

Teaching "Fixed Income Fundamentals" in an Interactive Hands-on Environment (Poster)

Eliezer Z. Prisman

York University, Toronto

eprisman@yorku.ca

Abstract

This poster presentation describes an interactive e-book powered by the Maple software and its use in the undergraduate course: "Fixed Income Fundamentals". The course is offered to third and/or fourth year BBA students. The BBA program does not require students to take calculus at a university level. The Maple software, symbolic software, compensates for the lack of university level calculus. Furthermore, having an excellent 3D and animation capability allows visualizing different processes, thereby gaining an intuitive understanding of different scenarios. These features, together with the numerical NUG package facilitate the programming of a simulated dynamic bond market environment. This environment allows the practice of different techniques of bond portfolio composition as well as risk management strategies. Being an upper level language and having a collection of procedures written for this course requires very little investment in syntax learning.

This eBook is written for an undergraduate first course in fixed income securities - bonds, interest rates and related financial contracts. The book assumes a certain mathematical maturity but not much above "finite mathematics". The use of calculus and optimization is concealed within the software capabilities so readers lacking this knowledge can read the complete book without difficulties. Nevertheless, given interactive and dynamic friendly environments, readers can learn through hands-on experience and appreciate the concepts and their goals.

Professors can use the eBook as lecture notes and provide the students with dynamic, real time visualizations, demonstrating the material, Lopez (2012), Monagan (2013). The examples and MAPLE commands are embedded in the text. Hence, Professors, during the lecture can, with a keystroke, recalculate the examples for different parameters, and animations can be run resampling the variables demonstrating a true random dynamic environment.

I conduct the lectures in a PC lab and split the time within lectures on theoretical material and hands-on experience. The course takes a hands-on approach and most lectures are divided between a theoretical lecture and a lab. Each lecture has a lab associated with it, where the theoretical material of the lecture is implemented in a practical environment. This is executed by utilizing the library of functions tailored for this course and case studies that are prepared and correspond to the theoretical material studies in the lecture.

For example consider a lab dedicated to the immunization technique which requires at each step, as market conditions change: solving an optimization problem for the estimation and smoothing of the term structure, calculating the duration of each bond of any order, composing the bond portfolio based on a solution, may be second best, of another optimization. The solution may

*Proceedings of the 10th Chais Conference for the Study of Innovation and Learning Technologies:
Learning in the Technological Era*

Y. Eshet-Alkalai, I. Blau, A. Caspi, N. Geri, Y. Kalman, V. Silber-Varod (Eds.), Raanana: The Open University of Israel

be tedious and the students not familiar with the theory behind its solution. However, the lectures highlight the meaning of the input parameters and the interpretation of the solution thereby allowing students to use the software very much like it is done in a commercial environment.

I found that students in my courses obtained a deep intuitive understanding of the real environment. While the first two lectures require some investment in the software, after the third or so lecture students were very comfortable with its use. Students' feedback at the end of the course, and in particular after they joined the labor force, was very positive and appreciative.

Keywords: eBook, Maple, interactive learning, fixed income.

References

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