Simulating the Blanchard Conjecture in a Multi-Period Life-Cycle Model

Jasmina Hasanhodzic

Babson College

AEA San Diego

January 2020

Blanchard Conjecture

- In many developed economies, projected nominal growth rates exceed safe rates

- Blanchard ('19):

  Can a fiscal Ponzi scheme be Pareto efficient?

- Blanchard's answer: Yes
  - Based on 2-period OLG model theory and simulations

Our Work

- Study Blanchard's finding in a 10-period OLG, CGE model

- Our main finding:

  Pay-go Social Security with a 15% payroll tax leads to 20% welfare loss for future generations

  - Measured as compensating consumption differential relative to no policy

Our Model

- 10-period Overlapping Generations Model
- Epstein-Zin Preferences, IES = 1
- Consumption and Portfolio Allocation Choices
- Inelastic Labor Supply, Retirement at Age 8
- Cobb-Douglas Production, Capital's Share is 1/3
- Shocks: AR1 TFP shock, Z_t, and iid Depreciation
- $\ln(Z_{t+1}) = \rho \ln(Z_t) + \epsilon_{t+1}$, where $\epsilon_{t+1} \sim \mathrm{N}(0, \sigma^2)$
- One Period Safe Bond Market

Differences from Blanchard's Model

Blanchard ('19):

- 2 periods for computational feasibility
- Part of the wage is safe
- TFP shocks

This work:

- 10 periods
- Wage is fully variable
- TFP shocks plus iid depreciation shocks

Calibration

- Calibrate the model to achieve average safe rate of -2 percent annually
  - Risk Aversion: 16
  - Depreciation shock S.D.: 3.2 x empirical estimate
  - TFP as in Hansen (85), Prescott (86),…

Policy	Safe Rate (annual, %)			Risky Rate (annual, %)		
	Min	Mean	Max	Min	Mean	Max
No	-5.55	-2.05	3.95	-10.86	8.28	16.54
5% SS	-4.85	-1.38	4.48	-10.13	8.57	16.73
15% SS	-3.58	-0.17	5.48	-8.80	9.11	17.10

Solution Method

- Hasanhodzic and Kotlikoff (2013, revised 2018) Solve 80-Period OLG Model with Aggregate Risk
- Based on Marcet (1988) and Judd, Maliar,& Maliar (2009, 2011)
- Trick is to Consider States in Ergodic Space
- Draw path of shocks, guess decision functions as polynomials of state vector, run economy forward, update polynomials based on Euler eq., continue till convergence

Welfare Effects of Social Security

Compensating Consumption Differentials Relative to No Policy (in %)												
SS Tax	Initial Generations (1 = youngest)									Newborns		
	1	2	3	4	5	6	7	8	9	Min	Mean	Max
15%	-11.8	-4.0	-1.4	0.6	2.1	3.0	4.5	4.6	1.7	-20.7	-19.9	-12.8
5%	-3.7	-1.2	-0.3	0.4	0.9	1.0	1.8	1.2	0.6	-7.1	-6.3	-4.6

- Note: The initial oldest have no welfare change since models with and without policy start from the same state at time 0.

Explaining Welfare Losses

- Crowding-out induced reduction in real wages

Percent Changes in K and w from the Introduction of SS

	15% Social Security			5% Social Security		
	Min	**Mean**	**Max**	**Min**	**Mean**	**Max**
K	-18.80	-15.76	-11.71	-7.27	-5.98	-4.26
w	-6.64	-5.50	-4.03	-2.46	-2.02	-1.42

- Net transfers discounted by mean risky rate as percentage of mean lifetime resources:

  14.3% with 15% SS, 4.7% with 5% SS

- Consumption variability when old increases by 18.8% with 15% SS, 6.3% with 5% SS relative to no policy

Welfare Losses With Safe Endowment

- Assumptions likely to make Ponzi scheme efficient:
  - Safe endowment: 43% of mean wage
  - Small transfer: 5% payroll tax
  - Initial safe rate (annual): -2.5%

Compensating Consumption Differentials Relative to No Policy (in %)

Safe Endowment = 43% of Mean Wage

SS	Initial Generations (1 = youngest)									Newborns		
Tax	1	2	3	4	5	6	7	8	9	Min	Mean	Max
5%	-0.9	-0.3	0.0	0.2	0.4	0.6	0.8	0.5	0.3	-2.1	-1.4	-0.1

- Welfare loss smaller, but still cannot replicate Blanchard's results

Conclusion

- We find enormous welfare losses – 20% – from the introduction of Social Security
- Unable to replicate Blanchard's result even under favorable assumptions
- Deploying recent computational advances for more detailed modeling is important
- Negative safe rates obtained via extreme calibration begs a question of where they come from
- Current work: Obtaining negative safe rate via more realistic channels (Hasanhodzic & Kotlikoff '20)

Thank You!