



Emanuel Derman knows something about models. He practiced physics after receiving his Ph.D., but moved to Wall Street in 1985. At Goldman Sachs, he co-developed one of the earliest interest rate models, and later headed their quantitative strategies group. *Business Week* chose his memoir, *My Life as a Quant: Reflections on Physics and Finance*, as one of the top 10 books of 2004.

Models Behaving Badly is Derman's tentative title for his next book. "It's about the different approaches people use to understand the behavior of the world," he said. In it, he distinguishes how theories differ from models, and explains how the unwarranted assumptions of models can lead to incorrect conclusions.

"Theories," Derman explained, "are attempts to grasp the way the world actually is, even if we don't know why. Take Newton's laws. You can't ask why they are correct. That's the way the world is. These are regularities that are always true."

Models are different. "In my view, they are metaphors or analogies," Derman continued. "We say, 'The brain is like a computer,' or 'Stock prices change the way smoke diffuses through a room.' Models are attempts to describe something by using theories that already work in a different field.

"When I first came to finance, I used the principles of physics to try to build something just as truthful. I discovered that although the techniques appear similar, the resemblance is deceptive. When we make analogies, we simplify things," he said.

Many on Wall Street believed their models represented reality. They were disabused of that notion in 2008.

"In physics there may one day be a theory of everything," he said. "In finance and the social sciences, you're lucky if there is a usable theory of anything."

Yet models still have a role to play. "I'm a bit of a Platonist," Derman added. "I think there is some truth out there. I'm trying to distinguish between finding the truth, which is rare, and building models while understanding their inherent limitations.

"Maxwell once remarked that Ampere's experiments could not have led to his results. His experiments seemed to confirm his intuition rather than point to it.

"I believe in intuitive knowledge, but you don't just wake up with it. It comes after a lot of hard work. Models are a step on that road," he concluded.

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Understanding When Models Behave Badly

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