Behavioral and Complexity Macroeconomics

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Introduction

- Macroeconomic theory: What have we learned?
- Focus on Behavioral Macroeconomics
  - Influence of behavioral economics on macro
  - Recent interest: 2000s and after the financial crisis
  - Relation to „irrational exuberance“
- Overview over behavioral macroeconomics
- Discussion of problems
  - Representative agent framework
  - Distinction between levels is important
  - Macro level vs. micro level
- Behavioral macroeconomics should be combined with complexity macroeconomics.
Two ways of macroeconomic theorizing

- Aggregate level
  - Old-style Keynesian macro
  - Post Keynesian macro
  - System dynamics
  - Accounting identities, technological constraints
  - Stock-flow consistent models
- Models with microfoundations
  - In principle a good idea, but not always needed
  - Not per se superior to purely aggregate models
  - Models with perfectly rational representative agents are a very bad idea.
  - Models with representative agents trivialize the aggregation process.
- If you use macroeconomic models with microfoundations, do it right!
History of Behavioral Macroeconomics

- J.M. Keynes had many behavioral insights, but he was an armchair theorist.
  - Insights about consumption
  - Animal spirits
- George Katona combined macroeconomics with psychology.
  - Already in the 1940s
  - Father of consumer sentiment
- George Akerlof’s Nobel lecture in 2001 „Behavioral macroeconomics and macroeconomic behavior“
  - Six unexplained phenomena in New Classical Macroeconomics
  - Rediscovery of psychology in macroeconomics
Current approaches

- Ad-hoc behavioral approaches, e.g.
  - Habit formation
  - Rule-of-thumb consumers
  - Mainly to get a better fit to the data
- Partial behavioral models, e.g.
  - Fairness and wage and price setting (Shefrin & Thaler 1988)
  - Consumption and discounting (Laibson 1997)
- Experiments, e.g.
  - Expectations (Hommes 2011, Luhan & Roos 2013)
  - Sunspots (Duffy & Fisher 2005)
  - Consumption (Carbone & Duffy 2014, Luhan et al. 2014)
- Attempts to marry standard (New Keynesian) models with behavioral approaches, e.g.
  - De Grauwe (2012): fundamentalist and extrapolative forecasting
  - Danthine and Kurmann (2010): Gift-exchange in labor market
Problems

- Many papers focus only on some issues and do not describe the macroeconomic system.
- Some papers introduce some behavioral features into otherwise standard macro models.
  - Some optimization, some use of heuristics
  - Some agents form rational expectations, others do not
  - Models not internally consistent
- Wilderness of bounded rationality
  - Many ways of not being rational
  - Hardly convincing to choose just one particular behavior for the representative agent
- Different types of agents
  - Degree of forward-orientation, propensity to plan
  - Very hard to incorporate many types into mathematical models
- Behavior may change and depend on external circumstances
  - Difficult do in standard equilibrium models
What is needed?

• Incorporating behavioral features into neoclassical representative agent models is the wrong approach.
• We need
  • A new theoretical framework
  • New modeling tools
• Both are available:
  • Complexity economics
  • Agent-based modeling
Complexity Economics

- Adequate framework for macroeconomics
- Economy seen as a Complex Adaptive System (CAS)
  - Composed of „large number of agents that interact and adapt of lean“
  - Decentralized decision-making
- Self-organization and emergence
- Regularities at the macro level are result of interactions of individual decisions
- Macro patterns typically different from micro patterns
- Nonlinear dynamics
- Uncertainty
Complexity and Behavioral Macroeconomics

• Complexity economics and behavioral economics are ideal complements for the study of macroeconomics.
• Substantive rationality impossible in a complex environment
  • Agents are confronted with fundamental uncertainty.
  • Procedural rationality
  • Heuristics and animal spirits
  • Learning
• Behavioral economics tells us how to model the agents.
• Complexity economics tells us how to analyze the different levels.
  • Micro, meso, macro
Agent-based Macroeconomics

- Complexity and behavioral macroeconomics is hard to do with mathematical models.
- Agent-based models are a more natural tool
- Algorithmic approach is closer to behavioral problem solving.
- Agent-based models have huge flexibility and many degrees of freedom.
  - Boon and bane
- Often criticised for arbitrary assumptions
  - Behavioral economics can help to justify assumptions about agents
- Approaches, e.g.
  - EURACE and EURACE@UniBi (Dawid et al. 2012)
  - Keynes-Schumpeter model (Dosi et al. 2013)
  - Financial accelerator model (Delli Gatti et al. 2010)
  - ABM-Stock-Flow consistent model (Caiani et al. 2016)
Implications

- Many challenges
  - Models richer and more difficult than conventional DSGE models
  - Conceptual problem: right degree of granularity
  - Validation
- No simple statements
  - Causality often difficult
  - No clear-cut predictions
  - No simple policy solutions
- These are inherent features of complexity.
- Complexity and behavioral macroeconomics requires a more sophisticated view.
- Assumptions do matter!
  - Behavior of agents must be well justified by empirical evidence.
The way forward

- Behavioral and complexity macroeconomics is still in its infancy.
- Much research needed.
- Host of insights from behavioral economics
  - What is relevant for macroeconomics?
  - Are there robust and parsimonious behavioral models?
- What is the right balance between behavioral details at the micro level and transparency of the macro level dynamics?
- How do we validate these models reliably?
- What kind of answers can we get from this approach?
What have we learned?

1. Macroeconomic models with perfectly rational representative agents are flawed.
   • Individual agents are boundedly rational

2. Models with boundedly rational representative agents are also flawed.
   • Agents are heterogenous
   • Behavior may change and is dependent on context
   • Agents interact
   • Aggregate behavior will be different from individual behavior

3. Macroeconomic models with microfoundations must take into account bounded rationality, heterogeneity and interaction.
   • Complex dynamics and emergent outcomes will result.
   • Behavioral and Complexity Macroeconomics