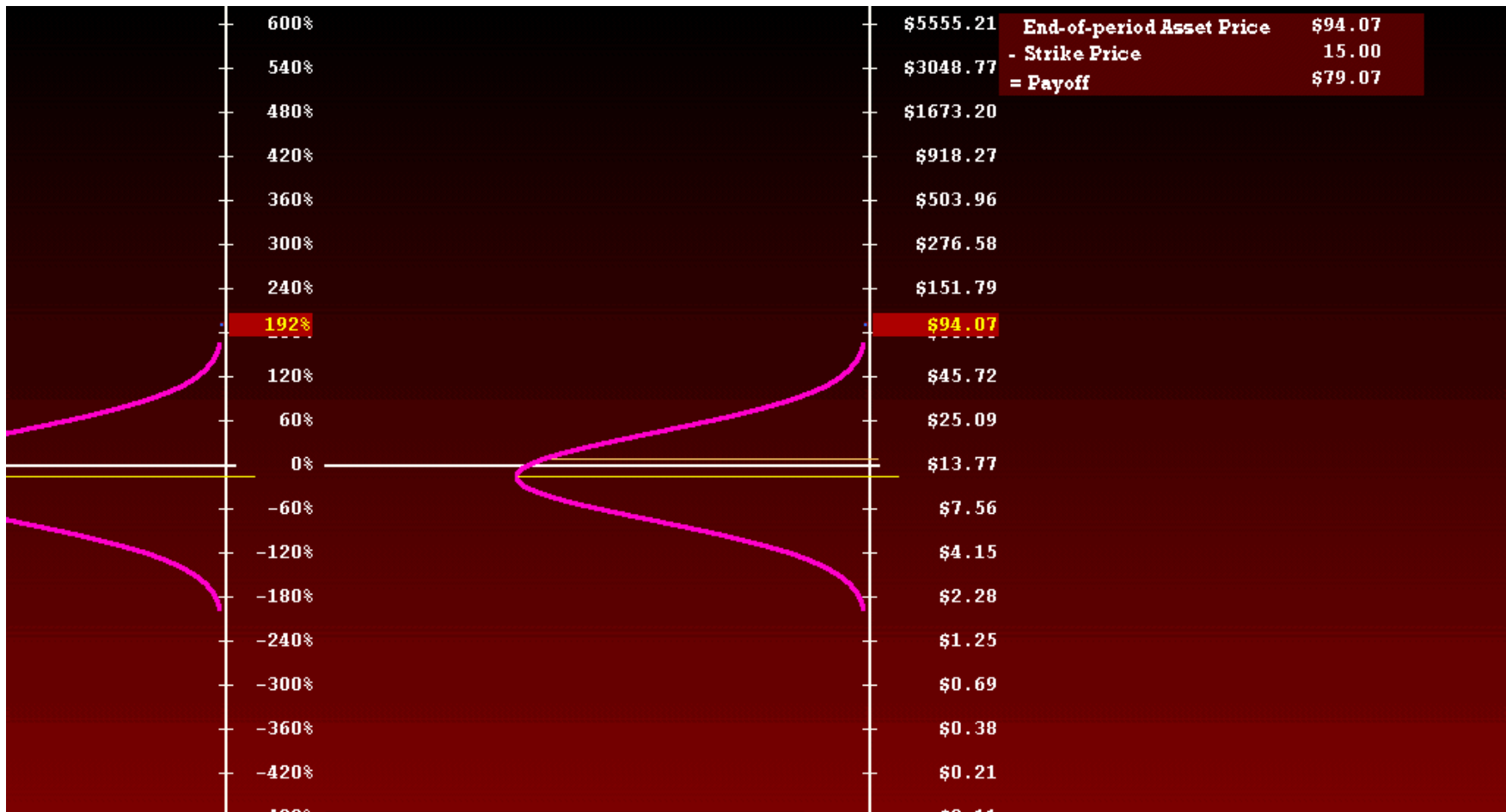


**To calculate the value of an option, we can evaluate the payoffs produced by the squares that fill up the bell-shaped curve.**

If we take this bell-shaped probability distribution to be a good representation of where the price of this stock might be 365 days from now, then we can calculate the probability-weighted

present value of all the payoffs that would be produced by stock prices within and just beyond this bell-shaped curve.



If we divide the bell-shaped curve into 2,000 possible outcomes, then the highest stock price we might expect for this stock at the end of 365 days would be \$94.07. This stock price would give us an option payoff of \$79.07. We want to find the probability-weighted future value of this payoff.

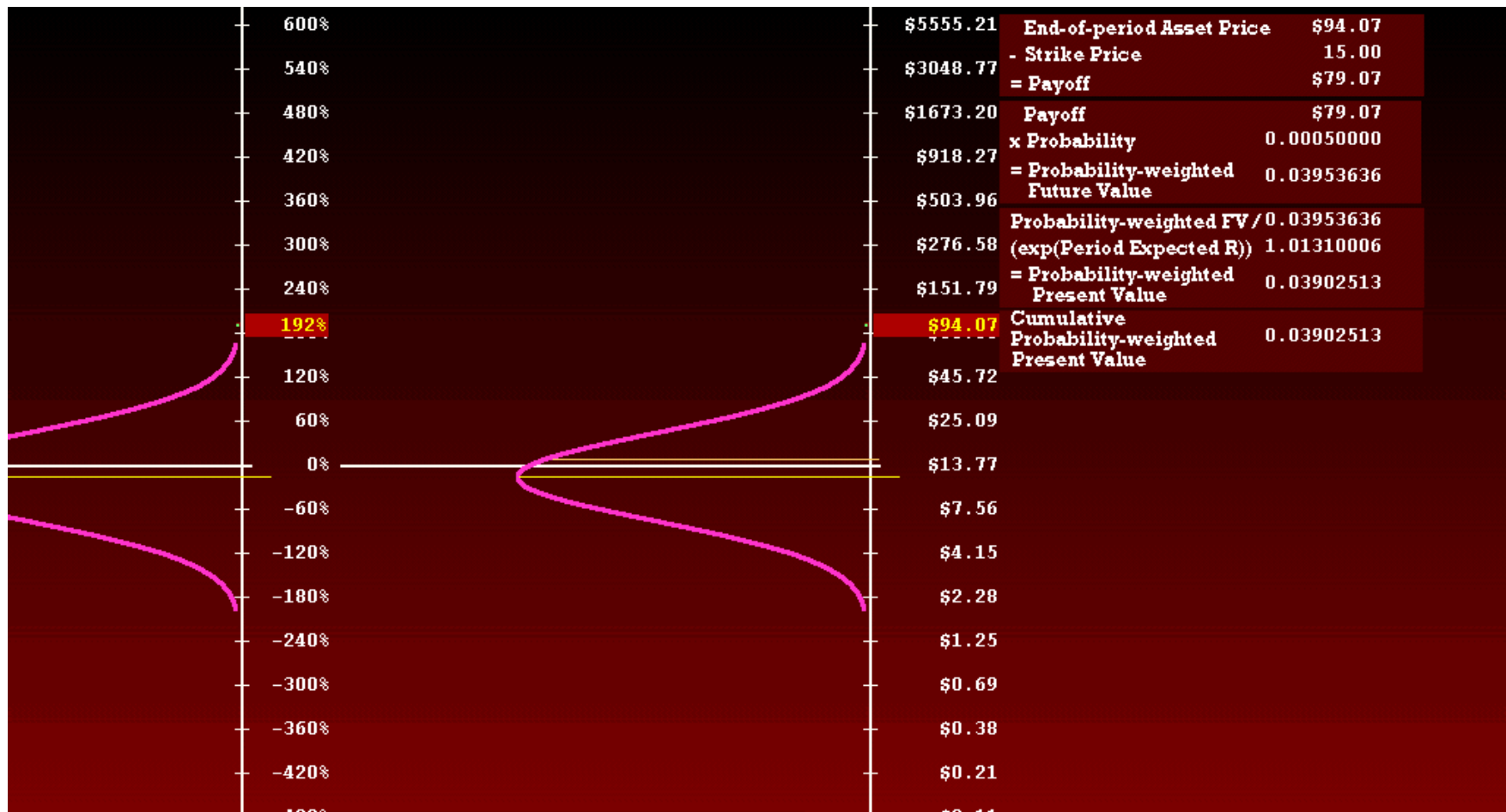


Because we're using 2,000 possible outcomes, the probability of this outcome is  $1 / 2000$  or .0005. Hence, the probability-weighted future value of this payoff is  $\$79.07 \times .0005 = \$0.03953636$ , or roughly 4 cents.

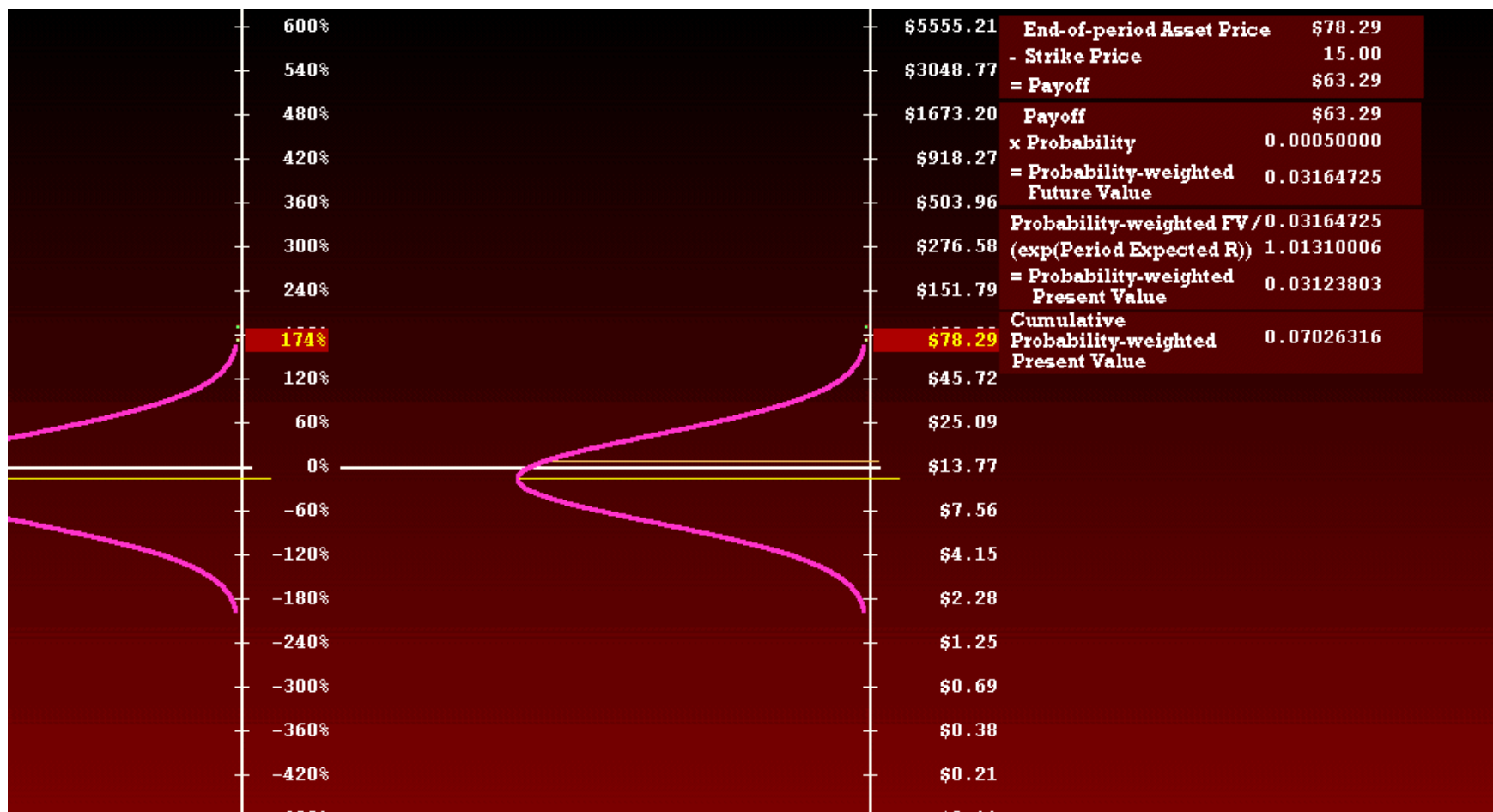


To find the value *today* of an option that can pay off *in the future*, at the risk-free rate of interest we discount the probability-weighted future values of the potential payoffs. To discount them, we divide the probability-weighted future values of each payoff by one plus the risk-free rate of interest for the option's time to expiration.

For this payoff, we divide its probability-weighted future value of \$0.03953636 by 1.01310006. We get a probability-weighted present value of \$.03902513— still right around 4 cents.

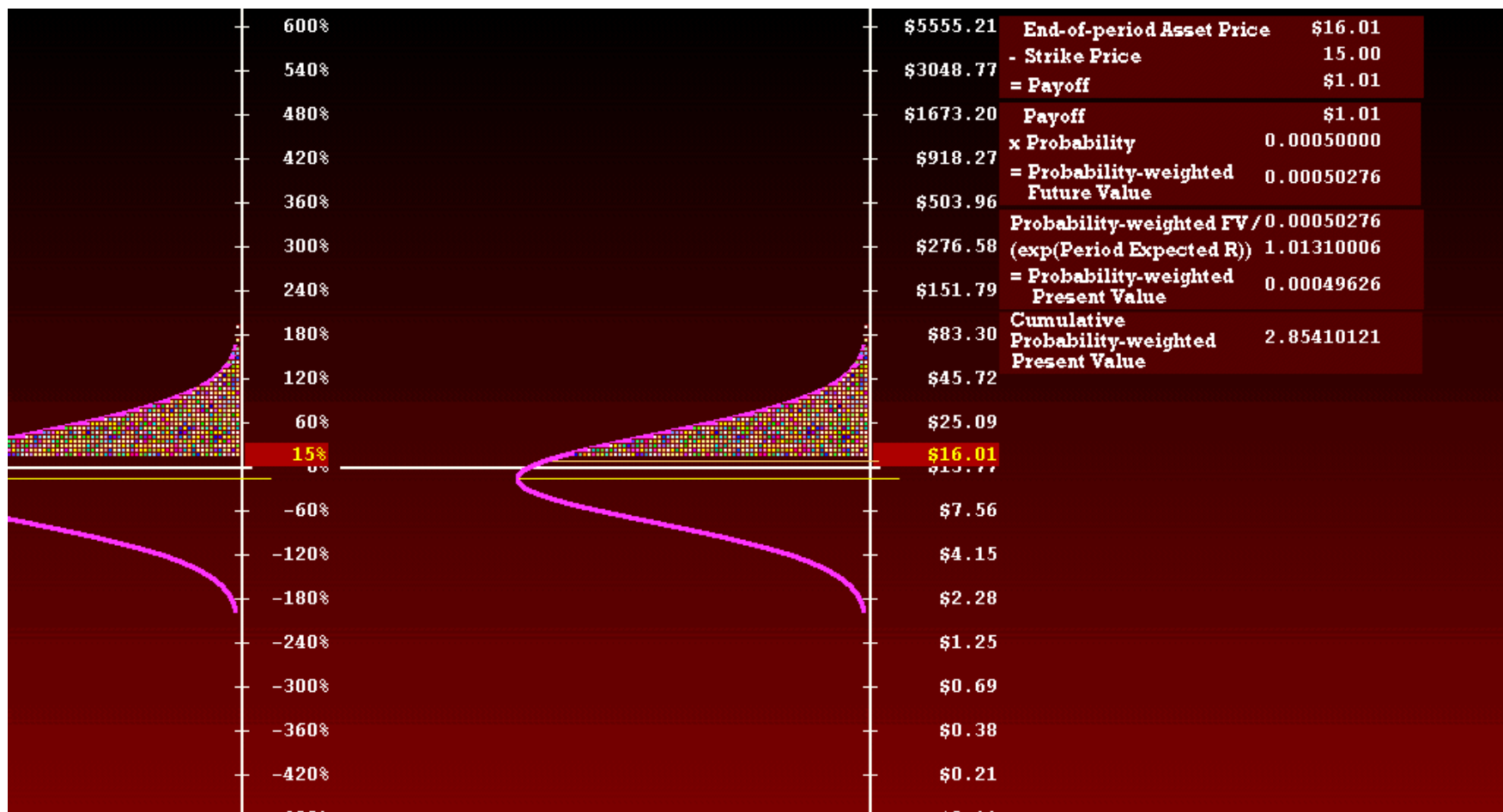


We've calculated the probability-weighted present value of this one payoff and we save it.



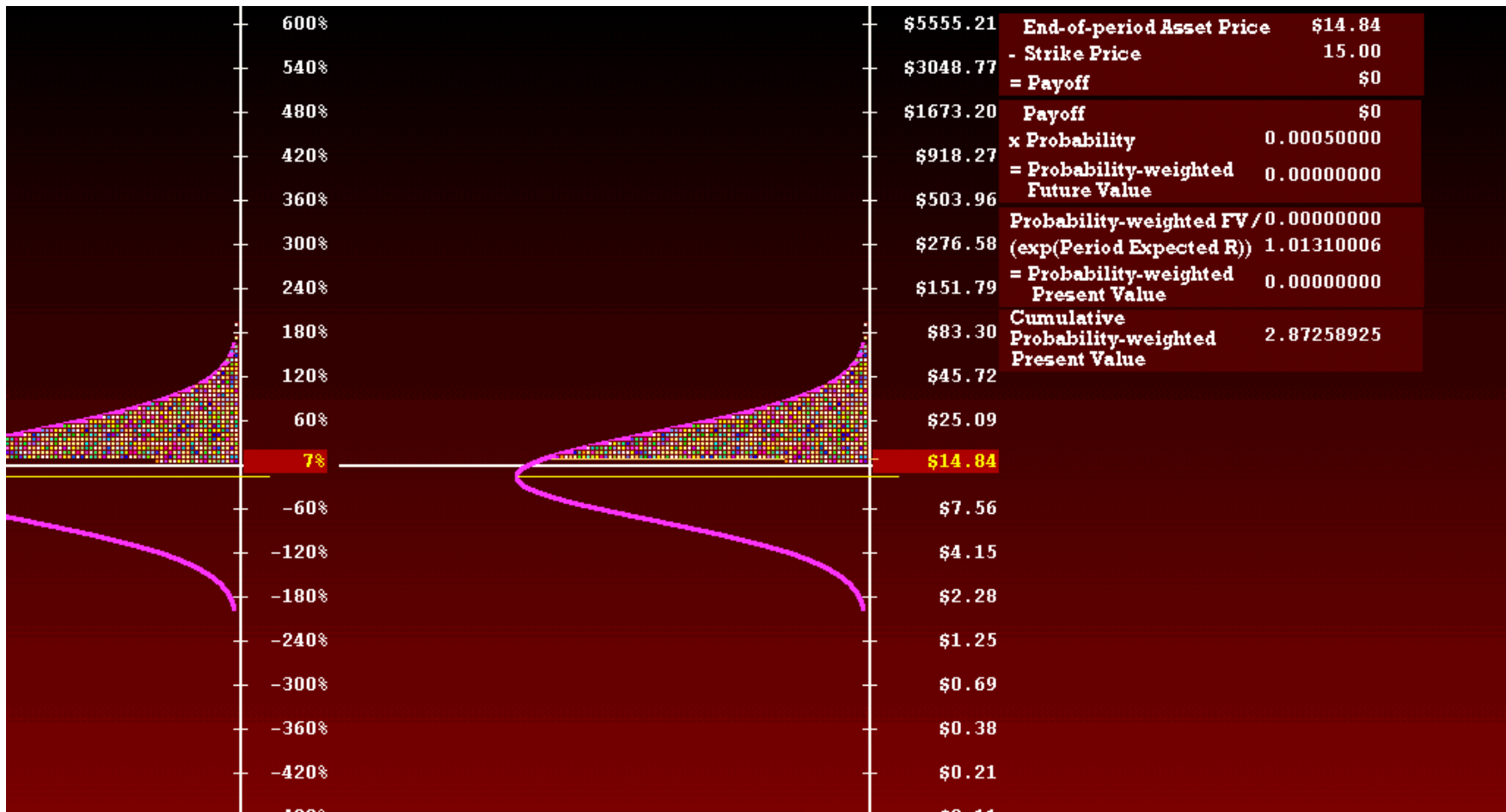
With the forecast we're using for this stock, the second highest price outcome we might expect at the end of 365 days is \$78.29. Its payoff is \$63.29. Its probability-weighted future value is \$0.03164725. Its probability-weighted present value is \$0.03123803. We add this payoff's probability-weighted present value to that of the first outcome.

And so we work our way through the entire bell-shaped probability distribution.



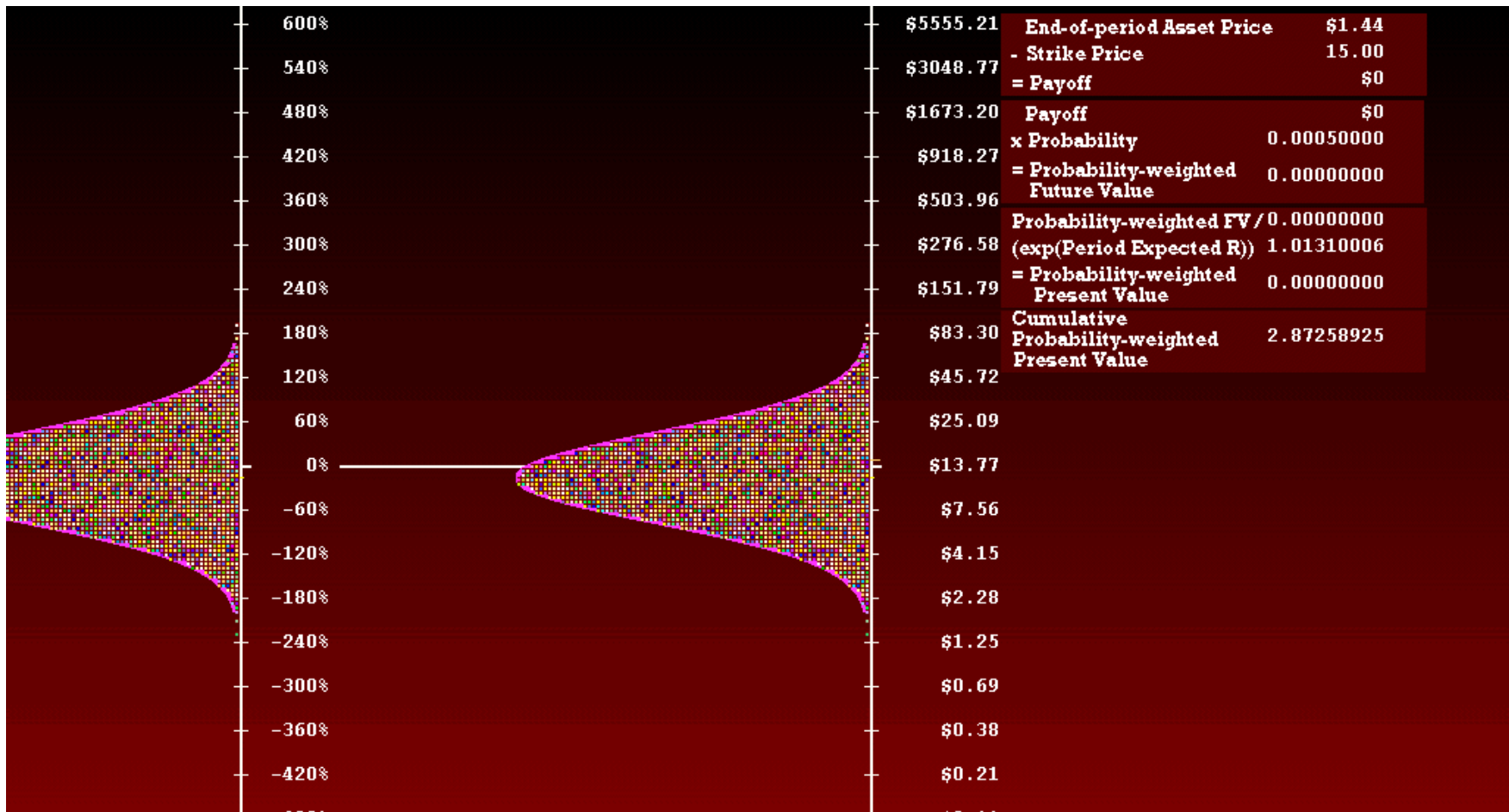
### Payoffs near the strike price add little to the value of the option.

We see that, when the stock price at the end of the 365 days is close to the strike price, the payoff is small. It adds very little to the cumulative probability-weighted present value. A payoff of \$1.01 adds less than a twentieth of a penny to the value of this option.



**Payoffs below the strike price add nothing to the value of the option.**

Once the stock price is below the option's strike price, the payoff is zero. It adds nothing to the option's probability-weighted present value.



**We get an option value half way between the marketplace bid and ask prices.**

When we divide the bell-shaped curve into 2,000 possible outcomes, the option value we get is \$2.87258925. Had we been more precise and divided the bell-shaped curve into 100,000 possible outcomes, we would've gotten an option value of \$2.8754.

In the marketplace, the ask price for this option is \$3.00. The bid price is \$2.75. The value we

calculated is half way between the bid and ask prices.