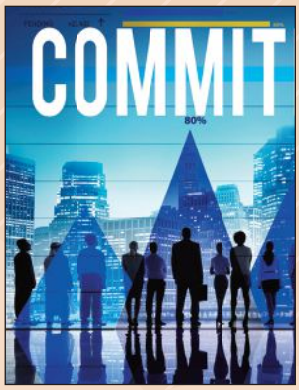
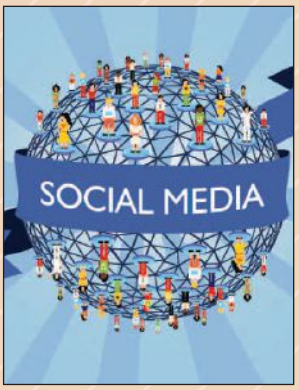
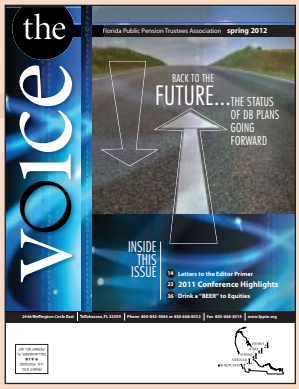
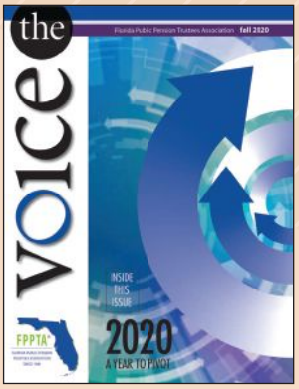
the voice

Florida Public Pension Trustees Association **Annual Edition 2022**









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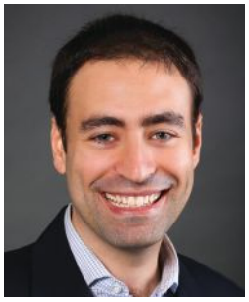
Thinking with Probabilities



Israel Bichachi, Gabriel Roeder Smith Consulting

You've probably heard actuaries talk about probability or expectations. While some think that probability is one of those topics that is best left to the actuaries, I happen to disagree – being able to think with probabilities might even be more important for a Pension Trustee than it is for an actuary. Consider the following three scenarios:

• **Fair Chance:** When considering whether to support the Bay of Pigs Invasion, President Kennedy asked for a second opinion from the Joint Chiefs of Staff, to which they told him there was a "fair chance" of success. Interpreting this optimistically, Kennedy went ahead with the invasion. After the fiasco, it was discovered that "fair chance" only meant around a 30 percent probability of success.

• **No Chance:** When discussing the 2016 US Presidential election, Alice mentions that popular statistical site FiveThirtyEight placed about a 30 percent probability that Donald Trump would win the election. Bob then says, "but he ended up winning! They said he had no chance! They were wrong! Those statisticians don't know anything!"

• **Unknown Chance:** The actuary, in conjunction with the investment consultant, recommends lowering a plan's investment return assumption from the current rate of 7.5 percent. The actuary says, "Based on your plan's asset allocation, the probability of earning a 7.5 percent average return over a particular time horizon is only 30 percent." One Trustee says, "This guy says we won't earn 7.5 percent. How can he possibly know what's going to happen? There's just no way to know!"

If we lived in a world where there was no uncertainty, things would be simple. Everything would either be true or false and that would be the end of it. But we don't live in such a world, so we are forced to deal with things that *might* be true or might be false. To make matters more complicated, some uncertain events might be likelier than others. Fortunately, we have a way of describing the certainty of these events by assigning them *probabilities*. One way to view probability is as a measure of the degree of belief that we think an event will happen. Let's consider a few basic examples:

• We are (almost) certain that the sun will rise tomorrow, so the probability that the sun will rise is (almost) 100 percent.

• It is (almost) certain that you won't meet a unicorn today, so the probability of this event is (almost) 0 percent.

• How about the probability that your next toss of a fair coin lands on heads? This one can go either way – it is just as likely for the event to happen as it is for it to not. So, we assign it a probability of 50 percent, right between 0 percent and 100 percent.

With probability, the likelier an event is to happen, the higher a probability we assign it. The less likely, the lower.

When it comes to your investment return assumption, your actuary can tell you the probability that your Plan will achieve your assumed return over a particular time horizon based upon your current asset allocation and statistical forward-looking assumptions for each asset class. Your actuary can also tell you how raising or lowering this assumption or changing the asset allocation would affect this probability. All the number crunching is done by your actuary – all you need to do is have an intuitive feel for what these probabilities mean for your plan.

Once you are given a probability assessment by your actuary, what do you do with it? Since probability can be considered as a degree of belief about an uncertain future event, this number should give you an internal *feeling* or intuition about the likelihood of its occurrence. Of course, having only an intuition about probabilities isn't enough – it is important that these probabilities are "well calibrated." Here are some examples to help you calibrate your own probabilities:

50 percent: This should be your maximum state of uncertainty. 50 percent is what you feel when you flip a fair coin, or when you make a wild guess on a true or false question.

60 percent: A 60 percent probability of success should make you feel the way you do about the chance that a random NFL kicker will make a 55-yard field goal.

70 percent: A 70 percent probability of success is how you should feel about the chance of winning in Texas hold-em poker before seeing the flop when you are holding Ace-Queen, and your opponent holds King-Queen.

80 percent: You should feel as confident about 80 per-

cent as you would about wildly guessing and missing a five-possible answer multiple choice question.

90 percent: 90 percent probability should make you feel as confident as you would that I won't guess the number you are thinking between 1 and 10.

95 percent: It is no surprise that expectant women rarely deliver on their actual due date. The confidence you have that it won't happen is about what you should assign to all events with a 95 percent probability.

99 percent: In 2019, a 65-year-old woman had a very good chance of not dying. The confidence she should have of making it from 65th to her 66th birthday is the confidence you should feel for all events with 99 percent probability.

(The examples above can also be used for probabilities under 50 percent. For instance, if a 65-year-old has a 99 percent chance of surviving until her next birthday, then 1 percent probability should feel like the chance of a 65-year-old not surviving the year.)

Of course, just the examples above are not going to fully calibrate someone. A real calibration session would ask you to guess the probabilities of certain events, and score you based on how close your predictions were. However, there is evidence that a single 3.5-hour session of calibration exercises can be enough to adequately calibrate most people's internal probability estimates.

Why is the ability to use probabilities so important to a Trustee? Here are a few reasons:

• Being able to speak with probabilities gives Trustees the ability to speak the same language with each other and communicate more precisely. Don't make the same mistake Kennedy made!

• Trustees can use probabilities to help determine how their risk appetite translates to appropriate actuarial assumptions, which will help them avoid adding new unfunded liabilities. If an actuary says there is a 30 percent chance of achieving the assumed return over a particular time horizon, that should feel like something. It should *feel* like a 30 percent chance ought to feel.

• Putting a well-calibrated number on an event will reduce the chances you fall prey to common cognitive biases that can cause you to over or underestimate its chances and lead to poor decisions.

• Most importantly, Trustees are fiduciaries to their Plan. They have a legal and ethical responsibility to make sure their decisions are well informed. Thinking with and using probabilities gives you the tools to do just that.

About the Author:

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