Introducing the **Econ-ARK**: Economics "Algorithmic Repository and toolKit"

Short Version

July 27, 2018

2/9

State-of-the-art tools for:

2/9

State-of-the-art tools for:

Solving microeconomic dynamic stochastic optimization problems

State-of-the-art tools for:

- Solving microeconomic dynamic stochastic optimization problems
 - 'Hard' Bellman problems with uncertainty, 'kinks,' nonconvexities

2/9

State-of-the-art tools for:

- Solving microeconomic dynamic stochastic optimization problems
 - 'Hard' Bellman problems with uncertainty, 'kinks,' nonconvexities
- Simulating populations of agents

2 / 9

State-of-the-art tools for:

- Solving microeconomic dynamic stochastic optimization problems
 - 'Hard' Bellman problems with uncertainty, 'kinks,' nonconvexities
- Simulating populations of agents
 - Whether or not they are solving DSOP

2 / 9

State-of-the-art tools for:

- Solving microeconomic dynamic stochastic optimization problems
 - 'Hard' Bellman problems with uncertainty, 'kinks,' nonconvexities
- Simulating populations of agents
 - Whether or not they are solving DSOP
 - · Allows disciplined exploration of deviations from RE

□ ト 4 回 ト 4 重 ト 4 重 ト 9 へ ○

2 / 9

State-of-the-art tools for:

- Solving microeconomic dynamic stochastic optimization problems
 - 'Hard' Bellman problems with uncertainty, 'kinks,' nonconvexities
- Simulating populations of agents
 - Whether or not they are solving DSOP
 - · Allows disciplined exploration of deviations from RE
- Finding equilibria for markets/economies populated by such agents

Who, What, Why July 27, 2018 2 / 9

Who Has Produced It?

Name	TLA	Affiliation
Christopher D Carroll	CDC	JHU, CFPB
David C Low	DCL	CFPB
Nathan M Palmer	NMP	OFR
Matthew N White	MNW	UDel, CFPB
Alex Kaufman	ABK	$CFPB \to Princeton$

Nothing herein may be interpreted as reflecing opinions of

CFPB - United States Consumer Financial Protection Bureau

JHU - Johns Hopkins University

IMF - International Monetary Fund

OFR - Office of Financial Research, U.S. Treasury

UDel - University of Delaware

3/9

Big Grant from Alfred P. Sloan Foundation!

Three Years

Big Grant from Alfred P. Sloan Foundation!

Three Years

• Hire Programmers, RA's, Open Source Project Managers, etc etc

• Heterogeneous Agent Macro Models

- Heterogeneous Agent Macro Models
 - Original name: Heterogeneous Agent Resources and toolKit

- Heterogeneous Agent Macro Models
 - Original name: Heterogeneous Agent Resources and toolKit
 - HARK!

- Heterogeneous Agent Macro Models
 - Original name: Heterogeneous Agent Resources and toolKit
 - HARK!
- Structural Micro Models (e.g., labor, health)

Who, What, Why July 27, 2018 5 / 9

- Heterogeneous Agent Macro Models
 - Original name: Heterogeneous Agent Resources and toolKit
 - HARK!
- Structural Micro Models (e.g., labor, health)
- IO models with equilibrim between consumer agents and firm agents

Make it *much* easier:

Make it *much* easier:

• To get started doing structural Heterogeneous Agent modeling

6/9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models

6/9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models
- To compare models to each other

6/9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models
- To compare models to each other
- To add new capabilities

6/9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models
- To compare models to each other
- To add new capabilities
- To mix-and-match components/modules/agent types

6 / 9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models
- To compare models to each other
- To add new capabilities
- To mix-and-match components/modules/agent types

6 / 9

Make it *much* easier:

- To get started doing structural Heterogeneous Agent modeling
- To teach newcomers how to use such models
- To compare models to each other
- To add new capabilities
- To mix-and-match components/modules/agent types

Remove the excuse 'Structural model was not worth the effort'

6 / 9

Browse without installing:

• Browse on our webpage at econ-ark.org

Browse without installing:

- Browse on our webpage at econ-ark.org
- Browse our code at http://github.com/econ-ark

Browse without installing:

- Browse on our webpage at econ-ark.org
- Browse our code at http://github.com/econ-ark
- Browse our talks at http://github.com/econ-ark/PARK

Browse without installing:

- Browse on our webpage at econ-ark.org
- Browse our code at http://github.com/econ-ark
- Browse our talks at http://github.com/econ-ark/PARK
- Overview paper at http://github.com/econ-ark/PARK/SciPy2018.pdf

7/9

Browse without installing:

- Browse on our webpage at econ-ark.org
- Browse our code at http://github.com/econ-ark
- Browse our talks at http://github.com/econ-ark/PARK
- Overview paper at http://github.com/econ-ark/PARK/SciPy2018.pdf
- Browse our live notebooks

7/9

Browse without installing:

- Browse on our webpage at econ-ark.org
- Browse our code at http://github.com/econ-ark
- Browse our talks at http://github.com/econ-ark/PARK
- Overview paper at http://github.com/econ-ark/PARK/SciPy2018.pdf
- Browse our live notebooks
- Browse our documentation

You Need Python 2.7 (Python 3 target is July)

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - Python 2.7

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed
 - Install the 'econ-ark' package:

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed
 - Install the 'econ-ark' package:
 - pip install econ-ark

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed
 - Install the 'econ-ark' package:
 - pip install econ-ark

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed
 - Install the 'econ-ark' package:
 - pip install econ-ark

8 / 9

- You Need Python 2.7 (Python 3 target is July)
- If you don't have Python 2.7 on your computer, install either:
 - Anaconda2 adds many packages useful for scientific computing
 - 2 Python 2.7
 - On Mac or Linux to download and install it
 - On Windows
 - Install Jupyter
 - Make sure you have pip installed
 - Install the 'econ-ark' package:
 - pip install econ-ark
- Get our our demonstration notebooks from DemARK

References I

- BLANCHARD, OLIVIER (2016): "Do DSGE Models Have a Future?," Discussion paper, Petersen Institute for International Economics, Available at https://piie.com/system/files/documents/pb16-11.pdf.
- COEURE, BENOIT (2013): "The relevance of household-level data for monetary policy and financial stability analysis," .
- HALDANE, ANDY (2016): "The Dappled World," Discussion paper, Bank of England, Available at http://www.bankofengland.co.uk/publications/Pages/speeches/2016/937.aspx.
- SUMMERS, LAWRENCE H. (2011): "Larry Summers and Martin Wolf on New Economic Thinking," Financial Times interview, http://larrysummers.com/commentary/speeches/brenton-woods-speech/.
- Yellen, Janet (2016): "Macroeconomic Research After the Crisis," Available at https://www.federalreserve.gov/newsevents/speech/yellen20161014a.htm.

9 / 9