

What Wall Street Needs

Does Wall Street need more physicists? This is a question Ira Flatow put to MIT Professor Andrew Lo, the Director of the MIT Laboratory for Financial Engineering, in a recent radio interview on National Public Radio's Science Friday (March 13, 2009). Professor Lo's answer was an unequivocal "Yes." Rather than believing that the financial rocket scientists may be at least partly to blame for the crisis in finance and risk assessment, Professor Lo believes the crisis is a sign that we need more physicists on Wall Street. "We didn't have enough quants to understand the risks we were taking."

I wonder if Professor Lo is right. I suspect that the proliferation of physicists and engineers on Wall Street contributed to the financial crisis, and several concerns would cause me to pause before signing up the next batch of physicists to work as masters of the universe.

First, for all of the computers and mathematics employed in finance, finance is not physics or engineering. It is not a physical science. Finance is fundamentally about human behavior and has more in common with the social sciences than the physical sciences. Although we may balk at resorting to a concept such as Keynes' animal spirits in describing the unpredictable and irrational ways in which human behavior sometimes manifests itself, we must acknowledge that the rational decision-making agent of classical economics who always seeks to maximize his or her utility is largely a fiction. Most of us are driven by a whole host of motivations, biases, and sub-optimal decision-making rubrics that in combination add up to Keynes' animal spirits.

Oddly enough, it has been the relatively recent quantitative analysis of investor behavior that has made Keynes's animal spirits respectable. Human irrationality and sub-optimal decision making is a subject of study itself in the field of behavioral finance—a field in which Professor Lo himself has worked and written.

My worry is that the physicists and engineers coming out of graduate school and entering the world of finance are not as smart as Andrew Lo about the potentially quirky behavior of financial markets because of our animal spirits. I am reminded of an engineering graduate from West Point who was a student in one of my MBA corporate finance classes. The student was struggling with the variable terminologies used in finance and with the variable interpretations that could be applied in financial statement analysis. When I said that surely the subject was no more difficult than engineering, he disagreed. In engineering, he said, all he had to do was insert the appropriate values into the right formula to arrive at the right answer.

If only finance were so straightforward, but it's not. We often don't know if our answers are right. Finance is not a closed system, and a naïve belief in the correctness of models and formulae will undo us. Every finance engineer or quantitative analyst must always be on the look out for how our animal spirits can upset the system or lead to unpredictable or surprising results. I'm not sure physicists are the best people to do this, even if they may have the most advanced quantitative abilities.

My second concern about putting more physicists to work on Wall Street follows from the first. Because finance is essentially a study of human behavior, any system of analysis used to model valuations or risks becomes an element in the market behavior that it is modeling and a factor in the market's behavior. This is a phenomenon physicists are accustomed to on the sub-atomic scale but not on the macro scale. It is only at the sub-atomic scale that attempts to measure a system perturb the system. But in finance and economics, the phenomenon occurs frequently—if

not in measuring the system, in modeling it. Valuation models that successfully account for valuation anomalies sometimes cause the anomalies to disappear as investors using the models to capture the anomalies alter the market dynamics that caused the anomalies. System models influence behavior which in turn changes the system. The outcome may be different from what the original model predicted because the model did not take into account its own influence on the underlying behavior it was modeling.

The failure of the risk models that underpinned the sub-prime lending boom was not a failure of the models per se. It was not as if someone used an incorrect tensile strength factor in calculating the load capacity of a girder, or the wrong equation for wind-shear on a wall. The failure was in not taking into account how behavior would change in response to the widespread use of the models, and how that changed behavior would then change the risks. Would a physicist or an engineer accustomed to modeling macro behavior anticipate that his or her model would be its own undoing? Would he or she think that the more the model was applied, the more it might change the behavior it was modeling?

Lastly, I'm concerned about a bias behind the idea that Wall Street needs more physicists. Part of Professor Lo's argument is that the physicists are needed because Wall Street needs more smart people. There's no question Wall Street needs smart people, but are physicists our only choice? Professor Lo seems biased towards those trained in the physical sciences—perhaps not surprising bias for someone who teaches at MIT. I confess, I share that bias myself. It is hard not to be terribly impressed by the rocket scientists whose mathematical and quantitative skills far surpass so many of ours.

But these skills are just one form of smarts, and what Wall Street needs is not a lot of smart people who have been trained as physicists but a lot of smart people who have been trained in a variety of disciplines. If we fall into the trap of thinking that the best and the brightest happen to be those trained in the physical sciences, or even in mathematics, computer science, and the allied quantitative disciplines, we run the risk of falling into group think.

We need more than just math geeks for Wall Street. As James Surowiecki observed in his book, *The Wisdom of Crowds*, the combined decision-making ability of a group can exceed the ability of the most capable member of the group, but only if the group is diverse. Diverse perspectives and skills can make a group smarter than the smartest of the group. But conversely, if a group is not diverse, it may fall into group think, with members reinforcing the validity of their singular perspective. In such a case, groups make poor decisions. Rather than being smarter than the smartest, it becomes dumber than the average.

Wall Street needs smart people, but not all of whom speak the same language, use the same tools, and have the same training. We need philosophers as well as physicists, historians as well as mathematicians. Only under these circumstances—when psychologists and physicists, engineers and anthropologists, sociologists and computer scientists are working side by side, will the aggregate wisdom of Wall Street exceed the sum of the parts. Only then, might we have some faith that the masters of the universe won't lead us into another financial and economic quagmire.

So, hold off on hiring more physicists. Let's hire some other smart people instead.

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