Embracing the Uncertainty of the Iran Nuclear Deal

Sam L. Savage 9/19/2015

"The only certainty is that nothing is certain"

- Pliny the Elder, c. 79AD

The Iran nuclear deal is fraught with uncertainty. And it is easy to reduce this complex issue to two sound bites: “Iran will cheat” or “Iran will comply”. But believing in either scenario leads to what I call the *flaw of averages*, which states that plans based on average assumptions are wrong on average. Combatting this problem requires an honest recognition of uncertainty, as practiced in financial engineering, petroleum exploration and military war gaming. But many decision makers in business and government do not appear to have the permission to be uncertain, which can lead to disaster.

Options

The most famous solution to a flaw of averages problem is the Black-Scholes option pricing formula, which is explicitly based on the *uncertainty* of stock prices, not *average* stock prices. The theory of options embraces uncertainty by teaching that even without an opinion on the average direction of a stock, you can make money either way based on the volatility of the stock.

In the Iran debate, “comply” and “cheat” are analogous to the stock going up or down. What is missing from the argument are details of our options to either lock in our gains or cut our losses in face of the uncertain outcome. To focus on the optionality, imagine an experiment in which the U.S. and Iran agree to the deal, and then Iran determines its behavior with a coin toss.

Outcome 1: Iran complies, and the removal of sanctions fosters liberalization and a vibrant middle class. Do we have options in place to establish a mutually beneficial economic relationship after decades of antagonism? If not, China may be the real winner, just as Iran was the winner when we invaded Iraq. Outcome 2: Iran cheats, gets back in the bomb business, and with the financial pressure removed, amps up terror funding. Do we have the option to double down on the sanctions with world outrage at our backs? Or will the coalition unravel, allowing Iran to have its cake and eat it too.

And what about all the other options? And what if we don’t do the deal? And what will Israel do? And how about the Saudis and the Russians? You nailed this one, Pliny.

Unfortunately the depth of analysis required for this issue doesn’t provide for gripping editorials on either side. And even if it did, our relationship with Iran dictates that we keep our most powerful options top secret, so a successful outcome cannot be accomplished through sound bites. But hopefully somewhere behind closed diplomatic and defense department doors

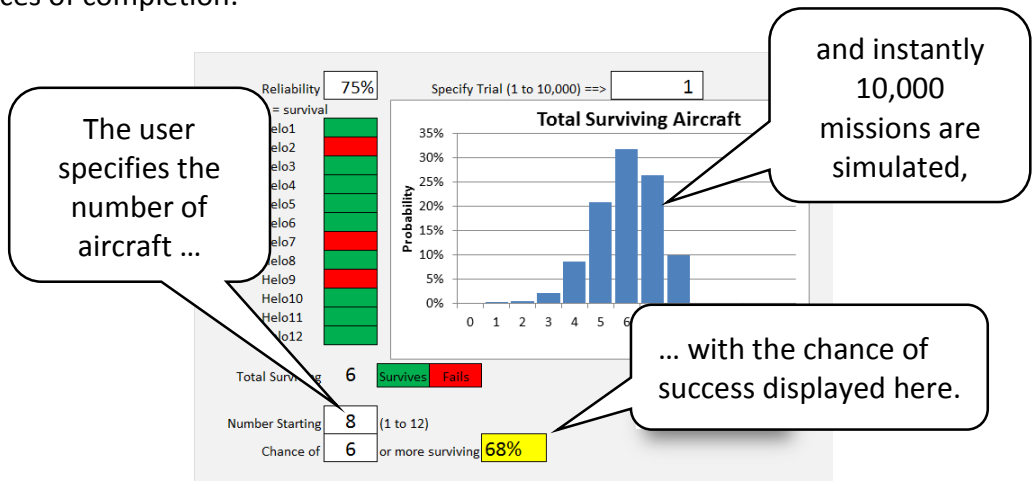
there are negotiators and analysts with enough confidence to be uncertain, because that is the only way to dream up options for opportunity in today's world.

Unfortunately history may indicate otherwise. In fact the Naval Postgraduate School (NPS) in Monterey California, teaches a case on how average-based thinking, led to disaster in an earlier chapter of the Iran Saga. Operation Eagle Claw was the mission to rescue 52 Americans taken hostage by Iranian revolutionaries in 1979. It was recently referred to by former President Jimmy Carter in his news conference on August 20, 2015 when he said: "I wish I'd sent one more helicopter to get the hostages … and I would have been re-elected."

NPS Professor of Practice, Jeff Kline, uses the case study to introduce NATO senior leadership to best practices in risk assessment. The PowerPoint deck is available here.

Wayne Hughes, a retired U.S. Navy Captain and Professor of Practice at NPS describes how the planning of Operation Eagle Claw, which required six helicopters for success, was a poster child for the flaw of averages. "Reliability of each aircraft was estimated to be 75%," says Hughes, "so one might assume that eight aircraft would be enough because 75% of 8 is 6." But that doesn't mean that *exactly* six would survive. Theoretically, starting with eight aircraft provided only a 68% chance of success!

Helicopters.xlsx is a SIPmath model in native Excel, which lets you experiment with the reliability and number of aircraft sent, then instantly simulates 10,000 missions to determine the chances of completion.



Helicopters.xlsx, a SIPmath Simulation in Excel

Lieutenant Commander Connor McLemore, who teaches SIPmath modeling in his spreadsheet modeling class at NPS, is developing a more realistic model to present at ProbabilityManagement.org's annual meeting in San Diego in January 2016. "SIPmath is ideal for providing decision makers with real insights on military problems requiring short turn-around times," says Lt. Cmdr. McLemore. "Additionally, SIPmath allows models to easily access real data sets. It may be a poor assumption that helicopter equipment failures will occur

independently when overloaded helicopters are operating together in sandstorms or at high temperatures. SIPmath coupled with real data allows correlation among helicopter failures based on environmental conditions to be explicitly modeled quickly and easily."

Phil Fahringer, a graduate from NPS says: "It is the instantaneous interactive nature of SIPmath, and the representation of the uncertainties as distributions, that truly illuminates risk and provides more relevant and actionable decision support."

Retired U.S. Navy Captain and NPS Senior Lecturer, Thomas H. Hoivik, who was Commanding Officer of a squadron providing aircraft for the mission says, "Bottom line, planning takes both good quantitative and qualitative factor analysis, plus the wisdom of experience to fully understand the risk and uncertainty."

That advice serves us well in the current nuclear deal with Iran.

Dr. Sam L. Savage is Executive Director of ProbabilityManagement.org, a 501(c)(3) nonprofit that is re-thinking the way we communicate and calculate uncertainties. He is also a Consulting Professor of Management Science & Engineering at Stanford University, and Author of The Flaw of Averages: Why we Underestimate Risk in the Face of Uncertainty.

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