Advanced Topics in Macro-Finance*
Institute of New Structural Economics, Peking University
Junjie Xia, Spring 2021

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Course Description
• Audience and prerequisite
This course is designed to graduate students who have finished first-year graduate courses, including macroeconomics, microeconomics and econometrics. Although it is not required, having knowledge on advanced numerical methods and applied econometric skills is highly encouraged.

• Course Objectives
The primary goal of this course is to teach students advanced models and tools in Macro-Finance topics.

Finance plays a crucial role in the modern economy. In terms of financial institutions, banks and stock markets channel funds from savers towards borrowers – productive ventures, while managing economic risks and liquidity. In terms of household finance, portfolio choices affect household investment, saving and consumption decisions, which also have the aggregate impact on inequality and social mobility. Standard macro-finance theories study the link between asset prices and economic fluctuation, and models are constructed to understand simple facts in real world. Students are expected to learn different classes of models in this course. Detailed layouts are discussed in the course outline section.

• Course Plan
This course can be structured into four parts: a) empirical methods in finance; b) theories in macro-finance; c) calibration and structural estimation; d) other research topics and related articles. Overall, for a graduate student who chooses financial economics as his or her research field, two to three classes are expected to assign in order to cover most contents of macro-finance. Nevertheless, depending on students’

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background, I will have corresponding emphases in different parts of this course. My current plan is to focus mostly on PART I – Empirical Methods in Corporate Finance.

For research on applied macroeconomics and empirical macro-finance, the following five steps are widely adopted.
1) Identify an idea or a question that you are interested in
2) Extract the idea from data and highlight the motivations (stylized facts)
3) Build a theoretical framework or model in the manner that is consistent with your findings in step 2). The model may have the following components.
   a) Characterize the property
   b) Provide numerical solution
4) Parameterizations and simulation (empirical): calibration/structural estimation
5) Model implications: counterfactual exercise
   (*Step 4) and step 5) could be also integrated together.*

Step 1) depends largely on your personal interests and may not be taught in the class.

Step 2) plays an extremely important role on the paper, because the construction of your model would depend highly upon the empirical findings. Thus, this course will start from teaching students with a toolbox and working knowledge of cross-sectional and panel data empirical methods for use particularly in finance. Since modern macro-finance research relies heavily on micro-foundation, therefore, we focus mainly on the subject of corporate finance. More specifically, you will learn empirical methods combined with academic articles in Finance. Nevertheless, these methods can be also applied to other economic fields. [*This is related to PART I – Empirical Methods in Corporate Finance*]

Step 3) is the core of the paper. Macro structural models employ theory to make the linkage between outcomes and welfare, and provides a coherent framework through which to understand, interpret, and evaluate empirical evidence. This course will sketch a detailed review for various theories in Macro-Finance. We will start from the first-generation models (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997), which have focused on financial accelerators in the representative firm environment. These types of models introduce some of the most common approaches in financial frictions, in which we will consider two – information asymmetries and collateral/enforcement constraints. Then, we will move to the second-generation models (e.g., Jermann and Quadrini, 2012; Brunnermeier and Sannikov, 2014). Most of these models are highly non-linear in formalizing financial friction, which for example allows models to generate asymmetries with significant effects on macroeconomic dynamics. Thus, we need to use some advanced computational techniques. Although I will not particularly discuss numerical methods in this course,
such as projection methods and perturbation methods, students should be aware that most modern models used in macroeconomics are highly complex and do not have a closed form solution\textsuperscript{†}. Therefore, we need to find approximate solutions, and you may need to learn numerical methods in a quantitative course or by yourselves. I will provide some references in class. [This is related to PART II – Theories in Macro-Finance]

Step 4) and step 5) attempt to link the model directly to data. There are two general approaches – calibration and structural estimation. As far as macroeconomic models are concerned, calibration has been the most common approach used in the literature. The main goal of calibration is to ascertain that a model with a numerical solution provides predictions in the manner that is likely to be empirically relevant. In sum, calibration advances the understanding of extant empirical results by running regressions on simulated data.

Most recently, however, structural estimation has become more popular. The main purpose of structural estimation is to ensure whether optimization models are able to generate data that resemble data from the real world. Structural estimation is a useful exercise in employing a realistic theoretical structure to explicitly interpret the data. Technically, calibration aims to match a few stylized facts with many model parameters, and is useful in situations that model estimation is not feasible. However, whenever there are too many degrees of freedom, inference is impossible, and thus, calibration is not accompanied by standard errors for the model parameters. In contrast, structural estimation is able to provide standard errors. Estimation methods, like simulated method of moments (SMM), matches at least as many stylized facts as model parameters. I will discuss both methods through reviewing journal articles and will particularly emphasize on structural estimation that is commonly use in both corporate finance and macro research. [This is related to PART III – Calibration and Structural Estimation]

PART IV provides references on recent research topics. Students are able to find papers that make contributions to different subjects.

**Textbooks**

There is NO required textbook, but the following references could be helpful.

- “Methods for Applied Macroeconomic Research”, Fabio Canova, Princeton University Press

\textsuperscript{†} The more dynamics, heterogeneity, frictions that models incorporate, the more challenging to solve and estimate. However, computational results are commonly criticized to disconnect from micro empirical research and to be eventually black box predictions. Therefore, the macro-micro synthesis needs to further develop.
Course Policy

• Grading

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<tr>
<th>Class participation</th>
<th>10%</th>
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<tr>
<td>Problem sets</td>
<td>20%</td>
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<tr>
<td>Paper presentation</td>
<td>30%</td>
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<tr>
<td>Referee report</td>
<td>10%</td>
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<tr>
<td>Research project</td>
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• Class participation
The class participation includes two parts: attendance and discussion. Students are expected to attend all classes at their scheduled time, and are responsible for all assigned materials. I will randomly check the class attendance. Two absences are equal to 1% deduction of total grade. Medical or other extenuating excuses are granted upon valid documentary proofs.

In addition, students are also encouraged to participate the class actively, such as in-class discussions and presentations. You could also ask any questions if something is confusing during the lectures. I do not anticipate that everything I teach in class or in-class writing will be crystal clear. I also cannot guarantee to always have an immediate answer to your questions, especially for them of a more technical nature. Therefore, your participation is very useful and helpful for your learning and my teaching.

• Problem sets
Each student has five assignments. The best four scores are counted into your grade (5% per each assignment). Students must turn in all five assignments. Missing one submission will deduct 5% from total grade.

• Paper presentation and referee report
Each student is required to provide an individual in-class paper presentation and submit a referee report for the same paper. Students may choose a journal article or a
working paper in the related literature. The presentation is 40 minutes, including 10 minutes Q and A.

Presenting is an important skill for academic research. A successful presentation may cover concisely the following five points: a) what is the motivation; b) what does the paper do; c) what are the results/findings; d) overall contributions; e) your comments and criticisms of the paper.

The referee report is no more than three pages. Each student is required to read a paper critically and write down the virtues and limitations of this paper.

• **Research project**
  Each student has a research project. You are expected to turn in a short research proposal (no more than 5 pages) and give a 15-minute presentation. A successful paper is considered to be modestly, rather than overly ambitious. You can identify a question that you are interested in. The topic could be one that has been tackled to some extent already in the literature and add to its existing treatment. Even small or incremental progress over existing work is a contribution.

**Course Outline**
(Note: the allocation of lectures in each part may be subject to change)

**PART I: Empirical Methods in Corporate Finance**

i. **Linear regression, causality and panel data:**

*Lecture notes will be given and references are as follows*


ii. Problems of panel regressions and some potential solutions

a) Instrumental variables

*Lecture notes will be given and references are as follows*


b) Natural experiments

*Lecture notes will be given and references are as follows*


• “Political Uncertainty and Managerial Preferences: Evidence from Discipline Inspections in China” K. Wang and J. Xia (2021), working paper

c) Regression Discontinuity

*Lecture notes will be given and references are as follows*


d) Common limitations and errors; standard errors and clustering limited dependent variables; matching and selection models

*Lecture notes will be given and references are as follows*


**PART II: Theories in Macro-Finance**

The advantage of developing macro models is to help researchers investigate clearly and quantitatively the roles of aggregate resources constraints, forward-looking/dynamics, various obstacles to allocate resources, scale economies, general equilibrium effects, and their implications to aggregate distributions and welfare.

i. **Preliminary review**

a) **Dynamic programming, some key general equilibrium notions and two workhorse models: Lucas tree and RBC**

*Lecture notes will be given and references are as follows*

- “*Recursive Macroeconomic Theory*, Chapters 3, 4, 8, 12, 13

b) **Numerical approximation**

*Lecture notes will be given and references are as follows*

- “*Dynamic General Equilibrium*, Heer, B. and Maussner, A (2009), Chapters 2, 6
- Lecture notes (in-class handouts)

ii. **Core models on financial frictions**

a) **Introduction: modeling financial frictions**

1) Missing markets: exogenous market incompleteness; endogenous market incompleteness (limited enforcement and information asymmetry)
2) Heterogeneity: finite life span; different discounting; tax benefits; bargaining position

*Lecture notes will be given and references are as follows*

- Lecture notes (in-class handouts)

b) **First-generation models**

We will consider some of the most common approaches that can be used to introduce financial frictions in macroeconomic models. We will look at two approaches – information asymmetries and collateral or enforcement constrains. The following papers in the earlier literature have focused on financial accelerators in representative firm environment. Particularly, we will go over two seminal articles: Bernanke and Gertler (1989) and Kiyotaki and Moore (1997). In addition, we will

*Lecture notes will be given and references are as follows*


c) **Second-generation models**
The second-generation models are extensions of early models.

*Lecture notes will be given and references are as follows*


d) **Introducing heterogeneity**
We start from two types of heterogeneity: one is overlapping generation and one is heterogeneity that is asset holdings when agents face uninsurable idiosyncratic risks. Then, we discuss a broad range of preferences and market structures, such as Habits (e.g., Campell and Cochrane 1999), idiosyncratic risk (e.g., Constantinides and Duffie, 1996), heterogeneous preferences (Garleanu and Panageas, 2015) and ambiguity aversion (Hansen and Sargent, 2001).

*References*

- “Recursive Macroeconomic Theory”, Chapters 9, 16, 17
- Lecture notes on the inequality of China
PART III: Calibration and Structural Estimation

As discussed in the first part, there are some distinctions between calibration and structural estimation. I will briefly introduce calibration by discussing some articles and focus on structural estimation.

Structural estimation attempts to fit a model directly to data; to assess the quality of the model; and to identify parameters governing preferences, technologies and time-invariant institutional features. More specifically, structural estimation evaluates whether optimization models are able to generate data that resemble data from the real world. Therefore, structural estimation is employing a realistic theoretical structure to interpret the data. *(Please note that structural estimation may or may not require a dynamic model)*

There are three main methods that have been widely used in Macro-Finance for structural estimation: generalized method of moments (GMM); simulated method of moments (SMM); and simulated maximum likelihood (SMLE). This course will particularly provide a brief introduction to SMM.

i) Some tools

*Lecture notes will be given and references are as follows*

- “Monetary policy shocks: What have we learned and to what end?” Lawrence J. Christiano, Martin Eichenbaum and Charles L. Evans (1999), In Handbook of Macroeconomics, pp. 65-148. (Vector autoregressions)
- Measuring the effects of monetary policy: A factor-augmented vector autoregressive (FAVAR) approach (2005), Ben Bernanke, Jean Boivin, and Piotr Eliasz, Quarterly Journal of Economics, 120(1), 387-422 (Kalman Filter and dynamic factor models)

ii) Continuous time contingent claims models

iii) Discrete time investment models


PART IV: Other Recent Research Topics and Related Articles

a) Macroeconomic models with financial imperfections

**Macro models with financial frictions** (further readings)


**Quantifying Financial Frictions**

- “Quantifying the Forces Leading to the Collapse of GDP after the Financial Crisis”, R. E. Hall, NBER Macroeconomics Annual, 2014

**Models with Heterogeneous Firms**

**Bubbles**

**Monetary Policy**

**b) Quantitative Models of Debt: Corporate, Household and Sovereign**

**Optimal Capital Structure of Firms**

**Corporate Investment with Debt**

**Credit Spreads**

**Household and Sovereign Debt**
Self-fulfilling and Finance


Quantitative Corporate Finance

Optimal investment with frictions


Industry equilibrium without investment


Macro Investment


Misallocation, financial frictions and production network

• “Industrial Policies in Production Networks”, Liu, E., Quarterly Journal of Economics, 2020

e) Fiscal policy, government spending and macroeconomics
• “Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data”, Ramey, V.A. and Zubairy, S., Journal of Political Economy, 2018
• “Geographic Cross-Sectional Fiscal Spending Multipliers: What Have We Learned?”, Gabriel Chodorow-Reich, American Economic Journal: Economic Policy, 2019

f) Inequality
Inequality is a large subject in macroeconomics. Topics in income inequality, consumption inequality and wealth inequality have been catching a lot of attentions. Models share many similarities with that in macro-finance, for example, the application from the Aiyagari type of models. However, this subject could be also assigned a specific course to cover empirical findings and theories. The following references are some core papers and recent studies.

• “Entrepreneurship, Saving, and Social Mobility”, Quadrini, V., Review of Economic Dynamics, 2000


