PAYG, Current Account and Fertility Rates: Consequences for Savings

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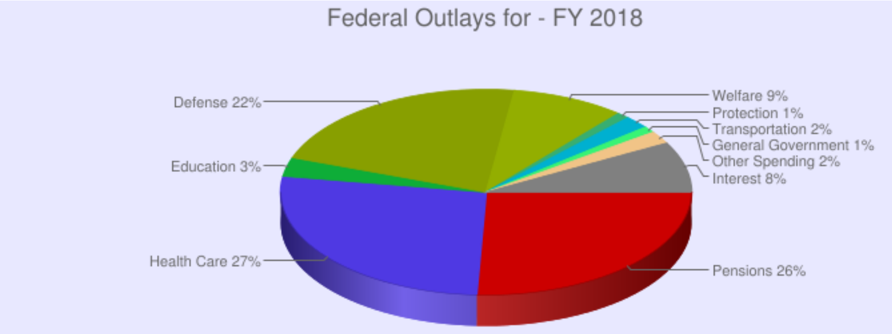
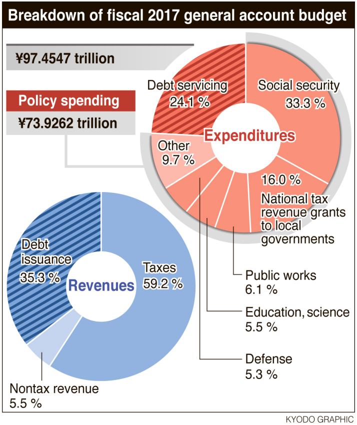
Overview

- Motivating Graphs
- Quick Literature Review
- Endgame Model
- Current Model
- Steady State Calculations
- Dynamic Preview

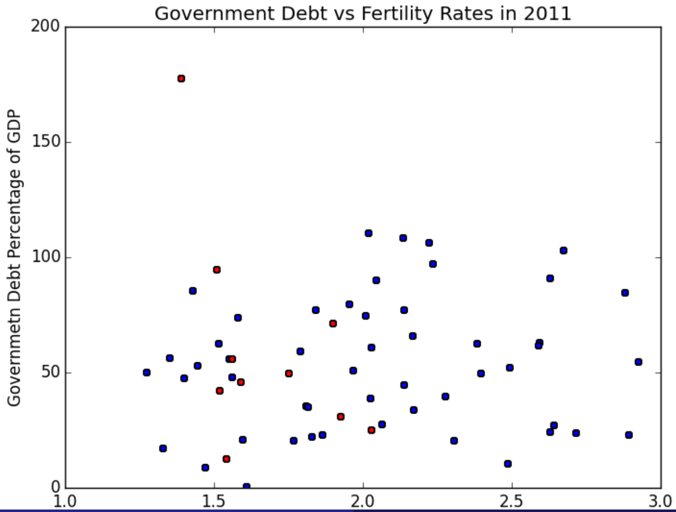
US Budget


Federal Outlays for - FY 2018
Defense 22%
Education 3%
Health Care 27%
Welfare 9%
Protection 1%
Transportation 2%
General Government 1%
Other Spending 2%
Interest 8%
Pensions 26%

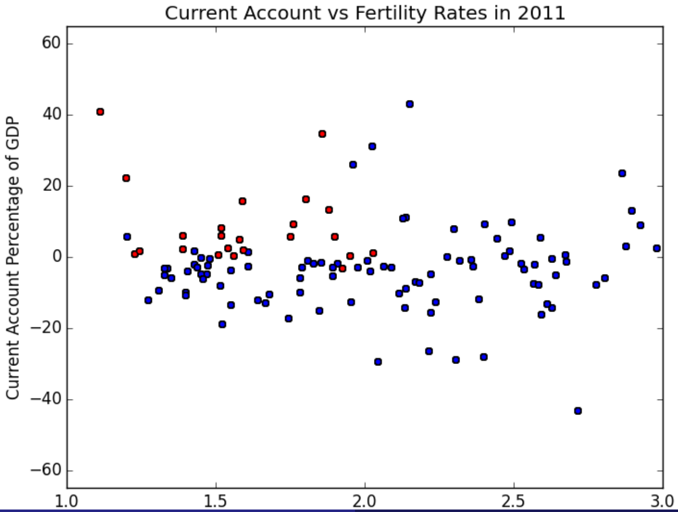
Japan Budget



Government Debt and Fertility



Current Account and Fertility



Underlying Question

- What is the impact of a Pay-As-You-Go Pension System and a shrinking population on international financial allocation?
- Based on my data search, I hypothesize that countries with a PAYG pension and shrinking populations will have current account surpluses.
- I will begin this exploration by building a model. This will be an overlapping generations model (OLG).

A Brief Review

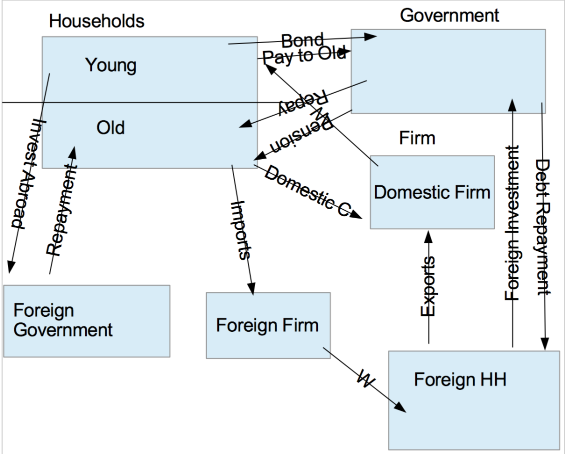
- **OLG in International Trade/Finance**
  - Stavely-O'Carroll and Stavely-O'Carroll (2017): Comparing two countries with and without PAYG system.
  - Eugeni (2015): Differences in PAYG execution lead to impact on current accounts
  - Sayan (2005): Two Countries growing at different (but constant) rates
- **OLG/Pension and Saving**
  - Samwick (2000): Pension system's impact on savings, Empirical evidence that it does distort savings decision.

Unique Features

I am working to build a two good, two country OLG Trade Model with the following features:

- Both countries have a Pay-As-You-Go (PAYG) pension system and exhibit population growth.
- However, one will have stochastic population growth and the other will grow at a constant rate.
- The governments will be permitted to borrow to finance pensions
- Households can purchase good from either firms.
- The intent is to examine the differences savings behavior between these two countries.

Full Model Diagram



Starting from the Ground Up (Households)

First, I'll focus on the stochastic population mechanic before adding the other features. The Household's problem is:

$$\max_{s_t, c_t^y, c_{t+1}^o} \; u(c_t^y) + \beta \mathbb{E}_t u(c_{t+1}^o)$$

$$c_t^y = w_t - x_t - s_t$$

$$c_{t+1}^o = p_{t+1} + (1 + r_{t+1}) s_t$$

Where the population grows:

$$N_t = (1 + g_t e^{z_t}) N_{t-1}$$

Where $z_t = \rho z_{t-1} + \epsilon_t \; \epsilon_t \sim N(0, \sigma_t^2)$

Households Continued

Households also have CRRA Preferences:

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma} \tag{1}$$

We normalize all of the variables in the following way:

$$\hat{\theta} = \frac{\theta}{N}$$

Firm and Government

Pensions must equal contributions

$$N_t x_t = N_{t-1} p_t \implies p_t = (1 + e^{z_t} g_t) x_t$$

Then the firm's (per capita) problem is:

$$\max_{k_t} k_t^\alpha - w_t - r_t k_t$$

With the standard factor prices:

$$r_t = \alpha k_t^{\alpha - 1}$$

$$w_t = (1 - \alpha) k_t^\alpha$$

Equilibrium Conditions

Given factor prices (w_t, r_t), x_t and k_t

$$(c_t^y)^{-\gamma} = \beta \mathbb{E}_t (1 + r_{t+1})(c_{t+1}^o)^{-\gamma}$$
$$k_t^\alpha = c_t^y + c_t^o + k_t + x_t$$

Using the constraints defined before.

"Calibrations"

Parameter	Value
g	0.03
β	0.95
α	0.35
δ	0.04
γ	3
ρ	0.8
σ_e	0.03

"Results" unconstrained

Steady State	Value
k_{ss}	0.00155394127258
x_{ss}	0.0387485406436
r_{ss}	23.4226243488
w_{ss}	0.0675951392773
c^y_{ss}	0.0272926573611
c^o_{ss}	0.0778623208233

Next Stage

- Expand to the dynamic model (VFI)
- Next, I'll incorporate bond markets.
- Then, I'll add trade.

You can follow my progress at:
`https://github.com/jdclawson/JeffPhDRepo`