University of St.Gallen

Course and Examination Fact Sheet: Autumn Semester 2021

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

ECTS credits: 4

Overview examination/s

(binding regulations see below)
Decentral - Written examination (with defined exam duration) (50%)
Examination time: term time
Decentral - examination paper written at home (individual) (50%)
Examination time: term time

Attached courses

Timetable -- Language -- Lecturer
10,381,1.00 Quantitative Macroeconomics: A Practical Approach for All -- Englisch -- 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 in 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 that 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 lectures, each lecture having both theoretical and practical (hands-on) parts.

Lectures:

1. Motivational Facts. Introduction to Matlab and Dynare. Basic Data Transformation.
2. Practical RBC modelling. 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 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

- In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in AS2021, the courseinformation listed above will be changed as follows:

  - The course will be conducted online via the platform Zoom;
  - The recordings of the course will be available for 30 days;
  - The lecturer will inform via Canvas of the changed implementation modalities of the course;
  - There are no changes necessary to the course information.

  The examination information listed below will be changed as follows:

  - The written examination part 1 will be replaced by an oral examination, which will be recorded;
  - There are no changes necessary to the examination information.

Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination time and form
Decentral - Written examination (with defined exam duration) (50%)
Examination time: term time

Remark
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Examination-aid rule
Extended Closed Book
The use of aids is limited; any additional aids permitted are exhaustively listed under "Supplementary aids". Basically, the following is applicable:

- At such examinations, all the pocket calculators of the Texas Instruments TI-30 series and mono- or bilingual dictionaries (no subject-specific dictionaries) without hand-written notes are admissible. Any other pocket calculator models and any electronic dictionaries are inadmissible.
- In addition, any type of communication, as well as any electronic devices that can be programmed and are capable of communication such as notebooks, tablets, mobile telephones and others, are inadmissible.
- Students are themselves responsible for the procurement of examination aids.

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2. Examination sub part (2/2)

Examination time and form
Decentral - examination paper written at home (individual) (50%)
Examination time: term time

Remark
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Examination-aid rule
Term papers

Written work must be written without outside help according to the known citation standards, and a declaration of authorship must be attached, which is available as a template on the StudentWeb.

Documentation (quotations, bibliography, etc.) must be carried out universally and consistently according to the requirements of the chosen/specified citation standard such as e.g. APA or MLA.

The legal standard is recommended for legal work (cf. by way of example: FORSTMOSER, P., OGOREK R., SCHINDLER B., Juristisches Arbeiten: Eine Anleitung für Studierende (the latest edition in each case), or according to the recommendations of the Law School).

The reference sources of information (paraphrases, quotations, etc.) that has been taken over literally or in the sense of the original text must be integrated into the text in accordance with the requirements of the citation standard used. Informative and bibliographical notes must be included as footnotes (recommendations and standards e.g. in METZGER, C., Lern- und Arbeitsstrategien (latest edition)).

For all written work at the University of St.Gallen, the indication of page numbers is mandatory, regardless of the standard chosen. Where page numbers are missing in sources, the precise designation must be made differently: chapter or section title, section number, article, etc.

Supplementary aids
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Examination languages
Question language: English
Answer language: English

Examination content

There will be one take-home assignment (also referred to as examination paper). The assignment is worth 50% of the final grade.The assignment asks you to obtain publicly available country-level data, prepare and transform it; derive variations of the models discussed in class and implement variations of existing Dynare code to create your own model and answer a particular research question. Baseline data and code in Dynare/Matlab will be made available on StudyNet (Canvas).

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 is 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, 26 August 2021);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 18 October 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 42 (Monday, 18 October 2021);

Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 45 (Monday, 8 November 2021).