Tax Policy Research Unit and World Bank Overlapping Generations Model Training Day 1: (Evans)

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Tax Policy Research Unit and World Bank

Before we begin

- Me: Richard W. Evans, University of Chicago
- You:
- Training repository: https://github.com/OpenRG/WB-India-2019
- Git installed
- GitHub accounts
- Anaconda distribution Python installed
- Jupyter notebooks

Past year and going forward

In the past 14 months:

- DeBacker and Evans: Simple OG model theory and computation
- Holmer and Frailer: Microsimulation model development
- Kallen: Business microsimulation model development

Going forward TPRU will:

- Calibrate full OG model to India
  - partially in next 3 weeks
- Develop and integrate microsimulation models
  - Already have some models working
  - Will take significant effort to integrate with other models
- Staff gain full mastery of modeling and collaborative process
  - This step will take the longest
  - TPRU has opportunity to lead state orgs

Schedule, Week 1

Day	9-11am (Evans)	4-6pm (DeBacker)
M, Aug 5	Git and GitHub basic, intro to Python, IDE's and Python workflows, data types, input/output	Numpy, broadcasting, indexing, pandas, visualization
W, Aug 7	Object oriented programming, functions, docstrings	Optimization (unconstrained, constrained)
F, Aug 9	3-period lived agent OG model: theory	3-period lived agent OG model: computation

Schedule, Week 2

Day	Topic
M, Aug 19	Theory and components/modules of OG-USA, downloading the model, installing packages, setting a policy
T, Aug 20	Estimation of tax functions from India micro-simulation model, Calibrating lifetime earnings profiles
W, Aug 21	Calibrating demographics, Calibrating bequests and transfers
Th, Aug 22	Calibrating labor supply and wealth distribution, calibrating open economy, government closure rule
F, Aug 23	Ways to run the model, how to change the model, questions/exercises

Short-run goals

Week 1 (Up to speed)

- Everybody understands Git and GitHub
- Everybody knows how to code in Python
- Everybody has a similar coding workflow
- Intro to OG models

Week 2 (Learn full OG model and some calibration)

- How to run big OG model
- Tax and earnings
- Demographics, bequests, transfers
- Calibrating to labor and wealth
- Open economy and gov't debt assumptions

Long-run goals

Medium-term

- Get OG-India calibrated and forecasting
- Integrate household tax microsimulation model

Long-term

- Multiple microsimulation models integrated
- TPRU staff lead core development
- TPRU staff manage collaborative workflow
- TPRU staff train all new collaborators

Opportunity

Most other countries have legacy systems the prevent them from fully adopting modern modeling architecture in state organizations. India has opportunity to lead here.

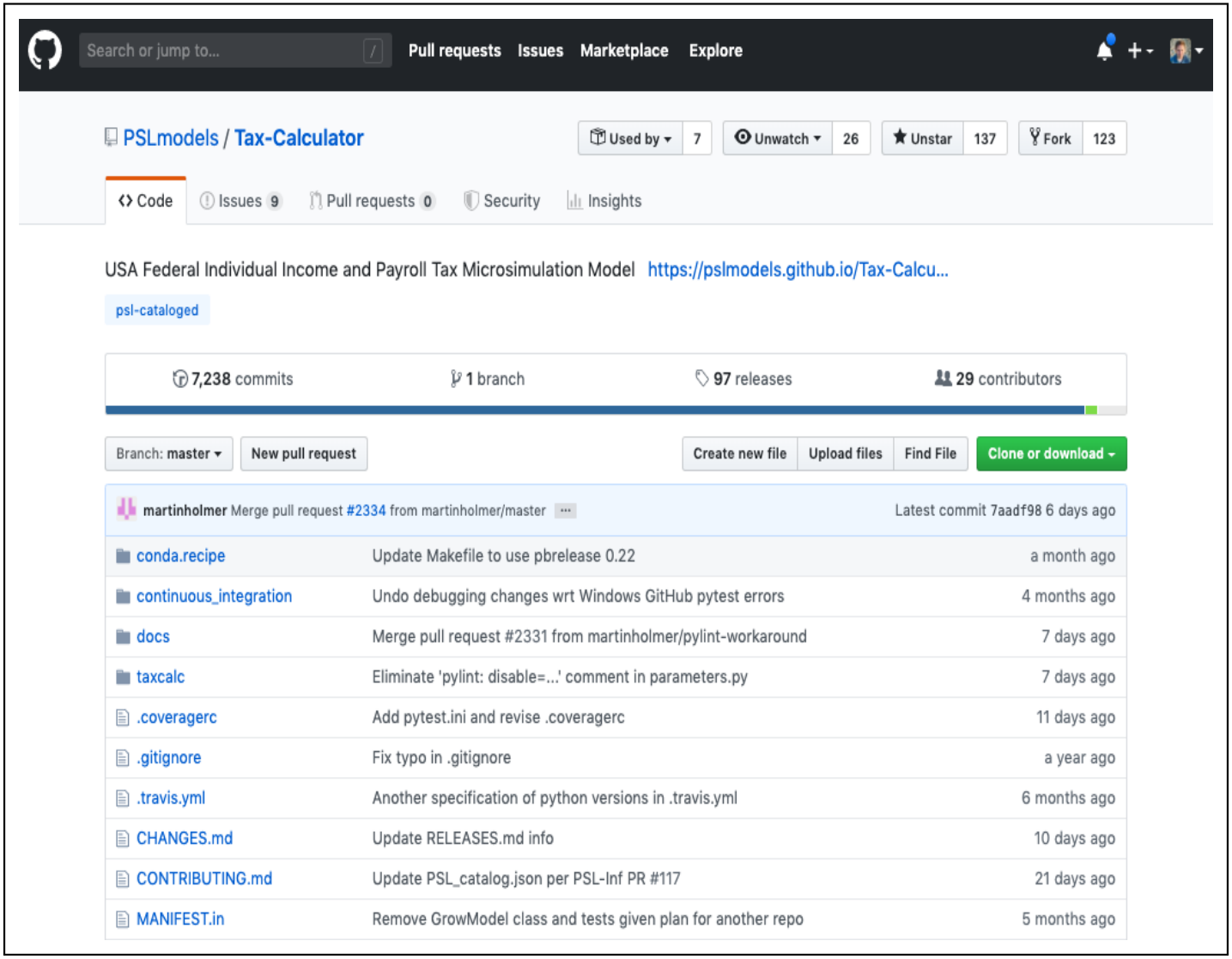
Slide

Tutorials Git and GitHub PDF

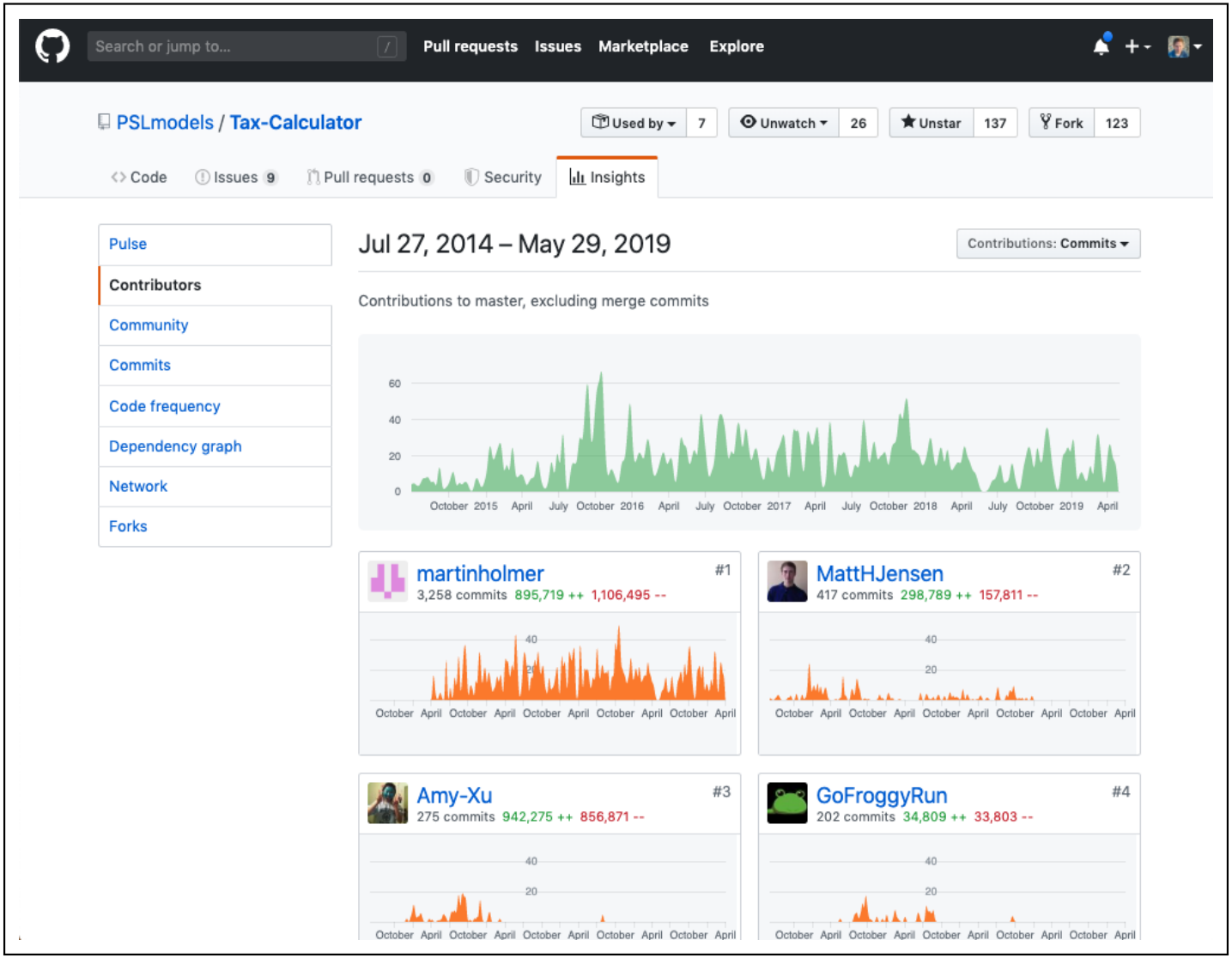
Go through Git and GitHub tutorial.

- Rick posts an issue to the repo
- Do a fork, clone, commit, branch, PR of some change in the repository

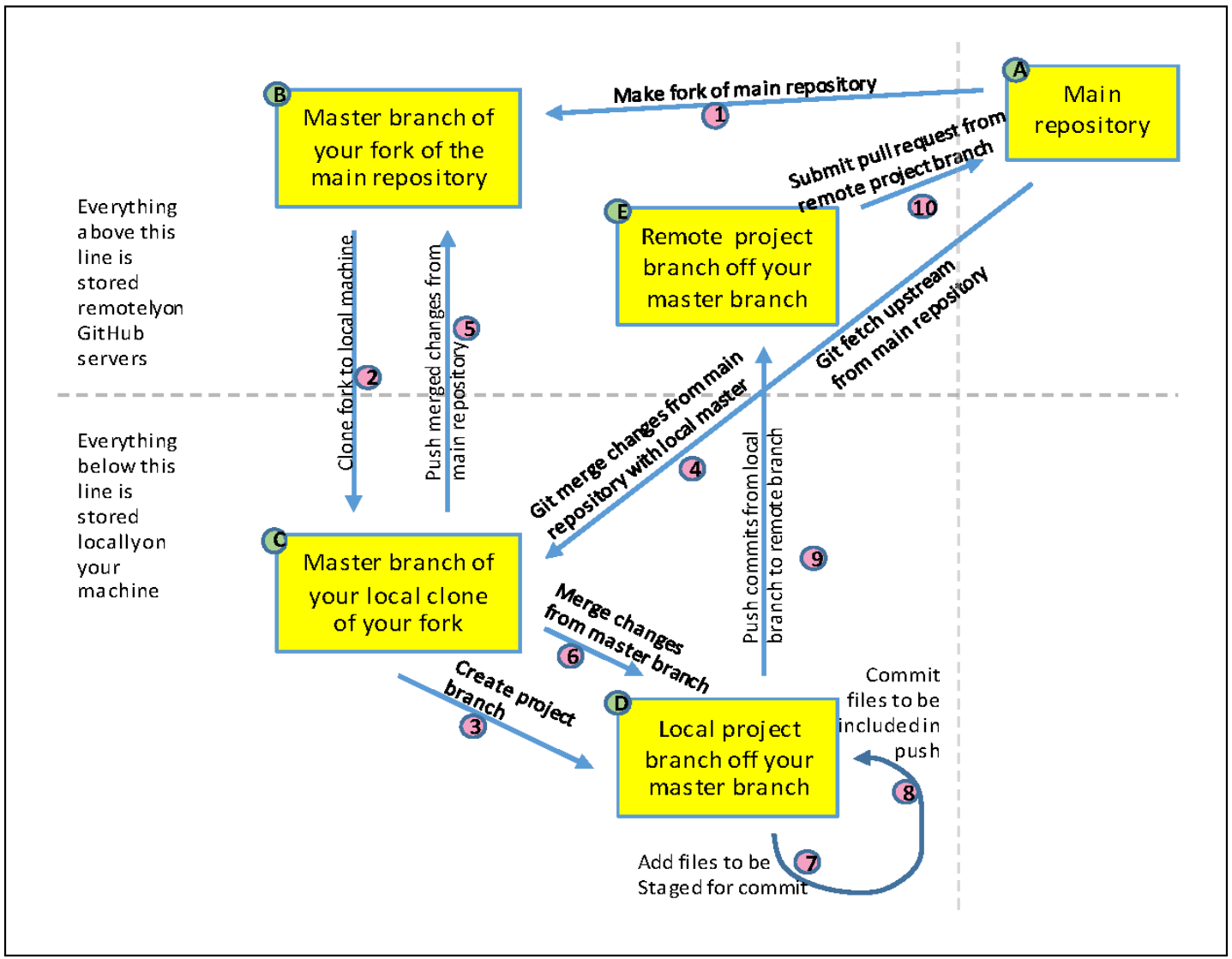
Using GitHub repositories



Using GitHub repositories



Git workflow diagram



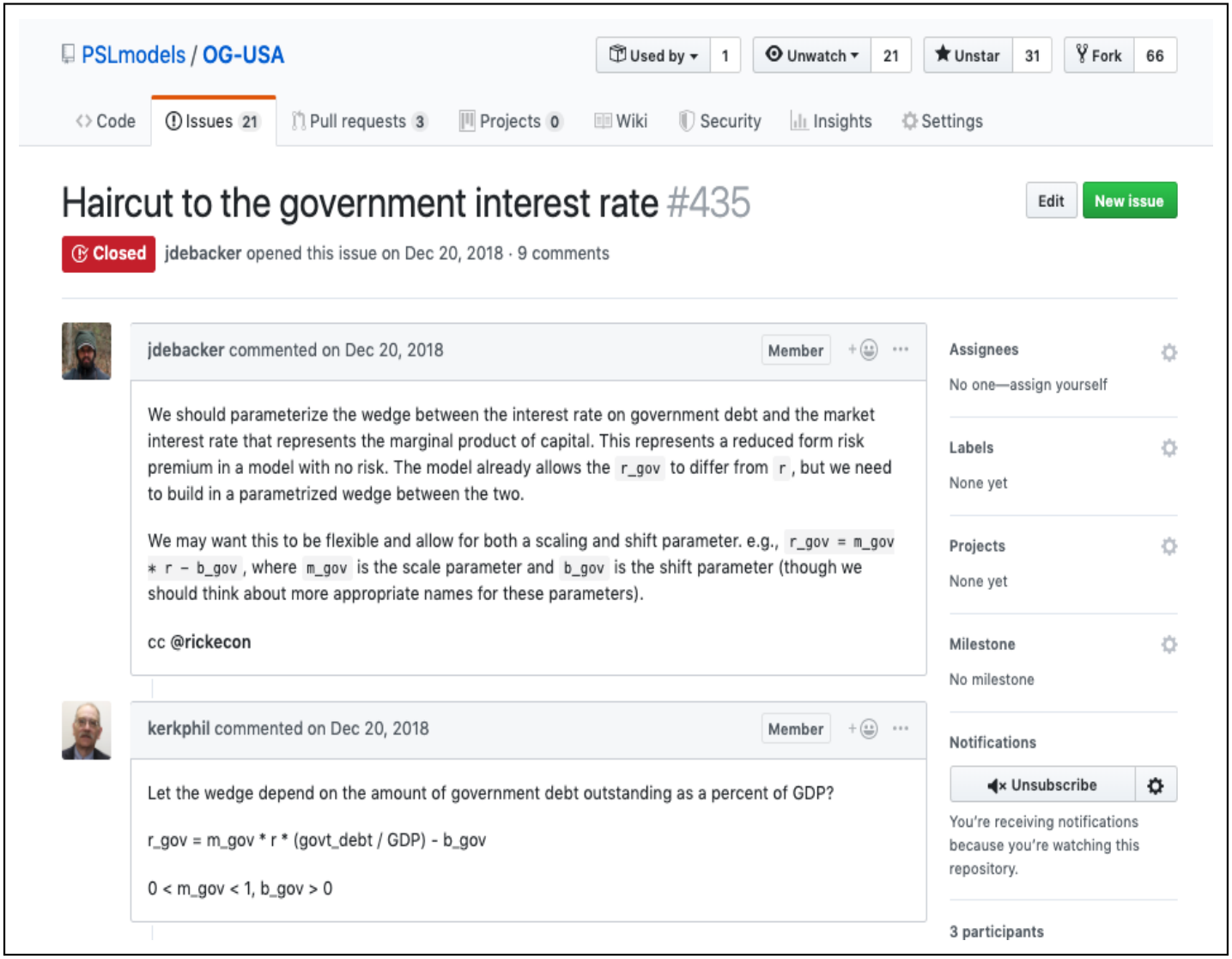
Collaborative workflow

- GitHub workflow (fork, branch pull request, issues, comments)
- Favorite recent threads
  - Issue #435 "Haircut to the government interest rate"
  - Issue #434 "Large open economy option"
- You can look at `Issues` to find places to contribute
- You can submit issues

Essential to large scale collaboration...

Unit testing and continuous integration testing allow project participation to scale.

GitHub issues and PR comments



PSLmodels / OG-USA

Used by 1 | Unwatch 21 | Unstar 31 | Fork 66

Code | Issues 21 | Pull requests 3 | Projects 0 | Wiki | Security | Insights | Settings

Haircut to the government interest rate #435

Edit | New issue

Closed **jdebacker** opened this issue on Dec 20, 2018 · 9 comments

jdebacker commented on Dec 20, 2018 — Member

We should parameterize the wedge between the interest rate on government debt and the market interest rate that represents the marginal product of capital. This represents a reduced form risk premium in a model with no risk. The model already allows the `r_gov` to differ from `r`, but we need to build in a parametrized wedge between the two.

We may want this to be flexible and allow for both a scaling and shift parameter. e.g., `r_gov = m_gov * r - b_gov`, where `m_gov` is the scale parameter and `b_gov` is the shift parameter (though we should think about more appropriate names for these parameters).

cc **@rickecon**

kerkphil commented on Dec 20, 2018 — Member

Let the wedge depend on the amount of government debt outstanding as a percent of GDP?

r_gov = m_gov * r * (govt_debt / GDP) - b_gov

0 < m_gov < 1, b_gov > 0

Assignees
No one—assign yourself

Labels
None yet

Projects
None yet

Milestone
No milestone

Notifications
Unsubscribe
You're receiving notifications because you're watching this repository.

3 participants

GitHub issues and PR comments

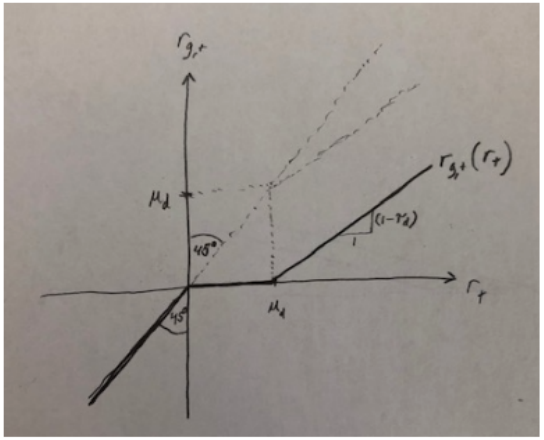
rickecon commented on Jan 8 • edited ▾ Member

@jdebacker, **@kerkphil**. OK, I agree that it is the best to set up a perfectly competitive mutual fund industry that takes savings from households and lends it to firms and government. And we can easily set the production function as CES, and just calibrate it to be Cobb-Douglas initially.

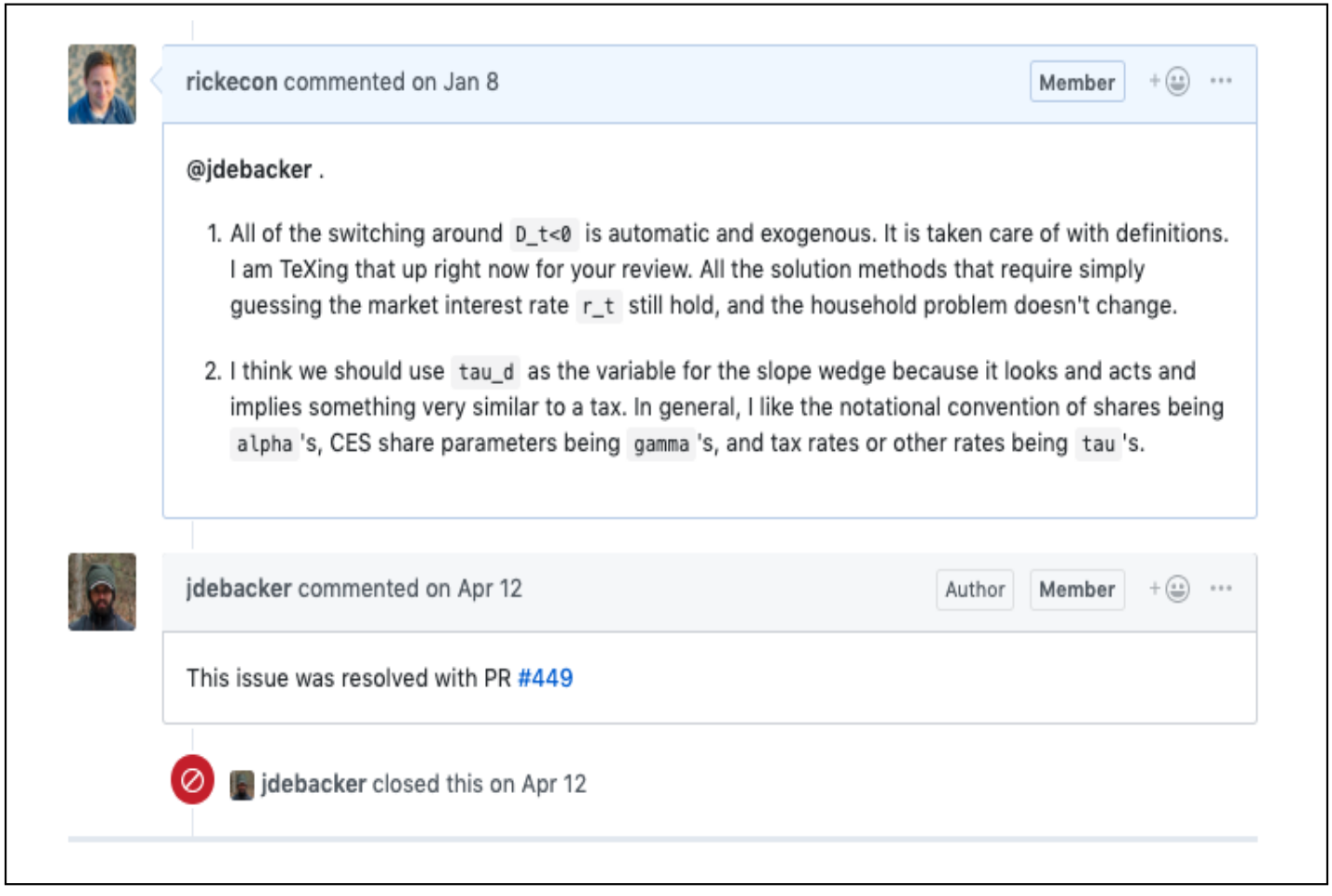
But I think that the interest rate wedge between the government borrowing rate `r_{g,t}` and the private rental rate `r_t` rule should have the following form that includes an indicator function.

$$r_{g,t} = \begin{cases} (1-\tau_d)r_t - \mu_d & \text{if} \quad r_t \geq \frac{\mu_d}{1-\tau_d} \\ 0 & \text{if} \quad r_t \in \left[0, \frac{\mu_d}{1-\tau_d}\right) \\ r_t & \text{if} \quad r_t < 0 \end{cases}$$

This is because I think it makes sense for the wedge to exist only when the private rate is positive (the bottom case). And I don't think it makes sense for the government rate to be negative if the private rate is not negative (middle case). The picture of this interest rate wedge is below. Let me know what you think.



GitHub issues and PR comments



rickecon commented on Jan 8 — Member

@jdebacker .

1. All of the switching around `D_t<0` is automatic and exogenous. It is taken care of with definitions. I am TeXing that up right now for your review. All the solution methods that require simply guessing the market interest rate `r_t` still hold, and the household problem doesn't change.

2. I think we should use `tau_d` as the variable for the slope wedge because it looks and acts and implies something very similar to a tax. In general, I like the notational convention of shares being `alpha`'s, CES share parameters being `gamma`'s, and tax rates or other rates being `tau`'s.

jdebacker commented on Apr 12 — Author — Member

This issue was resolved with PR #449

jdebacker closed this on Apr 12

Python introduction

Go through the following sections of ACME Python Intro

- Running Python
- iPython
- Python Basics
- Data types
- Control flow tools

Exercises

Do problem 1, 2, 3, 4, 6

Python workflows

- **Python scripts in text editor + execute from terminal**
  - Visual Studio Code, Atom, Sublime Text, Vim
  - Positive: Most flexible, minimum dependency compatibility issues
  - Negative: A little bit cumbersome
- **Jupyter notebooks**
  - Positive: Great for teaching, tutorial, testing
  - Negative: Not great for implementation
- **Python IDE (integrated development environment)**
  - PyCharm (not free)
  - Spyder (free with Anaconda)
  - Positive: Easy to use, similar to MATLAB
  - Negative: Has some dependency/compatibility issues

Python input/output

Tutorials Notebook

Go through Reading data into Python notebook.