Loss Discounts: Understand the Math

-By Steve Karoul

Last month I discussed Cash Back versus Cash Rewards and the need to better understand the math. That article drew more response from around the world than many other articles that I have published. Therefore, I can see that there is an industry need to try to explain the basics behind many of the casino marketing programs that are so arbitrarily adopted by casinos around the world. People want to better understand them but do not know where to go to find the answers. In addition, the casino industry today is known as being a "copy cat" industry where one casino just copies another if they think they have a good idea. However, the problem magnifies itself when bad ideas get copied and replicated.

I remember working for Caesars World International many years ago. Caesars Palace was viewed as the leader at that time in international casino marketing. We decided to change our airfare reimbursement guidelines to try to help boost the profitability of our Far East Marketing program so we changed the method of calculation in our comp guidelines. However, within three months we realized that we made a huge mistake and were actually over compensating players and reimbursing way to much towards international airfares especially First Class and Business Class tickets from Asia. Caesars corrected their program but interestingly enough I saw that exact same flawed program surface for many years afterwards on various different casino letterheads as their casino's Airfare Reimbursement Policy. Therefore, I always caution people to be aware of the "copy-cat" syndrome before adopting any other casino's program. Do the math first and make sure that the program really makes good business sense and more importantly

good business sense for your particular casino which may have a different tax rate or other variable factors.

During those years (early 1980's) Caesars World International was actually quite progressive in its thought processes when it came to casino marketing. We were not afraid to try new ideas and in fact were encouraged by Senior Management to look for innovative concepts. We developed one which we referred to as our Risk / Reward Strategy. This was actually the precursor of Loss Discounts as we know them today. The competition for the lucrative Far East business from Asia was increasing rapidly so we knew that we had to develop something innovative to help increase market share and maintain customer loyalty. We thereby decided to focus on the premium VIP player and offered anyone who would deposit at least $100,000 in the cage in cash or credit a new opportunity. That opportunity was basically that if they lost $100,000 or more they would only have to pay us $90,000 (the amount they lost less 10%) but on the other hand if they won $100,000 or more we would also deduct 5% and alternatively only pay them a net of 95% of what they won. It sounded fair and creative to us.

However, our customers hated the idea and it never worked. About the same time, I adopted one of my favorite expressions relating to the casino industry; "The operation was a success, but the patient still died". Our innovative idea died but we were still left with damage control and eventually gave in to a one sided deal of discounting the player if they lost over $100,000. To the best of my recollection, this was the beginning of casino Loss Discount programs. I am not sure if the program was born out of innovation or out of conciliation to try to appease our VIP customers.

Loss Discount programs are pretty straight forward today but there are a lot of variable factors that still need to be taken into consideration. Basically, the casino agrees to rebate a player a

certain percentage of their loss on a gaming trip based upon certain minimum pre-established thresholds. For example, a typical program today would be:

Player loss of $100,000 to $500,000/ trip = 10% rebate
Player loss of $501,000 to $1,000,000 / trip = 15% rebate
Player loss of $1,000,000+/ trip = 20% rebate

There are some variations of this but normally the maximum rebate is capped at 20%. The rebates are normally applied to any outstanding credit balances first before giving any cash to the player. In the event that the player's check is returned by the bank to the casino the amount owed to the casino normally reverts back to the Gross amount owed before any Loss Discount. Normally a "trip" consists of up to seven consecutive days of play maximum to help average out the variances due to volatility. And finally, all Loss Discounts are strictly discretionary and subject to final approval by casino management which will review them on a case by case basis. This allows casino management to reject Loss Discounts requests from players that are on a winning streak and then all of a sudden lose a large amount of money but who are also still substantially ahead of the casino (unprofitable). Loss Discounts are not and should not be automatic for every customer.

If your casino is contemplating establishing a Loss Discount program the very first thing that you need to check is to make sure that your regulations will allow you to do so. The second thing that you need to do is establish approval procedures and limit that approval to just individuals in senior management positions who understand gaming, the regulations and how to deal with premium VIP players. My recommendation is not to allow any sales people such as Casino Hosts or Casino Player Development Executives the ability to approve Loss Discounts. It is always difficult for a sales person to say No to one of their better customers. The decision

maker needs to be objective and needs to able to explain to VIP Premium players why they decided not to give a Loss Discount for that trip in a manner that will still maintain the player as a customer. It is not easy dealing with big players who are not used to hearing the word "No". If the Loss Discount program is based upon actual losses then you will also face the challenge of rating discrepancies from the floor and may have to make some value judgements if your regulations will allow for such.

Other issues that have surfaced recently are whether to pay Loss Discounts on Slot Losses or on Theoretical Losses versus Actual Losses. With Slot losses I always caution everyone to take a look at the gaming tax rate first. For example, many Native American casinos may pay 25% tax to the State on Slot Win and 0% on Table Game win depending upon how the compact was written. Also, if a casino is paying 0% State tax on Table Game win they can afford to be a little more generous and competitive than other casinos that may be paying a higher tax rate. Slot machines generally hold a smaller percentage than table games and also machines do vary. It is far more difficult to calculate Theoretical Losses on slots due to Jackpots and other variables by manufacturer, machine type, game type, etc.

As far as Discounts on Loss on Theoretical Loss versus Actual Loss, I contacted my friend Andrew MacDonald again. Andrew has done some exceptional research on the mathematics related to Discounts on Loss. He sent me his paper and will use one except from his research paper that also acknowledges contributions from Bill Eadington, Judy Cornelius and the staff at U.N.R, Peter Griffin, Professor of Mathematics C.S.U. and Jim Kilby, Professor of Gaming U.N.L.V.:

"When rebating on loss, what must be calculated is the conditional mean of all situations where the player loses. In all cases because

we are dealing with biased games that value will exceed or equal the mean of all possible events, both winning and losing, which we refer to as the player's theoretical loss.

If a rebate on loss policy is to be sound, it is a percentage of the latter which should be utilized to calculate an equivalent rebate on loss percentage for a given number of decisions. That can be accomplished by determining the percentage of theoretical loss relative to the conditional mean of only player losses.

In a simple one hand example on an even money game, if normally the Casino were prepared to pay back 50% of theoretical loss then for each $1 wagered the player would receive 50% of the house advantage multiplied by the number of decisions. If the edge were 1.2% then 0.6% of $1 would be paid back to the player regardless of whether they won or lost. If it were only the player who lost to be rewarded then that player could be provided nearly twice as much, as the net position would be compensated by the winning player receiving nothing. Why slightly less than double? Because the player would lose 50.6% of the time and thus paying 1.186% of actual loss if settlement occurred after a single hand would be the equivalent of paying 50% of theoretical loss for the example cited.

As the number of hands increases so to does the percentage of actual loss which may be rebated until such time as the number of hands played is so large that in virtually every instance the player loses and thus the rebate percentage on actual loss may equal the percentage of theoretical loss. This is due to the fact that in such a case the theoretical loss (mean) and the conditional mean are one and the same. If 50% of theoretical loss were the general policy to be returned, then the maximum rebate on actual loss would also be 50%.

How large a value for the number of hands would this take?

In an even chance game such as Baccarat with a 1.2% house advantage the following could be calculated.

One standard deviation = square root (N)
where N is the number of hands

99.7% of all results fall within three standard deviations of the mean.

Therefore, 99.85% of all results would fall to the right of minus three standard deviations.

If we were to solve for when 0 were -3 standard deviations from the mean we find

3 square root (N) = mean

mean = N x edge

3 square root (N) = 1.2% N

3 = N
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1.2% square root (N)

Therefore N = (3/1.2%) 2
N = 62 500
Thus, if a player were to play approximately 62,500 hands and then settle it would be appropriate to pay 50% of whatever that player's actual loss were at the time.

We now know that for one hand it is appropriate to rebate 1.186% of actual player loss, whereas at 62,500 hands, 50% of actual loss

may be repaid with both scenarios maintaining a 50% equivalency relative to theoretical loss in an even money game.

To determine points in between these extremes of number of hands, it is necessary to determine the conditional mean for each number of hands. To crudely demonstrate the process of integration the following is provided:-

Number of hands N = 100
Edge = 1.2%
Even money game such as Baccarat

The mean = 1.2% x 100
= 1.2

1 standard deviation = square root (N)
= square root (100)
= 10

From basic statistics we know that 34.13% of results occur between the mean and one standard deviation.

13.64% of results occur between one and two standard deviations and

2.23% of results are greater than two standard deviations

From this we may roughly calculate the conditional mean for all player losses.

To do this we take the probability range and multiply this by the mid point result.

34.13% x {(1.2 + (1.2 + 10)) / 2 }

13.64% x {((1.2 + 10) + (1.2 + (2 x 10))) / 2 }
2.23% x {((1.2 + (2 x 10)) + (1.2 + (3 x 10))) / 2 }

and sum these which provides the conditional mean greater than the mean and then add the probability of results between 0 and the mean multiplied by that midpoint.

Without referring to normal distribution tables this may be approximated by taking the mean divided by the standard deviation and multiplying this by 34.13% and then multiplying that by the midpoint of zero and the mean.

= 1.2 / 10 x 34.13% x 1.2/2

Thus the conditional mean = 2.116
+ 2.210
+ 0.584
+ 0.025
= 4.935

This compares to the standard mean (theoretical loss) of 1.2 and thus if a 50% rebate on theoretical loss were desired the rebate on actual loss based upon the above would be

Rebate on actual loss % = 50% x 1.2 / 4.935
= 12.16%

As stated this is a very crude example provided for demonstration purposes only.

To more accurately calculate the percentage to be rebated it is merely necessary to utilize smaller sections when integrating and refer to normal distribution tables for the probabilities or to utilize a lesser known statistical function referred to as the "UNLLI" or Unit

Normal Linear Loss Integral. This is basically analogous to the sum of all possible values of a standard normal variables positive distances above the number "a", multiplied by their corresponding probabilities of occurrence."

I realize that this probably seems extremely complicated at first glance but then again I am only giving you part of Andrew's complete analysis for demonstration purposes. Once again, Andrew has agreed and I am happy to send anyone who wishes a complete copy of his paper on Loss Discounts. When you read it in its entirety it is not quite so complicated. The entire paper is actually only 11 pages in length. So, anyone who wants to learn more about the math behind Loss Discounts please send me an E-mail with all of your contact information and I will be happy to send it to you. Remember, do your homework ahead of time. Good luck.

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