Macro, Money and (International) Finance:  
A Heterogeneous Agents Continuous Time Approach

Course Description:
This course will expose students to modern continuous time modeling technics at the intersection between macroeconomics, monetary economics and (international) finance. The aim of this course is to develop and teach advanced tools and includes a step-by-step solution procedure that students can apply to a variety of economic problems. (See last page of this syllabus.)

While prior to the Great Recession the key frictions were price stickiness and wage rigidities, the great recession highlighted the importance of financial frictions. Similarly, financial regulation shifted course. Whereas prior to the crisis the focus was on micro-prudential regulation, measuring the soundness and risks of individual banks in isolation, current thinking stresses the importance of macro-prudential regulation with its focus on spillover risks. Several new systemic risk measures were proposed. The course would also cover interaction between monetary policy and macro-prudential policy within a thorough welfare analysis. Another emphasis is a thorough study of the international financial architecture, also in the light of emergence of new digital forms of money. New concepts like Digital Currency Areas and digital dollarization will be discussed.

Lecture Notes:
See link: https://www.dropbox.com/s/r7ek4cy59nda2fp/ECO529_Notes.pdf?dl=0

Online-Option:
The lecture will be live and online via ZOOM.us. Students from the same university are expected to congregate in the same classroom. Ideally, we will have student groups from several universities participating. Problem Sets can be solved in groups of 3 to 5 students, will be submitted to the university point person and passed on to head TAs Alexandre Kopytov and Sebastian Merkel at Princeton.

Structure of the Course:

1. Intro: Run-up, Amplifications, Externalities, Recovery  Sept. 11

Part I: Real Macro-Finance Models with Heterogenous Agents

2. A Simple Heterogenous Agents Model  Sept. 16
3. Endogenous Risk (and Price of Risk) Dynamics  Sept 18,23 (25 TA session)
4. International Model with Sudden Stops/Runs  Sept. 30, Oct 2
Part II: Monetary Models with Aggregate and Idiosyncratic Risk

5. A Simple One-Sector Money Model with Idiosyncratic Risk  Oct 7
6. Cash vs. Cashless Economy and Inflation Risk as Hedge  Oct 9, 14 (16 TA)
7. The I Theory of Money  Oct 21
   Safe Assets and Flight to Safety
8. Welfare: Monetary Policy and Macro-Prudential Policy Interaction  Oct 23
9. International Monetary System: A Risk Perspective  Oct 28
10. Digital Money, Digital Currency Areas, Digital Dollarization

Optional Topics:
Machine Learning and Macro-Models
Reversal Interest Rate – Effective Lower Bound of Monetary Policy
Opening the current account: Consumption-led growth

Readings:

1. Run-up, Crisis-Amplification, Recovery


Brunnermeier, Markus K., Thomas Eisenbach and Yuliy Sannikov, 2013, “Macroeconomics with Financial Frictions: A Survey”, (please study it carefully before class)


Brunnermeier, Markus K, 2015, Baffi Lecture: "Financial Dominance".


2. A Simple Heterogenous Agents Model

See also website: http://scholar.princeton.edu/markus/MacroMoneyFinance


Caballero, Ricardo J. and Alp Simsek, 2018, “A Risk-centric View of Demand Recessions and Macro-prudential Regulation”
https://www.dropbox.com/s/ud0jejrqxsc852/DRSR_37_public.pdf?dl=0
3. Endogenous Risk (and Price of Risk) Dynamics


4. International Model with Sudden Stops/Runs


5. A Simple One Sector Money Model


6. Nominal versus Real Debt

Lecture Notes: https://www.dropbox.com/s/r7ek4cy59nda2fp/ECO529_Notes.pdf?dl=0
7. The I Theory of Money

*Brunnermeier, Markus K. and Yuliy Sannikov, 2015, “The I Theory of Money”. (see website)


8. Welfare

Lecture Notes: https://www.dropbox.com/s/r7ek4cy59nda2fp/ECO529_Notes.pdf?dl=0

9. International Monetary System and Safe Assets

**Brunnermeier, Markus K. and Yuliy Sannikov, 2019, “International Monetary Theory: A Risk Perspective”. (see website).


Brunnermeier, Markus K., Pierre-Olivier Gourinchas, and Oleg Istkoki, “Consumption-Led Growth”, working paper.

10. Digital Money


11. Machine Learning and Macromodels (optional guest lecture)


Additional Course Material:
Additional course material (if necessary) and lecture slides will be made available on jointly shared Google Drive.

Teaching Assistant:
Main TA: Contact person at participating university
Princeton’s TA’s Name: Sebastian Merkel Alexandre Kopytov
Office: 306A 231
E-mail: smerkel@princeton.edu akopytov@princeton.edu

• The preceptors’ job is to act as a catalytic in that process. Please ask him when something is not clear – if you did not understand something, the odds are that somebody else did not either.
Example of Step-by-Step solution Method of generic Macro Models with Heterogeneous Agents

Solving MacroModels Step-by-Step

0. Postulate aggregates, price processes & obtain return processes

1. For given SDF processes \( \text{static} \)
   a. Real investment \( t \), (portfolio \( \Theta \), & consumption choice of each agent)
      - Toolbox 1: Martingale Approach
   b. Asset/Risk Allocation across types/sectors & asset market clearing
      - Toolbox 2: “price-taking social planner approach” – Fisher separation theorem

2. Value functions \( \text{backward equation} \)
   a. Value fcn. as fcn. of individual investment opportunities \( \omega \)
      - Special cases
   b. De-scaled value fcn. as function of state variables \( \eta \)
      - Digression: HJB-approach (instead of martingale approach & envelop condition)
   c. Derive \( \varsigma \) price of risk, \( C/N \)-ratio from value fcn. envelop condition

3. Evolution of state variable \( \eta \) \( \text{forward equation} \)
   - Toolbox 3: Change in numeraire to total wealth (including SDF)
     - (“Money evaluation equation” \( \mu \))

4. Value function iteration & goods market clearing
   a. PDE of de-scaled value fcn.
   b. Value function iteration by solving PDE