



Course and Examination Fact Sheet: Autumn Semester 2023

10,381: Quantitative Macroeconomics: A Practical Approach for All

ECTS credits: 4

Overview examination/s

(binding regulations see below)

decentral - Written work, Digital, Individual work individual grade (50%)

Examination time: Term time

decentral - Analog written examination, Analog, Individual work individual grade (50%)

Examination time: Term time

Attached courses

Timetable -- Language -- Lecturer

[10,381.1.00 Quantitative Macroeconomics: A Practical Approach for All](#) -- English -- [Iordache-Bolboaca Maria](#) , [Cozzi Guido](#)

Course information

Course prerequisites

Macroeconomics courses at the Master level (e.g. Advanced Macroeconomics I, II, III) are recommended prerequisites for this course. Some prior knowledge of basic time-series analysis and mathematics for economics might be beneficial but is not required. No prior knowledge of the computer software Matlab or its Dynare toolbox is required but having some coding experience, in general, might help.

Learning objectives

The main objective of the course is to bridge the gap between theoretical macro models and data. This course introduces participants to applied macro methods, with a strong emphasis on numerical methods, which optimally prepare students for a job market entry into a policy-making institution (e.g. central/national banks) or performing academic research in macroeconomics.

After completion of this course, you will be able to perform simulations of deterministic and stochastic models with the help of Dynare, a toolbox that runs on top of Matlab or Octave. To this end, calibration and estimation methods will be applied. The advantage of using Dynare is that you can write the model almost as on paper and Dynare applies a set of codes to solve and simulate the model.

Course content

The primary focus of the course will be on dynamic stochastic general equilibrium (DSGE) models, which have become the standard workhorse models for the analysis of aggregate fluctuations in various national and international policy-making institutions. In particular, students will learn how to construct, calibrate, estimate, solve, and simulate DSGE models in Dynare. However, we will also dedicate some time to the solution of deterministic growth models in Dynare and the study of economic reforms in this framework. We will work with these models in conjunction with data, discussing how to calibrate and evaluate the performance of each model from a quantitative perspective.

The course starts with a brief discussion of motivational facts, methods of data transformation, and empirical evidence, which we will further use to either calibrate or match in our models.

We proceed with the baseline Real Business Cycle (RBC) model and then enlarge it to address some volatility and correlation puzzles. In particular, we will study the role of the preference specification, the introduction of real rigidities (habit persistence, investment adjustment costs, capital utilization, etc.) and of nominal rigidities (wage and price stickiness). We will then use Bayesian methods to estimate the model.



We continue with a discussion of growth models and how deterministic models can be solved in Dynare and used to study various economic reforms.

Lastly, we study a DSGE model in which productivity growth is endogenized. This allows the model to account for a wide range of high- and medium-frequency economic fluctuations neglected by RBC or New Keynesian (NK) models, which focus on the short-term fluctuations of the economy.

Course structure and indications of the learning and teaching design

The course is structured into six topics, each topic having both theoretical and practical (hands-on) parts.

Lectures:

1. Motivational Facts. Introduction to Matlab and Dynare. Basic Data Transformation.
2. Practical RBC modeling. Model equations in Dynare. Compute steady states. Calibrate and simulate the model introducing various shocks. Interpret impulse responses and the variance decomposition.
3. Extensions of the RBC Model: Introduce various model setups and real rigidities. Experiment with parameter values. Examine differences.
4. The NK Model: Introduce nominal rigidities. Study the effects of various shocks and compare them with the RBC results. Use Bayesian methods to estimate the model.
5. Growth Models. Deterministic Models in Dynare. Study economic reforms.
6. Extensions of the RBC model to analyze medium-run frequencies. Introduce endogenous productivity growth in the RBC model and study the implications.

Course literature

The main source of material for this course is the set of slides and Dynare codes, which will become available online on *StudyNet (Canvas)* before each lecture. Additional reading material will be provided in class. Below is a list of recommended readings on which the material in the lecture notes develops and that may be useful for a more in-depth understanding of the theoretical models.

Textbooks (recommended):

Gali, J. (2015). *Monetary Policy, Inflation and the Business Cycle. An Introduction to the New Keynesian Framework*, Princeton University Press.

Ljungqvist, L. and Sargent, T. (2018). *Recursive Macroeconomic Theory*, MIT Press;

Miao J. (2020). *Economic Dynamics in Discrete Time*, MIT Press;

Romer, D. (2019). *Advanced Macroeconomics*, McGraw-Hil.

Background Readings (recommended):

An, S. and F. Schorfheide (2007). Bayesian Analysis of DSGE Models. *Econometric Reviews*, 26 (2-4): 113-172.

Bolboaca, M., G. Cozzi, and S. Galli (2021). Multinational's Entry: Boon or Bane for Non-Frontier Economies?. Available at <http://dx.doi.org/10.2139/ssrn.3844757>

Christiano, L., M. Eichenbaum, and C.L. Evans (2005). Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy. *Journal of Political Economy*, 113 (1): 1-45.

Comin, D. and M. Gertler (2006). Medium-Term Business Cycles. *American Economic Review*, 96 (3): 523-551.

Cozzi, G. and S. Galli (2014). Sequential R&D and blocking patents in the dynamics of growth. *Journal of Economic Growth*, 19 (2): 183-219.

Cozzi, G. and M. Davenport, (2017), Extrapolative Expectations and Capital Flows during Convergence, *Journal of International Economics*, 108: 169-190.

Cozzi, G., B. Pataracchia, P. Pfeiffer, and M. Ratto (2021). How Much Keynes and How Much Schumpeter? *European Economic Review*, 133: 1036-1060.



Greenwood, J., Z. Hercowitz, and G. Huffman (1988). Investment, Capacity Utilization, and the Real Business Cycle. *American Economic Review*, 78 (3): 402-417.

Jaimovich, N. and S. Rebelo (2009). Can News About the Future Drive the Business Cycle? *American Economic Review*, 99 (4): 1097-1118.

Justiniano, A., G. E. Primiceri, and A. Tambalotti (2010). Investment shocks and business cycles. *Journal of Monetary Economics*, 57 (2): 132-145.

Justiniano, A., G. E. Primiceri, and A. Tambalotti (2011). Investment Shocks and the Relative Price of Investment. *Review of Economic Dynamics*, 14 (1): 101-121.

King, R., C. Plosser, and S. Rebelo (1988). Production, Growth and Business Cycles: I. The Basic Neoclassical Model. *Journal of Monetary Economics*, 21 (2-3): 195-232.

Rebelo, S. (2005). Real Business Cycle Models: Past, Present and Future. *The Scandinavian Journal of Economics*, 107(2): 217-238.

Smets, F. and R. Wouters (2007). Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach. *American Economic Review*, 97 (3): 586-606.

Additional course information

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Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination modalities

Examination type	Written work
Responsible for organisation	decentral
Examination form	Written work
Examination mode	Digital
Time of examination	Term time
Examination execution	Asynchronous
Examination location	Off Campus
Grading type	Individual work individual grade
Weighting	50%
Duration	--

Examination languages

Question language: English
Answer language: English

Remark

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Examination-aid rule

Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

Supplementary aids

Baseline data and codes in Dynare/Matlab will be made available on StudyNet (Canvas).



2. Examination sub part (2/2)

Examination modalities

Examination type	Analog written examination
Responsible for organisation	decentral
Examination form	Written exam
Examination mode	Analog
Time of examination	Term time
Examination execution	Synchronous
Examination location	On Campus
Grading type	Individual work individual grade
Weighting	50%
Duration	--

Examination languages

Question language: English
Answer language: English

Remark

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Examination-aid rule

Closed Book

The use of aids is prohibited as a matter of principle, with the exception of pocket calculator models of the Texas Instruments TI-30 series and, in case of non-language exams, bilingual dictionaries without any handwritten notes. Any other aids that are admissible must be explicitly listed by faculty members in the paragraph entitled "Supplementary aids" of the course and examination fact sheet; this list is exhaustive.

Procuring any aids, as well as ensuring their working order, is the exclusive responsibility of students.

Supplementary aids

None.

Examination content

There will be one take-home assignment. The assignment is worth 50% of the final grade. The assignment asks you to implement variations of existing Dynare code to create your own model and answer a particular research question.

Examination relevant literature

See Course Literature.



Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW51) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 42 are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 34 (Thursday, 24 August 2023);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 16 October 2023);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 45 (Monday, 06 November 2023);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the de-registration period in CW 45 (Monday, 06 November 2023).