

Dynamic Macroeconomics

Introduction

University of Siegen

- ① Bachelor versus master level macro education:
- ② Organizational issues
 - Contact information
 - Course information

Bachelor versus master level macro education:

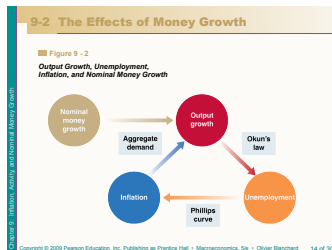
- What is the value-added of the course Dynamic Macroeconomics?
- Question is answered based on three illustrations of the value-added of this course relative to a standard bachelor macro course.
 - Analysis of the effect of an aggregate demand shock (short-run analysis).
 - Analysis of the effect of a one-time increase in the saving rate (long-run analysis).
 - Decomposition of macroeconomic time series (business cycle versus growth perspective).

⇒ Ultimate goal: Learn tools that enable you to perform independent economic analysis.

⇒ By-product: Improve your analytical skills.

Bachelor versus master level macro education: Analysis of the effect of an aggregate demand shock (business cycle analysis).

- **Bachelor level analysis:**
 - Consider a closed economy with households, firms, fiscal and a monetary authority.
 - Question: What is the effect of a positive aggregate demand shock?



Bachelor versus master level macro education: Analysis of the effect of an aggregate demand shock (business cycle analysis).

- **Bachelor level analysis:**

- Consider a closed economy with households, firms, fiscal and a monetary authority.
- Aggregate demand, Y^D , is given by:

$$Y^D = C + I(r) + G. \quad (1)$$

- There is an aggregate demand shock:
 - Can be unexpected increase in either C , I or G .
 - Denoted by ε^D .
 - Aggregate demand is then given by:

$$Y^D = C + I(r) + G + \varepsilon^D. \quad (2)$$

- Question: What is the effect of a positive aggregate demand shock?

Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- **Bachelor level analysis (continued):**

- Combination of Phillips curve:

$$\pi = \pi^e - \alpha (u - u^n) \quad (3)$$

with Okun's law (negative relationship between unemployment and output growth) yields:

$$\pi = \pi^e + \beta (Y - Y^n) \quad (4)$$

- Positive demand shock $\varepsilon^D > 0 \implies Y^D \uparrow \implies Y^D - Y^n \uparrow \implies$
Phillips curve: $\pi = \pi^e + \beta (Y - Y^n) \implies \pi \uparrow \implies$ Monetary
authority: $r \uparrow \implies Y^D \downarrow$.

Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- **Bachelor level analysis (continued):**
 - Overall results:
 - At first, positive demand shock leads to higher output and inflation.
 - Monetary authority then increases interest rates.
 - The increase in interest rates dampens demand and as a consequence inflation rates decrease.
 - Finally, the economy returns to its natural output level at which inflation is equal to its target.
- **Assessment of bachelor-level-analysis:**
 - Provides a good understanding of basic macroeconomic processes induced by a demand shock.
 - However, there exist some unsatisfying shortcomings:
 - Provides a qualitative, but no quantitative analysis.
 - Does not provide an appropriate framework to analyze the dynamics from the old to the new equilibrium.
 - Does not explain the structural parameters of the economy.

Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- **Master level analysis:**
 - Goal: Develop an analytical framework that allows us to overcome the shortcomings of the bachelor level macro framework.
 - Guideline for master level macro approach is provided by sentence of Frank Fisher:

“Macroeconomics is microeconomics. Plus aggregation”.

- Focus: Microeconomics. Aggregation problems are assumed away.
- Basic approach:
 - Model household, firm and government behavior explicitly.
 - Solve their decisions problems.
 - Determine equilibrium in goods and factor markets.
 - Evaluate model solution.

Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- **Master level analysis:**

- Model setup:

- Household experience utility from consuming and supply labor (Objective: Maximize lifetime utility).
- Firms have access to a production function and use labor to produce output (Objective: Maximize profits).
- Monetary authority controls short-term nominal (and due to price rigidities real) interest rates. Objective: Minimize loss function, L :

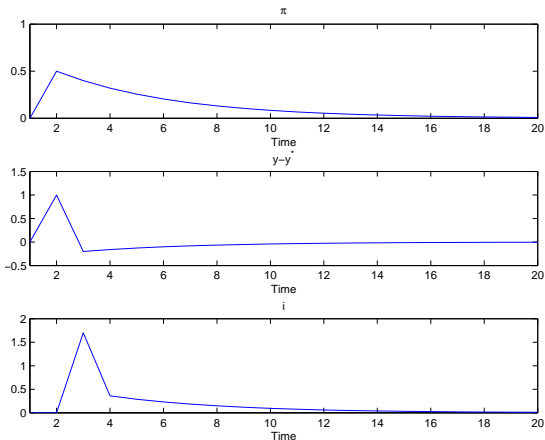
$$L = (\pi - \pi^*) + \omega (y - y^n) \quad (5)$$

with $\pi^* = 0$ and $\omega = 0.5$ (flexible inflation targeting).

- Scenario: There is a one-time demand shock of size 1.

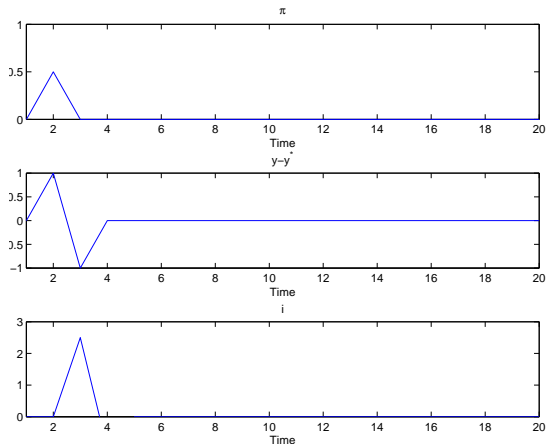
Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- Master level analysis:**



Bachelor vs. master level macro education: Analysis of the effect of an aggregate demand shock.

- **Master level analysis: $\omega = 0$ (strict inflation targeting)**



Bachelor vs. master level macro education: Analysis of an one-time increase in the saving rate (long-run analysis).

- **Bachelor level analysis:**

- The economy is described by the following aggregate production function:

$$Y = K^\alpha (AL)^{1-\alpha}. \quad (6)$$

- Model solution: Express variables in terms of units of efficient labor and solve for steady-state. Result:

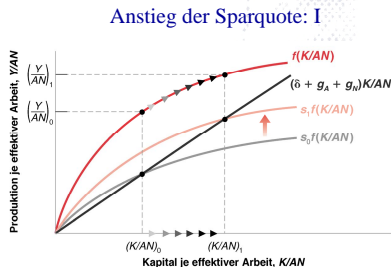
$$k^* = \left(\frac{s}{\delta}\right)^\alpha \quad (7)$$

- Now assume that s increases once.
- Effect: There is a new steady-state which is characterized by higher per-capita income and capital.
- Graphical analysis: See next page.

Bachelor vs. master level macro education: Analysis of the effect of an increase in the saving rate

• Bachelor level analysis: Graphical illustration

Wachstum und technischer Fortschritt: Der Einfluss der Sparquote



⇒ Je höher die Sparquote, desto höher sind langfristig sowohl Produktion wie Kapital im Verhältnis zu effektiver Arbeit.

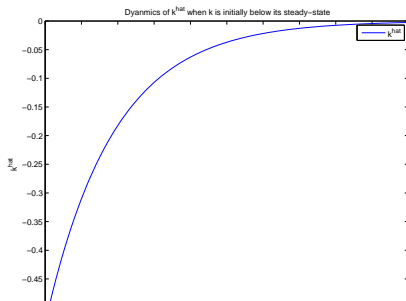
⇒ Not answered: How long does the transition last?

Bachelor vs. master level macro education: Analysis of the effect of an increase in the saving rate.

- **Master level analysis:**
 - Capital accumulation equation represents a dynamic equation:

$$k_{t+1} = sf(k_t) - \delta k_t. \quad (8)$$

- Can be analyzed quantitatively.



Bachelor vs. master level macro education: Decomposition of macroeconomic time series.

- **Bachelor level analysis:**

- No data analysis!!!

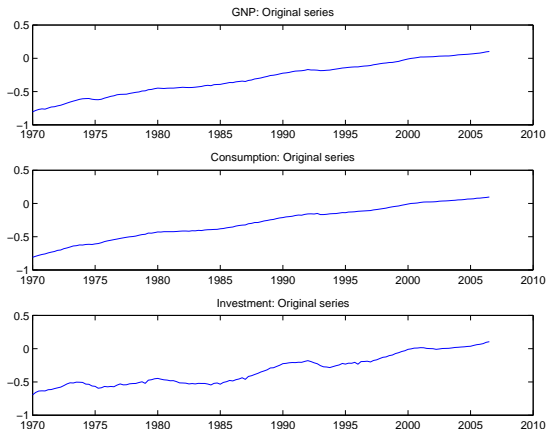
- **Master level analysis:**

- Actual values of macroeconomics variables are sum of long-run and short-run component (growth and business cycle perspective)
- Decompose time series into two components using a filter:
- Basic idea:

$$y_t = y_t^{lr} + y_t^{sr}. \quad (9)$$

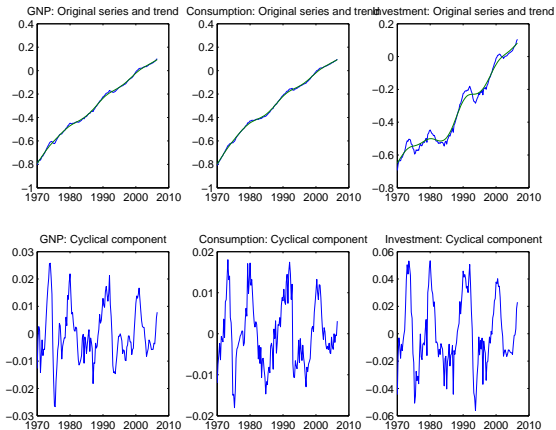
Bachelor vs. master macro: Decomposition of macroeconomic time series.

- **Master level analysis:**



Bachelor vs. master macro: Decomposition of macroeconomic time series.

- Master level analysis: Original and filtered time series**



Organizational issues

- **Contact information**

- **Instructor:**

Michael Gail

Hoelderlinstrasse 3, H-C 5326

- **Office hours:**

After lecture and on appointment.

- **Teaching assistants:**

Natalia Zabelina and Assem Khussainova

Hoelderlinstrasse 3, H-B 5416/17

- **Lectures:**

Tuesday, 2.00 p.m. - 4.00 p.m.; Room: H-A 3102

First lecture: October 20th, 2015

- **Classes:**

Monday, 4.00 p.m. - 6.00 p.m.; Room: H-A 3102

First class: October 26th, 2015

Course information

- **Course website:**

http://www.wiwi.uni-siegen.de/gail/lehre/wintersemester_1516/

- **Course requirements:**

- Final exam

- **Readings:**

The main reference for the course is:

- Wickens, Michael (2011). *Macroeconomic Theory – A Dynamic General Equilibrium Approach*, 2nd ed., Princeton University Press, Princeton.

Course information

Course overview:

- ① Introduction (MW, Chapter 1)
- ② The centralized economy (MW, Chapter 2).
- ③ Economic growth (MW, Chapter 3).
- ④ The decentralized economy (MW, Chapter 4).
- ⑤ Government: Expenditures and public finances (MW, Chapter 5).
- ⑥ The Overlapping-Generations Model (MW, Chapter 6.3)
- ⑦ Imperfectly flexible prices (MW, Chapter 9)
- ⑧ Asset pricing and macroeconomics (MW, Chapter 11)
- ⑨ Financial markets (MW, Chapter 12)
- ⑩ Monetary policy (MW, Chapter 14)