

Seminar in Economic Policy for Master Students

– Summer Term 2016

Quantitative methods in economic growth

1 Introduction

Ongoing growth of labor productivity has been a stylized fact in modern economies since the era of industrialization. Since more than 25 years now it is possible to derive the aggregate growth rate of an economy as the result of optimizing agents. The fundamental construct upon which these models build is the Ramsey model. It provides insights into the dynamics of an economy in transition to the long-run equilibrium. Most Ramsey-type models are highly aggregated single sector models. However, a major challenge consists in understanding the interdependencies of several forces across multiple sectors as well as likely impacts of certain policy interventions. Ideally, we also need to confront theory with data.

Playing around with different model parameters and various data bases is extremely helpful in understanding the structure of economic growth and the related policy implications. This is the basic concern of the seminar entitled "Quantitative methods in economic growth". Both, doing comparative analysis and fitting growth models to data has been greatly facilitated by advances in numerical algorithms and computer technology. The ease of obtaining numerical solutions using procedures is important because the differential equations of even the single sector, two factor, closed economy Ramsey model are essentially analytically intractable.

2 Aim of the seminar

The aim of this seminar is thus to equip students with quantitative skills which are based on the programme Mathematica (www.wolfram.com/mathematica/). It is widely used in mathematical problem solving, simulations, programming and visualization. An understanding of the subtleties of control theory and numerical algorithms is not required, but familiarity with any programming language is essential. For students, Mathematica can be downloaded for free from the Software Shop of KIT (rzunika.asknet.de/cgi-bin/product/P10006430).

More instructional material about Mathematica can be retrieved from the website www.wolfram.com/support/learn/students.html.

3 Key sources

The seminar is based on two major sources:

1. The textbook of
Roe, T. L., Smith, R. B. and Şaracoğlu, D. S.: 2010, *Multisector Growth Models – Theory and Application*, Springer.
2. selected Mathematica files that serve as starting point
 - a) Wolfram-Solow.nb
 - b) Wolfram-Ramsey.nb

These sources serve as a starting point for own calculations and coding. Supplementary literature is mandatory.

4 Topics

1. The role of Duality (Optimization) Theory in explaining the general equilibrium conditions in The Heckscher-Ohlin-Samuelson Model.
Literature: Roe et al. (2010) corresponding sections: 2 - 2.3.
2. The effects of a sector specific factor on a country's transition to long run equilibrium under different price effects.
Literature: Roe et al. (2010) corresponding section: 2.4.
3. The effects of a sector specific factor in a two-sector Ramsey type growth model.
Literature: Irz and Roe (2005), "Seeds of growth? Agricultural productivity and the transitional dynamics of the Ramsey model" *European Review of Agricultural Economics*, Vol: 32 (2) pp. 143-165, and Roe et al. (2010) corresponding section 3.
4. The role of initial level of capital stock in determining the transitional dynamics of the two-sector type of Ramsey growth model.
Literature: Roe et al. (2010) corresponding section: 3.
5. Two-sector Ramsey Model with an extension of labor augmenting technological progress and exogenous population growth.
Literature: Roe et al. (2010) corresponding section: 3.3.
6. The role of initial level of capital stock in determining the transitional dynamics of the three-sector type of Ramsey growth model.
Literature: Roe et al. (2010) corresponding section: 4.

5 Organisation

The seminar is intended for Master students at KIT. Each topic will be prepared and presented by up to 2 students.

5.1 Application

The registration has to be submitted online at the service portal of the Department of Economics and Management (<https://portal.wiwi.kit.edu>) until Friday, March 18, 2016 by 11.59 p.m.

If more than 12 students apply, former course participants at the Chair in Economic Policy are taken into consideration for acceptance decisions.

Applicants will be notified about these decisions via email on Monday, March 21, 2016. Participation must then be confirmed by the students until Thursday, March 24, 2016.

5.2 Time schedule

There will be two blocked phases of attendance on which presence is mandatory:

1. Introduction and preliminary discussion on Monday, April 18, 2016, 1:00 - 2:00 p.m., room 103.1, building 20.14.
2. Presentations on Thursday, June 16, 2016 (lecture room 002, building 20.12), 2:00 - 5:00 p.m. and on Friday, June 17, 2016 (room 214, building 11.40), 10:00 a.m. - 5:00 p.m.

Rooms and hours will be confirmed again in time.

5.3 Certificates

In order to be officially registered, participants have to provide a seminar form until Monday, April 11, 2016, 12.00 am. The mailbox of the Chair in Economic Policy is located in building 20.14, ground floor. The form template for Master students can be found in the download section of the Department of Economics and Management (Section: Study and Education: http://www.wiwi.kit.edu/downloads/Formular_Seminarschein_20090603.pdf).

Placeholder in the module handbooks is SemIWW3. Students in the Diploma program receive a form from the secretariat at the Chair in Economic Policy.

5.4 Formalities

The seminar assessment is based on the following deliveries:

1. Mathematica file including the coding and economic argumentation (both as file and two printed copies),
2. presentation of the results of the work in a seminar meeting
3. active participation in the discussions of the seminar meeting .

The final grade results from an weighted average of these components with the following weights: Written work 50%, oral presentation 40%, active participation 10%.

The coursework (.nb-file and .pdf-file) has to be uploaded at ILIAS by Monday, **June 13, 2016, 1:00 p.m.** The two printed copies have to be delivered either directly at the secretariat or at the mailbox of the Chair in Economic Policy, which is located in building 20.14, groundfloor.

The title pages of the Notebook file must list the students' names, matriculation numbers, study programmes together with the following information: Seminar-Mathematica-SS2016. Moreover, the notebook file has to include a signed statement according to the following text:

Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, keine anderen als die angegebenen Quellen und Hilfsmittel benutzt zu haben, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht zu haben und die Satzung des Karlsruher Instituts für Technologie (KIT) zur Sicherung guter wissenschaftlicher Praxis beachtet zu haben.

We expressly point out that **the seminar papers in which signed statements are missing, will not be accepted** and students will therefore not be graded. Also take into consideration the brief notes on writing an academic paper from the Chair in Economic Policy (<http://wipo.econ.kit.edu/english/68.php>).