Introduction

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Econ 126: Computational Macroeconomics

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Why Computational Methods for Macroeconomics

- Computational tools are indispensable for many areas of economic research and particularly for macroeconomics.
- Macroeconomists use computational tools to:
  1. Solve and simulate complex dynamic models (often impossible with paper and pencil)
  2. Manage and analyze data
- Undergraduate economic curriculum often shields students from this knowledge for a variety of reasons (e.g., pedagogical philosophy, perceived lack of math proficiency of students, cost to faculty of course design)

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$$C_t + K_{t+1} = A_t K_t^{\alpha} + (1-\delta) K_t \tag{2}$$

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- Equation (1) implies that C_t depends on the *expectation* of C_{t+1}.

- But Equation (1) also implies that the *expectation* of C_{t+1} depends on the *expectation* of C_{t+2} and so on.

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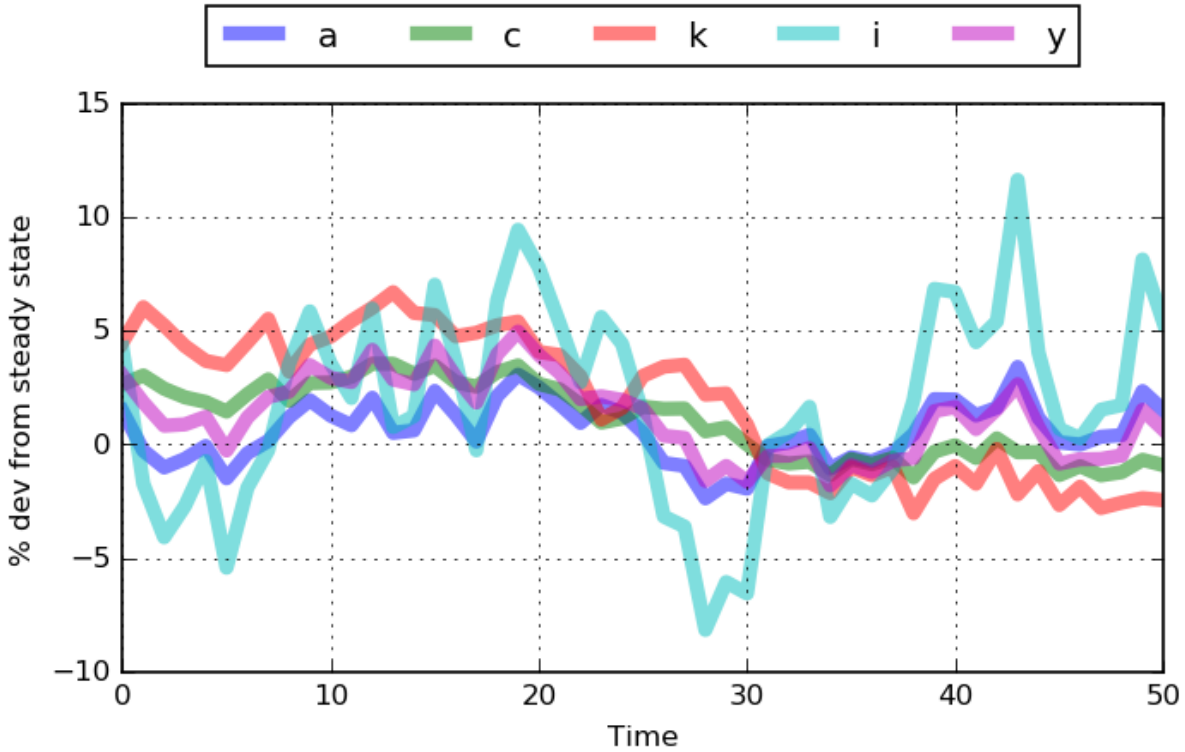
- Solving the problem *analytically* (i.e., exactly with paper and pencil) would take pages of calculations and is error prone.
- Programmed properly, a computer can solve the problem *numerically* (i.e., approximately) in less than a second.

Figure 1: **Simulated RBC model.**



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  1. Lower level, compiled languages: Fortran, C/C++
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- The compiled languages execute more quickly, but the time investment to write code is greater.

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- Versatility means that even if you don't become a researching macroeconomist or a financial engineer, you can still use Python.

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  - Designing a mural for a wall in my house.

Figure 2: **Mural: design concept.** Colors are taken from the Sherwin Williams color catalog.

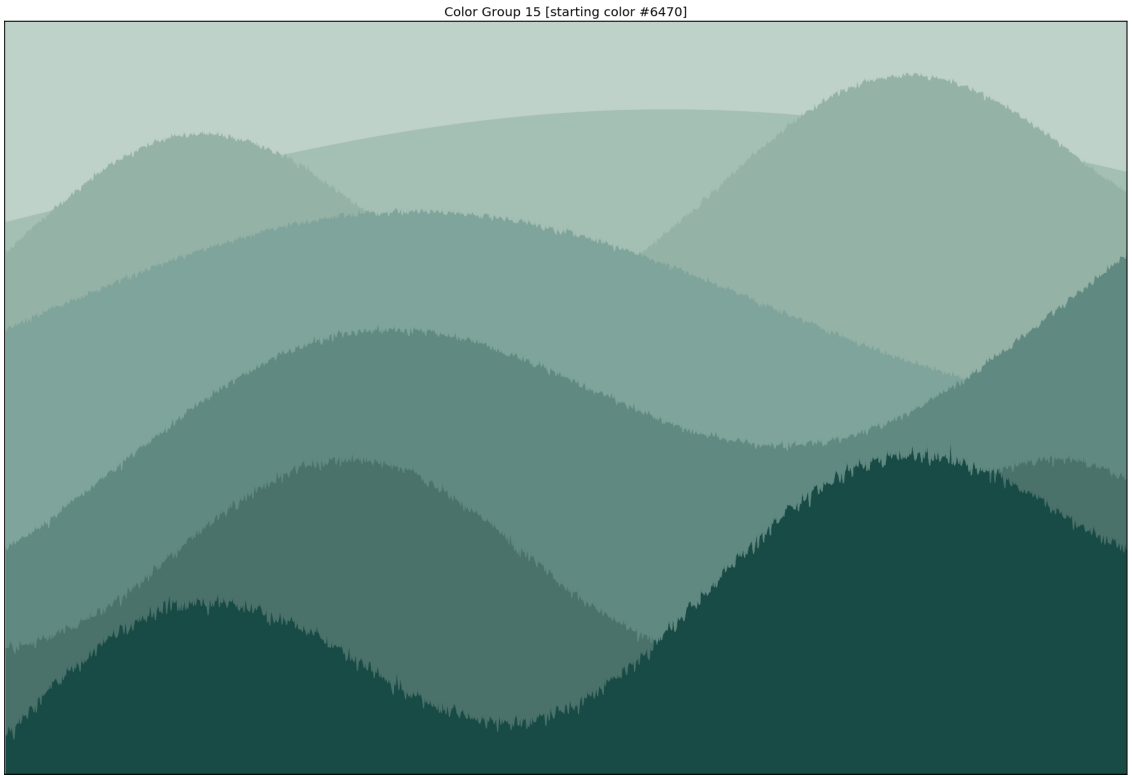

Figure 3: **Mural: key coordinates.**

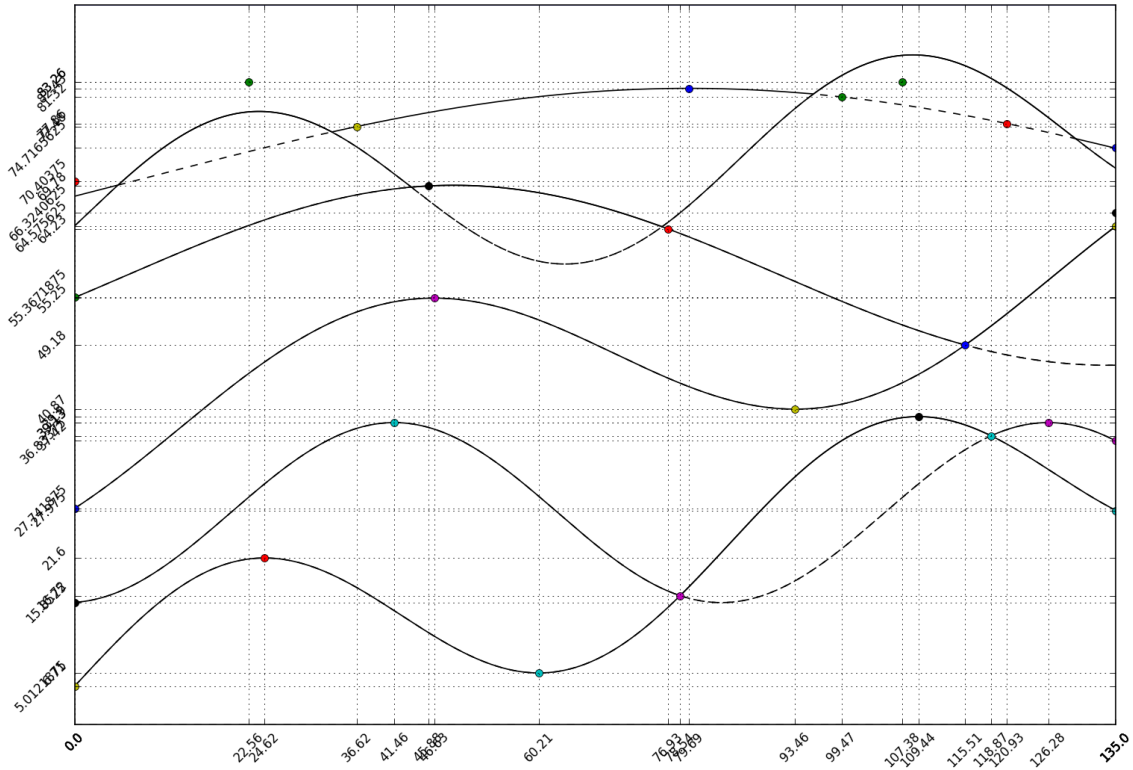

Figure 4: **Mural: final result.**

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  - The basics of the real business cycle (RBC) and new Keynesian modeling approaches
  - Critiques and criticisms of both business cycle modeling approaches

Overview of the Course

- The course presumes no programming experience
- My philosophy is that coding is like cooking: it's often sufficient to learn just what you need to know in order to make what you're trying to make