

Moderné nástroje pre finančnú analýzu a modelovanie

Program konferencie

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MathWorks

Solving Large Optimization Problems in Finance: How MATLAB Can Help You

Solving optimization problems is an important task in Finance. Examples of this are fitting models to data and optimizing portfolios composition based on different criteria. MATLAB provides a very good set of tools for these tasks, with different solver types and heavy customization of how to use them.

We will focus mainly on performance. That is, improving the execution time when optimizing large problems or smaller ones that take many iterations to converge. We will show how to use the different tools available in MATLAB (as, for instance, using a parallel environment). We will also address the provision of gradients and Hessians, and how this will affect both performance and robustness.

Vahe Sahakyan

Bank for International Settlements, Switzerland

Macro-Based Asset Allocation for Official Institutions

In this paper we will introduce the BIS Asset Management Asset Allocation Module (BAAM) –a comprehensive software solution that provides quantitative support to the investment decision-making process of official reserve managers. BAAM is a forward looking tool allowing for the projections of future asset returns, taking into consideration current and future estimated macroeconomic and financial factors. The module covers all three key aspects of the Strategic Asset Allocation (SAA) process: 1) factor modelling; 2) asset modelling and 3) portfolio optimisation. The module allows enough flexibility to meet the demand of users with varying degrees of sophistication and it can handle unconventional monetary policy and negative interest rates.

Martin Železník

Národná banka Slovenska

Public Investment and EU Funds in a Small Open Economy Integrated in the Euro Area

Small open economies within the European Union can be extensively influenced by the utilization of the structural and investment EU funds. In many of these countries, we observe an EU-funds cycle that causes spikes in total investment as the programming period draws near to its end, and a decline after the new programming period begins. As the share of EU-funded public investment and the public investment financed from domestic sources varies highly over time, we decided to explore the differences in the transmission of these two types of public investment shocks into the real economy. We use a version of the EAGLE model calibrated for the Slovak economy integrated in the euro area and extended with EU funds mechanisms. We find that if the part of the total investment that is funded from domestic sources comes from an increase in taxes, the EU-funded investment delivers larger improvement in real GDP. The difference is especially striking for investment funded by an increase of social security contributions paid by firms.

Stanislav Tvrz

Česká národní banka

A New Foreign Block for the CNB Core Model

In this work we present the structure and empirical results of the new foreign block of the Czech National Bank's core prediction model. The new foreign block is more structural than the previous version, which makes it possible to interpret the foreign outlook in a storytelling way. At the same time the model also incorporates the oil price as a production factor.

Zuzana Múčka

Rada pre rozpočtovú zodpovednosť

How Costly is the Retirement Age Cap in Ageing Society? (Analysis of the Pension Reform Reversal in Slovakia)

We assess the adverse fiscal and macroeconomic implications of population ageing in Slovakia, how they can be reduced through pension reforms, and what would be the impact in case reforms were reversed. The latter aspect is highly relevant due to recent withdrawal of earlier reform measures. Compared to other studies we exploit the country-specific information contained in the 2018 Ageing Report projections and integrate this information into a general equilibrium model with overlapping generations. We find that population ageing - if left unaddressed - has major adverse macroeconomic effects, with the debt-to-GDP

ratio in the baseline scenario increasing by more than 100pp. By contrast, implementing comprehensive reform packages helps to alleviate the adverse impact and to spread the adjustment burden more equally across generations. Furthermore, reversal of earlier pension reforms leads to substantial fiscal and macroeconomic costs - going well above the costs of the baseline scenario.

Martin Veselý

Česká národní banka

Measuring Market Risk with Entropy

Since Great Financial Crisis many analysts have been searching for a risk measure with as little as possible assumptions about underlying data. A metric called entropy seems to fulfil this requirement. This metric is used in information theory to describe a "surprise" contained in a message. Since a risk can be considered as the "surprise" as well, the entropy seems to be an appropriate measure. Firstly, a mathematical model of entropy is discussed, then a method how to calculate it is presented and finally it is shown that the entropy can be actually used as a market risk measure in a practical way.

Kristián Barát

ZSE Energia a.s.

Optimalizácia výroby plynovej elektrárne Malženice

Témou príspevku je riadenie optimalizácie výroby plynovej elektrárne Malženice. Príspevok prináša praktický pohľad na riadenie výroby plynovej elektrárne reflektujúci na technické vlastnosti elektrárne ako aj trhové podmienky - najmä vývoj cien elektrickej energie, plynu a emisných povoleniek. Každodenná prevádzka prináša zaujímavé situácie ako sa vysporiadať s príležitosťami na trhu s energiami a maximalizovať tento potenciál v prospech elektrárne.

Philip Gruber

arithmetic Consulting GmbH, Austria

Risk Modelling Using Monte Carlo Methods – Design and Validation of an Insurance Model

Using a Monte Carlo model for risk management purposes requires careful thought about the design and validation of the model. This is especially important when approval of supervisors is involved, as is the case for internal models in Solvency II. Automated validation tests improve the validation process and enable the validators to focus on the topics which matter most. In this presentation, the initial design decisions involved in creating a simulation model are presented together with common validation tests and ways to automate them.

Michal Hojčka, Riccardo Gismondi

R7 CORP k.s.

Optimization of Financial Models Using Evolutionary Algorithms and GPU Computing

Traditional gradient-based optimization techniques are not very useful in case of multimodal or non-differentiable functions which is also the case with many financial models. We use Evolutionary Algorithms (Genetic Algorithm (GA), Covariance Matrix Adaptation Evolution Strategy (CMA-ES), etc.) to provide an alternative and more robust way of optimization. In order to deal with huge computational requirements we utilize GPU parallel computing with CUDA.

Jorge Paloschi, Michal Blah

MathWorks, Humusoft s.r.o.

Master Class: Application Development Workflow - From Algorithm to Production Systems

Sharing analysis results with your colleagues can be challenging, especially when they are not MATLAB users. MathWorks provide several tools and workflows to solve this challenge. During this masterclass we will focus on application building, packaging and deployment to showcase application development workflows successfully used in many industries.

Deploying MATLAB implemented application for production implies undertaking several steps to ensure a safe process. We will be discussing these topics as well as what tools are provided by MathWorks to make this not only a robust process but also make software developers and managers life easier.

Vahe Sahakyan

Bank for International Settlements

Workshop: Macro-Based Asset Allocation for Official Institutions: Introduction to Use

In this workshop, we will cover the theory behind the BIS Asset Management Asset Allocation Module (BAAM) and show its use on practical examples. There will be also time to discuss development aspects of this application and possibilities to use it in your organization.