files at face value, we performed independent corroboration directly with some players, as described in Section 2.4.

2.4 Verifying Log Data

PokerStars players were asked to independently submit their hand histories to Cigital, along with an attestation that the hand history was accurate.

2.4.1 Rationale

Part of the reason that we chose December 2008 as a sample month was so that the players would have their histories fresh. It gave them the best opportunity to honestly recollect their hands.

2.4.2 Mechanics

Each player sent their history by email. It included the following affirmation statement: *I, NAME, affirm that, to the best of my recollection, the attached data is an accurate representation of my activity on PokerStars.com.*

One might dispute the idea that a player can remember 60,000 hands accurately. The players who submitted histories are the kinds of players who use databases while they play. As each hand finishes, it is stored in their personal database. Certainly the player would notice a loss being recorded as a win and such obvious mistakes. The kinds of players who submitted hand histories are diligent and scrupulous about recording and analyzing their play. So, while it is unlikely that they remember all 60,000 hands in mid-January, it is highly likely that they vetted those hands as the hands were added to their database. Furthermore the data the players provided was directly from their private databases, not from PokerStars itself. That is, it was data that they collected prior to our announcement of this study or any request for assistance. Thus, an extraction from their personal databases can be considered independent of PokerStars' influence.

2.4.3 Results

Cigital received 14 player histories covering 760,836 games. Out of that set of histories, 714,439 games applied to our sample set. The other 46,397 hands were either from the wrong date (e.g., November 30) or were from tables we are not analyzing (tournaments, heads-up, low-limit, etc.). This yields 0.69% of hands in the sample data directly confirmed by players. We treat these as samples of log data where a "successful test" is when the player's personal data match PokerStars' log file, and an "unsuccessful test" is when they don't.

All the players' histories agreed with PokerStars log files exactly. We conclude that there is a 99.99% chance that the accuracy of ALL hands is 99.99% ± 0.001%. It is highly improbable that PokerStars modified the data in the log files.

3 Findings

The short summary of our findings is that 24.3% of hands result in a showdown. Of that 24.3% of hands that result in showdown, 50.3% of them are won by all players that were dealt two cards that combined with the board to make the best 5-card hand.

3.1 Margin of Error

To calculate the margin of error, we assumed a confidence level of 99.99%. The margin of error for the calculation of showdowns is estimated at ± 0.02%. The margin of error for the calculation of best hands winning is estimated at ± 0.01%. Individually, all but eight of the 55 game types had margins of error < ± 1%. Those eight game types did not experience significant play volume in the sample.

To explain the effect of margin of error, consider a specific game-type: No Limit 10¢/25¢ in December 2008. 26.1% of those hands went to showdown that month at that limit. If we were to sample lots and lots of months, we would expect some months to have a higher percentage, some months to have a lower percentage, and so on. These different percentages would stack up in a normal distribution (the bell curve, see Figure 1) **assuming that there is no reason for there to be differences in the data, other than random chance.**

That final assumption is critical. We can only extrapolate these values to be representative of reality if we assume that December 2008 is representative of reality.

Since the samples of all of the months fall into a normal distribution, we need to determine what the odds are that example month falls into the "fat" part of the bell curve. That's where confidence intervals and margins of error come into play.

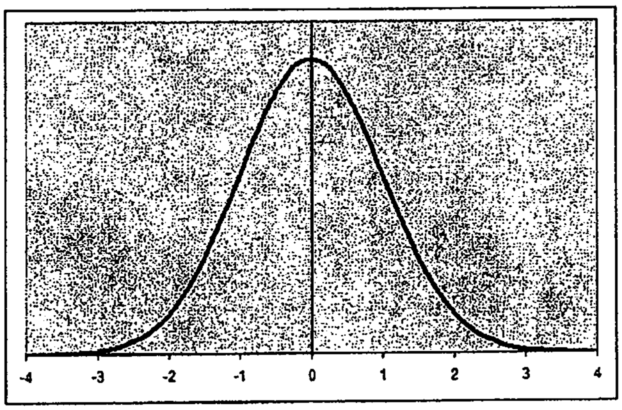

Figure 1: Standard Bell Curve

Figure 1 is a "standard" distribution, which means that it has been rescaled to be centered around 0.

Given that 26.1% of the hands went to showdown. We want to know how likely it is that the "real" bell curve for this situation has its center at, or close to, 26.1 (in other words, how likely is it that the "0" position in the picture is really at 26.1?). Obviously, it is unlikely that it will be exactly 26.1%, but the margin of error gives us a range. If we set the margin of error to 0.1% in the calculations we are asking *How likely is it that the center is 26.1%, ± 0.1%?* It's never a sure thing—it's always theoretically possible that we had a freakishly weird month, but the more hands we sample, the less likely that's true. This is just like it's not too hard to have 9 out of 10 coin flips come up heads, but it's really unlikely—though theoretically possible—to have a 90% heads rate after a million coin flips. The confidence interval comes out to about 99%, and it's based on the margin of error we set. So, what that means is that it is 99% likely that the "0" position of the bell curve in our situation is between 26.0% and 26.2%.

If we increase the margin of error, our confidence goes up (because we have a wider range to cover, so it's more likely that the real center is in that range). If we decrease the margin of error, our confidence goes down (for the same reason).

We can also perform this calculation in the reverse direction. Suppose we want to have a certain confidence that the results are not a fluke. How wide a margin of error do we need for it to be that likely? If we work in this direction and look for a confidence level of 99.99%, we figure out how wide a band of possibility is needed to be 99.99% likely that the "0" position of the real distribution is within that band, based on our estimate. It turns out to be 0.05%. In other words, we believe it is 99.99% likely that 26.1% ± 0.05% of hands at the 10¢/20¢ limit will end up in a showdown.

4 Conclusion

It is clear from these numbers that, at least in the sampled data, the majority of games are determined by something other than the value of the cards, since no player reveals any cards to determine the winner. Only rarely (about 12% of all hands) does the player who can make the best 5-card hand go all the way to showdown and win. The statistical analysis of the logs gives us confidence that the logs accurately describe what was played. The analysis of the hands gives us confidence that this sample represents online Texas Hold'Em at PokerStars as a whole.

5 Recorded Artifacts

The following log files and hand histories were received, stored, and used for this analysis.

5.1 PokerStars Log Files

File	SHA-1 signature	File	SHA-1 signature
HandsDec01.txt.gz	c5501596528dc717338b2a53c0d224c125d79729	HandsDec17.txt.gz	e0f82db68d4411724a45b5c383ff8e0ebf790a58
HandsDec02.txt.gz	90caeb2cbda43c7720d628bb3f92d731b7128ad9	HandsDec18.txt.gz	6f4d4209b78bdcf0a7486fea5e92b7d4678e3123
HandsDec03.txt.gz	cf3aac342ded4951d550090d4dcf05bc77ca633a	HandsDec19.txt.gz	4bd8bdf4e28b01d10a94e87d93d631f7f36b8c15
HandsDec04.txt.gz	b8d4c3dc5301384fd7e9da6210c0f04ed248aa98	HandsDec20.txt.gz	a318b050d9f4c019531fe1295c334bb1aa6cc68b
HandsDec05.txt.gz	717d0d87cd7d290533f3b70a9e9cb8b5f0bf7f6e	HandsDec21.txt.gz	b3920863256aa224831eebeaf93cf1145f6435ca
HandsDec06.txt.gz	8150330d3b7eb38af78c83ed6c0a3a45c197e216	HandsDec22.txt.gz	eaa2fdec8512a2cef09c89188600640e68cfca24
HandsDec07.txt.gz	2289a717c1896468d069b6331e96a4197317d446	HandsDec23.txt.gz	623c5a6e5021e1560cbfcbe506c8cf7fe40af8c6
HandsDec08.txt.gz	641ffb8ed18a27d17fd7ba7d25646257cf7343ac	HandsDec24.txt.gz	524c35fb57532166bf684f6ac0f64bd0e1c76093
HandsDec09.txt.gz	bfb86ba566571a2b5fb5b2d3cd8bc97770c2bfc5	HandsDec25.txt.gz	1996e0479bb2e8bc5557578c13d3ea4b591639f5
HandsDec10.txt.gz	20f27406f47b080cb0cd09112dde2f52deb96453	HandsDec26.txt.gz	14e1c82537b2a1c88bae32e4fbc53f738cbe4ef5
HandsDec11.txt.gz	1fb1d1ade45fd2b649e055956494ca207e076bf8	HandsDec27.txt.gz	d0d13614584ab7e6b335df8f402e6d8c94b309a5
HandsDec12.txt.gz	3aee3fd7a538096104ffbf22a9f44b010beb13b7	HandsDec28.txt.gz	7373859b2120dc6681b9d382abd0c7dedde9bb3b
HandsDec13.txt.gz	2dc2b691fc6559ea5f0d3553616ebcad1a96529e	HandsDec29.txt.gz	d901cdc805c2fed8561f119139503b5e187f03a6
HandsDec14.txt.gz	df5f318f3b0f97f49a65369a1d849109c2a572f4	HandsDec30.txt.gz	44214e493fdaf335aa019077b7066c2254650597
HandsDec15.txt.gz	5ec47e468f03c51ac6637c2d567806ed370200f4	HandsDec31.txt.gz	19ec3cdfa2beddeb2bf39a81a5d62871e732877c
HandsDec16.txt.gz	d1384390abae8ec2c927892a364bd78b0ffc45c6	HandsJan01.txt.gz	b5ee0ff2401ef9c03551159f45244a8ad2368bc1
		HandsJan02.txt.gz	94e55df1892c64bfa7a4e7a804b6bd4ee5f891cc

5.2 Player-submitted Hand Histories

SHA-1 Signature	Archive File
f620fad11de3347002f76b680bc215469d4236c9	furbean.zip
558840922 5a4a09482008301e21a72d37731df01	LihanLi.zip
621d2508b6836fce55169acc5d344e9b3e1e47bb	basile.zip
9b6ed3073b4bc4823f7fe274b255ee5c6b9728b8	buntaine.zip
0cee4d4e03cb472d08bbb9674fb8c4504e10324b	stein.zip
dd1deac5a8f17c7715e886b2077e9764902be06f	Zeidler.rar
6e424fc2ed793429a60fba34e5362f195a0345f9	aguirre.zip
4edbcac2eb92883077cc6fbd84f48c3ad89f4cfc	ajtai.zip
57c5cf23a558dd271c936b92377d76b310c94ad2	boyett.rar
8fb769442b43475d270a4f81a61a26e0cc6ba495	linnane.zip
2cdd02064d95853181db54038e79ac3f10962366	smith.zip
3aafbafec8e31ee3c890609ec324d8989f58bf77	zorec.zip
1486eaa0b119b6aad360a8b8552d05c2e22b65bd	stabile.zip
8849e37642aa24f016987c1c8e0c9ce8c84b178d	pfaff.zip

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Table 2: Contact Information

About Cigital, Inc.

Cigital helps commercial and government clients assure software quality and improve software development processes. Our Software Quality Management (SQM) solutions drive down the cost of deploying quality software and ensuring software reliability, security and performance. Cigital's expert Consultants measure software quality by combining proprietary methodologies, tools and knowledge to perform full-lifecycle testing via a risk management framework. The resulting metrics are used to drive application readiness decisions and identify the most cost-effective areas for software process improvement. Founded in 1992, Cigital (www.cigital.com) is headquartered in Northern Virginia with additional offices in Boston.

cigital

Digitally signed
by Paco Hope
Date: 2009.03.05
09:49:51 -05'00'

Exhibit B

Poker, Chance and Skill

Noga Alon *

1 Introduction

The question if poker is a game of skill or a game of chance received a considerable amount of attention mainly because of its potential legal implications. See, for example, [3] and its many references. Most of the material dealing with the subject focuses on legal issues, and only briefly touches the question from a purely scientific point of view. In the present article we address the question as a scientific one. To do so, we provide a detailed analysis of several simplified models of poker, which can be viewed as toy models of Texas Hold'em, the most popular variant of poker. The advantage of considering these simplified models is that unlike the real game, they are simple enough to allow a precise mathematical analysis, and yet there is every reason to believe that this analysis captures many of the main properties of the far more complicated real game, and enables us to estimate the advantage of skilled players over less skilled ones. The analysis suggests that skill plays an important role in poker. As explained in the second half of the article, this fact, together with the Central Limit Theorem, imply that skill is the major component in deciding the results of a long sequence of hands. As the common practice is to play many hands, the conclusion is that poker is predominantly a game of skill.

The article is organized as follows. In Section 2 we describe the rules of Texas Hold'em which is probably the most popular poker game played in casinos and card-rooms throughout the world, as well as in online poker sites. Section 3 contains the basic probabilistic information regarding the odds of the main possibilities in the game. In Section 4 we give a detailed analysis of several simplified versions of poker. Section 5 contains a discussion of

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the relevance of the Law of Large Numbers, or more specifically, the Central Limit Theorem, to the determination of the success of skilled and less skilled players in a sequence of games. This is illustrated by considering the simplified versions introduced in Section 4. A summary and concluding remarks appear in the final section 6.

2 The Game

There are many versions of poker, here we focus on Texas Hold'em (often called Hold'em, for short). The game is usually played with at most 10 (and at least 2) players. This is the most popular member of a class of poker games known as community card games, which all bear some similarity to each other. Like most variants of poker, the objective in hold'em is to win pots, where a pot is the sum of the money bet by all players in a hand. A pot is won either at the showdown by forming the best five card poker hand out of the seven cards available, or by betting to cause other players to fold and abandon their claim to the pot. The objective of a player is not to win the maximum number of individual pots, but rather to make mathematically correct decisions in order to maximize the expected net amount won in the long run.

Here is a rough brief description of the game: Each player is dealt two cards and this is followed by a round of betting. Then the dealer spreads three cards face up (called the flop) in the middle, and this is followed by a second round of betting. The dealer places a fourth card (called the turn) face up and another round of betting follows. Finally, the dealer places a fifth card (called the river) face up and the last round of betting takes place. Each player who has not folded during the betting rounds gets the best hand of five cards among his own two cards plus the five community cards in the center.

A more detailed account follows. See, e.g., [9] for several variants and further details. Hold'em is often played using small and big blind bets. A dealer button is used to represent the player in the dealer position; the dealer button rotates clockwise after each hand, changing the position of the dealer and blinds. The small blind is posted by the player to the left of the dealer and is usually equal to half of the big blind. The big blind, posted by the player to the left of the small blind, is equal to the minimum bet.

There are several variations on the betting structure, here we describe limit hold'em. In this version bets and raises during the first two rounds of betting (pre-flop and flop) must be equal to the big blind; this amount is called the small bet. In the next two rounds of betting (turn and river), bets and raises must be equal to twice the big blind; this amount is called the big bet.

A play of a hand begins with each player being dealt two cards face down from a standard deck of 52 cards. These cards are the player's hole or pocket cards, they are the only cards each player will receive individually, and they will only (possibly) be revealed at the showdown, making hold'em a closed poker game. After the pocket cards are dealt, there is a "pre-flop" betting round, beginning with the player to the left of the big blind (or the player to the left of the dealer, if no blinds are used) and continuing clockwise. A round of betting continues until every player has either folded, put in all of their chips, or matched the amount put in by each other active player.

After the pre-flop betting round, assuming there remain at least two players taking part in the hand, the dealer deals a flop; three face-up community cards. The flop is followed by a second betting round. This and all subsequent betting rounds begin with the player to the dealer's left and continue clockwise.

After the flop betting round ends a single community card (called the turn) is dealt, followed by a third betting round. A final single community card (called the river) is then dealt, followed by a fourth betting round and the showdown, if necessary.

If a player bets and all other players fold, then the remaining player is awarded the pot and is not required to show his hole cards. If two or more players remain after the final betting round, a showdown occurs. On the showdown, each player plays the best five-card hand he can make from the seven cards comprising his two pocket cards and the five community cards. A player may use both of his own two pocket cards, only one, or none at all, to form his final five-card hand. If the five community cards form the player's best hand, then the player is said to be playing the board and can only hope to split the pot, since each other active player can also use the same five cards to construct the same hand.

If the best hand is shared by more than one player, then the pot is split equally among them. The best hand is determined according to the ranking described below. If the significant part of the hand involves fewer than five cards, (such as two pair or three of a kind), then the additional cards (called kickers) are used to settle ties. Note that only the card's numerical rank matters; suit values are irrelevant in Hold'em.

The ranking of the hands is as follows:

- Royal Flush (the top hand): The five highest cards, the 10 through the Ace, all five of the same suit. A royal flush is also an ace-high straight flush.
- Straight Flush: Any five cards of the same suit in consecutive numerical order.
- Four of a Kind: Four cards of the same denomination.
- Full House: Any three cards of the same denomination, plus any pair of a different denomination. Ties are broken first by the three of a kind, then the pair.
- Flush: Any five non-consecutive cards of the same suit.
- Straight: Any five consecutive cards of mixed suits. Ace can be high or low.
- Three of a Kind: Three cards of the same denomination.
- Two Pair: Any two cards of the same denomination, plus any other two cards of the same denomination. If both hands have the same high pair, the second pair wins. If both pairs tie, the high (fifth) card wins.
- Pair: Any two cards of the same denomination. In a tie, the high card wins.
- High Card: If no other hand is achieved, the highest card held wins.

Texas hold'em (usually with a no-limit betting structure) is played as the main event in many of the famous tournaments, including the World Series of Poker's Main Event. Traditionally, a poker tournament is played with chips that represent a player's stake in the tournament. Standard play allows all entrants to "buy-in" a fixed amount and all players begin with an equal value of chips. Play proceeds until one player has accumulated all the chips in play. The money pool from the players "buy-ins" are redistributed to the players in relation to the place they finished in the tournament. Usually only a small percentage of the players receive any money, with the majority receiving nothing. As a result the strategy in poker tournaments can be different from that in a cash game.

3 Odds and Probabilities

Some familiarity with the odds of the various possible combinations in poker is necessary, though certainly not sufficient, for skilled poker play. The ranking of hands in poker is determined according to their frequencies as 5-card poker hands. These frequencies can be easily computed. There are $\binom{52}{5} = 2,598,960$ different poker hands. Among these 4 are Royal Flush and 36 are non-royal Straight Flush. These and the numbers of the other hands are given below.

The numbers of 5-card poker hands:

- Royal Flush: $\binom{4}{1} = 4$
- Straight (non-royal) Flush: $\binom{9}{1}\binom{4}{1} = 36$
- Four of a Kind: $\binom{13}{1}\binom{4}{4}\binom{48}{1} = 624$
- Full House: $\binom{13}{1}\binom{4}{3}\binom{12}{1}\binom{4}{2} = 3,744$
- Flush: $\binom{13}{5}\binom{4}{1} - 40 = 5,108$
- Straight: $\binom{10}{1}\binom{4}{1}^5 - 40 = 10,200$
- Three of a Kind: $\binom{13}{1}\binom{4}{3}\binom{12}{2}\binom{4}{1}^2 = 54,912$
- Two Pair: $\binom{13}{2}\binom{4}{2}^2\binom{11}{1}\binom{4}{1} = 123,552$
- Pair: $\binom{13}{1}\binom{4}{2}\binom{12}{3}\binom{4}{1}^3 = 1,098,240$
- High Card: $[\binom{13}{5} - 10](4^5 - 4) = 1,302,540$

Thus, for example, a fraction of $\frac{123,552}{2,598,960} = 0.047539$ of all 5 card hands form a Two Pair.

More relevant to Hold'em is the corresponding information for 7-card hands. Their total number is $\binom{52}{7} = 133,784,560$. The number of hands for each possibility of the best 5 card subset is also not difficult to compute. This is done in [1] , and appears below, together with the probability of each possibility in a random 7-card hand.

The numbers and frequencies of 7-card poker hands:

Royal Flush	4,324	.0000323
Straight (non-royal) Flush	37,260	.000278
Four of a Kind	224,848	.0017
Full House	3,473,184	.026
Flush	4,047,644	.030
Straight	6,180,020	.046
Three of a Kind	6,461,620	.048
Two Pair	31,433,400	.235
Pair	58,627,800	.438
High Card	23,294,460	.174

Hence, when playing Hold'em a player should expect to get Three of a Kind or higher once in about 20 hands, and Four of a Kind once in about 600 hands.

During the game, a player should be capable of estimating the probability of improving his hand when the turn or river community cards will be dealt. If, for example, the player holds two diamonds, and the flop contains two other diamonds, then there are 9 additional diamonds in the deck, implying that the probability that the next community card will be a diamond is $9/47$, and in case it will not, the probability that the last community card will be a diamond is $9/46$. A player should also always be aware of the expected winning amount in a game; in general one should bet when the expected value of the gain (which is the amount in the pot after the bet, times the probability of winning) is greater than the wager. Of course, even if the player knows the precise probability, this should be modified from time to time in order not to reveal the strategy of the player; bluffing is a crucial part of the game as will be clear from the analysis of the simplified versions considered in the next section.

4 Simple Variants

There is a significant amount of literature on various toy models of poker, starting with the variants discussed in the classical book of Von Neumann and Morgenstern [8]. See, for example, [7], [5], [6]. In most of these articles, however, the authors try to find the best strategy of the players assuming they play optimally. Our treatment here is different, as the main intention is to assess the significance of skill in the game. We therefore investigate the case in which one player is more skilled than the other(s). Although the models we suggest are vast simplifications of the real game, they do seem to capture many of the properties of real poker.

4.1 The Basic Variant

Consider a version of Hold'em in which each player gets two face down pocket cards, the flop, turn and river community cards are spread face up in the middle, and only then there is one round of betting. Suppose, further, that in this round each player is allowed to either fold, or bet 1 chip, and these decisions are made simultaneously by all players. If all players fold then nothing happens, if at least one player bets, then the active player with the highest hand wins the pot. Given the 5 community cards, there are $m = \binom{47}{2} = 1081$ possibilities for the two pocket cards of each player, and ignoring equalities, there is a linear order among them. Therefore, a perfect player that sees the community cards and his hole cards, knows precisely the rank of his hole cards among the 1081 possibilities, and hence can compute, in principle, the precise probability that his hand is the highest among all hands of the participants. It is worth noting that knowing these precise probabilities in all cases is not an easy matter, and is probably beyond the ability of a human being, as this requires to memorize a huge table of ranks representing all possible values of the community cards and the player's hole cards. Yet, it seems that skilled poker players can estimate well the probability in each case. Ignoring the (rather negligible) effect of the fact that the pairs forming the pocket cards of all players should be disjoint, one can model this situation by a game in which the players are dealt random distinct numbers between $m = 1081$ (the strongest possibility for the pocket cards given the community cards) and 1 (the weakest possibility). As m is a large number this can be further simplified by considering the case in which each player is dealt his hole number; a uniformly chosen random real number in the unit interval $[0, 1]$, where a higher number is considered better than a lower one. In what follows we refer to this game as the *basic game*.

We start with the simplest case, in which there are two players, A (Alice) and B (Bob). In this case, Alice gets a uniform random number $x_A \in [0, 1]$, and Bob gets a uniform random number $x_B \in [0,1]$, where the choices of x_A, x_B are independent. Each player knows his/her own number, but not the one of the other player, and they have to choose between folding and betting 1 chip.

Suppose that Bob is an unskilled player, who plays randomly. That is, for any value of x_B, Bob decides to fold with probability 1/2, and decides to bet with probability 1/2. Alice, who is a skilled player, suspects that this is Bob's strategy, and chooses her strategy in order to ensure maximum expected gain in the game against Bob. To determine the strategy of Alice, let us consider how she should behave when her pocket number is $x_A = x$. If she decides to bet, then the expected number of chips she wins (including her own chip) is

$$\frac{1}{2}1 + \frac{1}{2}x2.$$

Indeed, with probability 1/2 Bob will fold, and in this case Alice will win her single chip, giving the first term above. With probability 1/2 Bob will decide to bet, in this case with probability x his number x_B lies in $[0, x)$ and is thus smaller than Alice's number, and if so Alice will win two chips. This gives the second term. Alice should bet if and only if her expected win exceeds her cost, which is the 1 chip she bets. Thus, she should choose to bet if and only if $\frac{1}{2}1 + \frac{1}{2}x2 \geq 1$, that is, if her hole number $x = x_A$ is at least 1/2.

If, indeed, Bob and Alice follow the above strategies, then at least one of them folds with probability $1 - \frac{1}{2} \cdot \frac{1}{2} = 3/4$, and thus, with probability 3/4 the expected net gain of Alice is 0. The probability that Alice's net gain is 1 is

$$\frac{1}{2}\int_{1/2}^{1} x dx = \frac{3}{16},$$

and the probability that Alice's net gain is -1 is

$$\frac{1}{2}\int_{1/2}^{1} (1-x) dx = \frac{1}{16}.$$

Altogether, in a single hand, the expected value of the random variable X describing Alice's net gain is

$$E(X) = \frac{3}{16} \cdot 1 + \frac{1}{16} \cdot (-1) = \frac{1}{8},$$

and its variance is

$$Var[X] = E(X^2) - (E(X))^2 = \frac{3}{16} + \frac{1}{16} - (\frac{1}{8})^2 = \frac{15}{64}.$$

We have thus proved the following, where here and in what follows we refer to the player playing randomly as the unskilled player.

Proposition 4.1 *In a single hand of the basic game with two players, a skilled one and an unskilled one, the expected value of the net gain of the skilled player is* $1/8$ *and the variance of this net gain is* $15/64$.

Note that, not surprisingly, the skilled player has a significant advantage over the unskilled one.

4.2 The Importance of Being Unpredictable

Suppose that Bob and Alice play a sequence of hands of the the basic game described above. Bob is likely to realize that Alice's strategy is better than his random one, and he is also likely to observe that she is betting if and only if her hole number x_A is at least $1/2$. He can thus decide to adopt Alice's winning strategy, and bet if and only if his number x_B is at least $1/2$. However, when he starts doing so, Alice, who is more skilled, realizes that this is the case. She can thus adjust her strategy and choose the optimal response to the new strategy of Bob. It is not difficult to modify the previous computation to this case. Observe, first, that if $x_A < 1/2$, then Alice should not bet, as with the new strategy of Bob this can never lead to any winning. If Alice hole number is $x \geq 1/2$, and she decides to bet, then the expected amount she wins is

$$\frac{1}{2} \cdot 1 + (x - \frac{1}{2})2 = 2x - \frac{1}{2}.$$

Indeed, with probability $\frac{1}{2}$ Bob's number x_B will lie in $[0, 1/2]$, he will not bet, and Alice will get her chip back. Similarly, with probability $x - \frac{1}{2}$ Bob's number will lie in $[\frac{1}{2}, x)$ and in this case Alice's win will be 2. Therefore, Alice should bet if and only if $2x - \frac{1}{2} \geq 1$, that is, if $x \geq \frac{3}{4}$. In case Bob and Alice play according to these new strategies, then the random variable describing Alice's net gain is 0 with probability $1 - \frac{1}{2} \cdot \frac{1}{4} = \frac{7}{8}$, it is $+1$ with probability $\int_{3/4}^{1} (x - \frac{1}{2})dx = \frac{3}{32}$ and it is -1 with probability $\int_{3/4}^{1} (1 - x)dx = \frac{1}{32}$. This gives the following.

Proposition 4.2 *In a single play of the basic game with two players* A *and* B*, where* A *bets if and only if* $x_A \geq 3/4$ *and* B *bets if and only if* $x_B \geq 1/2$*, the expected value of the net gain of* A *is* $1/16$ *and the variance of this net gain is* $31/256$.

Note that here the losing player is using exactly the same strategy used by the winning player in the previous subsection. This shows that already in this simplified version of the game, a winning player should adjust her strategy to those of the other players. It also shows the importance of bluffing; once your strategy is revealed, the other players can exploit it. These principles hold (in a far more sophisticated way) in real poker; it is crucial for a winning player to stay unpredictable, and to take into account the strategy of the other players.

4.3 More Players

In real poker the number of players is often larger than 2. Consider the basic game in which there are $n+1$ players denoted by $P_0, P_1, \ldots, P_n$. As our objective is to measure the significance of skill, assume that the first player, P_0, is skilled, and all other players are unskilled and play randomly. Therefore, the players are dealt $n+1$ uniform, independent random numbers in $[0,1]$, where x_i is the hole number of P_i, then each of them decides to fold or bet one chip, where all these decisions are taken simultaneously, and finally the active player with the largest number wins the pot. Let us compute the optimal strategy for P_0, assuming all other players play randomly. If $x_0 = x$ and P_0 decides to bet, then the expected amount of chips he wins is

$$\frac{1}{2^n}\sum_{k=0}^{n}(k+1)\binom{n}{k}x^k.$$

Indeed, the probability that exactly k players among the n unskilled ones decide to bet is

$$\frac{\binom{n}{k}}{2^n}.$$

If so, then the probability that all their hole numbers will lie in $[0,x)$ is x^k, and in this case P_0 will win the pot, whose size will be $k+1$. Therefore, P_0 should bet if and only if

$$\frac{1}{2^n}\sum_{k=0}^{n}(k+1)\binom{n}{k}x^k \geq 1.$$

Since

$$\sum_{k=0}^{n}(k+1)\binom{n}{k}x^k = \frac{d}{dx}\left(x(1+x)^n \right) = (1+x)^n + nx(1+x)^{n-1},$$

it follows that P_0 should bet when $x_0 = x$ if and only if

$$(1+x)^n + nx(1+x)^{n-1} \geq 2^n.$$

In particular, for $n = 1$ (two players, one skilled and one unskilled), the skilled player should bet if and only if $(1+x)+x \geq 2$, that is, if and only if $x \geq 1/2$, as we have already seen in subsection 4.1. If $n = 2$ (three players), the skilled player should bet if and only if $(1+x)^2+2x(1+x) \geq 4$, that is, if and only if $x \geq \frac{\sqrt{13}-2}{3} = 0.535..$, and if $n = 9$ (10 players, 9 of whom are unskilled), the skilled player should bet if and only if his hole number x satisfies $(1+x)^8(10x+1) \geq 512$, that is, whenever x exceeds 0.685...

Here, too, the mathematical analysis of the simplified model reveals a crucial feature of real poker: a skilled player should adjust his strategy to the number of players. In general, when this number grows, the player should fold more often and bet mostly with stronger hands.

4.4 Blinds and Position

In the basic model considered in subsection 4.1, there is no nontrivial optimal strategy in the sense of Game Theory, that is, if both players play optimally, then their best (mixed) strategy is to keep folding and never bet. Indeed, as a uniformly chosen random number in $[0, 1]$ is strictly smaller than 1 with probability 1, one can show that for any nontrivial betting policy of one of the players, there is a strategy that beats it. The reason for this is that this simplified version of the game ignores the cost of playing and, more crucially, contains no forced bets (called blinds, or ante in real poker) which are necessary to create an initial stake for the players to contest. We thus discuss here a slightly more realistic model of the game, containing a forced blind bet. In order to enable a rigorous analysis, this model is still far from the real game, and yet its analysis illustrates nicely the fact that in real poker the strategy has to be adjusted to the position and the order in which players have to act. Consider, thus, a model in which there are two players. The game starts with a blind bet of 1 chip by the first player, then the 5 community cards as well as the two pocket cards of each player are dealt. The second player can now either fold or bet 3 chips, and the first player can also either fold or raise his bet to 3, where both players make their decisions simultaneously. If both players fold nothing happens, if one player folds and the other bets, then the active player wins the pot, and if both players bet, the higher hand wins the pot. The choice of the numbers 1 and 3 here is arbitrary, and the analysis can be carried out for different numbers in a similar manner. By the discussion in subsection 4.1, assuming the players can memorize a substantial table of possibilities, the game is well approximated by a version in which the first player makes a blind bet of 1, then the players get uniform, independent, random pocket numbers in $[0, 1]$, and then the second player either folds or bets 3, and the first either folds or increases his bet to 3. The blind bet alternates between the players, as obviously having to start with it is a disadvantage. We call this version of the game the *basic game with a blind bet*, and analyze it as in subsection 4.1 for two players, a skilled one (Alice) and an unskilled one playing randomly (Bob). There are two cases to consider, depending on the identity of the player posting the blind bet.

Assume, first, that Alice is making the blind bet. If her number is x and she decides to bet, then her expected win is $\frac{1}{2} \cdot 3 + \frac{1}{2}x \cdot 6 = \frac{3}{2} + 3x$. Indeed, with probability 1/2 Bob folds and then Alice gets back her 3 chips, and with probability $\frac{1}{2}x$ Bob bets and his number is smaller than x, and if so Alice wins 6 chips. Alice should bet if and only if she expects to win at least the cost of increasing her bet. As this cost is 2, she should bet if and only if $\frac{3}{2} + 3x \geq 2$, that is, if and only if $x \geq \frac{1}{6}$. If she uses this strategy, then her net gain is -3 with probability $\frac{1}{2}\int_{1/6}^{1}(1-x)dx = \frac{25}{144}$. It is -1 with probability $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$, 0 with probability 1/2, and $+3$ with probability $\frac{1}{2}\int_{1/6}^{1} x dx = \frac{35}{144}$.

A similar analysis shows that when Bob is posting the blind bet Alice should bet if and only if her number $x = x_A$ satisfies $\frac{1}{2} \cdot 4 + \frac{1}{2}x \cdot 6 = 2 + 3x \geq 3$, that is, if and only if $x \geq 1/3$. With this strategy the expected net gain of Alice is -3 with probability $\frac{1}{2}\int_{1/3}^{1}(1-x)dx = \frac{1}{9}$, it is 0 with probability 1/3, it is $+1$ with probability $\frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$, and it is $+3$ with probability $\frac{1}{2}\int_{1/3}^{1} x dx = \frac{2}{9}$. We summarize these facts in the following.

Proposition 4.3 *Suppose a skilled player is playing one basic game with a blind bet against an unskilled player.*

(i) If the skilled player posts the blind bet, then her expected net gain is

$$\frac{25}{144} \cdot (-3) + \frac{1}{12} \cdot (-1) + \frac{35}{144} \cdot 3 = \frac{1}{8}$$

and the variance is

$$\frac{25}{144} \cdot (-3)^2 + \frac{1}{12} \cdot 1^2 + \frac{35}{144} \cdot 3^2 - (\tfrac{1}{8})^2 = \frac{733}{192}.$$

(ii) If the unskilled player posts the blind bet, then the expected gain of the skilled player is

$$\frac{1}{9} \cdot (-3) + \frac{1}{3} \cdot 1 + \frac{2}{9} \cdot 3 = \frac{2}{3}$$

with variance

$$\frac{1}{9} \cdot (-3)^2 + \frac{1}{3} \cdot 1^2 + \frac{2}{9} \cdot 3^2 - (\tfrac{2}{3})^2 = \frac{26}{9}.$$

Note that the skilled player has to use one strategy when posting the blind bet and another one when the second player is posting the blind bet. Indeed, in real poker the strategy has to take the position into account.

5 The Effect of the Central Limit Theorem

The analysis of the simplified models of poker discussed in the previous section shows that skilled players have a rather significant advantage over unskilled ones; this advantage becomes more and more prominent as the number of hands played increases. Intuitively that's a clear fact, as in the long run the cards dealt to all player are similar on average. A rigorous explanation with precise quantitative estimates can be given using the Central Limit Theorem.

By (a special case of) the Central Limit Theorem (see, e.g., [4]), the normalized sum of independent uniformly bounded random variables is converging to a normal distribution. A precise version follows.

Theorem 5.1 *Let M be a positive real, and let $X_1, X_2, \ldots$ be a sequence of independent random variables, where each X_i satisfies $|X_i| \le M$, the expectation of X_i is μ_i and its variance is σ_i^2. Define*

$$Z_n = \frac{\sum_{i=1}^n X_i - \sum_{i=1}^n \mu_i}{\sqrt{\sum_{i=1}^n \sigma_i^2}}.$$

Then, for every real z,

$$\lim_{n\to\infty} Prob[Z_n \le z] = \Phi(z)$$

where

$$\Phi(z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-t^2/2} dt, \tag{1}$$

is the cumulative distribution function of a standard Normal Random Variable.

Applying this theorem to the basic game between a skilled and an unskilled player in the basic game discussed in subsection 4.1, we get the following.

Proposition 5.2 *In a sequence of n hands of the basic game between a skilled and an unskilled player, the probability that the skilled player will not lead at the end is approximately $\Phi(-\sqrt{n/15})$, where $\Phi(z)$ is given in (1).*

The proof is simple. For each i, $1 \leq i \leq n$, let X_i denote the net gain of the skilled player in the i-th hand. By Proposition 4.1 the expected value of each X_i is $\mu_i = \frac{1}{8}$ and its variance is $\sigma_i^2 = 15/64$. Using the notation of Theorem 5.1, put

$$Z_n = \frac{\sum_{i=1}^n X_i - n/8}{\sqrt{15n/64}}.$$

Since the random variables X_i are independent (and bounded), the theorem applies and shows that for large n, the probability that $\sum_{i=1}^n X_i$ is at most some real number y, which is precisely the probability that

$$Z_n \leq \frac{y - n/8}{\sqrt{15n/64}}$$

is approximately

$$\Phi(\frac{y - n/8}{\sqrt{15n/64}}).$$

As $\sum_{i=1}^n X_i$ is the total net gain of the skilled player, the probability he will not lead at the end is precisely the probability that $\sum_{i=1}^n X_i \leq 0$. The desired result follows by substituting $y = 0$ in the last displayed equation.

The above approximation is very accurate already for modest values of n, and certainly for all $n > 50$. Taking the values of the function Φ from a table of Normal Distribution we conclude that, for example, for $n = 60$ this probability is $\Phi(-2) = 0.0227..$ and for $n = 240$ the probability is $\Phi(-4) = 0.00003167..$, that is, smaller than $1/30,000$. For $n = 350$ the probability the unskilled player wins is already smaller than one in a million. Note that by the same reasoning one can bound the probability that after n games the skilled player will have a net gain of at most y chips. Thus, for example, the probability that after $n = 240$ hands the skilled player will have a net gain of at most $n/16 = 15$ chips is roughly $\Phi((15 - 30)/\sqrt{15 \cdot 240/64}) = \Phi(-2) = 0.0227..$

A similar computation for the case of the simple game with a blind bet can be carried out using Proposition 4.3.

Proposition 5.3 *Suppose a skilled and an unskilled player are playing $2n$ hands of the basic game with a blind bet, where each player posts the blind bet n times. Then the probability that the skilled player will not lead at the end is approximately*

$$\Phi(-\frac{19\sqrt{n}}{\sqrt{3863}}).$$

We omit the detailed computation and only give two examples. If $n = 90$ then the probability that at the end the skilled player will not be ahead is about $\Phi(-19\sqrt{90}/\sqrt{3863}) = 0.00187.$. For $n = 140$ this probability drops down to less than 0.00016.

The discussion above shows that the skill component in poker (at least in the simplified models considered here), which gives some advantage in a single hand, provides a major advantage in a sequence of games. In fact, when the sequence becomes long, as is usually the case in poker games, a skilled player wins against an unskilled one with overwhelming probability. It is instructive to compare the situation here to other games, without restricting the discussion to card games. Consider, for example, tennis. There is certainly an important skill component in tennis, but there is surely also some influence of chance in the game, arising from the impact of lots of random elements, like the wind, the sun, balls hitting hidden bumps in the court, etc. Indeed, without these, a stronger player would beat a weaker one in every point (while serving, say), and this is certainly not the case. In reality, a top-ten player probably wins about 55% of the points in a match against a player ranked 100, that is, the stronger player has an advantage of about 0.1 in a single point. However, since a match consists of $3, 4$ or 5 sets, each set consists of at least 6 (and usually more) games, and each game consists of aleast 4 points, in a typical match there are at least 72 points, and often at least twice that number. The Central Limit Theorem thus kicks in, and implies that even a relatively small advantage in a single point becomes a major factor in deciding the final result of the game. The situation in poker is similar. Indeed, poker is different than tennis as it has an inherent element of chance in it, but the influence of this is not necessarily larger, and in fact appears to be smaller, than the influence of chance elements in tennis. The repeated nature of the game reduces considerably the effect of chance, making poker almost entirely a game of skill.

6 Summary and Concluding Remarks

By analyzing simplified versions of poker we have seen that although like in essentially almost any other game there is some influence of chance in poker, the game is predominantly a game of skill. Indeed, the discussion in Section 4 shows that in the simplified one-round version of the game, a good player should first be able to master the probabilities in the game sufficiently well in order to be able to translate his pocket cards and the community cards to an accurate rank of his cards among the available possibilities. He should then be able to use this information to estimate the probability of winning. We have seen that the strategy of a wining player should be adjusted to that of the other players, as a strategy that is winning against some player may well be losing against another. The number of players and the position at the table should also be taken into account, and bluffing is important in order not to reveal one's strategy. Therefore, a significant amount of skill is required to play well any of the simplified versions of the game discussed in Section 4. The real game, is, of course, far more complicated, and there is every reason to believe that skill plays a dominant role in the real version as well.

The Central Limit Theorem discussed in Section 5 implies that the significance of skill increases dramatically as the number of hands played grows. As usually the number of hands played is rather large, this fact implies that the end result in a long sequence of hands is determined with near certainty by the skill of the players.

The real game is far more complicated than the simplified versions analyzed here, and playing it well requires a lot of skill. A skilled player should be able to assess the strength of his hand as a function of his hole cards, the community cards, the number of players still in the game, their betting strategy and the position at the table. He should be able to assess the model of play of the other players, estimate the probability of improving his hand once the next community cards are revealed, and should be able to hide his strategy by bluffing and leaving his behavior unpredictable. It is not surprising that there is no software that plays poker as well as a good human player, although, for comparison, there are computer programs that play chess at least as well as the very best human chess players. Indeed, in many ways poker requires more human skill than chess, as an optimal strategy depends so crucially on the behavior of the opponents. The challenges of poker have been investigated in papers in Game Theory like [8], [7], [6], and in Artificial Intelligence (see, e.g., [2]), and there are still many intriguing questions concerning the analysis of optimal strategies for the game.

In almost every existing game there is an element of skill and an element of chance. As a matter of fact, the principles of Statistical Physics and Quantum Mechanics imply that some influence of chance appears in essentially every phenomenon in our life, not only in games. Despite the inherent element of chance in poker, our analysis of the simplified models suggests that the result of a soccer match, and probably even that of a tennis match, are influenced by chance more than the results in poker played over a long sequence of hands. The main reason some people may feel otherwise is psychological- one tends to associate randomness with cards or dice more than with weather, wind or bumps in a court, even when the latter have a greater effect on the end result. The fact that a significant number of players excel repeatedly in poker tournaments is a further indication that poker is mainly a game of skill.

Practice and study do help to improve in poker, and although luck may well play an essential role in a single hand, we believe that skill is the major component, by far, in deciding the results of a long sequence of hands. As the common practice is to play many hands, this strongly supports the conclusion that skill is far more dominant than luck, and that poker is predominantly a game of skill.

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Exhibit C

Poker Superstars: Skill or Luck?

Similarities between golf—thought to be a game of skill—and poker

Rachel Croson, Peter Fishman, and Devin G. Pope

"Why do you think the same five guys make it to the final table of the World Series of Poker every year? What are they, the luckiest guys in Las Vegas?"

—Mike McDermott (Matt Damon in the 1998 film "Rounders")

The popularity of poker has exploded in recent years. The premier event, the World Series of Poker Main Event, which costs $10,000 to enter, has increased from a field of six in 1971 to 839 in 2003 and 5,619 in 2005. Broadcasts of poker tournaments can frequently be found on television stations such as ESPN, Fox Sports, the Travel Channel, Bravo, and the Game Show Network. These tournaments consistently receive high television ratings.

Poker also has garnered the attention of many influential academics. It served as a key inspiration in the historical development of game theory. John Von Neumann and Oskar Morgenstern claim that their 1944 classic, *Theory of Games and Economic Behavior*, was motivated by poker. In the text, they described and solved a simplified game of poker. Other famous mathematicians/economists such as Harold Kuhn and John Nash also studied and wrote about poker.

For all its popularity and academic interest, the legality of poker playing is in question. In particular, most regulations of gambling in the United States (and other countries) include poker. In the United States, each state has the authority to decide whether it is legal to play poker for money, and the regulations vary significantly. In Indiana, poker for money is legal only at regulated casinos. In Texas, poker for money is legal only in private residences. In Utah, poker for money is not legal at all. The popularity of online poker for money has raised further questions about the right (or ability) of states to regulate this activity. At the national level, the U.S. Department of Justice recently stated that the Federal Wire Act (the Interstate Wire Act) makes online casino games illegal (in addition to sports wagering), although the U.S. Fifth Court of Appeals subsequently ruled that interpretation incorrect.

That said, there are heated arguments on both sides of the regulation debate. Those in favor of regulating argue that poker is primarily a game of luck, such as roulette or baccarat, and that it should be regulated in a manner similar to those games. Those in favor of lifting regulations argue that it is primarily a game of skill—a sport such as tennis or golf—and it should not be regulated at all. So, is professional poker a game of luck or skill?

Several 'star' poker players have repeatedly performed well in high-stakes poker tournaments. While this suggests skill differentials, it is far from conclusive. In how many poker tournaments have these stars participated in which they did not do well? Furthermore, even if poker competition among top players were random, we would expect a few players to get lucky and do well in multiple tournaments.

We use data from high-stakes poker and golf tournaments and identify the rates at which highly skilled players are likely to place highly. We use golf as a comparison group, as it is an example of a game thought to be primarily skill-based. If the data from golf and poker have many similarities, especially in terms of repeat winners, those data could suggest poker is equivalently a game of skill.

Data

In a large poker tournament, individuals pay an entry fee and receive a fixed number of chips in exchange. These chips are valuable only in the context of the tournament; they cannot be used elsewhere in the casino or exchanged for money. Players are randomly assigned to tables, typically including nine players and one professional dealer. Players remain in the tournament until they lose all their chips, at which point they are eliminated. Some tournaments include a "rebuy" option, where players can pay a second entry fee and receive more tournament chips. Others include an "add-on" option, where they can pay a small extra fee (often used to tip the dealers) and receive more tournament chips. At some point during the tournament, these options disappear. As players lose their chips, they are merged to create a roughly equal distribution of players per table.

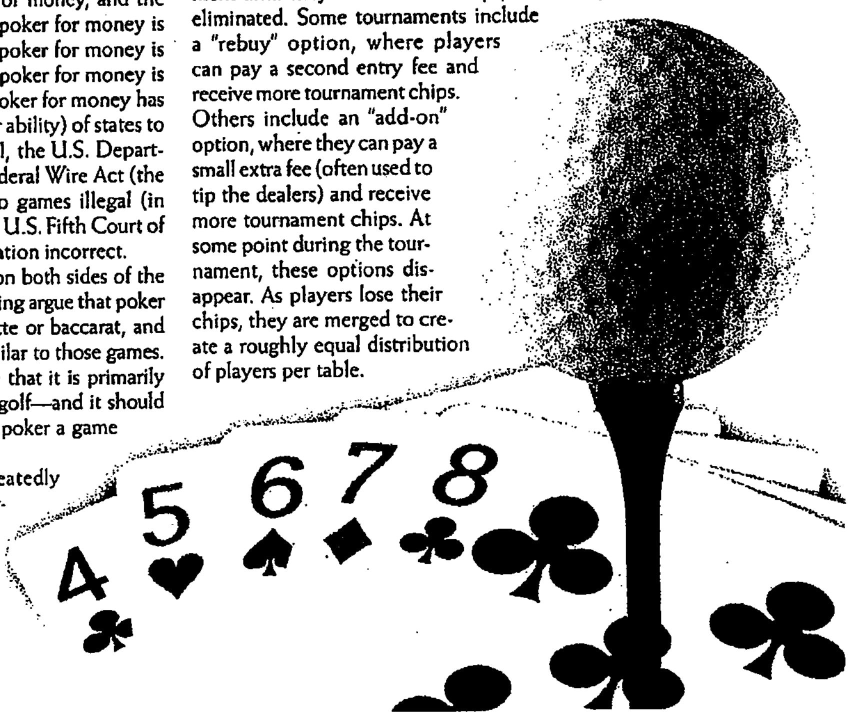

Table 1—Descriptive Statistics

	Poker	Golf
% with 1 top 18 finish	70.1	24.3
% with 2 top 18 finishes	14.7	14.7
% with 3 top 18 finishes	6.9	18.9
% with 4 or more top 18 finishes	8.3	42.2
Number of tournaments	81.0	48.0
Number of individuals	899.0	218.0

Note: Poker summary statistics represent data from all high-stakes ($3,000 or greater buy-in) limit and no-limit Texas Hold'em tournaments between 2001 and 2005 from the World Series of Poker, the World Poker Tour, or World Poker Open. The 899 players represent those who finished in the top 18 of at least one of these 81 tournaments. The golf summary statistics represent data from all Professional Golfers' Association tournaments in 2005. The 218 players represent those who finished in the top 18 of at least one of these 48 tournaments.

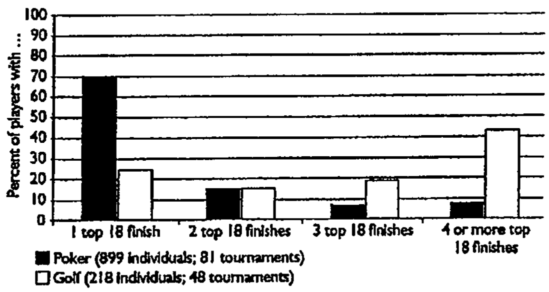

Figure 1. Descriptive statistics

Identifying skill discrepancies among top poker players is complicated by the lack of precise tournament data. The lists of entrants for large poker tournaments are not available, and outcomes are typically only recorded for players who finish in the final two or three tables. Thus, it is not possible to know the total number of tournaments for which a given player has participated. In our data, we have 899 poker players who finish in the top 18 of a high-stakes tournament at least once. The average tournament has between 100 and 150 entrants. Thus, a given person has an 11%–17% chance of entering a given tournament. Due to the lack of data on tournament attendance, it is impossible to know if players who frequently show up at final tables are more skilled than other players, or if they simply play in more tournaments.

To circumvent this selection issue, we employ a strategy that focuses on individuals who finished in the top 18 in high-stakes tournaments (the two final tables). As data are typically available for all players who finish in the top 18 of a given tournament, we can overcome the selection issue by focusing on just these individuals. Thus, while we are unable to identify the number of tournaments an individual has played in, we are able to identify the number of times a player has played in a tournament of 18 players. We can analyze whether certain players consistently outperform other players conditional on being in the top 18, or whether the outcomes appear to be random.

We use data from limit or no-limit Texas Hold'em tournaments that are part of the World Series of Poker, World Poker Tour, or World Poker Open. Texas Hold'em is a variant of poker in which all players are given two personal cards and there are five community cards that apply to all players' hands. The goal is to make the best five-card hand from the two personal cards and the five community cards. Betting occurs after each player receives his or her cards, again after three of the five community cards are revealed, again after the fourth community card, and finally after the fifth community card. In limit Texas Hold'em, the bet amounts each round are fixed, whereas, in no-limit Texas Hold'em, a player can wager as many chips as he or she wants above a set minimum wager.

Using information gleaned from *pokerpages.com*, we record outcomes for the top 18 finishers of tournaments since 2001 that had at least a $3,000 buy-in. For a small number of tournaments after 2001 (and for all tournaments prior to 2001), the top 18 finishers were not recorded or not available and, thus, were not included in the analysis. A total of 81 separate poker tournaments fit these criteria. Table 1 presents summary statistics for the poker players in these tournaments.

We similarly collect data for all 48 Professional Golfers' Association (PGA) tournaments in 2005. We record the name and final rank of each player who finished in the top 18 in each tournament. In golf, there are often ties. We record an average rank for these situations (i.e., if two players tie for third place, each player is given a rank of 3.5). Table 1 provides summary statistics for the golf players in these tournaments.

Empirically, we are interested in using information about past performance to predict the outcome of individuals in a given tournament, conditional on them being among the final 18 contestants. Our main outcome variable will be the individual's rank in this tournament of 18 (1 through 18), with lower ranks being better. If we are able to predict an individual's rank in this tournament of 18 based on their past performance, this implies that outcomes are not random. We also will compare our predictive ability between golf and poker (see Figure 1).

Methods

We fit the data using ordinary least squares regression. Thus, given standard notation, the coefficients ($\hat{\beta}$) are estimated such that $\hat{\beta}=(X'X)^{-1}X'y$. The variance of this estimator is $(X'X)^{-1}X'\sum X(X'X)^{-1}$, where $\sum=E\,[(y-Ey)(y-Ey)']$. Typical OLS estimation assumes homoscedasticity and the independence of error terms across observations. These assumptions imply that $\sum=\sigma^2 I$, thus the variance of the OLS estimator can be represented as $(X'X)^{-1}\sigma^2$.

One might worry that one or more of these assumptions will fail in our case. For example, in many cases, we have observations for the same player across different tournaments in our data set. Thus, the error terms on these observations may not be independent. While we present typical OLS coefficient estimates, we adjust the standard errors in our model to account for the possibility of heteroskedasticity and that the error terms on observations from the same player may not be independent of each other. In other words, the standard errors we present are "robust" and "clustered" at the player level. Mathematically, this implies that, instead of assuming $\sum=\sigma^2 I$, we allow $\sum$ to have off-diagonal terms that are not zero and to have diagonal terms that are different from each other. These terms are simply represented by the appropriate products of the residuals $((y-Ey)(y-Ey)')$ when calculating the standard errors on our OLS coefficients. The classic 2002 econometric text by Jeffrey Wooldridge supplies an even more detailed description of this process.

Table 2—OLS Regressions with Robust Standard Errors: Rank (1st–18th)

	Poker			Golf		
	(1)	(2)	(3)	(4)	(5)	(6)
Experience	-0.781 [.278]*			-1.420 [.382]*		
Finishes		-0.225 [.098]*			-0.222 [.089]*	
Previous Rank			0.203 [.050]*			0.033 [.056]
Constant	9.810 [.173]*	9.707 [.166]*	7.189 [.490]*	10.270 [.331]*	9.743 [.253]*	8.566 [.595]*
R-Squared	0.5%	0.9%	2.8%	1.6%	1.2%	0.1%
Observations	1494	1494	595	811	811	586

Note: Columns (1)–(6) present coefficients and robust standard errors clustered at the player level from regressions with finishing rank (1st–18th) as the dependent variable. Experience is an indicator that equals one if the player had previously finished in the top 18 of a tournament in our sample (0 or 1). Finishes is the number of times the individual has previously appeared in the top 18 of a tournament in our sample (ranges 0 to10 for poker and 0 to 14 for golf). Previous Rank indicates the average rank for all previous tournaments in which the player finished in the top 18 in our sample (ranges from 1 to 18).

* significant at 5%

Our baseline econometric specification is $Rank_i = \alpha + \beta X_i + \varepsilon_i$ where $Rank_i$ is the rank at the end of a tournament for player i and X_i is a measure of previous tournament performance for player i. We will examine three measures of previous tournament performance to see how well they explain current rank. Our first measure is called "experience," and it records whether a player has previously finished in the top 18 of another tournament prior to the one whose rank we are predicting (thus, it takes the value of either 0 or 1). Our second measure is called "finishes," and it records the number of times a player has previously finished in the top 18 of another tournament prior to the one whose rank we are predicting (this variable ranges 0 to 10 for poker and 0 to 14 for golf). Our third measure is called "previous rank," and it records the average rank of a player in all previous tournaments in which the player finished in the top 18.

To assess the sensitivity of results to the chosen model, the analysis is repeated using an ordered probit model, a regression format designed to handle situations where the dependent variable has several discrete categories ordered in some way (such as rank). In comparison with least squares, the ordered probit is more robust, but also more computationally intensive. Results from the ordered probit are the same as those we find using OLS. We present OLS coefficients in this paper for purposes of clarity and ease of interpretation. (Results from the ordered probit are available from the authors.)

We will conduct two types of statistical tests. The first focuses on only the poker data. If there are no skill differentials among poker players, we would expect the coefficient on experience, finishes, and previous rank to be statistically insignificant. This would indicate that, conditional on making it to the final 18, one's final rank is not influenced by previous tournament performance. However, if some players are more skilled than others, we would expect to find statistically significant and negative coefficients for experience and finishes in the above specifications (past experience and success should be associated with a reduction in rank [e.g., from 7th place to 6th place]) and a positive coefficient for previous rank (a higher rank in previous tournaments of 18 should be associated with a higher rank in this one).

A second test we use is a comparison of the results between golf and poker tournaments. We compare the size of the coefficients of interest. If golf has statistically larger coefficients than poker (in absolute value), then there is more skill in golf than in poker. If the coefficients in golf are not statistically different than those in poker, we will conclude that poker has similar amounts of skill (and luck) as golf.

Results

Table 2 presents the results. Robust standard errors are presented in brackets below the coefficient values. Our first analysis involves simply looking at the poker data and identifying whether previous success predicted current success. Clearly it does. The coefficient on experience (whether a player has previously finished in the top 18) is significantly and negatively correlated with a player's rank in the given tournament, suggesting an increase in finishing (-.78 ranks, $p<.01$). The coefficient on finishes (the number of times a player has previously finished in the top 18) is significantly and negatively correlated with a player's rank in the given tournament, suggesting an increase in finishing as well (-.22 ranks, $p<.05$). The coefficient on previous rank (the average rank for the player in previous tournament finishes) is significantly and positively correlated with a player's rank in the given tournament (.20 ranks, $p<.01$). These results clearly suggest poker is, at least somewhat, a game of skill.

But, how much skill? A comparison with golf can illuminate this question. If we compare the estimated coefficients on the experience variable, we find that these coefficients are not statistically different from each other (t = 1.35, $p>.05$). Similarly, there are no statistically significant differences between the estimated coefficients on finishes (t = 0.10, $p>.05$). For the final measure of previous performance, previous rank, the coefficient for poker is statistically larger than the coefficient for golf (t = 2.24, $p<.05$).

Figures 2a and 2b show two of these relationships graphically. Figure 2a depicts the average rank in a given tournament as a function of finishes. Figure 2b depicts the average rank in a given tournament as a function of previous rank. Both show the average rank, as well as a linear fit of the data. These figures

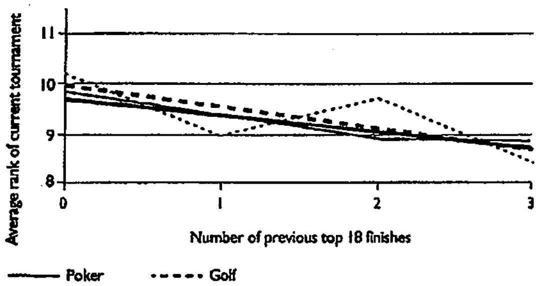

Figure 2a. Relationship between rank and number of previous top 18 finishes

Note: This figure depicts the average rank for poker and golf players who finish in the top 18 for a given poker or golf tournament. The number of previous top 18 finishes (finishes in the analyses above) is the total number of previous top 18 tournament finishes for each player in our sample (0, 1, 2, 3, or 4 or more). The straight lines indicate linear fits of the data. Note that the slope of these lines is not exactly the same as the slope from the regressions, as we have simplified the variable finishes for ease of display.

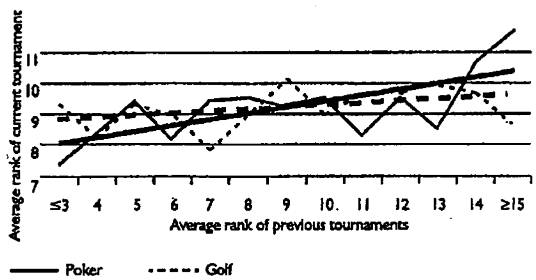

Figure 2b. Relationship between rank and average previous rank

Note: This figure depicts the average rank for poker and golf players who finish in the top 18 for a given poker or golf tournament. The average rank of previous tournaments (previous rank in the analyses above) is the average rank the individuals achieved in previous tournaments in which they made the top 18. The straight lines indicate linear fits of the data.

visually depict our regression results from Table 2: Both poker and golf show a significant negative relationship between current rank and finishes. Poker, but not golf, shows a significant positive relationship between current rank and previous rank.

That said, the R-squared values for the regressions we report for both poker and golf are extremely low (ranging from .1%–2.8%). This suggests that, in general, it is very difficult to predict the ordering of a given set of poker or golf players who finish in the top 18 of a given tournament. Although our measures of previous performance are statistically significant predictors of current performance, they still only explain a small amount of the overall variation that exists in poker and golf, as one might expect to be the case in many sports and games, especially those with explicit randomization such as poker.

Discussion and Conclusion

We present evidence of skill differentials among poker players finishing in one of the final two tables in high-stakes poker tournaments. We show two main results. First, there appears to be a significant skill component to poker: Previous finishes in tournaments predict current finishes. Second, we find the skill differences among top poker players are similar to skill differences across top golfers.

While our analysis provides evidence for skill being a factor in poker (significant regression coefficients), the current evidence needs further support from other analyses (primarily because of the small R-squared). Thus, this analysis should be considered a first attempt to answer this question, and we hope this article will stimulate further efforts.

A second limitation of the present study is that models do not specifically account for repeated observations from some players in the analyses and that results within a tournament for different players are correlated. These aspects of the data would impact standard errors in analyses, but perhaps not too strongly. First, most players appear in just a few tournaments, so they are used not many times. In poker, this is especially true. Second, few pairs of players appear in the same pairs of tournaments. Thus, the amount of information that could be learned by modeling ranks for pairs of players is quite limited. This is especially true in poker.

While we provide evidence for the impact of skill on poker outcomes, we cannot provide insight regarding the cause of this result. We do not know, for example, if poker players are skilled because they are good at calculating pot odds and probabilities, good at reading their opponents' tells (subtle physical cues that signal the strength of a player's hand), or simply better at bluffing or intimidating the rest of the table. Similarly, we cannot identify the source of skill differentials at golf. Are these due to better driving skills, better putting skills, or better strategies? Further research (with more data) is clearly needed to identify which skills are at play. However, our evidence argues that at least some portion of poker outcomes are due to skill, and we hope this will illuminate the raging regulatory debate in the United States and elsewhere. ■

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Exhibit D

NBER WORKING PAPER SERIES

THE ROLE OF SKILL VERSUS LUCK IN POKER:
EVIDENCE FROM THE WORLD SERIES OF POKER

Steven D. Levitt
Thomas J. Miles

Working Paper 17023
http://www.nber.org/papers/w17023

NATIONAL BUREAU OF ECONOMIC RESEARCH
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The Role of Skill Versus Luck in Poker: Evidence from the World Series of Poker
Steven D. Levitt and Thomas J. Miles
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May 2011
JEL No. K23,K42

ABSTRACT

In determining the legality of online poker – a multibillion dollar industry – courts have relied heavily on the issue of whether or not poker is a game of skill. Using newly available data, we analyze that question by examining the performance in the 2010 World Series of Poker of a group of poker players identified as being highly skilled prior to the start of the events. Those players identified a priori as being highly skilled achieved an average return on investment of over 30 percent, compared to a -15 percent for all other players. This large gap in returns is strong evidence in support of the idea that poker is a game of skill.

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Until recently, millions of American consumers played poker online, spending an estimated $6 billion a year on the activity, despite the obstacles to playing posed by the 2006 passage of the Unlawful Internet Gambling Enforcement Act (UIGEA). While the UIGEA does not make it illegal for individuals to play online poker for real money, it is illegal for banks and other financial institutions in the U.S. to process transactions with online gambling sites. Federal authorities recently indicted executives of the three leading online poker sites that allow Americans to play.[2] In response, these poker sites stopped accepting American players, but vowed to demonstrate the legality of online poker.

While many arguments can be made for and against UIGEA, the single most important factor in determining the legality of poker is whether poker is a game of skill or a game of luck. The UIGEA defines unlawful internet gambling as transmitting through the internet a wager that is illegal under state or federal law. Under state law, courts have evaluated the legality of a game by asking whether it is dominated by skill or luck. The federal statute's own definition of gambling or wagers (risking something of value upon a game of chance with an agreement that certain values will be given for particular outcomes of the game) is itself borrowed from state definitions of gambling. This definition makes the legality of poker under federal law also depend on a skill-versus-luck inquiry. Whether the UIGEA governs online poker therefore hinges on whether poker is a game of skill or chance.

The UIGEA remains controversial. Immediately upon its passage, calls began for the repeal of the UIGEA. In fact, a bill to legalize and regulate online poker, H.R. 2267, was passed by the House Financial Services Committee in July of 2010. With the arrival of a new Congress in 2011, the legislation was reintroduced in the committee, H.R. 1174, and it is currently awaiting action.

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[2] Matt Richtel, "U.S. Cracks down on Online Gambling," *New York Times*, April 15, 2011, at B1.

Despite the central role that the skill versus luck dichotomy has played in legal rulings with respect to poker, there is little academic research on the subject. State courts that have ruled on whether poker is a game of skill-versus-luck generally have done so in the absence of any statistical evidence, and often they have treated all types of poker games alike.[3] A highly popular poker game online is Texas Hold 'Em, and the few cases that consider its permissibility have generated sharp dissents on whether skill dominates luck in the game.[4]

A small literature has emerged that attempts to test the importance of skill in poker. Cabot and Hannum (2005) conduct computer simulations of repeated rounds of Texas Hold 'Em and seven-card stud with players following "skilled" or "unskilled" strategies. In their simulations, skilled players earned as much as 10 times that of the unskilled. Dedonno and Detterman (2008) conducted experiments in which participants played hundreds of hands of Texas Hold 'Em poker, and some participants received instruction on poker strategy while others did not. They found that participants receiving instruction outperformed the contol group. These studies reinforce a point which should be clear from introspection: there are ways to play quite poorly in poker which ensure that the individual loses money (e.g., folding every hand). Less obvious based purely on introspection is whether, among the set of individuals actually engaged in playing poker for high stakes, there is a large role for skill. Especially relevant to this question is the recent work of Croson et al. (2008) which analyzes finish positions of individual players across 81 high-stakes poker tournaments, conditional on a player "making the money" in that tournament, i.e. finishing roughly in the top ten percent of all entrants. The idea underlying the

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[3] Early state court decisions contained strong pronouncements about poker and have proven highly influential on subsequent courts. *City of Shreveport v. Bowen*, 40 So. 859 (La. 1906) ("[I]t is a matter of common knowledge concerning which there can be no doubt or dispute that draw poker is a gambling game, pure and simple"); *Ginsberg v. Centennial Turf Club*, 251 P.2d 926 (Colo. 1952) ("No one would contend that a game of poker, in which money is bet on the relative value of cards dealt by participants, constitutes a lottery, but it is most certainly gambling").

[4] *People v. Mitchell*, 444 N.E.2d 1153 (Ill.App. 1983); *Garrett v. State*, 963 So.2d 700 (Ala.Crim.App. 2007).

paper is that positive serial correlation in outcomes across tournaments is an indicator of skill. In those cases where a player makes the money, both having finished in the top 18 of a previous tournament and the number of top-18 finishes in previous tournaments are found to be significantly and negatively correlated with a player's rank among the top-18 finishers in the current tournament. Also, a player's average previous rank in the top 18 is significantly and positively correlated with their rank in the current tournament.

The greatest shortcoming of the Croson et al. (2008) analysis – unavoidable because of the data available -- is that all the analysis conditions on a player making the money in a particular tournament because information on the full set of players who enter a tournament is not available. Also absent are any data regarding the number of chips that a player has amassed at intermediate points along the way in a tournament. These data limitations introduce three potential weaknesses. First, because these tournaments generally have many entrants, any given player only rarely is one of the top eighteen finishers, leading the useable information set to be quite sparse. More than two thirds of the players they observe appear in their data exactly once, and thus provide no useful identifying variation. [5] Among the players who do appear on multiple occasions, roughly half appear exactly twice.

A second potential problem in the Croson et al. (2008) analysis is that the inference hinges on the assumption that, absent skill, the finish positions conditional on making the money would be randomly distributed across players. This assumption is likely to be violated if players follow different tournament strategies. The psychic benefits that players derive from just "making the money" are likely to differ substantially. For instance, amateur players who enter only a few tournaments are likely to value the bragging rights of lasting long enough to make the

[5] Because their measure of skill is the correlation in outcomes across tournaments, at least two observations per player are required.

money more than top professionals, who recognize that the highly convex distribution of payouts mean that winning an occasional tournament is far more important to long term profits than a steady diet of finishes in the lower half of the top eighteen. Players who are focused on winning are likely to pursue a riskier strategy that, all else equal, leads them to be eliminated earlier in the tournament in return for having a greater number of chips down the stretch on those occasions when they survive to the end. Because the Croson et al. (2008) analysis is done conditional on finishing in the top eighteen, holding skill constant, players following riskier strategies will appear to perform better even if their strategy has the same unconditional expected value, leading to a spurious upward bias in their estimate of skill.

Finally, since the Croson et al. (2008) data do not include information on who enters tournaments, they are unable to estimate the return on investment (ROI) across players.[6] ROIs provide a more direct and intuitive metric for quantifying skill than correlations.

In this paper, we take advantage of newly available information from the 2010 World Series of Poker (WSOP) to improve on the methodology of Croson et al. (2008).[7] For the first time, complete lists of all players who entered each of the 57 tournaments that comprise the WSOP were made available in 2010. As a consequence, we are able to compute ROIs for individual players, allowing us to measure poker skill more directly than in previous research. We identify sets of players who, based on information available prior to the start of the 2010 WSOP, could reasonably be classified as being especially skilled (e.g. players who were top money winners in the 2009 WSOP, or those who appear in one of the published lists of the most highly ranked poker players). We then compare the ROIs achieved by these selected players

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[6] Players pay an entrance fee to participate in these tournaments. The venue that runs the event keeps a small portion of the entrance fees; with the remainder returned as prize money. Typically, no outside money is added to the prize pool, meaning that on average players earn a negative ROI due to the venue keeping some of the entry fee.
[7] Neither these specific data nor anything comparable were available at the time that Croson et al. (2008) was published.

relative to other players. The greater the difference in ROI's across the two groups, the greater the implied skill differential. To the extent that our classification of poker players into "skilled" versus "unskilled" is inevitably quite noisy, our estimates represent a lower bound on the true amount of skill that is present.

Our empirical findings suggest a substantial role for skill in poker over the time horizon examined. The 720 players identified *a priori* as being high-skilled generate an average ROI of 30.5 percent in the 2010 WSOP, reaping an average profit of over $1,200 per player per event.[8] In contrast, all other players obtain an average ROI of -15.6 percent, implying a per event loss of over $400. The observed differences in ROIs are highly statistically significant and far larger in magnitude than those observed in financial markets where fees charged by the money managers viewed as being most talented can run as high as three percent of assets under management and thirty percent of annual returns.

The remainder of the paper is structured as follows. Section II provides background on the World Series of Poker and the data set used in the analysis. Section III presents the empirical findings. Section IV concludes.

Section II: Background and Data

Each summer, a series of poker tournaments known as the World Series of Poker are held in Las Vegas. In 2010, the WSOP included nearly 57 separate tournaments, more than 32,000 participants, and more than $185 million in prize money. The WSOP culminates with a final tournament known as the "Main Event;" the winner of this event earns nearly $9 million.

The poker tournaments that make up the WSOP share a basic structure. Players wishing to participate in a tournament pay an entry fee ranging between $1,000 and $50,000. Almost all

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[8] Events last an average of three days, but the majority of players are eliminated within the first day, so the typical entrant spends slightly less than one day playing poker per event.

WSOP events are open to any player who pays the entry fee. In return for the entry fee, each player is given a pre-determined number of chips and randomly assigned to a poker table. A player remains in the tournament until all of his chips are lost, at which time the player is eliminated. Play proceeds until one player collects all of the chips, with all other competitors having been eliminated. That player is the winner. The other players' ranks are based on the length of time that a player survives before losing all chips. The last player to lose all his/her chips finishes second; the first player to run out of chips is the last-place finisher. Most of the WSOP events take two or three days (with pre-specified breaks) to complete, although the Main Event, which allots more chips to each player and attracts larger numbers of players, takes two weeks.

Entry fees paid by competitors fund the prize pool, with some proportion of the fees (on average 7.5 percent) going to the venue in which the WSOP is held. The payoff structure in WSOP events is highly convex, as demonstrated in Figure 1 which presents the distribution of earnings for a typical tournament. The vertical axis shows a player's net payoff (winnings minus entry fee). The horizontal axis represents the player's order of finish, with the winning player on the far right of the graph. Figure 1A presents the distribution for all players in the typical tournament, and Figure 1B presents the distribution for just players between the top 75 and 500 finishers. Roughly 90 percent of the players in any given tournament receive no prize money, and thus suffer a net loss equal to their entry fee. Those who are paid are said to be "in the money." There is a discontinuity in payoffs between those who just make the money and those who are eliminated "on the bubble." Those who just make the money receive roughly 2 times their initial entry fee in prize money, while those knocked out earlier receive nothing. The value of prizes then increases relatively slowly until the very top spots are reached, after which prizes accelerate sharply. For instance, in the event pictured, which is typical of other events, the player who finished in 200th place received roughly $2,700, the 100th place finisher received $3,000, and the winner took home $571,000. The combination of a discontinuity in payoffs upon "making the money" and convexity in payoffs thereafter has an important influence on strategy. As the number of players remaining approaches the number of players who will receive prize money, those competitors with relatively few chips may find it optimal to play very cautiously, sacrificing expected value in order to survive long enough to make the money.[9] This provides the players with deep stacks of chips an opportunity to play especially aggressively, leading to a very wide spread of chips at the time when the field shrinks to the point where positive payoffs begin.

The WSOP attracts a large number of participants. Figure 2 presents the distribution of the number of events played by individuals. In total, over 32,000 people competed in at least one WSOP event in 2010. Approximately two-thirds of these players entered exactly one event. The 10 percent of players who play the most events comprise 45 percent of all entries into the WSOP. Playing in a large number of events entails a substantial financial investment: one individual spent more than $260,000 on entry fees in the 2010 WSOP.[10]

We make use of six data sources to serve as a proxy for which poker players are most skilled. Three of these rankings are drawn from published lists of top players in 2009, one compiled by *BLUFF* magazine, a second by the website PokerPages.com, and the last by *Card Player* Magazine. Of the 250 highest ranked players on each of these lists, more than 200

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[9] This tendency is exacerbated by the fact that the number of times a player makes the money is tracked as a statistic and is readily available online. Making the money may also have other psychic benefits – poker players loath being the player knocked out "on the bubble," which involves playing 20 or more hours of poker over two days with nothing to show for it. The data presented below suggest this tendency is much more pronounced among the less skilled poker players.

[10] That player earned $437,000 in prize money. The biggest loser in the 2010 WSOP paid in $252,000 in entry fees, but earned only $24,000 in prize money.

competed in at least one 2010 WSOP event and thus were included in our sample. Our fourth proxy drew names from the Player of the Year rankings in the eighth season of the World Poker Tour, a series of televised international poker tournaments. Only 110 players from this ranking system had "Player of the Year Points" greater than 0, and of these 86 competed in at least one 2010 WSOP event. Our final two proxies for poker skill are based on performance in previous years' WSOPs. As one measure of past performance, we included as "high skill" anyone who had won a WSOP event prior to 2010. Such players are known as "bracelet winners" because the victor in each event receives a bracelet as well as a cash prize. There were a total of 556 past winners, 311 of whom participated in at least one WSOP in 2010 and thus are included in our data. The last measure of skill is being among the top 250 money winners in the 2009 WSOP.[11] Table 1 presents the correlation matrix across our six proxies for poker skill. There is positive correlation across all of the proxies, as would be expected, with the greatest overlap *(ρ>.50)* observed for the three published measures of the current top 250 players.

Section III: Results

Table 2 presents the basic findings for the data used in the analysis. The first column shows data for all competitors. Columns 2 and 3 divide the sample into two mutually exclusive groups: those who do not qualify as "high skill" by any of our proxies, and those who do qualify. The remaining six columns report summary statistics for the six individual high skill proxies. These last six columns are not mutually exclusive because there is overlap across the proxies. A total of 32,496 players appear in the data, 720 of whom are classified as "high skill" according to at least one of our proxies. Although only about two percent of the entrants are in the high skill

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[11] The 250th money winner in 2009 won $118,000 in prize money. Average prize money across this group in 2009 was $426,000.

category, because these players enter six times as many tournaments on average as other players, the high skill players represent 12.1 percent of all the tournament entries.

The results with respect to poker skill are presented in the bottom seven rows of Table 2. Rows 4 and 5 present measures of the frequency with which these players make the money and make the final table respectively, compared to what would be predicted if there was no skill in poker. The results are normalized so that a value of 1.00 represents the average in the data. Consequently, by definition, in column 1 for the sample as a whole the value shown is 1.00.[12] Players classified as high skill are 12 percent more likely to make the money than the average player, and 19 percent more likely to make the final table.

The next four rows show dollars spent on buy-ins and dollars received in prize money. High skill players invest nearly ten times as much on average in buy-ins (both because they enter more events and because on average the events they enter have higher buy-ins), but they are paid out fourteen times as much as other players. Totaled across all players in a category, the low skill players lose almost $26 million dollars (for a return on investment of -15.6 percent). In contrast, the high skill players net a profit of nearly $11 million (for a return on investment of 30.5 percent). This difference in return on investments is evidence of skill in poker, since a set of pre-determined proxies for skill prove to be correlated with future returns. Five of the six proxies for skill are associated with a positive ROI, with the Bluff Top 250 list yielding the highest return on investment – more than 36 percent.[13]

The results in Table 2 are heavily influenced by one of the 57 tournaments that make up the WSOP; that tournament is known as the "Main Event." The Main Event has a high buy-in

[12] We report this normalization, rather than the raw likelihoods of making the money or the final table because high-skill and low-skill players play in tournaments with different average field sizes. Because the number of players at the final table is fixed, a lower share of entrants make the final table in larger tournaments.

and a large number of competitors, so that fully 36 percent of the money invested by players across all the tournaments goes towards that one event. Results excluding the Main Event are shown in Table 3. High skill players continue to outperform other players when the Main Event is excluded, but the gaps are smaller: 9.8 percent ROIs for high skill players versus –13.8 percent ROIs for other players.

The returns on investment reported above can be translated into dollar returns per tournament. The high skill players earn an average return of over $1,200 per tournament in profit ($350 excluding the Main Event) versus a loss of over $400 per tournament ($235 without the main event) for other players. The amount of time it takes to play an event is a function of how long the player survives before being eliminated. On average, an entrant would expect to survive about one day’s worth of play, implying substantial wages for the skilled players.

Section IV: Conclusion

This paper attempts to shed light on the extent to which pre-existing metrics of poker skill are useful in predicting tournament outcomes. Our results suggest that players who are *a priori* identified as “high skill” do indeed substantially outperform other competitors. This predictability in returns is evidence for a substantial role of skill in poker.

It is not immediately obvious how one measures the importance of skill versus luck in poker relative to other activities. One approach that problem is to estimate the probability that a randomly drawn high skill poker player will outperform a randomly drawn low-skilled poker player over the course of a tournament. An important limitation of our data in this regard is that we do not observe the complete order of finish, but rather, only the order of finish for those who make the money. Because of this limitation, we can make pairwise comparisons between two players in a tournament only when at least one makes the money. Subject to that constraint, an exhaustive pairwise comparison of high skilled and low skilled players entered in each tournament in the WSOP finds that the high skilled player wins 54.9 percent of the match ups. For purposes of comparison, we calculated the regular season win rates for professional sports teams that made the playoffs *in the previous season* – making the playoffs last year is akin to being a highly skilled player entering the WSOP. Since the year 2007, teams that made the playoffs the previous season win 55.7 percent of their games in Major League Baseball against teams that failed to make the playoffs in the previous year. Thus, in some crude sense, the predictability of outcomes for pairs of players in a poker tournament is similar to that between teams in Major League Baseball. To the extent that baseball would unquestionably be judged a game of skill, the same conclusion might reasonably be applied to poker in light of the data.

Asset management is another domain where skill is generally believed to be important, as evidenced by consumers paying billions of dollars annually in fees to money managers. Academic analysis, however, has generally found little evidence for skill in this domain as demonstrated by low rates of persistence in mutual fund returns (Carhart 1997, Bollen and Busse 2004) and evidence of inferior or superior performance only in the extreme tails of the mutual fund distribution (Fama and French 2010).

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Garrett v. State, 963 So.2d 700 (Ala.Crim.App. 2007).

Ginsberg v. Centennial Turf Club, 251 P.2d 926 (Colo. 1952).

People v. Mitchell, 444 N.E.2d 1153 (Ill.App. 1983).

Figure 1A: Typical Cash Structure

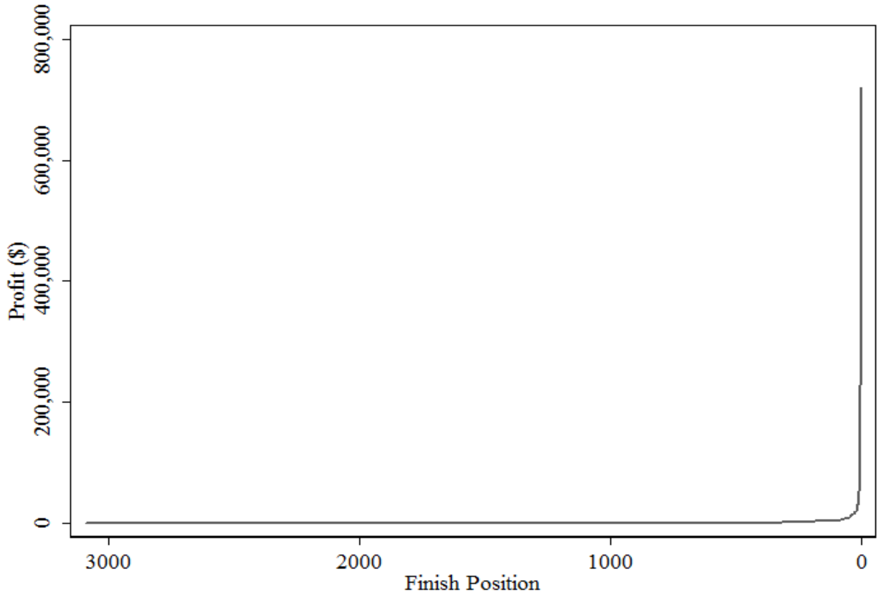
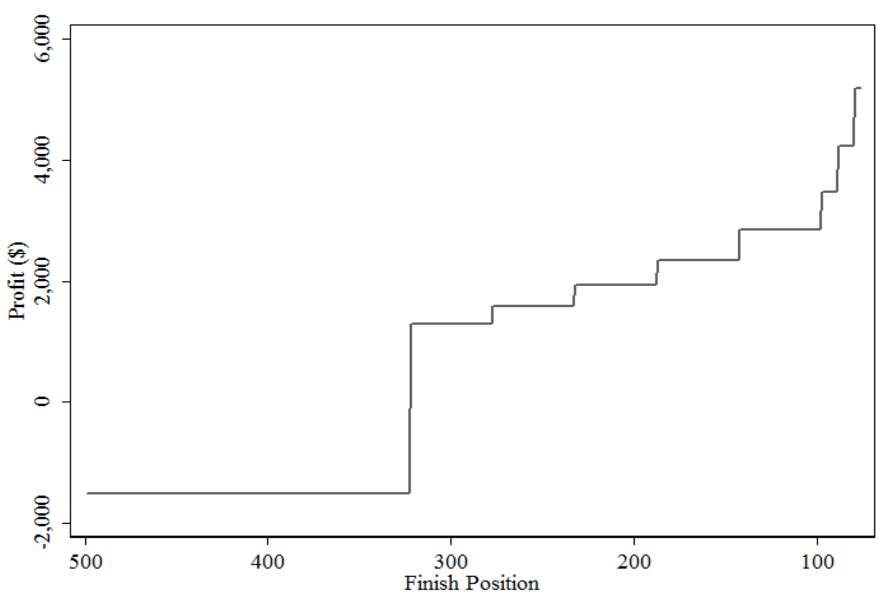
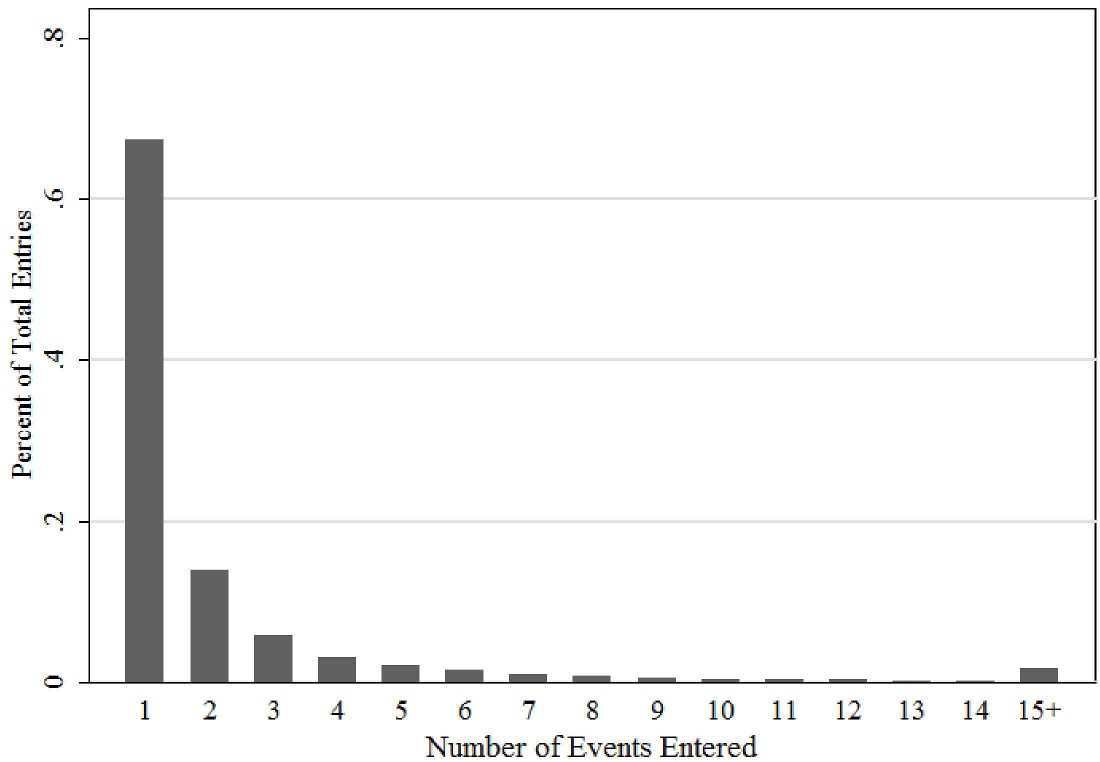


Figure 1B: Typical Cash Structure (Discontinuity)



Notes: Figure 1 presents the distribution of earnings for a typical poker tournament. The vertical axis shows a player's net payoff (winnings minus entry fee), and the horizontal axis shows the player's order of finish, with the winning player on the far right of the graph. Figure 1A presents the distribution for all players in the typical tournament, and Figure 1B presents the distribution for just players between the top 75 and 500 finishers.

Figure 2: Number of Events Entered Per Player



Notes: Figure 2 presents the distribution of events played by the 32,496 individual participants in the tournaments of the 2010 World Series of Poker.

Table 1: Correlation Matrix for "High Skill" Proxies

	BLUFF Top 250	Pro Rank	Card Player Top 250	World Poker Tour	WSOP 2009 Top Money Winners	Past Winners
BLUFF Top 250	1					
Pro Rank	0.643	1				
Card Player Top 250	0.646	0.566	1			
World Poker Tour	0.221	0.178	0.228	1		
WSOP 2009 Top Money Winners	0.380	0.327	0.405	0.081	1	
Past Winners	0.267	0.223	0.221	0.118	0.255	1

Notes: Table 1 presents the correlation matrix across six proxies for poker skill for players who participated in the 2010 World Series of Poker. The first three proxies were drawn from published lists of top players in 2009: a ranking was compiled by BLUFF magazine, another by the website PokerPages.com, and a third by Card Player Magazine. The fourth proxy is a Player of the Year ranking in the eighth season of the World Poker Tour, a series of televised international poker tournaments. The fifth proxy is the top 250 money winners in the 2009 World Series of Poker, and the last is so-called “bracelet winners” who are players who have won the World Series of Poker before 2010.

Table 2: Summary Statistics and Results

	All Players	Not "High Skill" Players	"High Skill" Players	"High Skill" Proxy: BLUFF	Pro Rank	Card Player	World Poker Tour	WSOP 2009	Past Bracelet Winners
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of Players	32496	31776	720	236	220	209	86	232	311
Tournament Entries	72951	64101	8850	4,096	3,571	3,239	1,188	3,224	3,621
	100%	87.87%	12.13%	5.61%	4.90%	4.44%	1.63%	4.42%	4.96%
Average Number of Tournaments Entered Per Player	2.24	2.02	12.29	17.36	16.23	15.50	13.81	13.90	11.64
	(3.27)	(2.59)	(9.18)	(9.44)	(9.74)	(9.87)	(9.26)	(9.62)	(9.68)
Make The Money Ratio	1.00	0.98	1.12	1.11	1.14	1.09	1.09	1.12	1.07
Final Table Ratio	1.00	0.94	1.19	1.19	1.24	1.07	1.04	1.28	1.03
Average Dollars Spent on Buy-Ins Per Player	$ 6,220	$ 5,239	$ 49,481	$ 73,892	$ 71,330	$ 63,600	$ 61,419	$ 60,817	$ 53,370
	$ (13,310)	$ (9,043)	$ (49,754)	$ (57,008)	$ (57,045)	$ (54,971)	$ (54,736)	$ (56,000)	$ (57,324)
Average Dollars Received in Prizes Per Player	$ 5,755	$ 4,422	$ 64,563	$ 100,798	$ 91,983	$ 69,168	$ 72,953	$ 65,710	$ 45,750
	$ (78,645)	$ (66,153)	$ (287,388)	$ (397,301)	$ (311,055)	$ (172,189)	$ (167,514)	$ (146,278)	$ (118,520)
Total Amount Spent on Buy-ins	$ 202,111,504	$ 166,484,992	$ 35,626,500	$ 17,454,000	$ 15,692,500	$ 13,292,500	$ 5,282,000	$ 14,109,500	$ 16,598,000
Total Amount Received in Prize Money	$ 187,004,480	$ 140,519,152	$ 46,485,332	$ 23,788,336	$ 20,236,158	$ 14,456,120	$ 6,273,967	$ 15,244,620	$ 14,228,302
Return On Investment	-7.5%	-15.6%	30.5%	36.3%	29.0%	8.8%	18.8%	8.0%	-14.3%

Notes : Table 2 presents measures of the performance of “skilled” and “unskilled” players in all tournaments of the 2010 World Series of Poker. The first column shows data for all competitors. Columns 2 and 3 divide the sample into two mutually exclusive groups: those who do not qualify as “high skill” by any of our proxies, and those who do qualify. The remaining six columns report summary statistics for the six individual high skill proxies. These last six columns are not mutually exclusive because there is overlap across the proxies. For average dollars spent on buy-ins per player and average dollars received in prizes per player, standard deviations are given in parentheses.

Table 3: Summary Statistics and Results Excluding the Main Event

	All Players	Not "High Skill" Players	"High Skill" Players	"High Skill" Proxy					
				BLUFF	Pro Rank	Card Player	World Poker Tour	WSOP 2009	Past Bracelet Winners
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of Players	29198	28507	691	231	216	203	82	223	298
Tournament Entries	65636	57351	8285	3,876	3,377	3,053	1,112	3,028	3,395
	100%	87.38%	12.62%	5.91%	5.15%	4.65%	1.69%	4.61%	5.17%
Per Player	2.25	2.01	11.99	16.78	15.63	15.04	13.56	13.58	11.39
	(3.23)	(2.54)	(8.87)	(9.15)	(9.47)	(9.57)	(8.90)	(9.29)	(9.36)
Make The Money Ratio	1.00	0.99	1.10	1.08	1.10	1.05	1.08	1.11	1.05
Final Table Ratio	1.00	0.94	1.18	1.18	1.22	1.08	1.04	1.29	1.04
Average Dollars Spent on Buy-Ins Per Player	$ 4,416	$ 3,472	$ 43,367	$ 65,968	$ 63,669	$ 56,318	$ 55,024	$ 54,482	$ 48,114
	$ (12,148)	$ (7,528)	$ (48,439)	$ (56,160)	$ (56,014)	$ (53,966)	$ (53,728)	$ (54,918)	$ (55,556)
Average Dollars Received in Prizes Per Player	$ 4,049	$ 2,994	$ 47,598	$ 68,095	$ 72,686	$ 62,038	$ 61,871	$ 57,999	$ 40,294
	$ (34,190)	$ (25,566)	$ (143,235)	$ (163,642)	$ (192,395)	$ (169,242)	$ (161,498)	$ (135,097)	$ (112,480)
Total Amount Spent on Buy-ins	$ 128,941,504	$ 98,975,000	$ 29,966,500	$ 15,238,500	$ 13,752,500	$ 11,432,500	$ 4,512,000	$ 12,149,500	$ 14,338,000
Total Amount Received in Prize Money	$ 118,237,080	$ 85,347,128	$ 32,889,956	$ 15,729,882	$ 15,700,250	$ 12,593,755	$ 5,073,435	$ 12,933,687	$ 12,007,497
Return On Investment	-8.3%	-13.8%	9.8%	3.2%	14.2%	10.2%	12.4%	6.5%	-16.3%

Notes : Table 3 is identical to Table 2, except it excludes the Main Event of the 2010 World Series of Poker. The first column shows data for all competitors. Columns 2 and 3 divide the sample into two mutually exclusive groups: those who do not qualify as “high skill” by any of our proxies, and those who do qualify. The remaining six columns report summary statistics for the six individual high skill proxies. These last six columns are not mutually exclusive because there is overlap across the proxies. For average dollars spent on buy-ins per player and average dollars received in prizes per player, standard deviations are given in parentheses.

Exhibit E

STATE OF SOUTH CAROLINA MT. PLEASANT MUNICIPAL COURT

COUNTY OF CHARLESTON

	)	Case No.: 98045DB
	)	Case No.: 98035DB
	)	Case No.: 98040DB
TOWN OF MOUNT PLEASANT,	)	Case No.: 98050DB
	)	Case No.: 98043DB
vs.	)	FINDING OF FACTS AND ORDER

ROBERT L. CHIMENTO

JEREMY BRISTEL

MICHAEL WILLIAMSON

SCOTT RICHARDS

JOHN T. WILLIS

This matter came to be tried on February 13, 2009 in the Town of Mt. Pleasant. It is admitted and is not contested that these defendants on April 12, 2006 were playing cards – namely Texas Hold-em in the home of Nathaniel Stallings in the Town of Mt. Pleasant. It is also uncontroverted that chips, money and cards were in front of each defendant – all of whom were seated at one of the two tables used for such purpose in the home.

The State offered testimony that the participants in this card game were advised of its location and availability over the Internet from a portion of a website called "Charleston Poker Meetups.com."

The Defendants do not challenge any of those facts. Instead they challenge whether or not Texas Hold-em is a game of skill and therefore beyond or outside the scope of the Statute 16-19-40. They offered uncontroverted testimony from Michael Sexton, a professional poker player from Las Vegas, Nevada, who has been a full-time poker player since 1977 that Texas Hold-em is a game of skill. It is a game where the average player can become a better and better player. The player can do so from books, articles, experience and/or tutoring. It is a skill that can and is developed. In his testimony he set forth many of the skills required – most important skill is betting - whether to fold, raise or call. He talked about math knowledge, the art of bluffing, the ability to change gears in your manner of play, patience and discipline, self control and continuing to study and to learn. He was an expert paid to testify by the National Poker Players Alliance.

Then Professor Robert Hannun, Ph.D. testified. He has taught Statistics and Probability for thirty (30) years. He has written books and papers on gaming including poker. In his uncontroverted opinion Texas Hold-em is a game of skill. Skill is the predominant factor in winning or losing in the game of poker. He has a study of this that has been used in a Law Review. In cross examination he differentiated between the games of skill and games of chance – listing roulette, slots, blackjack as all having house advantages and therefore not predominated by skill.

In 103 million poker hands studied in Texas Hold-em:

Seventy-six percent are resolved before it gets to a show down

Twelve percent of the remaining hands will not get to showdown, but will be won by the lesser hand, and

Twelve percent of the time the best hand will win. This shows from that study that 88% of the outcome of hands are determined by skill.

He further testified that the consensus of the scientific community does agree that skill is the predominant factor in Texas Hold-em. He, too, was paid as an expert by the National Poker Players Alliance. He stated that in two cases, namely Wisconsin and Connecticut, has testified on behalf of the State, in two other states, Colorado and here in South Carolina, he has testified for the Defense.

The Defense further cited the fact that in the dissenting opinion in Johnson v Collins Entertainment Co., Inc. 333SC96, 508 S.E. 2d 575(1998) – Justice Burnett and Chief Justice Toal indicated that the "dominant factor" is the appropriate test in South Carolina – to determine whether a particular activity is a game of skill or not. The other justices in the majority in that case gave no indication of their opinion in that regard.

There are no clear guidelines given to this Court to follow. Each challenge to a particular gaming problem has been decided without the Supreme Court or the Legislature explicitly and precisely defining gaming or gambling house – key factors of determination in this case.

This Court, based on the above stated facts, finds that Texas Hold-em is a game of skill. The evidence and studies are overwhelming that this is so. On January 14, 2009, the State of Pennsylvania in a fact situation very similar to this one determined that Texas Hold-em poker is not unlawful gambling as defined by their gaming statutes because it is a game of skill, (Commonwealth of Pennsylvania vs Dent Case No. 733 of 2008). That Court said there are three elements of gambling: consideration, chance and reward. The determination hinged on whether or not Texas Hold-em was a game of chance or one where skill predominates. If the later is true, then it is not gambling. The Court there accepted the "Dominant Factor" test. Studies by 35 Hofstra Law Review in Spring 2007 issue also opined that it is a game of skill. Therefore the Courts should look no further. The Honorable Thomas A. Jones, Jr. dismissed the gambling charges on January 14, 2009.

In the briefs filed with this Court, it is evident that the Courts in California, Missouri and Nebraska also accept the Predominate Factor test. If this Court knew that this State follows that test in this factual circumstance the decision would be simple. But it is not.

Here we have Nathaniel Stallings, who advertised on the Internet, who took twenty dollar ($20) buy-ins, who took a rake out of the pot to cover food and drink provided. In addition to all of that, he appeared in the Court of General Sessions for the Ninth Judicial Circuit in Charleston and pled guilty on January 5, 2007, to Operating a Gaming House. He paid $747.50 to the Court.

In addition, Code Ann. Section 16-19-40 reads as follows: "If any person shall play … in any house used as a place of gaming….at any games with cards or dice…upon being convicted thereof, before any magistrate ….

There is no definition by the Legislature as to what will or will not constitute a house as a place of gaming.

It is and appears to have been the public policy of the State of South Carolina to suppress gambling and that gambling in all forms is illegal in south Carolina. (Holiday v Governor of the State of South Carolina etal 78 F Supp 918 (1914). Further the Attorney General in opinion No. 04-18 dated January 22, 2004 indicates the Legislature prohibits playing of "any game with cards or dice".

In light of all of the matters set forth above, this Court will not set itself to definitively conclude that this State will or does follow the "Dominant Test" Theory and thus is compelled, since it has no clear guideline from the Legislature or from the majority of this Supreme Court to find the defendants guilty of violating Code Section 16-19-40, and therefore are required to pay the fines and assessments required by such a violation.

AND IT IS SO ORDERED

J. Lawrence Duffy, Jr.
Municipal Judge, Town of Mt. Pleasant

February 19, 2009

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