

American Roulette

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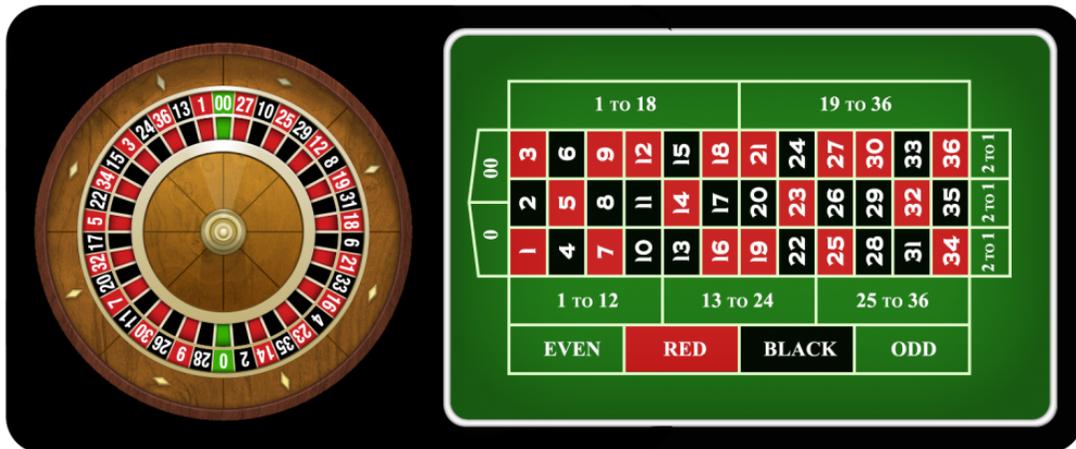
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Las Vegas has been built upon the wealth transfers that occur when people engage in seemingly-small disadvantageous capital transactions.

- Warren Buffett

The rules for American Roulette are simple:

- There are 38 pockets on the roulette wheel, ranging from 0 to 36, and the additional 00 number
- 18 of these pockets are red
- 18 of these pockets are black
- The two pockets containing 0 and 00 are green
- The croupier spins the wheel in one direction, then spins the ball in the opposite direction
- The ball eventually loses momentum and falls onto one of the pockets



The rules:

- There are 38 numbers on the wheel (1-36, 0 and 00)
- The probability of picking the correct number on a single-odds bet is 1/38
- The house pays 35 to 1
- There is a 37/38 chance that the player loses his bet

Example:

- You bet **\$1** on lucky number 7
- The ball lands of 7
- You therefore win \$35, otherwise you lose your \$1

Event	Probability	Payoff
Ball lands on 7	1/38	\$35
Ball does not land on 7	37/38	-\$1

Expected Value = (probability of win) x (\$ win) + (probability of losing) x (\$ loss)

$$EV = (1/38) \times (\$35) + (37/38) \times (-\$1)$$

$$EV = -0.05263$$

Therefore, the house edge is 5.263%

Let's take the analysis a step further

Assume you decide to bet \$1 on each of the 38 numbers (**bet size = \$38**) to 'spread your risk'

Event	Probability	Payoff
Ball lands on your number	38/38	\$35
Ball does not land on your number	0/38	-\$38

$$EV = (38/38) \times (\$35) + (0/38) \times (-\$38)$$

$$EV = \$35$$

As you can see, you will do better on a single odds bet since you had a small chance of getting lucky and making 35x your money.

On the other hand, you will ALWAYS LOSE in a fully diversified strategy.

Lessons for investors

- Diversification does not work when margin of safety is absent
- In fact, diversification hurts you when margin of safety is negative
- You will likely lose money over time if you buy a diversified portfolio of overvalued stocks