

# 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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- 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.



## Example: RBC Model

- So computing  $C_t$  requires also computing the expected path of  $C_{t+1}, C_{t+2}, C_{t+1}, \dots$  given  $A_t$  and  $K_t$ .

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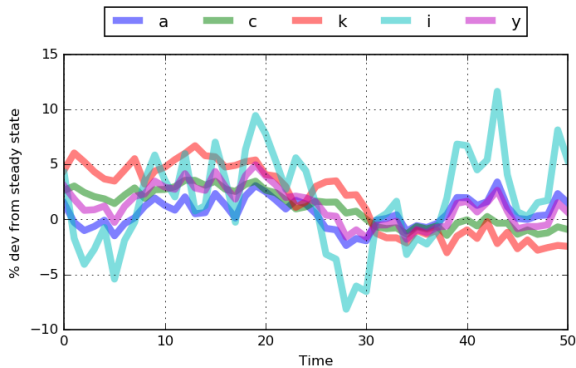
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- Solving the problem *analytically* (i.e., exactly with paper and pencil) would take pages of calculations and is error prone.
- Programmed properly, a computer can solve the problem *numerically* (i.e., approximately) in less than a second.

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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  - 4 Versatile: Numerical applications, web scraping, email management, web development
- 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.

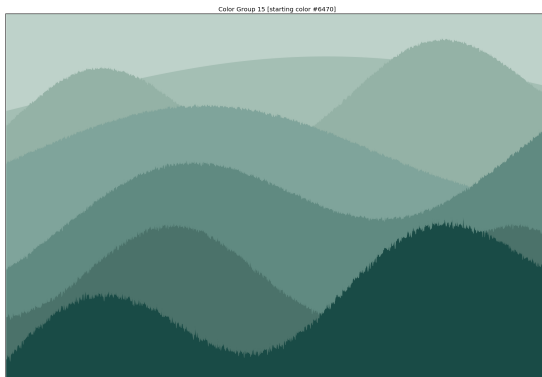


Figure 3: Mural: key coordinates.

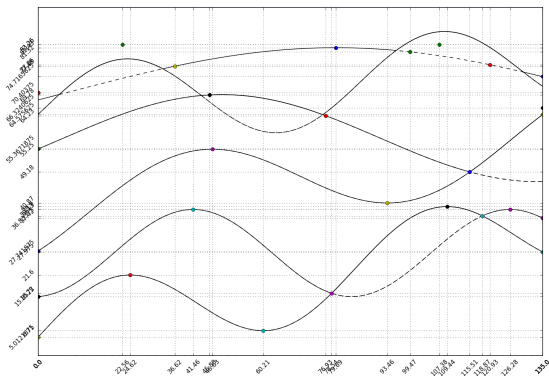


Figure 4: Mural: final result.



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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