PAYG, Current Account and Fertility Rates: Consequences for Savings

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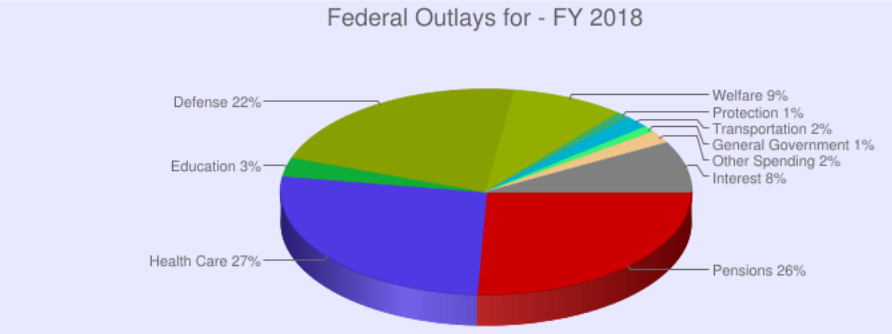
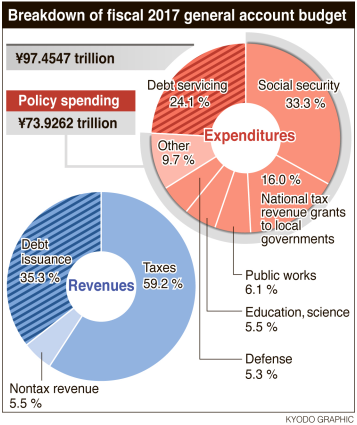
Overview

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

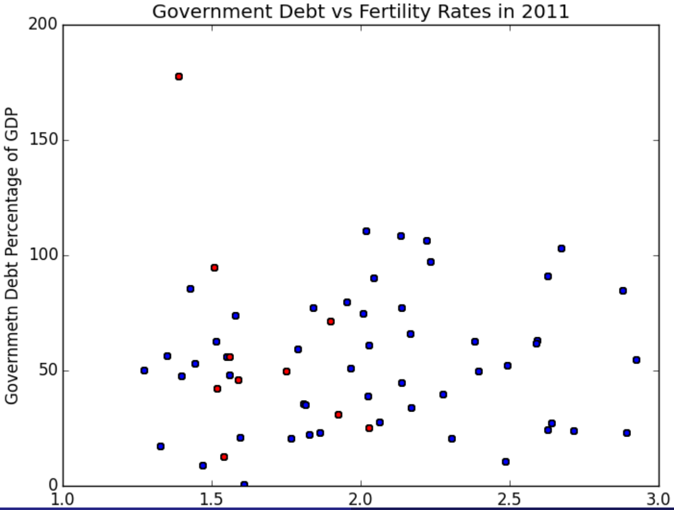
US Budget


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%

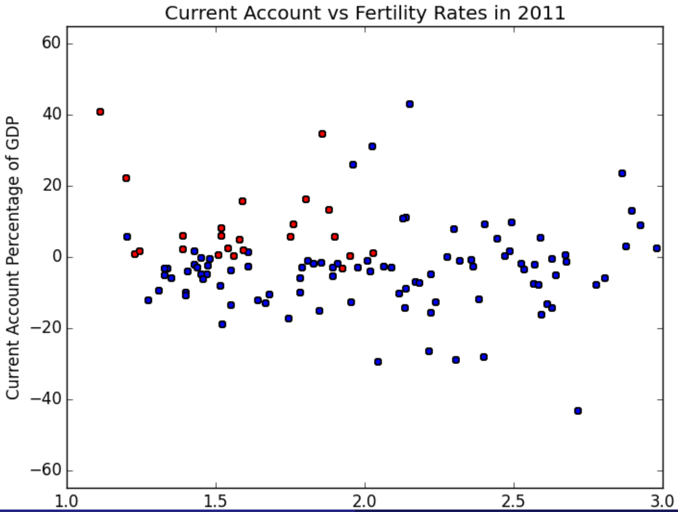
Japan Budget



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?
- I will begin this exploration by building a model. This will be an overlapping generations model (OLG).

A Brief Review

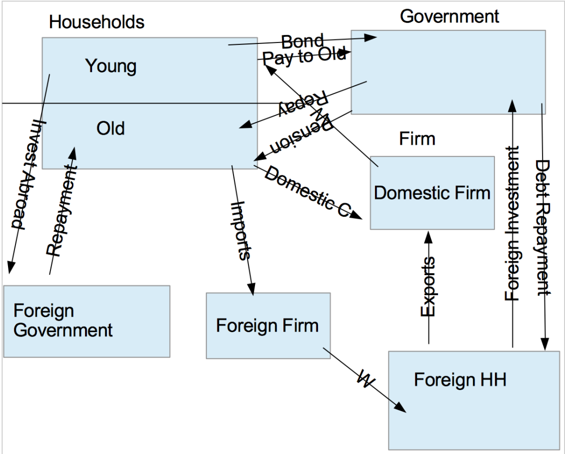
- **OLG in International Trade/Finance**
  - Stavely-O'Carroll and Stavely-O'Carroll (2017): Comparing two countries with and without PAYG system.
  - Eugeni (2015): Differences in PAYG execution lead to impact on current accounts
  - Sayan (2005): Two Countries growing at different rates
- **OLG/Pension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

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. They could be subject to trade costs.

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

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 problem is:

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

With the standard factor prices:

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

$$w_t = f(k_t) - k_t f'(k_t)$$

Equilibrium Conditions

Given (Assuming CRRA utility) factor prices (w_t, r_t), x_t and k_t satisfy:

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

$$k_t^\alpha = c_t^y + c_t^o + k_t + x_t$$

Using the constraints defined before.

"Calibrations"

Parameter	Value
g	.03
β	.95
α	.35
δ	.04

”Results”

k_{ss}: 0.0108942393752
x_{ss}: 0.0521844807871
r_{ss}: 6.60526202666
w_{ss}: 0.133638710501
c^y_{ss}: 0.0705599903384
c^o_{ss}: 0.13660356024

Next Stage

- Need to figure Constraint with the c_t^o
- Next, I'll incorporate bond markets.
- Then, I'll add trade.