

We did the math to see if it's worth buying a ticket for the \$393 million Mega Millions jackpot



(AP Photo/G-Jun Yam)

- **Friday's Mega Millions drawing has a jackpot worth \$393 million.**
- **A useful tool in deciding whether to buy a ticket is the expected value of that ticket.**
- **After factoring in taxes, it might be a bad idea to spend your \$1 on the lottery.**

The [Mega Millions drawing for Friday evening](#) has, as of noon ET, an estimated jackpot of about \$393 million.

While that's a huge amount of money, buying a ticket is still probably a losing proposition.

Consider the expected value

When trying to evaluate the outcome of a risky, probabilistic event like the lottery, one of the first things to look at is [expected value](#).

The expected value of a randomly decided process is found by taking all of the possible outcomes of the process, multiplying each outcome by its probability, and adding all of these numbers up. This gives us a long-run average value for our random process.

Expected value is helpful for assessing gambling outcomes. If my expected value for playing the game, based on the cost of playing and the probabilities of winning different prizes, is positive, then, [in the long run](#), the game will make me money. If expected value is negative, then this game is a net loser for me.

Lotteries are a great example of this kind of probabilistic process. In [Mega Millions](#), for each \$1 ticket you buy, you pick five numbers between 1 and 75, and then an extra number between 1 and 15. Prizes are then given out based on how many of the player's numbers match the numbers chosen in the drawing.

Match all five of the numbers between 1 and 75, and the extra number between 1 and 15, and you win the jackpot. After that, smaller prizes are given out for matching some subset of those numbers.

The Mega Millions website helpfully provides [a list of the odds and prizes](#) for each of the possible outcomes. We can use those probabilities and prize sizes to evaluate the expected value of a \$1 ticket. Take each prize, subtract the

price of our ticket, multiply the net return by the probability of winning, and add all those values up to get our expected value:

(Business Insider/Andy Kiersz, odds and prizes from Mega Millions)

Looking at the basic case, we end up with a positive expected value of 69 cents, making it look like a Mega Millions ticket might be a good investment.

But there are a few catches.

Annuity versus lump sum

Looking at just the headline prize is a vast oversimplification.

First, the headline \$393 million grand prize is paid out as an annuity, meaning that rather than getting the whole amount all at once, you get the \$393 million spread out in smaller — but still multimillion-dollar — annual payments over 30 years. If you choose instead to take the entire cash prize at one time, you get much less money up front: The cash payout value at the time of writing is \$246 million.

Looking at the lump sum, we get a pretty big cut into our expected value, which falls to 13 cents:

(Business Insider/Andy Kiersz, odds and prizes from Mega Millions)

The question of whether to take the annuity or the cash is somewhat nuanced. The [Mega Millions website](#) says the annuity option's payments increase by 5% each year, presumably keeping up with and somewhat exceeding inflation.

On the other hand, the state is investing the cash somewhat conservatively, in a mix of various US government and agency securities. It's quite possible, although risky, to get a larger return on the cash sum if it's invested wisely.

Further, having more money today is frequently better than taking in money over a long period of time, since a larger investment today will accumulate compound interest more quickly than smaller investments made over time. This is referred to as the [time value of money](#).

Taxes make things much worse

In addition to comparing the annuity with the lump sum, there's also the big caveat of taxes. While state income taxes vary, it's possible that combined state, federal, and, in some jurisdictions, local taxes could take as much as half of the money.

Factoring this in, if we're taking home only half of our potential prizes, our expected-value calculations move into negative territory, making our Mega Millions "investment" a bad idea. Here's what we get from taking the annuity, after factoring in our estimated 50% in taxes. The new expected value is now underwater, at -7 cents:

(Business Insider/Andy Kiersz, odds and prizes from Mega Millions)

The hit to taking the one-time lump sum prize is just as devastating:

(Business Insider/Andy Kiersz, odds and prizes from Mega Millions)

After factoring in taxes, then, our "investment" in a Mega Millions ticket doesn't necessarily seem like a great idea.

NOW WATCH: [Wells Fargo Funds equity chief: Companies were being rendered obsolete long before Amazon emerged](#)

More From Business Insider

- [Trump says the military is 'locked and loaded' to strike North Korea —](#)

Here's how it would go down

- Elon Musk responds to story of him putting his assistant through a 2-week test after her raise request
- James Damore has an 'above decent' chance of winning his legal case against Google

The expected return on a \$2 Powerball ticket.
(Assuming a lump sum payout, after federal taxes, and accounting for the likelihood of sharing the jackpot as ticket sales increase)

