Evolution of the Quant from the Glory Days to the New Normal

J. Michael Steele
University of Pennsylvania, Wharton School
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  ▶ Twain’s Rhyme: Financial History and Possible Futures
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- Let’s Look at a Picture of the Construction of a CDO
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- **The Government**: CDOs created placement for mortgage assets beyond Fannie Mae and Freddie Mac. Politicians could even imagine a day when Fannie Mae and Freddie Mac could be decommissioned.
What is Special about Risk in a Pool of Mortgages?

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  - Always in Demand: Relevant Tools and Relevant Data
Default “Life Times” with Correlation Zero

Mortgage Pair Default Times

Mortgage A vs Mortgage B

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Default “Life Times” with 20% Correlation

Mortgage Pair Default Times

Mortgage A

Mortgage B

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Evolution of the Quant from the Glory Days to the New Normal
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Mortgage B

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- With jointly normal data, we have the tool of correlation to “deal with” dependence.
- True, we have zillions of correlations to worry about, but we “simplify the model” by assuming that all of the correlations are equal. After all, this is still progress, right?
Try a Little Mathematics (or, Day Dream for One Overhead)
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- The “Gaussian copula” is the modestly more scary:

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▶ The famous Li Model is just

$$C_{\text{Gaus}}(F_A(x), F_B(y))$$

This gives you one parameter to deal with dependence and it allows for the kinds of marginal distributions you meet in real life. You lucky rascal, you can now compute away — having “dealt” professionally with the pesky dependence issue.
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  - CDO Issuance: 2007 481 B USD, 2008 61 B USD, and then in 2009 just 4 B USD
- This is what a crash looks like — in the CDO market. The tipping point was in 2006. The equity market did not start its crash until November 2007. The economy ... we’ll it stayed on the skids to 2009 Q1.
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- Lessons Learned? Well, let’s stick to what quants may have learned — and may still worry about.
Quants: Responsibilities and Lessons Learned
Nobody who understands Li’s model will put any blame on his shoulders. He clearly and honestly put forward a simple model that addressed a part of the dependence issue in CDOs. This is what modelers do.
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▶ The business of “originate to distribute” changed the risk characteristics of mortgages.
▶ The ratio of median home price to median household income changed the likelihood of a national decline in housing prices
▶ Absorption of marginal purchasers created fragile owners — so historical rates were less relevant to contemporary estimates.
Quants, the Next Problem, and the New Normal
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- Just don’t check your common sense at the door.