theoretical discussion paper

[Editor's note: This correspondent conveniently placed his views after the text on which he wished to comment. We have edited his response for easier reading: (1) by adding "Comment:" and indenting his response, and (2) by deleting the portions on which he did not comment.]

Comments on "Between consumption and investment..."

In typical casinos, cash wagers are not permitted. Players may only play with chips, so they must buy in, i.e., exchange cash for chips. Money may be exchanged for chips at a cashier's desk or directly at the table. The total amount of money exchanged for chips is called the *drop* in casino terminology.

> **Comment**: Drop may or may not be gambled, or risked against the casino. Drop is not, therefore, equivalent to the amount gambled. The amount gambled is called the "handle." In casino table games the handle is typically a much larger number than the drop and may be derived from the expression
>
> Handle = win/(expected value or house advantage).
>
> For example, in double-zero roulette, the house advantage is 5.26%. A $100 win therefore implies a handle, or amount wagered, of 100/0.0526 = $1,901. There is no necessary arithmetic relation between drop, handle, and win, since the percentage of drop that is actually gambled is unknown. Win or gross gaming revenue is equivalent to sales in the income statement of, say, "General Widget": it represents the operator's gross revenue from gaming, from which are deducted taxes, including gaming privilege tax; operating costs; interest expense; depreciation; amortization; and other charges against income. The residue, if any, is profit. From the consumer's point of view, win or gross gaming revenue, not drop or handle, is consumption (consumer spending on gaming).

Depending on the game, a typical monthly hold falls between 15% and 25%. Since the *house edge* (i.e., statistical advantage) of casino games is much smaller, this value of the hold indicates that the total amount of cash wagered must be several times the total amount of money exchanged for chips. For example, the house advantage in single-zero roulette is about 2.7%; if the roulette hold is equal to 20%, each $1,000 exchanged for chips generates an average turnover of about $7,400 (see Kilby & Fox, 1997, chap. 13, for a detailed discussion).

> **Comment**: This is inaccurate but an all too common error. See above. Also, in the US the usual accounting term is “handle,” not “turnover,” which is British usage.

Casino managers use the terms *drop*, *win*, and *hold* to refer to aggregated financial variables from the casino viewpoint. But we may also speak of an individual player's drop or hold. If Mr. X exchanges $500 for chips during his visit and before leaving cashes chips totaling

$350, his drop is equal to $500 and the casino hold for Mr. X's visit is equal to 30% ($150/ $500).

> **Comment**: This also is inaccurate; see above. The author is falling into a common error at the pit boss level of casino management. If a player exchanges $500 for chips and leaves the casino with $350 in cash exchanged for chips, the following has occurred: the casino revenue accounting department recorded a $500 drop and a $150 win. This player spent (lost) $150. Casinos are unconcerned with individual player wins and losses except in the important sense of qualifying the player for comps. The business mission of any casino table game operation is to ensure that the tables are tried enough times to reach statistical average or expected value. If the casino succeeds in this, it will win, over time, the expected value of each game (for example, 5.26% of the handle at roulette, which the casino does not record unless it has installed one of the new computer-controlled tables; drop is a substitute number that functions in table/cage accounting relationships to control table gaming). Whether player X wins or loses is immaterial.

The term *win* is confusing in this case, because it refers to the casino win (or the player's loss). For the purpose of further analysis, the term *player's daily hold* or PHOLD is defined as

PHOLD = 100% – hold.

> **Comment**: Player daily hold cannot be meaningfully related to casino or regulatory agency revenue accounting and hence to the numbers generally used to describe gambling industries. While I understand the measure that the author is trying to develop, it already exists, in very much more detail, in (highly proprietary) casino player databases and customer relationship management (CRM) programs. Harrah's has by far the world's most extensive and advanced database of this kind: it would of course not make these data available to outsiders and conducts analyses of this kind internally as a routine matter, but might be amenable to an approach from qualified academics for some sort of independent blind study intended to identify factors influencing gambling behavior.
>
> A possibly useful concept here is "player bankroll," meaning the wealth the player is prepared to risk against the casino. The player may or may not exchange all of his or her bankroll for chips, either because the casino allows him or her to play cash or play on credit (markers), or because he or she is not inclined to do so. Gambler's ruin occurs when the player bankroll is exhausted. The size of the bankroll makes no difference to player outcomes except in the sense that the player cannot be assured of reaching statistical average at a given game unless he or she tries the table or device enough times. This may take days or weeks at some games. As a practical matter, few players gamble long enough at a table game for the results to reach statistical value (the "odds" or expected value of the table game). Most players stop before this point is reached, with results that are above (they win) or below (they lose) statistical average. The casino, however, will see the expected value of its tables provided they are tried enough times to reach statistical average. Again, as a practical matter, in heavily trafficked casinos this will typically be true for all table games in an accounting period (say,

a month or quarter) with two exceptions: very high stakes baccarat, where the shoe of cards may not be tried enough times to reach statistical average, with consequent wide swings either for or against the casino (or players), and single-deck blackjack, a game that violates the law of independent trials sufficiently that skilled players have an advantage (that is, the game has a negative expected value). Single-deck blackjack is rarely encountered today.

Quantitative field studies of casino gambling are extremely rare.

> **Comment**: This isn't true. All casinos monitor individual player gambling for the purpose of qualifying players for comps, i.e., rating players. Rating players is the most important aspect of CRM and is at the heart of modern casino operations. Casinos have massive and detailed records of individual player activity.

The average PHOLD for this strategy is 82.8%, which translates to an average loss during the visit equal to $18.20. Ms. Y has a 47% probability of ruin before playing 120 deals. Additionally, 37% of her visits will end with a tie or a net win. Overall, for a very large sample of visits, Ms. Y's PHOLD values will have approximately a ruin-adjusted binomial distribution.

> **Comment**: These are the kinds of data maintained in casino CRM files and they cannot be related to the consumption numbers (gross gaming revenues) in corporate or regulatory agency reporting.

Now suppose that Ms. Y believes incorrectly that blackjack is a good way to earn some money...

> **Comment**: ...unless she is an expert card counter and the shoe is not larger than four decks.

The analysis procedure outlined above may be easily reversed. If we know the distribution of PHOLD, we may infer the player's motivation to gamble. The only problem is how to obtain these data. It is unlikely that survey research could provide the scientist with reliable information regarding the distribution of a player's wins and losses...

> **Comment**: Player database files report these data precisely for tens of millions of players over periods of many years.

Since Polish casinos are small, the number of frequent visitors is very limited. In addition, the whole procedure of data collection and transfer is time consuming. This study was based on observations from a 6-month period.

> **Comment**: In pre-computer days, casinos did try to collect these data through observation. For the past 25 years or so, computer monitoring of machine play has eliminated the need for this in machine operations; currently, computer table game control systems are eliminating the need for the manual collection and filing of individual player activity in table gaming.

1. Large differences in total hold

The casino hold differed significantly for frequent players, ranging from as high as 55% to as

low as a negative hold of –12%. Random noise is definitely not the only reason for this variability.

> **Comment**: As noted, the reason for this variation is that within the observation period the player didn't try the device enough times for the result to equal expected value.

The hold for many high rollers is usually lower than the hold for recreational players.

> **Comment**: The reason for this is that high rollers overwhelmingly make more intelligent choices than low rollers.

For the vast majority of players, both the hedonic (i.e., pleasurable experience) and the investment (i.e., desire to win money) dimensions of gambling are important. However, there are strong individual differences. Table 2 presents the data for four players labeled *High Roller*, *Investor*, *Social Gambler*, and *Consumer*. The labels *High Roller* and *Consumer* speak for themselves. The investor is a medium player (i.e., placing medium-sized bets) who definitely wants to win some money but also enjoys the atmosphere of the casino—so he often takes a break between his bets, walks to the bar, etc. Additionally, he usually takes certificates if he wins. The social gambler is a recreational player who is probably not very rich but likes to play and very much enjoys staying in the casino. However, he knows of his limited resources and does not play heavily. The last two statistics in Table 2 are very important and require some explanation. The average drop is conditioned on whether the visits ended with a win (PHOLD greater than or equal to 100%) or a loss (PHOLD less than 100%) or, simply speaking, the average drop for the subsample of visits ending with a gain or tie (for convenience, this will be labeled WIN_ADROP) and the average drop for the remaining visits (LOS_ADROP) are considered. In a simple consumption model that assumes single buy-in and playing for fun, the values of WIN_ADROP and LOS_ADROP should be equal, regardless of drop variability. However, a compulsive gambler who always attempts to chase losses will report LOS_ADROP substantially greater than WIN_ADROP. However, this difference may also be caused by a cautious strategy in which the gambler simply does not want to exchange all of his or her money at once. Finally, players who frequently generate false drops may report WIN_ADROP greater than LOS_ADROP.

> **Comment**: Here you touch on a fundamental distinction among gambling games: different games are associated with or stimulate different gambling behaviors. Take "heavy gambling," which, no matter how defined, is a common parameter in academic gambling studies. In a game of pure chance utilizing a random device, heavy gambling will lead to loss that if sufficiently protracted will equate exactly with the game's a priori expected value. All possible strategies at double-zero roulette will eventually (if the bankroll is sufficient and the wheel is tried enough times for the result to reach statistical average) result in the loss of 5.26% of the amount wagered (i.e., handle, not drop). Craps, slot machines, roulette, and Big Six all fall into this category. Blackjack does not, because the device employed in blackjack, a deck or shoe of cards, is not random in that successive trials violate the law of independent trials unless the deck or shoe is shuffled after each hand. Heavy gambling at blackjack may indicate that the player is an expert counter and is pursuing a profession. Games of mixed chance and skill, where the element of skill is sufficient to give expert players a positive expectation (i.e., the game has negative expected value for a casino), fall into this category. Poker is

the most prominent current example. Expert poker players have positive expectations; consequently, poker supports professional players. This is why poker is never played against the house; casinos would be funding the incomes of expert poker players. When poker is offered commercially, poker operators use other methods of extracting money from the game. Poker rooms in California charge seat rentals, Nevada casino rooms rake the pot (typically 5% of the pot), and so forth. A related category of game used for commercial gambling comprises games of subjective probability: betting on sports events, horse races, and so forth. Such games create markets similar to the markets for currencies or securities and similarly support professional investors (bettors). Professional bettors at games of mixed chance and skill like poker or sports or horse race betting may devote enormous amounts of time to the activity and generate staggering handles. The Internet created conditions in which professional bettors could greatly expand the scope of their operations: in one case, a trading room, similar to a currency trading room, that employed a substantial number of people and highly sophisticated software capable of analyzing a great number of races (to identify undervalued horses) was established in Pacific Asia by a professional horse race bettor; the operation made its entrepreneur financially independent within a few years, at which point he retired. Parenthetically, all gambling games redistribute wealth among their players (commercial games additionally extract a percentage of the wealth of all players collectively and transfer it to the operator in the form of win or gross gaming revenue). Games of mixed chance and skill and games of subjective probability redistribute wealth from inexpert players ("marks") to expert players.

Table 2
Statistics for four distinct players showing large differences in money management strategies

Statistics (drop is standardized)	Player			
	High roller	Investor	*Social gambler*	Consumer
Visits	63	54	107	57
Casino hold	10%	(7%)	28%	32%
Frequency of wins	67%	65%	38%	21%
Frequency of ruins	14%	17%	49%	60%
SD drop	0.86	0.94	0.69[a]	0.79
Av. drop/wins	0.63	0.64	0.75	1.01
Av. drop/losses	1.74[b]	1.66[b]	1.15[b]	1.00

Note. Parentheses denote negative hold.

[a]The SD drop of the social gambler is significantly lower than the SD drop of the high roller and the investor ($p < .05$). Other comparisons of the SD drop are n.s.

[b]For the high roller, the investor, and the social gambler, Av. drop/losses is significantly greater than Av. drop/wins ($p < .001$).

Comment: In games of mixed chance and skill and games of subjective probability these values may differ, depending on the players observed.

For the majority of casino players, visits ending with a win corresponded to a substantially

smaller drop than visits ending with a loss. This is exactly opposite to the result obtained by Schellinck and Schrans (2002) in their study of Canadian VLT players. Schellinck and Schrans found out that players tend to switch from one machine to another to reinvest their wins.

> **Comment**: This is a common reason for switching machines in markets, such as Nevada, that allow operators to set the consumer price of individual machines: players switch machines endeavoring to find the “loosest” or lowest-priced machine.

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For correspondence: Eugene Christiansen, Christiansen Capital Advisors, LLC, 250 West 57th Street, Suite 432, New York, New York 10107, U.S.A.
E-mail: cca-ny@verizon.net

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Centre for Addiction and Mental Health
Centre de toxicomanie et de santé mentale

Editorial Contact: phil_lange@camh.net
Subscribe to our automated announcement list: gamble-on@lists.camh.net
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