

From: Jerome Stein <Jerome_Stein@Brown.edu>
Subject: Research Program: Quants

Dear Colleagues:

I should like to pose a research program to the operations research profession interested in mathematical finance/economics. I am dismayed at the gap between academic work in boutique journals and the serious problems of policy - that require sophisticated mathematical tools. Think of the fed - they had no idea of what was coming and behave in an ad-hoc panic stricken way.

Below is a set of research questions (i) - (iv). If you know of people/organizations who would be interested in initiating such a research program, could you please forward this message to them.

The questions are:

(i) To what extent did the "quants" in Wall St., Paris, London anticipate the sub-prime mortgage crisis?

(ii) What models did they use?

(iii) How did their analysis compare with that in my paper "A Tale of Two Debt Crises: A Stochastic Optimal Control Analysis", referred to below?

(iv) Was the failure due to the inadequate modeling or to the failure of senior management to accept the warnings?

If this challenge interests your group, you can convey to them the information concerning my paper, whose abstract is contained below. One can access and download the paper by clicking/copying on the SSRN URL
<<http://ssrn.com/author=15886>>
to the paper and you can download it.

For my part, I am embarking on a project whereby I examine to what extent the stochastic optimal control techniques used by mathematicians have useful economic applications.

Jerome L. Stein
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ABSTRACT February 2008

A TALE OF TWO DEBT CRISES: A STOCHASTIC OPTIMAL CONTROL ANALYSIS

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Abstract

Banks should evaluate whether a borrower is likely to default. I apply several techniques in the extensive mathematical literature of stochastic optimal control/dynamic programming to derive an optimal debt in an environment where there are risks on both the asset and liabilities sides. The vulnerability of the borrowing firm to shocks from either the return to capital, the interest rate or capital gain, increases in proportion to the difference between the Actual and Optimal debt ratio, called the excess debt. As the debt ratio exceeds the optimum, default becomes ever more likely. This paper is “A Tale of Two Crises” because the analysis is applied to the agricultural debt crisis of the 1980s and to the sub-prime mortgage crisis of 2007. A measure of excess debt is derived, and we show that it is an early warning signal of a crisis.