

Multi-Strike and Multi-Strike 16X Video Poker Analysis

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This paper formally analyzes Multi-Strike and Multi-Strike 16X Video Poker games.

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1. Introduction

This paper explores a popular game by IGT¹ called Multi-Strike Video Poker and a variant called Multi-Strike 16X Video Poker. These games are also known as Multi-Rise Video Poker. We refer the reader to our earlier paper analyzing Ultimate X² Poker [1] for basic concepts.

Multi-Strike Video Poker is a sequential four-line game where one pays to play all four lines but can progress from one to the next only if they draw to a winning hand or are given a random Free Ride to the next line. After the draw of any hand, any winnings are paid a multiple of the normal payout depending on the level. The first level pays 1x the normal payout; level 2 pays 2x; level 3 pays 4x and level 4 pays 8x. Table 1 shows the normal payouts for one pay table available for the game Jacks or Better. Multi-Strike 16X adds one more line with a 16x multiplier.

| Outcome | Per Coin |
|------------------------|-----------------|
| Royal Straight | 800 |
| Straight Flush | 50 |
| Four of a Kind | 25 |
| Full House | 9 |
| Flush | 6 |
| Straight | 4 |
| Three of a Kind | 3 |
| Two Pair | 2 |
| Jacks or Better | 1 |
| Nothing | 0 |

Table 1: Jacks or Better 9-6 Pay Table

At the start of play, one places a max bet which is 20 times the selected coin denomination for Multi-Strike (and 25 times that for Multi-Strike 16X). The "20" is 4 Lines of play times 5 coins per line (the max bet per line is 5 coins). So if the denomination is 25 cents, one would be betting \$5. After placing the bet, 5 cards are randomly dealt from a standard deck of cards for the game (e.g., Joker Poker games would have 53 cards). The player then decides which cards to hold and to discard. Discarded cards are replaced by random draws from the remaining deck. If there is a winning outcome (or if a Free Ride card had momentarily been shown) the player proceeds to the

¹ Multi-Strike Video Poker games were created by IGT (<https://www.igt.com/>) and are offered in their video poker machines.

² Ultimate X was created by IGT (<https://www.igt.com/>) and is offered in their video poker machines.

next line after being paid for the win. Otherwise, the hand of play is over and the player must place a new bet or leave.

For example, using screen-shots from VideoPoker.com, here is the deal of the first hand of play. Holding the 2 Aces yielded a winning hand of play.



The draw ended with a Two Pair outcome, paying 10 coins (2 for each of the 5 coins bet per hand), The second hand received one Jack on the deal but got a second on the draw for a Jacks or Better outcome. Normally that pays 1 coin per coin bet, making 5 coins, but Line 2 has a 2x multiplier, so 10 coins were paid. Note in the following the total win is now 20 (10 from the first line and 10 from the second). And then play proceeds to the third line.



No cards were held on the third hand but the draw yielded a winning hand, a Pair of Kings, and was paid 4x the normal amount of 5 coins. The total winnings are now 40 coins.



Four of the cards were held for a possible Straight draw that didn't materialize. So this particular round was profitable yielding 40 coins on a 20 coin wager.



Occasionally, on the deal, a Free Ride card shows momentarily as in the following. In this case it wasn't necessary since the hand is already showing a winning Two Pair outcome (if held). The Free Ride automatically guarantees one progresses to the next line, even without a winning outcome. Normally, one might be more conservative on lower line hands, choosing holds with higher probabilities of wins over ones with lower probability but higher returns so one increases

the chance of progressing to the next line. So getting a Free Ride is of value since knowing one will progress regardless of a winning hand allows a more aggressive strategy.



2. Expected Value Analysis

Let \mathbb{H} be the set of all possible five card hands (order not a factor). For any five card hand, $H \in \mathbb{H}$, let H_i be the i^{th} subset of H , $i=0, \dots, 31$. For example, if $H = \{2H, JC, QD, 3S, 7S\}$, meaning a hand containing a 2 of Hearts, a Jack of Clubs, a Queen of Diamonds, a 3 of Spades and a 7 of Spades, then

$$\begin{aligned}
 H_0 &= \{ \} \\
 H_1 &= \{2H\} \\
 H_2 &= \{JC\} \\
 H_3 &= \{2H, JC\} \\
 H_4 &= \{QD\} \\
 H_5 &= \{2H, QD\} \\
 H_6 &= \{JC, QD\} \\
 H_7 &= \{2H, JC, QD\} \\
 &\dots \\
 H_{31} &= \{2H, JC, QD, 3S, 7S\}
 \end{aligned}$$

Let V_j be the value of outcome j relevant to the game (e.g., a Flush) and

$$P_j(H_i) = \text{prob}(\text{outcome}_j | H_i)$$

be the probability of outcome j computed from all possible completions of subset i from the deck of cards with the cards listed in H removed.

For a normal one-Line game, the expected return for choosing subset i is $R_{H_i} = \sum_j V_j P_j(H_i)$. The

set of optimal actions, S_H , for hand $H \in \mathbb{H}$ is found by solving

$$S_H = \arg \max_i \sum_j V_j P_j(H_i).$$

Ties can be broken by choosing from optimizing actions based on other criteria (e.g., those minimizing or maximizing the variance as we do below). Multi-Strike is different in that one pays for 4-Lines of play but has to advance with wins or Free Rides to subsequent lines. So the expected return needs to consider future hands. For example, one might be more conservative on lower line hands, choosing holds with higher probabilities of wins over ones with lower probability but higher returns so one increases the chance of progressing to the next line. As mentioned above, the Free Ride feature complements these decisions since, if one has a Free Ride, a conservative play isn't needed.

If one makes it to Line-4 in Multi-Strike, one simply maximizes the expected return since no further hand depends on the outcome. So for any dealt hand H , one solves

$$8 \max_i R_{H_i}$$

And, when each hand is equally likely, the expected return is

$$EV_4 = \frac{8}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i R_{H_i}$$

or just 8 times the optimal expected value of the normal underlying game. For 9-6 Jacks or Better, the optimal expected value is 0.99543904.

If one makes it to Line-3, they can get to Line-4 with a Free Ride or a winning outcome on hand 3. Let f_ℓ be the probability of a free ride on Line $\ell = 1, 2, \dots$. Then the expected value of a hand H on Line-3 is

$$EV_3 = f_3(4EV + EV_4) + \frac{(1-f_3)}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i (4R_{H_i} + (1-P_0(H_i))EV_4).$$

$P_0(H_i)$ is the probability of no win. The first term gives the contribution given a Free Ride.

Since one is guaranteed advancing to Line-4, the game's normal optimal expected value can be attained with a multiplier of 4x. The second term is for hands without a Free Ride. Note one gets 4 times the expected return plus the 4th line's return times the probability of advancing to the 4th line. Here it is clear how the decision on Line-3 impacts the overall return through the probability of a win $1 - P_0(H_i)$.

In like manner, the expected value at Line-2 is

$$EV_2 = f_2(2EV + EV_3) + \frac{(1-f_2)}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i (2R_{H_i} + (1-P_0(H_i))EV_3)$$

and for Line-1

$$EV_1 = f_1(EV + EV_2) + \frac{(1-f_1)}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i (R_{H_i} + (1-P_0(H_i))EV_2).$$

Table 2 summarizes the games and pay tables that we are familiar with. We started with information available at [3].

| Game | Pay Table ID | EV | Min σ^2 | Max σ^2 | Free Ride Probabilities | | |
|--------------------|--------------|---------|-------------------|-------------------|-------------------------|-------|-------|
| Bonus Poker | 8 | 99.3746 | 22.5578 | 22.5578 | 0.076 | 0.07 | 0.062 |
| Bonus Poker | 7 | 98.2245 | 22.3557 | 22.3557 | 0.076 | 0.07 | 0.062 |
| Bonus Poker | 6 | 97.08 | 22.2092 | 22.2092 | 0.076 | 0.07 | 0.062 |
| | | | | | | | |
| Bonus Poker Deluxe | 9-6 | 99.8631 | 33.1608 | 33.1608 | 0.078 | 0.072 | 0.062 |
| Bonus Poker Deluxe | 8-6 | 98.7106 | 32.9327 | 32.9327 | 0.078 | 0.072 | 0.062 |
| Bonus Poker Deluxe | 8-5 | 97.6931 | 33.4358 | 33.4358 | 0.078 | 0.072 | 0.062 |
| Bonus Poker Deluxe | 7-5 | 96.5396 | 33.2147 | 33.2147 | 0.078 | 0.072 | 0.062 |
| Bonus Poker Deluxe | 6-5 | 95.6476 | 33.7792 | 33.7792 | 0.078 | 0.072 | 0.062 |

| | | | | | | | |
|-----------------------|----------------|---------|---------|---------|--------|--------|--------|
| | | | | | | | |
| Deuces Wild | 25-15-9-5-3-2 | 100.881 | 26.3661 | 26.3679 | 0.0825 | 0.078 | 0.078 |
| Deuces Wild | 25-16-10-4-4-3 | 99.9203 | 26.3629 | 26.3629 | 0.09 | 0.081 | 0.079 |
| Deuces Wild | 25-15-9-4-4-3 | 98.9926 | 26.1242 | 26.1286 | 0.0891 | 0.0804 | 0.0775 |
| Deuces Wild | 20-12-10-4-4-3 | 97.8467 | 25.1952 | 25.1964 | 0.09 | 0.081 | 0.079 |
| Deuces Wild | 20-12-9-4-4-3 | 97.3749 | 25.325 | 25.325 | 0.09 | 0.081 | 0.079 |
| Deuces Wild | 25-16-13-4-3-2 | 97.2714 | 25.8941 | 25.8941 | 0.09 | 0.081 | 0.079 |
| Deuces Wild | 20-10-8-4-4-3 | 96.297 | 25.1715 | 25.1716 | 0.09 | 0.081 | 0.079 |
| Deuces Wild | 25-15-10-4-3-2 | 95.4939 | 25.8282 | 25.8282 | 0.09 | 0.081 | 0.079 |
| | | | | | | | |
| Deuces Wild Bonus | 9-4-3 | 99.5981 | 32.5706 | 32.5706 | 0.09 | 0.08 | 0.08 |
| Deuces Wild Bonus | 13-3-3 | 98.9937 | 31.9213 | 31.9213 | 0.09 | 0.08 | 0.0794 |
| Deuces Wild Bonus | 10-3-3 | 97.6926 | 32.5597 | 32.5605 | 0.09 | 0.08 | 0.08 |
| Deuces Wild Bonus | 12-3-2 | 96.7313 | 31.9725 | 31.9725 | 0.09 | 0.08 | 0.08 |
| Deuces Wild Bonus | 10-3-2 | 95.9198 | 32.242 | 32.242 | 0.09 | 0.08 | 0.08 |
| | | | | | | | |
| Deuces Wild Dbl Bonus | 25-12 | 99.894 | 39.6374 | 39.6374 | 0.0844 | 0.0805 | 0.0785 |
| Deuces Wild Dbl Bonus | 25-9 | 98.8195 | 39.7917 | 39.795 | 0.084 | 0.081 | 0.081 |
| Deuces Wild Dbl Bonus | 20-9 | 97.995 | 39.8448 | 39.8448 | 0.084 | 0.081 | 0.0802 |
| | | | | | | | |
| Double Bonus | 10-7-5 | 100.368 | 29.9976 | 29.9976 | 0.084 | 0.07 | 0.063 |
| Double Bonus | 9-7-5 | 99.2934 | 30.2733 | 30.2733 | 0.084 | 0.07 | 0.063 |
| Double Bonus | 9-6-5 | 97.9986 | 31.7067 | 31.7067 | 0.083 | 0.069 | 0.062 |
| Double Bonus | 9-6-4 | 97.0592 | 31.7279 | 31.7279 | 0.084 | 0.07 | 0.063 |
| Double Bonus | 8-5-4 | 94.9394 | 31.7691 | 31.7691 | 0.084 | 0.07 | 0.063 |
| | | | | | | | |
| Double Dbl Bonus | 10-6 | 100.258 | 42.3767 | 42.3767 | 0.079 | 0.07 | 0.061 |
| Double Dbl Bonus | 9-6 | 99.1788 | 42.1569 | 42.1569 | 0.079 | 0.07 | 0.061 |

| | | | | | | | |
|----------------------|------------------------------|---------|---------|---------|--------|--------|--------|
| Double Dbl Bonus | 9-5 | 97.9948 | 42.417 | 42.417 | 0.077 | 0.07 | 0.061 |
| Double Dbl Bonus | 8-5 | 97.0694 | 42.2804 | 42.2804 | 0.079 | 0.07 | 0.061 |
| Double Dbl Bonus | 7-5 | 96.002 | 42.3411 | 42.3411 | 0.079 | 0.07 | 0.061 |
| Double Dbl Bonus | 6-5 | 94.9553 | 42.2716 | 42.2716 | 0.079 | 0.07 | 0.061 |
| | | | | | | | |
| Jacks or Better | 9-6 | 99.7918 | 20.9959 | 20.9959 | 0.077 | 0.07 | 0.064 |
| Jacks or Better | 9-5 | 98.781 | 21.211 | 21.211 | 0.077 | 0.07 | 0.064 |
| Jacks or Better | 8-5 | 97.6302 | 20.9893 | 20.9893 | 0.077 | 0.07 | 0.064 |
| Jacks or Better | 7-5 | 96.48 | 20.7864 | 20.7864 | 0.077 | 0.07 | 0.064 |
| Jacks or Better | 6-5 | 95.3302 | 20.6184 | 20.6184 | 0.077 | 0.07 | 0.064 |
| | | | | | | | |
| Joker Poker (2 Pair) | 1000-100-50- 50-20-10-6-5 | 99.9993 | 30.8337 | 30.8342 | 0.282 | 0.281 | 0.277 |
| Joker Poker (2 Pair) | 100-800-100- 100-16-8-5-4 | 97.5241 | 69.2194 | 69.2194 | 0.284 | 0.28 | 0.278 |
| | | | | | | | |
| Joker Poker (Aces) | 1000-200-100- 50-20-6-5 | 94.4944 | 34.5519 | 34.5519 | 0.186 | 0.18 | 0.176 |
| | | | | | | | |
| Joker Poker (Kings) | 800-50-20-7-5 | 100.832 | 26.2434 | 26.2434 | 0.089 | 0.081 | 0.077 |
| Joker Poker (Kings) | 940-50-17-7-5 | 98.6311 | 31.5118 | 31.5118 | 0.089 | 0.082 | 0.079 |
| Joker Poker (Kings) | 940-50-15-7-5 | 96.9436 | 30.9895 | 30.9895 | 0.089 | 0.082 | 0.081 |
| Joker Poker (Kings) | 800-50-15-7-5 | 96.5837 | 25.098 | 25.098 | 0.088 | 0.082 | 0.082 |
| Joker Poker (Kings) | 800-40-20-5-4 | 95.694 | 24.7802 | 24.7823 | 0.086 | 0.08 | 0.079 |
| | | | | | | | |
| Super Aces Bonus | 8 | 99.9963 | 62.3038 | 62.3038 | 0.0792 | 0.0673 | 0.0587 |
| Super Aces Bonus | 7 | 98.9923 | 62.2252 | 62.2252 | 0.08 | 0.068 | 0.0576 |
| Super Aces Bonus | 6 | 97.9927 | 62.334 | 62.334 | 0.08 | 0.068 | 0.0597 |
| | | | | | | | |
| Super Double | 9 | 99.885 | 39.0379 | 39.0379 | 0.078 | 0.068 | 0.06 |
| Super Double | 8 | 98.8892 | 39.7277 | 39.7312 | 0.078 | 0.068 | 0.06 |

| | | | | | | | |
|------------------|-----|---------|---------|---------|--------|-------|-------|
| Super Double | 7 | 97.9902 | 39.595 | 39.595 | 0.078 | 0.068 | 0.06 |
| Super Double | 6 | 97.1089 | 39.5025 | 39.5025 | 0.078 | 0.068 | 0.06 |
| | | | | | | | |
| Super Dbl Dbl | 8 | 99.8932 | 51.2467 | 51.2467 | 0.077 | 0.068 | 0.061 |
| Super Dbl Dbl | 7 | 98.832 | 51.2261 | 51.2261 | 0.077 | 0.068 | 0.061 |
| Super Dbl Dbl | 6 | 97.9348 | 51.6 | 51.6 | 0.077 | 0.068 | 0.061 |
| | | | | | | | |
| Triple Dbl Bonus | 9-7 | 99.7648 | 95.8845 | 95.8845 | 0.0835 | 0.066 | 0.059 |
| Triple Dbl Bonus | 9-6 | 98.5777 | 97.2489 | 97.2489 | 0.0835 | 0.066 | 0.059 |
| Triple Dbl Bonus | 9-5 | 97.5285 | 97.8771 | 97.8786 | 0.0835 | 0.066 | 0.059 |
| Triple Dbl Bonus | 8-5 | 96.4929 | 97.9268 | 97.9269 | 0.0835 | 0.066 | 0.059 |
| Triple Dbl Bonus | 7-5 | 95.4591 | 97.9063 | 97.9063 | 0.0835 | 0.066 | 0.059 |
| | | | | | | | |
| White Hot Aces | 9 | 99.7679 | 43.933 | 43.933 | 0.079 | 0.069 | 0.062 |
| White Hot Aces | 8 | 98.6967 | 44.0026 | 44.0026 | 0.079 | 0.069 | 0.062 |
| White Hot Aces | 7 | 97.649 | 43.8639 | 43.8639 | 0.079 | 0.069 | 0.062 |
| White Hot Aces | 6 | 96.6037 | 43.7125 | 43.7125 | 0.079 | 0.069 | 0.062 |

Table 2: Multi-Strike Analyses. For each game/pay table combination, we show the per-coin expected value of the game, the per-coin max/min variance of the game, and the Free Ride probabilities used.

Notice the variance of 20.9959 in 9-6 Jacks or Better. The variance for regular 9-6 Jacks or better is 19.5147, which may seem odd given one is wagering more in Multi-Strike. Dr. Rick Percy provided a great explanation on the WizardOfVegas blog [2]:

“For anyone surprised that 20.9959 is not that much bigger than the variance associated with regular 9-6 Jacks (19.5147), it is helpful to remember that the units here in both cases are bets-squared. Since the MultiStrike bet is 20 coins instead of the standard 5-coin bet, we can show the two variances in a different light in units of coins-squared to be 487.8669 (19.5147×5^2) for standard Jacks vs. 8398.3535 (20.9959×20^2) for MultiStrike Jacks.”

In Multi-Strike 16, if one makes it to line 5 they get

$$EV_5 = \frac{16}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i R_{H_i} .$$

Similarly, Line 4's expected value is:

$$EV_4 = f_4 (8EV + EV_5) + \frac{(1-f_4)}{|\mathbb{H}|} \sum_{H \in \mathbb{H}} \max_i (8R_{H_i} + (1-P_0(H_i))EV_5)$$

and so forth as above. Table 3 summarizes the Multi-Strike 16X games and pay tables that we are familiar with. We started with information available at [4]. We will update whenever we acquire additional Free Ride probabilities.

3. Variance Analysis

An early version of this paper derived an equation for the variance and argued that Levels were independent so covariance terms could be ignored. An astute reader, Dr. Rick Percy [2], pointed out:

“For simplicity, if we just consider the random variable that is the sum of the Level 3 outcome plus the Level 4 outcome, for any Level 3 outcome other than zero, it is true that all the Level 4 outcome probabilities are the same. But if the Level 3 outcome happens to be zero, you can predict that the Level 4 outcome will also be zero more than 97% of the time. So, the random variable representing the Level 3 outcome is clearly not independent of the random variable representing the Level 4 outcome, so you cannot do a handwave and ignore the covariances entirely.”.

He was correct. However, deriving a nice expression for the variances is not trivial when covariances are involved. Instead, we computed variances shown in Tables 2 and 3 using a standard approach. We enumerated all the possible totals (call these X) and their probabilities, and then computed the variance using the usual

$$Var(X) = E(X^2) - E(X)^2 .$$

As mentioned earlier, expected value ties for different holds can be broken by choosing from optimizing actions based on other criteria, such as optimizing holds with minimal or maximal variance. The resulting overall min and max variances are shown in Tables 2 and 3. In most games, there aren't ties (or enough to make a difference), but in some there is a notable difference in the minimum and maximum variances.

| Game | Pay Table ID | EV | Min σ^2 | Max σ^2 | Free Ride Probabilities | | | |
|--------------------|--------------|---------|-------------------|-------------------|-------------------------|--------|--------|--------|
| Bonus Poker | 8 | 99.4975 | 66.3875 | 66.3875 | 0.076 | 0.07 | 0.062 | 0.0575 |
| Bonus Poker | 7 | 98.3556 | 65.7612 | 65.7612 | 0.076 | 0.07 | 0.062 | 0.0575 |
| Bonus Poker | 6 | 97.22 | 65.404 | 65.404 | 0.076 | 0.07 | 0.062 | 0.0575 |
| | | | | | | | | |
| Bonus Poker Deluxe | 9-6 | 99.8932 | 78.9456 | 78.9456 | 0.078 | 0.072 | 0.062 | 0.0575 |
| Bonus Poker Deluxe | 8-6 | 98.7484 | 78.6387 | 78.6387 | 0.078 | 0.072 | 0.062 | 0.0575 |
| Bonus Poker Deluxe | 8-5 | 97.7436 | 79.8147 | 79.8147 | 0.078 | 0.072 | 0.062 | 0.0575 |
| Bonus Poker Deluxe | 7-5 | 96.5959 | 79.4239 | 79.4239 | 0.078 | 0.072 | 0.062 | 0.0575 |
| Bonus Poker Deluxe | 6-5 | 95.7142 | 85.7834 | 85.7834 | 0.078 | 0.072 | 0.062 | 0.0575 |
| | | | | | | | | |
| Deuces Wild | 25-16-10-4-3 | 99.9486 | 81.7671 | 81.7671 | 0.0891 | 0.0825 | 0.078 | 0.0754 |
| Deuces Wild | 25-15-9-4-3 | 98.9827 | 81.2201 | 81.2399 | 0.0891 | 0.0804 | 0.0768 | 0.0754 |
| Deuces Wild | 20-12-10-4-3 | 97.8831 | 78.2574 | 78.261 | 0.09 | 0.081 | 0.079 | 0.074 |
| Deuces Wild | 20-12-9-4-3 | 97.4185 | 78.7898 | 78.7898 | 0.09 | 0.081 | 0.079 | 0.074 |
| Deuces Wild | 25-16-13-3-2 | 97.3045 | 80.2568 | 80.2568 | 0.09 | 0.081 | 0.079 | 0.074 |
| Deuces Wild | 20-10-8-4-3 | 96.3427 | 78.2648 | 78.2654 | 0.09 | 0.081 | 0.079 | 0.074 |
| Deuces Wild | 25-15-10-3-2 | 95.5489 | 79.9816 | 79.9816 | 0.09 | 0.081 | 0.079 | 0.074 |
| | | | | | | | | |
| DW Bonus | 9-4-3 | 99.6494 | 127.013 | 127.013 | 0.09 | 0.08 | 0.08 | 0.076 |
| DW Bonus | 13-3-3 | 98.986 | 124.109 | 124.109 | 0.09 | 0.08 | 0.0787 | 0.076 |
| DW Bonus | 10-3-3 | 97.7477 | 126.872 | 126.88 | 0.09 | 0.08 | 0.08 | 0.076 |
| DW Bonus | 12-3-2 | 96.7979 | 124.226 | 124.226 | 0.09 | 0.08 | 0.08 | 0.076 |
| DW Bonus | 10-3-2 | 95.9973 | 125.967 | 125.967 | 0.09 | 0.08 | 0.08 | 0.076 |
| | | | | | | | | |
| DW Db1 Bonus | 25-12 | 100.008 | 154.385 | 154.385 | 0.084 | 0.081 | 0.081 | 0.075 |
| DW Db1 Bonus | 25-9 | 98.8812 | 155.894 | 155.914 | 0.084 | 0.081 | 0.081 | 0.075 |
| DW Db1 Bonus | 20-9 | 98.1008 | 156.794 | 156.794 | 0.084 | 0.081 | 0.081 | 0.075 |
| | | | | | | | | |
| Double Bonus | 9-7-5 | 99.3263 | 85.8547 | 85.8547 | 0.084 | 0.07 | 0.063 | 0.0535 |
| Double Bonus | 9-6-5 | 97.9974 | 91.643 | 91.643 | 0.083 | 0.069 | 0.0614 | 0.0535 |
| Double Bonus | 9-6-4 | 97.1525 | 91.2895 | 91.2895 | 0.084 | 0.07 | 0.063 | 0.0535 |
| Double Bonus | 8-5-4 | 95.0525 | 91.2968 | 91.2968 | 0.084 | 0.07 | 0.063 | 0.0535 |
| | | | | | | | | |
| Db1 Db1 Bonus | 9-6 | 99.1795 | 138.915 | 138.915 | 0.079 | 0.07 | 0.061 | 0.0515 |
| Db1 Db1 Bonus | 9-5 | 97.9958 | 140.005 | 140.005 | 0.077 | 0.07 | 0.0608 | 0.0515 |
| Db1 Db1 Bonus | 8-5 | 97.1142 | 139.606 | 139.606 | 0.079 | 0.07 | 0.061 | 0.0523 |
| Db1 Db1 Bonus | 7-5 | 96.0549 | 140.089 | 140.089 | 0.079 | 0.07 | 0.061 | 0.0523 |

| | | | | | | | | |
|------------------|--------|---------|---------|---------|--------|-------|--------|--------|
| Dbl Dbl Bonus | 6-5 | 95.0164 | 139.856 | 139.856 | 0.079 | 0.07 | 0.061 | 0.0523 |
| | | | | | | | | |
| Jacks or Better | 9-6 | 99.8118 | 53.062 | 53.062 | 0.077 | 0.07 | 0.064 | 0.0524 |
| Jacks or Better | 9-5 | 98.8187 | 53.3196 | 53.3196 | 0.077 | 0.07 | 0.064 | 0.0524 |
| Jacks or Better | 8-5 | 97.6784 | 52.7057 | 52.7057 | 0.077 | 0.07 | 0.064 | 0.0524 |
| Jacks or Better | 7-5 | 96.5387 | 52.4118 | 52.4118 | 0.077 | 0.07 | 0.064 | 0.0524 |
| Jacks or Better | 6-5 | 95.3994 | 52.1285 | 52.1285 | 0.077 | 0.07 | 0.064 | 0.0524 |
| | | | | | | | | |
| Joker Poker (K) | 940-17 | 98.6552 | 71.4537 | 71.4537 | 0.089 | 0.082 | 0.079 | 0.075 |
| Joker Poker (K) | 940-15 | 96.9915 | 70.0014 | 70.0014 | 0.089 | 0.082 | 0.081 | 0.075 |
| Joker Poker (K) | 800-15 | 96.6524 | 56.6597 | 56.6597 | 0.088 | 0.082 | 0.082 | 0.075 |
| | | | | | | | | |
| Super Aces Bns | 7 | 98.9984 | 183.344 | 183.344 | 0.08 | 0.068 | 0.0575 | 0.0499 |
| Super Aces Bns | 6 | 97.9526 | 183.759 | 183.759 | 0.08 | 0.068 | 0.0575 | 0.0499 |
| | | | | | | | | |
| Super Double | 9 | 99.903 | 120.903 | 120.903 | 0.078 | 0.068 | 0.06 | 0.05 |
| Super Double | 8 | 98.9184 | 128.351 | 128.368 | 0.078 | 0.068 | 0.06 | 0.05 |
| Super Double | 7 | 98.032 | 127.917 | 127.917 | 0.078 | 0.068 | 0.06 | 0.05 |
| Super Double | 6 | 97.1638 | 127.501 | 127.501 | 0.078 | 0.068 | 0.06 | 0.05 |
| | | | | | | | | |
| Triple Dbl Bonus | 9-7 | 99.7829 | 319.972 | 319.972 | 0.0835 | 0.066 | 0.059 | 0.0508 |
| Triple Dbl Bonus | 9-6 | 98.6309 | 325.345 | 325.345 | 0.0835 | 0.066 | 0.059 | 0.0508 |
| Triple Dbl Bonus | 9-5 | 97.6032 | 327.888 | 327.896 | 0.0835 | 0.066 | 0.059 | 0.0508 |
| Triple Dbl Bonus | 8-5 | 96.5754 | 328.818 | 328.818 | 0.0835 | 0.066 | 0.059 | 0.0508 |
| Triple Dbl Bonus | 7-5 | 95.549 | 330.299 | 330.299 | 0.0835 | 0.066 | 0.059 | 0.0508 |

Table 3: Multi-Strike a6 Analyses. For each game/pay table combination, we show the per-coin expected value of the game, the per-coin max/min variance of the game, and the Free Ride probabilities used.

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We thank Dr. Rick Percy from Columbus, Ohio who found an error in a prior section on Multi-Strike variance and provided a nice explanation of the variances of regular and Multi-Strike 9-6 Jacks or Better .

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