

## William Irving, '87 (6-1), SM '91, MEng '92, PhD '95

### Quantitative theory backs up investment instincts



Growing up in suburban Denver, Bill Irving stood out as a math and science kid. "For many years in elementary and junior high school, I was left to my own devices to learn math and science – rather than be bored in class," he says. This isolation finally abated in the summer before his senior year when he went to the Frontiers of Science Institute at the University of Northern Colorado. Following this very affirming experience, Bill decided to study engineering at MIT — specifically chemistry followed by medicine.

As an undergraduate at MIT, Bill Irving was struck by two realities: how positive he found his experience being part of the Chi Phi fraternity and how potentially demoralizing it was to keep up with all the brilliant people in his classes. Fortunately, Bill's frat brothers remain life long friends and ultimately he found at MIT that he was inspired by his very bright classmates and that "feeling humbled was not such a bad thing."

#### Not just about circuits

By his sophomore year, Bill Irving was tending towards Course VI particularly because of his experiences taking several classes such as Al Drake's 6.041, Probabilistic Systems Analysis. His eyes were opened by the diversity of Course VI. "It wasn't just about circuits," he notes. From his doctoral studies, his engineering career in battlefield surveillance and even his career in finance, Bill still relies on the skills he learned in 6.041 for probabilistic modeling.

Taking Alan Oppenheim's 6.341, Digital Signal Processing at the time that compact discs were usurping records as the preferred medium for music storage, Bill found it really cool that sound could be digitized and then filtered using the techniques taught in the class. He also notes "Prof. Oppenheim's textbook *'Discrete-Time Signal Processing'* was a masterpiece – representing a culmination of many decades of dedicated thought and research."

#### Estimation theory and cycling through Vermont: the path to graduate school and beyond

Following his undergraduate years, Bill Irving worked full time for two years at MIT Lincoln Laboratory. His Lincoln colleagues Rick Barnes and Dennis Blejer were particularly influential. Rick taught him the essentials of detection and estimation theory, and was an enviable master of back-of-the-envelope calculations. Dennis taught him the essentials of electromagnetic wave theory and also the beauty of cycling through the hills of Vermont.

Lincoln Lab also fostered Bill Irving's move back to graduate school by funding his studies through their Staff Associate program, and he continued to work for them during the next five summers.

Back at MIT, Bill joined the Laboratory for Information and Decision Systems (LIDS), working with Professor John Tsitsiklis on his Masters thesis and with Professor Alan Willsky on his doctoral thesis.

"My graduate career taught me that learning can be a very personal, human endeavor; initiative and hard work are im-

portant, but more so are the interactions and collaborations with others. With regard to these others, my tremendous good fortune was to be surrounded by top-notch advisors, teachers, colleagues and friends."

#### From a sea of red ink to performing on radio and television — lessons in communication

Of the skills he developed through his graduate studies, Bill singles out the value he gained in developing crisp, effective communication – both written and oral. "Alan Willsky used to mark drafts of my papers with a sea of red ink," he notes, yet through collaboration with his Lincoln colleague Shawn Verbout, Bill learned that "the key to clear writing is painstaking, hard work."

Bill Irving transitioned from engineering to finance around 15 years ago when he began a new career in the fixed-income division of Fidelity Investments as a quantitative analyst. His first job was to build and maintain tools for valuing mortgage-backed securities (MBS). At the time, he notes, "he knew close to nothing about bonds or finance. But I was fearless," he continues, "as my MIT training had given me a level of confidence that was not easily shaken." In fact, interacting with traders and portfolio managers who knew the inside jargon did not dissuade him. Today, Bill is a portfolio manager at Fidelity where he leads a team that manages about \$40 billion in fixed income assets, mainly MBS.

Bill not only entered the financial world as an MIT PhD trained engineer, but was still getting his boots on the ground when the 2007-2009 financial crisis hit. "I feel like I gained about 15 years of experience in that short, turbulent period," he notes. In fact, Morningstar nominated one of his MBS funds for 'bond fund of the year'. Although the fund didn't win, he says, "I was fortunate to survive and emerge smarter and more experienced [through this period]."

Although nearly 15 years of experience in the market have given Bill Irving an instinctive feel for how things work, he says he can still back this up with a good understanding of the underlying quantitative theory. Although he rarely develops algorithms anymore, he has been a regular in various tv and online interviews. You can hear him present his sought-after analytically-based financial reports on Bloomberg media and CNBC. Go to: <http://media.bloomberg.com/bb/avfile/News/Surveillance/vWwczf6W79b4.mp3> and <http://video.cnbc.com/gallery/?video=3000105695&play=1>

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