

February 28, 2017

# Seminar in Economic Policy

Summer Term 2017, for Master Students

## Quantitative Methods in Economic Growth

### Aim of the seminar

Theories of economic growth analyse the factors and their interrelations that determine the productivity growth of an economy. In neoclassical growth models, like the Solow-Swan or the Ramsey model, the long-run rate of growth is usually determined by the rate of technical progress, which is exogenously given. Unsatisfied with these theories, economists since the 1980s developed models, in which the key determinants of growth are endogenous, i.e. a result from optimisation decisions of rational individuals. Particular importance is usually given to the production of new technologies via innovations, the influence of human capital, productive government spendings, or the role of institutions. Spillover effects, increasing numbers of intermediate goods, increasing product qualities, and accumulation of human capital, amongst others, play a crucial role in these models of endogenous growth.

Due to the complexity of the models, the application of formal-analytical and numerical methods are essential to derive theoretically sound economic policy recommendations to overcome identified market failures. In this seminar *Quantitative Methods in Economic Growth* the computer algebra program *Mathematica*<sup>1</sup> is used in order to gain a better understanding of the structure and various aspects of different economic growth models. With *Mathematica* complex

---

<sup>1</sup>There is a free student version of *Mathematica* available via the [SCC](#).

mathematical models can be solved or simulated with an appropriate parameter calibration. The results can then be visualised in an effective and appealing manner.

The focus of the seminar in the summer term 2017 is, on the one hand, on extensions of neoclassical growth models. Relaxing crucial assumptions in the Solow-Swan model can lead to interesting results like multiple equilibria and poverty traps. In the Ramsey model, valuable insights can be gained when the model is extended by taking government spendings or interactions with other economies into account. On the other hand, two-sector models are studied, where physical and human capital are produced by different technologies. Different aspects and variations of the basic model developed by Uzawa (1965) and Lucas (1988) will be analysed. Here, human capital is produced in the so-called education sector, which is relatively intensive in human capital. In the seminar elements of the model like externalities and savings will be examined.

## Topics

The respectively mentioned literature serves as a starting point. The use of supplementary literature is mandatory. Recommended textbooks in the field of economic growth are:

- Acemoglu (2009): Introduction to Modern Economic Growth
- Aghion and Howitt (2009): The Economics of Growth
- Barro and Sala-i-Martin (2004): Economic Growth

Instructional material about Mathematica can be retrieved from the [Wolfram website](#).

### **The topics in the summer term 2017 are:**

1. Growth models with poverty traps  
Barro and Sala-i-Martin (2004, pp. 74) and Novales (2014, pp. 63).
2. Government spendings in the Ramsey model  
Barro and Sala-i-Martin (2004), chapter 3.1.
3. An open economy Ramsey model  
Barro and Sala-i-Martin (2004), chapter 3.3.
4. Dynamics and steady state analysis in the Uzawa-Lucas model  
Barro and Sala-i-Martin (2004), chapter 5.2.2.
5. Externalities in the Uzawa-Lucas model  
Lucas (1988) and Meyer, Müller-Siebers and Ströbele (1998, pp. 143).
6. Savings in the Uzawa-Lucas model  
O'Connell (1998).

## Organisation

### Application

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

You have to register online at the [Wiwi-Portal](#) until Sunday, March 19, 2017. If more than 12 students apply, former course participation at the Chair in Economic Policy is taken into consideration. Please tell us in your application which of our courses you already took and what is your motivation for applying to this seminar (not more than five sentences).

You will be informed about our decision on Monday, March 20, 2017 in the *Wiwi-Portal* and accepted students have to confirm their seminar participation until Friday, March 24, 2017 also via the *Wiwi-Portal*. Sequentially students on the waiting list will be contacted.

### Time schedule

There are two seminar meetings. Attendance is mandatory in both sessions:

1. Kick-off on Wednesday, April 26, 2017 between 1:30 pm and 2:30 pm in building 01.87, seminar room B 5.25.
2. Presentations of the seminar works at the end of the lecture period (whole day). The exact date will be announced later.

### Formalities

The seminar assessment is based on the following deliveries:

- *Mathematica* file containing your code and *PDF* file with your economic argumentation.
- Presentation of the results in the seminar meeting.
- 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%.

## References

- Acemoglu, D. (2009):** *Introduction to modern economic growth*. Princeton, N.J.: Princeton Univ. Press.
- Aghion, P. and P. Howitt (2009):** *The economics of growth*. Cambridge, Mass.: MIT Press.
- Barro, R. J. and X. Sala-i-Martin (2004):** *Economic growth*. 2. ed. Cambridge, Mass.: The MIT Press.
- Lucas, R. E. (1988):** On the mechanics of economic development. In: *Journal of monetary economics* 22(1), pp. 3–42.
- Meyer, E. C., K.-W. Müller-Siebers and W. Ströbele (1998):** *Wachstumstheorie*. 2., völlig überarb. Aufl. Oldenbourgs Lehr- und Handbücher der Wirtschafts- und Sozialwissenschaften. München: Oldenbourg.
- Novalés, A. (2014):** *Economic Growth: Theory and Numerical Solution Methods*. Ed. by **Esther Fernández Casillas and Jesús Ruíz**. Berlin, Heidelberg.
- O’Connell, J. (1998):** Savings in the Uzawa-Lucas model of economic growth. In: *Journal of Macroeconomics* 20(2), pp. 413–422.
- Uzawa, H. (1965):** Optimum technical change in an aggregative model of economic growth. In: *International economic review* 6(1), pp. 18–31.