... An apocryphal example concerns the statistician who drowned while fording a river that was, on average, only three feet deep, as depicted in the sensitive portrayal by cartoonist Jeff Danzinger. ... In everyday life, the Flaw of Averages ensures that plans based on average customer demand, average completion time, average interest rate, and other uncertainties are below projection, behind schedule, and beyond budget.

... Red Lobster
Summer 2003: Red Lobster seafood restaurants promote “Endless Crab: a celebration of all the hot, steaming snow crab legs you can eat.” Shortly thereafter, the President of Red Lobster was replaced. According to the *St. Petersburg Times*, “the move came after management vastly underestimated how many Alaskan crab legs customers would consume.” Furthermore, “The chain was pinched by rising wholesale prices.”

I suspect that during the planning of the ill-fated promotion, a high-level manager asked for the average number of customers expected to order crab. Further, the manager might have inquired about the average number of helpings per customer and the estimated price of crab. It would have been tempting to calculate the expected profit of the promotion based on these three numbers, but this approach would have been deeply flawed.

If the number of helping exceeded expectations, then the chain was poised to lose money on each crab-eating customer. According to the *Times*, “It wasn’t the second helping, it was the third one that hurt,” company chairman Joe R. Lee said in a conference call with analysts.” Worse, the uncertainties were linked: if demand exceeded expectations, the promotion itself had the potential to drive up the price of crab. ... Thus estimated profit associated with the average demand, the average number of helpings, and the average price was higher than the average profit.

... Red River
Spring 1997: The U.S. National Weather Service issues a forecast that the Red River is expected to crest at roughly 50 feet. The *New York Times* later quoted experts who said the problem was “that more precision was assigned to the forecast that was warranted.” ... Assume that, at the time of the forecast, the expected crest level is indeed 50 feet, but the actual level is still uncertain. In this version, Mother Nature determines the weather by flipping a coin. Heads creates torrential rains, which results in a 55-foot crest. Tails creates a mere drizzle, leading to a 45-foot crest. Because the dikes are designed to withstand a 50-foot crest, there is no damage when a tail occurs. But don’t forget the 50 percent chance of a head, in which case flooding results in $2 billion in damage.

In short, the damage resulting from the average crest of 50 feet (the average of 45 and 55) is zero, whereas the average damage (the average of zero and $2 billion) is $1 billion. In fact, what occurred in Grand Forks was a disastrous flood, forcing an estimate 50,000 people from their homes...

... Red Ink in Orange County
Summer 1994: Interest rates are low and expected to remain so or fall even farther. Orange County, California, has created a financial portfolio to fund the pensions of its teachers and firefighters, based on the expected future behavior of interest rates. For several years, this fund run by County Treasurer Robert Citron, has yielded much higher returns than comparable funds in similar municipalities. For the sophisticated investor, this actually a red flag; there is no free lunch, as they say. John Moorlach, who unsuccessfully runs against Citron in 1994, argues in his campaign that “Mr. Citron believes he can accurately anticipate the market all the time, and also outperform everyone. That’s impossible.” Nonetheless, so many people line up with their money that the county has to turn investors away. In fact, the fund has naively leveraged itself into a very risky position and goes bankrupt in December of 1994.

In 1995, Professor Philippe Jorion of the University of California at Irvine showed that if the county officials had explicitly considered the well documented range of interest rate uncertainties instead of a single average interest rate scenario, they would have detected the likelihood of the looming train wreck.

There was absolutely no need for such a pension to shot for the moon. Moreover, had the county’s government members understood the increased risk they faced as a result, they would no doubt have adopted a more conservative investment strategy in time to prevent the debacle.

Source: The Flaw of Averages; Sam L. Savage, 2009