

Generational Risk—Is It a Big Deal?

Simulating an 80-Period OLG Model with Aggregate Shocks

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Three Aspects of Generational Risk

- Differences in expected lifetime utility
- Differences in realized lifetime utility
- Failure to share risk among contemporaneous generations

Is Generational Risk Large?

- All three aspects—measures are very small
- Government has limited scope to pool risk across generations using intergenerational redistribution
- Intergenerational redistribution policy can easily exacerbate generational risk

Brief Literature on Generational Risk

- Substantial literature:
Merton ('83), Bohn ('98), Shiller ('99), Smetters ('03),
Krueger and Kubler ('06), Ball and Mankiw ('07), ...
- Theoretical literature implicitly assumes generational risk is important
- Quantitative models may exaggerate generational risk via their calibration

Our Work

- Simulate 20, 40, 80 period overlapping generations models to measure generational risk
 - Isoelastic preferences
 - TFP: AR(1), rare disasters, random walk
Calibrated as in empirical literature
(Hansen, '85; Prescott, '86; Barro, '06; ...)
 - Bond market: one-period safe bonds

Solving OLG Model with Aggregate Shocks

- **Bottleneck**: Dimensionality curse due to many state variables
- **Prior solution methods**
 - Log-linearization (Rios-Rull, '94)
 - Krusell-Smith in OLG (Gourinchas, '00; Storeletten et al. '01)
 - Smolyak (Krueger and Kubler, '06)
- **Our method builds on Judd, Maliar, Maliar ('09, '11)**
We extend it to deal with bonds

Models We Simulated

Period #	Bond	AR1 TFP	Rare Disaster TFP	Random Walk TFP	Stochastic Depreciation	Max Risk Aversion
80	✗	✓	✓	✗	✗	5
40	✓	✓	✓	✗	✗	5
20	✓	✓	✓	✓	✓	20

- Euler equation mistakes on the order of 10^{-3} - 10^{-4}

Models With No Policy (and No Bond)

80-Period Models

Generational Risk Measure	Risk Aversion = 2			Risk Aversion = 5		
	AR(1)			AR(1)		
	Min	Mean	Max	Min	Mean	Max
Correlation	0.785	0.963	1.000	0.840	0.987	1.000
Adjustment (%)	0.000	0.191	0.855	0.000	0.163	0.814
	Risk Aversion = 2					
	Rare Disasters					
Correlation	0.637	0.934	1.000			
Adjustment (%)	0.000	0.250	2.903			

- Generational risk **very small** without policy, regardless of TFP process, risk aversion

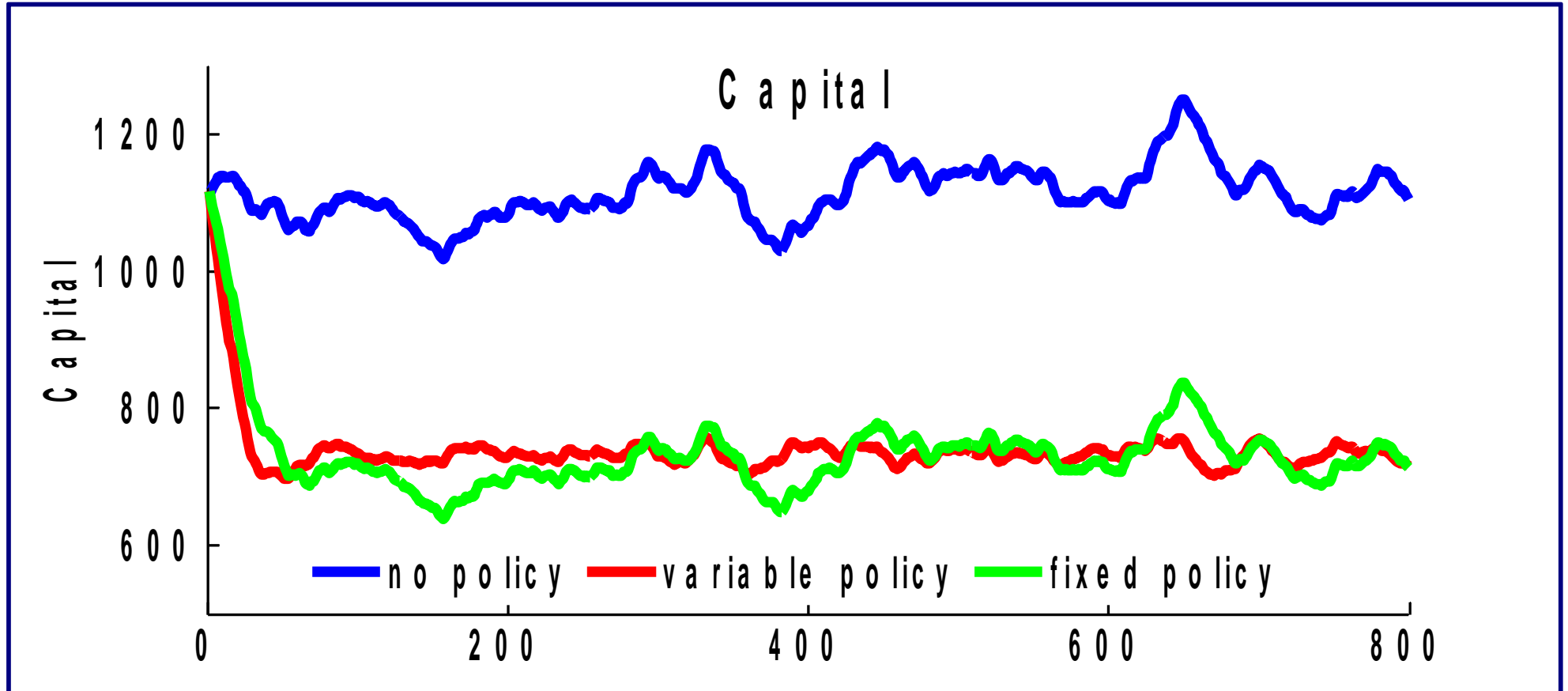
Number of Periods Is Crucial

Model Periods	Risk Measure Adjustment		
80	0.000	0.191	0.855
10	2.691	4.674	6.403
5	14.351	16.382	18.300

- Smaller-scale models may entail more risk just because there are less periods over which to pool

Policy Crowds Out Capital

80-Period Models



- From the original position perspective, generations born after the policy is put into place are worse off

Models With Policy (and No Bond)

80-Period Models

Generational Risk Measure	No Policy			Proportional Policy		
	Min	Mean	Max	Min	Mean	Max
Correlation	0.785	0.963	1.000	0.953	0.993	1.000
Adjustment	0.000	0.191	0.855	0.000	0.496	1.279
	Fixed Policy			Variable Policy		
Correlation	0.330	0.874	1.000	-0.989	0.008	1.000
Adjustment	0.000	0.513	1.815	0.000	1.015	9.684

- Policy **can easily exacerbate** generational risk

The Effect of Bonds on the Policy

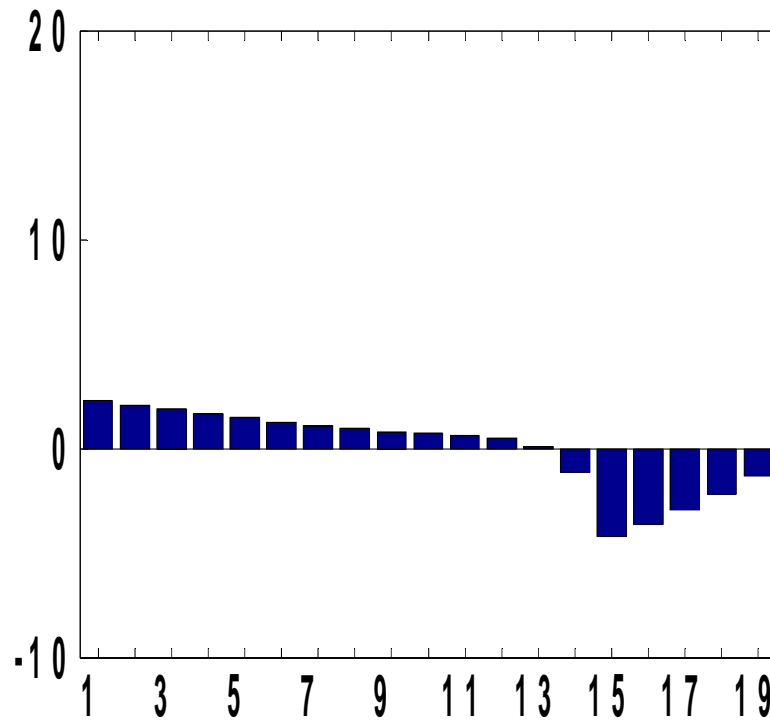
20-Period Models

Generational Risk Measure	No Policy No Bond			No Policy With Bond		
	Min	Mean	Max	Min	Mean	Max
Correlation	0.963	0.988	1.000	1.000	1.000	1.000
Adjustment	1.577	3.023	4.426	2.759	3.022	3.259
Generational Risk Measure	Variable Policy No Bond			Variable Policy With Bond		
	Min	Mean	Max	Min	Mean	Max
Correlation	-0.974	0.037	1.000	0.839	0.958	1.000
Adjustment	0.000	6.062	22.879	4.278	5.935	7.626

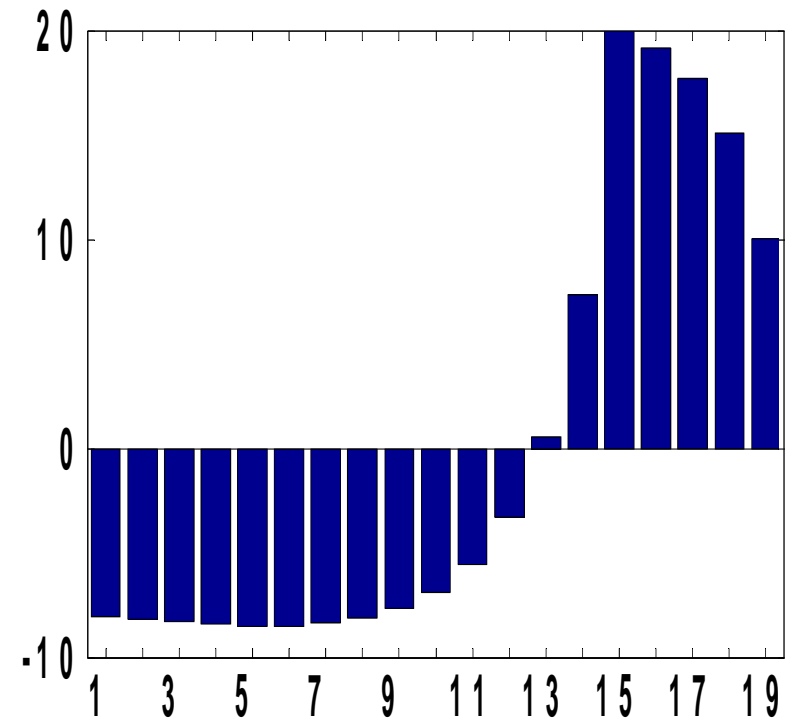
- The bond market can **mitigate** naturally occurring or government-generated generational risk

How Do Bonds Insure Against Risks?

No Policy



With Policy



Age

- Variable policy hurts the young in good times => young short bonds to insure against good times

Conclusion

- Building on Judd, Maliar, and Maliar ('09, '11)
we solve large-scale OLG models for the first time
- Generational risk is very small

Intergenerational redistribution policy can easily exacerbate generational risk

The bond market can mitigate generational risk

Thank you!