COURSE BROCHURE

BUILDING AN ALM & BALANCE SHEET OPTIMIZATION MODEL

Overview

In this training, inspired by the book "ALM Modeling and Balance Sheet Optimization -- A Mathematical Approach To Banking" by Diogo Gobira and Lucas Processi, you'll learn to build a balance sheet optimization model using stochastic dynamic programming. This comprehensive course covers everything from data layers to decision variables, business and regulatory constraints, objective functions, modeling strategies, solving techniques, debugging, and reporting. Unique in the market, this online training provides cutting-edge tools to optimize your bank's performance, offering invaluable insights and skills for effective implementation of liquidity management and capital optimization tasks, financial statement and funding mix projections, funding and hedging instrument-level prescriptions, and more.

Who should attend?

- ALCO Members
- Management (Treasurer, CFO)
- ALM Teams
- Treasury Practitioners
- Optimization Experts

11-Week Program of Online Videos & Live Sessions

Fully-functional Model Included!

Source-code Walkthroughs & Discussion Forums

Lots of Business Cases!

Most Practical ALM Course in Market!

Course Requirements

- Basic Knowledge in Finance
- Interest in Learning Programming

Advanced Programming Not Required

QUESTIONS, FEES AND SCHEDULE

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WEEK	COURSE SYLLABUS	HIGHLIGHTS
1	**INTRODUCTION** We begin the course by contextualizing the role of a modern treasury in banks and explaining how the imperatives of the Strategic ALM concept naturally emerge as a response to the problems of lack of coordination between assets and liabilities. Finally, we discuss how Mathematical Optimization can assist in the practical implementation of such concepts.	• ALM History • Treasury Function • Strategic ALM • Holistic Approach • Constrained Optimization
2	**ALM MODEL ARCHITECTURE** In this module, we take a first overview exploring the main layers of an ALM and balance sheet optimization solution, highlighting the main challenges in implementing each of them. We will have a first, still conceptual, contact with the main inputs of the model, ETLs, contract modeling, reconciliation, and mathematical modeling. Finally, we briefly discuss optimization processes, reporting, and data integration.	• ETLs • Contract Modeling • Reconciliation • Mathematical Modeling • Optimization • Reporting • Integration
3	**MATHEMATICAL PROGRAMMING** In this module, students will have their first contact with code examples to recapitulate and apply the main concepts of mathematical programming and optimization. In particular, we will explore examples of use in asset management areas, cash flow matching, OTC procurement, and finally some introductory examples of dynamic programming under uncertainty that will help lay the foundation for the balance model.	• Code Examples • Programming Environment Setup • Julia/JuMP/SDDP • Linear Programming • Mixed Integer Programming • Dynamic Programming • Stochastic Programming
4	**CONTRACT MODELING** In this module, we will revisit the notions of scenario, trajectories, and contracts, as well as implement a library of functions for calculating prices, accruals, cash flows, as well as risk and sensitivity measures such as DV01, CR01, Delta NII, Delta EVE, etc. Finally, we will have our first contact with liquidity risk measures, which will help us encode LCR-style constraints later in the course.	• Pricing & Amortized Cost • Cash Flows Projections • IR Risk: DV01 • Credit Risk: CR01 • IRRBB: Delta NII and EVE • Reinvestment Risk: Repricing Gap • Liquidity Risk: Maturity Ladder and LCR • Duration Gap (Equity Gap)
5	**ETL – EXTRACT, TRANSFORM, LOAD** In this important module, we will show how to extract, transform, and convert ledger account data, contracts, and positions to the internal format of the balance optimization model. Next, we will do the same for different business assumptions, discussing the importance of standardizing and validating data, ensuring that optimization occurs on solid and consistent bases.	• Contracts & Positions • Scenarios & Yield Curves • Typical File Formats: CSV, JSON, TXT, XLSX • Data Structures • Data Validation • Business Assumptions
6	**MODEL BUILDING :: FOUNDATIONS** At this stage, we will create our first balance model! We will define model control and state variables, set up state variable dynamics, add basic accounting rules as well as constraints to calculate the income statement. Next, we will run the model for the very first time to then export our first optimized projections.	• Decision Variables • Auxiliary Variables • Planning Horizon • Rebalancing Frequency • Fundamental Constraints • Objective Function • Mathematical Solver Integration

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7	**MODEL BUILDING :: BUSINESS RULES** Here, we reach the heart of the modeling process. To give realism to the model by adding a wide variety of business rules to the model, such as growth targets, basic assets and liabilities profiling, market limits for investing and issuing, risk targets for IRRBB, DV01, FX, and Liquidity. We'll also discuss how to equip the model with a set of constraints to reconcile optimization with phenomena such as deposits withdrawals, loans lrepayments, loans defaults, and allowance for credit losses and their respective models.	• Growth Targets • Market Limits • IRRBB Targets and Limits • FX Risk Limits • Exposure Limits • Liquidity Risk • Capital Transfer Schedules • Internal Models Integration
8	**REPORTING AND TROUBLESHOOTING** In this module, we will discuss how to navigate, export, and transform the raw results of the model to build understandable balance, income, and cash flow statements with different levels of granularity. We will also create reports with optimal prescriptions for funding and hedging strategies, for example. Finally, we will discuss a series of specific troubleshooting strategies for mathematical programming.	• Balance Sheet Projections • Income Statement Projections • Cash Flows Statement Projections • Optimal Funding Mix • Optimal Hedging and Funding Strategies • Troubleshooting Strategies • Solver Fine-tuning
9	**OPTIMIZATION & USE CASES** With the complete model in hand, we can now discuss specific use cases in investment, funding, hedging, and profitability areas. At this stage, we expect the participation of students who will be called upon to use curiosity and propose debates and challenges.	• FTP & Optimal Funding Mix • Stress Testing • Capital Assessments • NIM Management • Feasibility of Business Plans • Hedging & Funding Prescriptions • Liquidity Risk • Return on Capital Management
10	**GOING STOCHASTIC** Now it's time to take a step further by equipping the model with the ability to perform optimizations not only for deterministic trajectories but also under uncertainty. We will show how to code this in Julia and SDDP, how to generate scenarios for the most typical risk factors, as well as create reports and probabilistic projections for different balance and income accounts.	• Stochastic Optimization • Sampling Schemes • In-Sample vs Out-of-Sample • Risk Measures • Probabilistic Analysis • Risk Buffers Estimation • Balance Sheet Empirical Distribution
11	**CONCLUSIONS** To conclude, in this module we will wrap up everything that has been presented, and share what we see as the main trends and challenges in the area of balance optimization, as well as some research topics that can help leverage our knowledge area even further.	• Wrap-up • Future Developments • Challenges • Market Trends • Final Message

INSTRUCTORS

LUCAS PROCESSI

Author of "ALM & Balance Sheet Optimization - A Mathematical Approach to Banking"

Lucas Processi is an engineer and financial expert with a passion for market risk management and pricing of financial instruments. With a Bachelor's degree in Production Engineering from the Federal Fluminense University (UFF) and a Master's degree in Economics and Finance from the Getulio Vargas Foundation (FGV), Lucas is a market risk manager at the Brazilian National Development Bank (BNDES) and one of the founders of the Financial Risk Academy, where he shares his expertise in quantitative finance and programming with students and professionals alike. Additionally, his experience in the banking industry has enabled him to be a consultant in robo-advisors development, mathematical programming, ALM, and balance sheet optimization.

DIOGO GOBIRA

Author of "ALM & Balance Sheet Optimization - A Mathematical Approach to Banking"

Diogo Gobira is a skilled finance professional and entrepreneur with a strong background in quantitative risk management and mathematical finance. He holds a Master of Science degree in Mathematical Finance from the Institute for Pure and Applied Mathematics (IMPA), and has worked as a Market Risk and Quantitative Modelling Manager at BNDES (Brazilian National Development Bank). Diogo is proficient in a range of technical areas, including programming, databases, derivatives pricing, portfolio optimization, integrated risk management, IRRBB, FTP, stress testing, and balance sheet optimization. Diogo is also a co-founder of Financial Risk Academy, a company specializing in the development of balance sheet optimization models and advanced training and consulting in quantitative finance.

ABOUT US

Financial Risk Academy is a company that helps financial institutions to optimize their balance sheets using dynamic programming and machine learning models. We also provide online training and consulting on ALM, FTP and Balance Sheet Optimization.

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