

Mathematical Analysis

of

Louisiana Baccarat

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Introduction

Louisiana Baccarat is a new version of casino Baccarat. It simplifies the “Banker 3rd card rule” compared with Standard Baccarat, which allows for several other changes and improvements.

Rules of Play

Baccarat is a contest between card hands called “Player” and “Banker”. To begin, bettors place a wager on “Player”, “Banker”, or “Tie”.

The Player and Banker hands will be made up of 2 or 3 cards. The score of a hand is the last digit of the total number of pips on the cards, with face cards counting as 0. Higher score wins.

The dealer starts by giving two cards to the Player and Banker hands. If either hand has a score of 8 or 9, no more cards are drawn, otherwise a 3rd card is drawn for each hand according to the following rules:

Draw with 4 or less, stand pat on 6 or more. Player 5 draws, but Banker 5 does the opposite of whatever Player did (draws if Player stood pat, stands pat if Player drew).

If one hand has a higher score, bets on it pay even money, while Tie bets and bets on the other hand lose. If the hands tied, Tie bets pay 9 to 1, while Player and Banker bets push (except that Banker bets lose on a 7-7 tie).

OPTIONAL SIDE BETS

The “77” bet pays 40 to 1 or 45 to 1 if the result is a 7-7 tie. The “Big Win Bonus” bet can be made for either Player or Banker hand, and pays if that hand either wins by at least 3 points, or wins with a “Natural” 2-card 8 or 9, according to the following pay table:

Win by 9:	30* to 1
Win by 8:	10 to 1
Win by 7:	5 to 1
Win by 6:	3 to 1
Win by 3,4,5:	1 to 1
Any Natural Win:	1 to 1

*Alternative pay tables may be offered that change this top payout from 30 to 25 or 35.

PLAY YOUR OWN CARDS FEATURE

If a bettor wagers only on the Player hand and makes no side bets, the dealer may ask him if he wants his own cards. If the bettor agrees, he will be dealt 2 “Player Hand” cards, and may choose for himself whether to take a 3rd card. The dealer will play the Banker hand against those cards to settle the bet.

OTHER VARIATIONS

Instead of having the Banker hand lose when the score is a 7-7 tie, a 4% or 5% commission may be taken from Banker wins, as in some versions of Standard Baccarat. Alternate Pay tables may be offered for the Big Win Bonus to raise or lower the House Edge.

Mathematical Analysis

All 6-card possibilities were analyzed in an Excel spreadsheet, for 8-deck and 6-deck shoes.

The following probabilities were obtained:

If Player draws on a 2-card hand of 5:

	8 decks	6 decks
Banker win	0.456706979	0.456756397
Tie (including 7-7)	0.094329229	0.094242636
Player win	0.448963792	0.449000967
7-7 Tie	0.019971654	0.01997977

If Player stands on a 2-card hand of 5:

	8 decks	6 decks
Banker win	0.457797374	0.457853328
Tie	0.092042789	0.091948709
Player win	0.450159837	0.450197963

The 7-7 tie probability is not relevant because that side bet is settled against the main Player hand that the dealer maintains, rather than against bettors who played their own cards.

For the Big Win Bonus, the outcome probabilities are as follows:

Result*	Player 8d	Player 6d	Banker 8d	Banker 6d
Win by 9	0.0035589	0.0035559	0.0033056	0.0033011
Win by 8	0.0065449	0.0065439	0.0061284	0.0061245
Win by 7	0.0172695	0.0172643	0.0166918	0.0166829
Win by 6	0.0268505	0.0268479	0.0261094	0.0261018
Win by 5	0.0303171	0.0303206	0.0355449	0.0355442
Win by 4	0.0381528	0.0381609	0.0390381	0.039053
Win by 3	0.0459556	0.0459566	0.0469977	0.0470046
Win by 2	0.053774	0.0537736	0.0549839	0.0549925
Win by 1	0.0639515	0.0639453	0.0653181	0.06532
Tie	0.0764583	0.0763899	0.0764583	0.0763899
Loss	0.2941179	0.2941245	0.2863747	0.2863691
Natural win	0.1625891	0.1626319	0.1625891	0.1626319
Natural tie	0.0178709	0.0178528	0.0178709	0.0178528
Natural loss	0.1625891	0.1626319	0.1625891	0.1626319

*First 11 rows are probabilities of these outcomes without any "Naturals"

Applying these probabilities to the payouts gives the following results for House Edge:

Player bet: 8 decks 0.774%, 6 decks 0.776%

Banker bet: 8 decks 1.223%, 7 decks 1.222%

Tie bet: 8 decks 5.671%, 6 decks 5.757%

Big Win Bonus Player side: 8 decks 5.263%, 6 decks 5.267%

Big Win Bonus Banker side: 8 decks 5.719%, 6 decks 5.733%

7-7 Tie bet at 45 to 1: 8 decks 8.130%, 6 decks 8.093%

7-7 Tie bet at 40 to 1: 8 decks 18.116%, 6 decks 18.083%

Player bet when standing on 5: 8 decks 0.764%, 6 decks 0.766%

Banker bet with 5% commission instead of 7-7 rule: 8 decks 1.509%, 6 decks 1.508%

Banker bet with 4% commission instead of 7-7 rule: 8 decks 1.053%, 6 decks 1.051%

Big Win Bonus Player side, paying 25:1 for 9-0 win: 8 decks 7.043%, 6 decks 7.045%

Big Win Bonus Banker side, paying 25:1 for 9-0 win: 8 decks 7.371%, 6 decks 7.383%

Big Win Bonus Player side, paying 35:1 for 9-0 win: 8 decks 3.484%, 6 decks 3.489%

Big Win Bonus Banker side, paying 35:1 for 9-0 win: 8 decks 4.066%, 6 decks 4.082%

A card counting analysis was performed and the following recommendations are made:

If the 7-7 tie bet pays 40:1, it may not be larger for a player than the amount he wagered on the regular Player, Banker, and Tie bets.

If the 7-7 tie bet pays 45:1, one of the following rules should be adopted:

- a) 7-7 tie bet should be at most 1/4 of the amount wagered on the regular Player, Banker, and Tie bets
- b) OR 7-7 tie bet should be limited to a maximum wager of \$25
- c) OR the shoe should be shuffled at 75% penetration

No card counting issue arises for any of the other bets.