Discussion of "A Model of Secular Stagnation: Theory and Quantitative Evaluation"

by Gauti Eggertsson, Neil Mehrotra and Jacob Robbins

Andrea Ferrero

University of Oxford

Federal Reserve Bank of San Francisco Conference on

"Do Changes in the Economic Landscape Require a New Policy Framework?"

San Francisco, 21 April 2017

Introduction

- Central tenet of Secular Stagnation hypothesis (Summers, 2014):

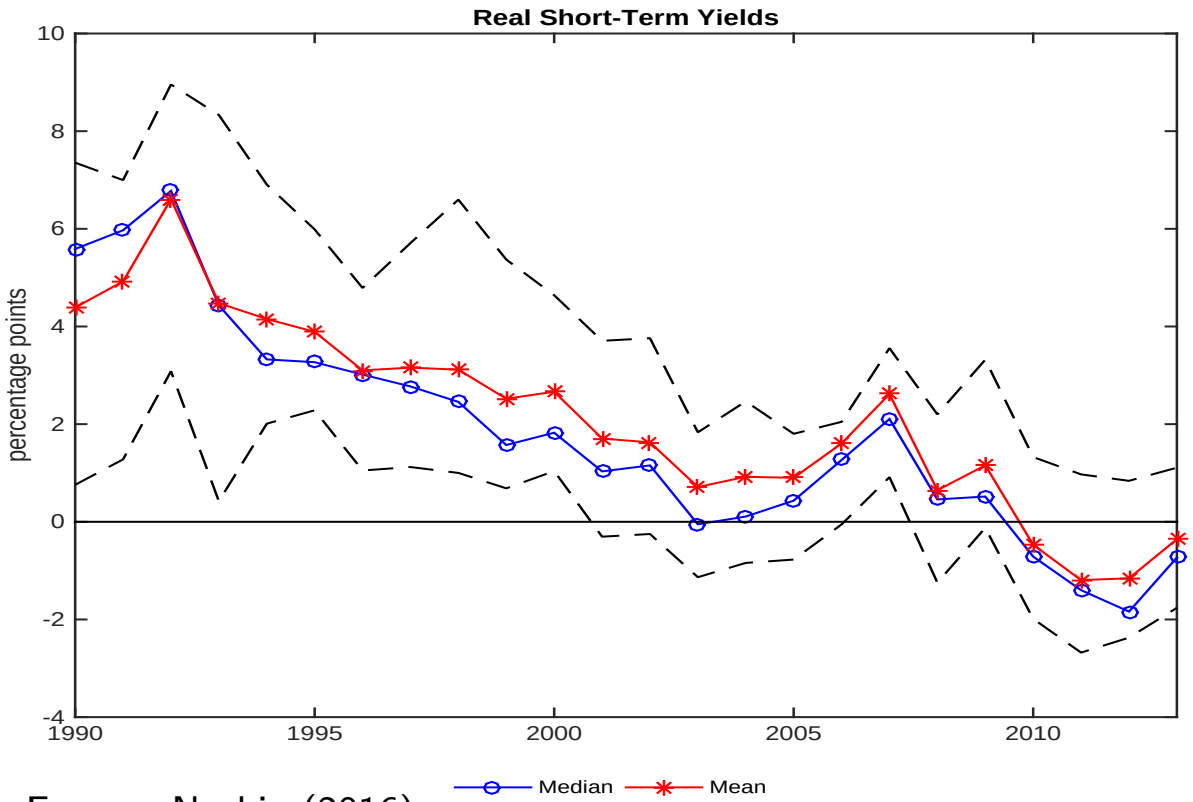
  Low (possibly negative) equilibrium real interest rate

Introduction

- Central tenet of Secular Stagnation hypothesis (Summers, 2014):

  Low (possibly negative) equilibrium real interest rate

- Data: Negative measured real interest rates



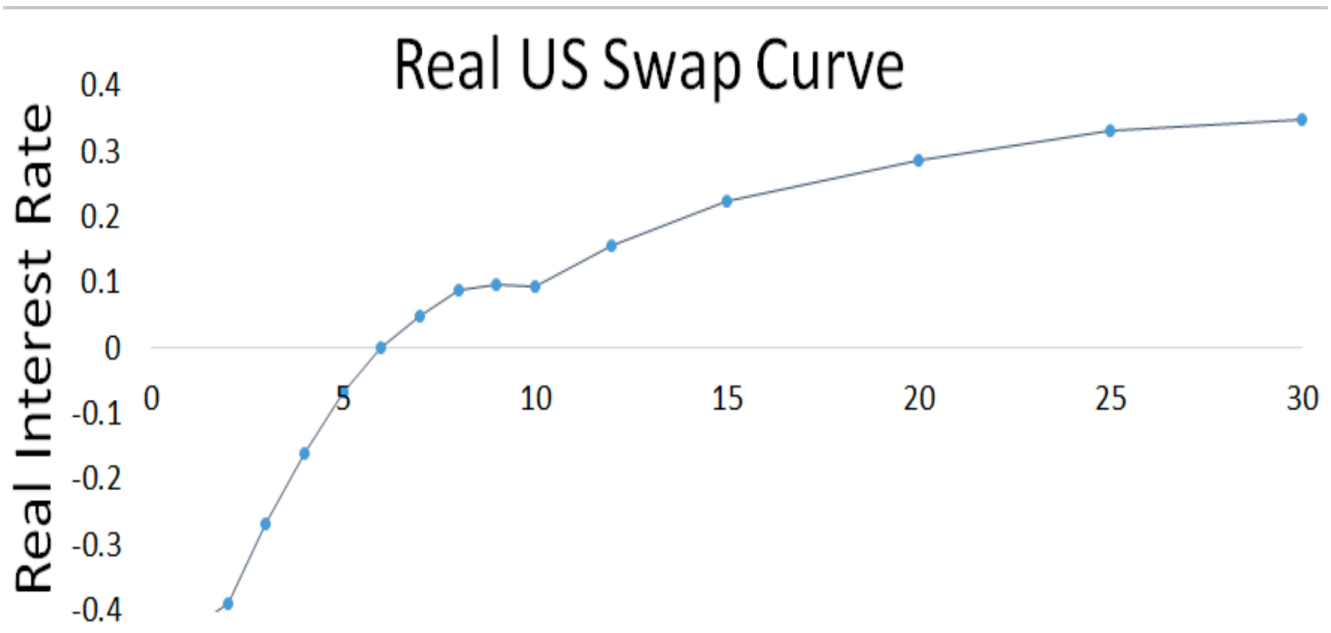
Source: Carvalho, Ferrero, Nechio (2016)

Introduction

- Central tenet of Secular Stagnation hypothesis (Summers, 2014):

  Low (possibly negative) equilibrium real interest rate

- Data: Negative measured real interest rates
  - Here to stay



Source: Summers (2015)

Introduction

- Central tenet of Secular Stagnation hypothesis (Summers, 2014):

  Low (possibly negative) equilibrium real interest rate

- Data: Negative measured real interest rates
  - Here to stay

- Need a model to construct equilibrium real interest rate
  - And think about "real interest rate gap"

- EMR provide a model of Secular Stagnation

Introduction

- Central tenet of Secular Stagnation hypothesis (Summers, 2014):

  Low (possibly negative) equilibrium real interest rate

- Data: Negative measured real interest rates
  - Here to stay

- Need a model to construct equilibrium real interest rate
  - And think about "real interest rate gap"

- EMR provide a model of Secular Stagnation

- A new framework for policy analysis

Outline of Discussion

1. **Brief summary and key findings**
2. Decline of natural rate
3. Policy implications

Summary

- **First part:** Three-period OLG model with borrowing constraint

$$\max_{C_t^y, C_{t+1}^m, C_{t+2}^o} \mathbb{E}_t(\ln C_t^y + \beta \ln C_{t+1}^m + \beta^2 \ln C_{t+2}^o)$$

subject to

$$\begin{aligned} C_t^y &= B_t^y = D_t/(1+r_t) \\ C_{t+1}^m &= Y_{t+1}^m - (1+r_t)B_t^y + B_{t+1}^m \\ C_{t+2}^o &= Y_{t+2}^o - (1+r_{t+1})B_{t+1}^m \end{aligned}$$

Summary

- **First part:** Three-period OLG model with borrowing constraint

$$\max_{C_t^y, C_{t+1}^m, C_{t+2}^o} \mathbb{E}_t(\ln C_t^y + \beta \ln C_{t+1}^m + \beta^2 \ln C_{t+2}^o)$$

subject to

$$\begin{aligned} C_t^y &= B_t^y = D_t/(1+r_t) \\ C_{t+1}^m &= Y_{t+1}^m - (1+r_t)B_t^y + B_{t+1}^m \\ C_{t+2}^o &= Y_{t+2}^o - (1+r_{t+1})B_{t+1}^m \end{aligned}$$

- Population growth: $N_t = (1+g_t)N_{t-1} \Rightarrow (1+g_t)B_t^y = -B_t^m$

Summary

- **First part:** Three-period OLG model with borrowing constraint

$$\max_{C_t^y, C_{t+1}^m, C_{t+2}^o} \mathbb{E}_t(\ln C_t^y + \beta \ln C_{t+1}^m + \beta^2 \ln C_{t+2}^o)$$

subject to

$$\begin{aligned} C_t^y &= B_t^y = D_t/(1+r_t) \\ C_{t+1}^m &= Y_{t+1}^m - (1+r_t)B_t^y + B_{t+1}^m \\ C_{t+2}^o &= Y_{t+2}^o - (1+r_{t+1})B_{t+1}^m \end{aligned}$$

- Population growth: $N_t = (1+g_t)N_{t-1} \Rightarrow (1+g_t)B_t^y = -B_t^m$
- Productivity growth: $Y_t = A_t \bar{Y} \Rightarrow D_t = A_{t+1}\bar{D}$

Summary

- **First part:** Three-period OLG model with borrowing constraint
- Get expression for equilibrium real interest rate

$$r_t = \frac{(1+\beta)(1+g_t)(1+x_t)\tilde{D}_t + (1+x_{t+1})\tilde{Y}^o_{t+1}}{\beta(\tilde{Y}^m_t - \tilde{D}_{t-1})} - 1$$

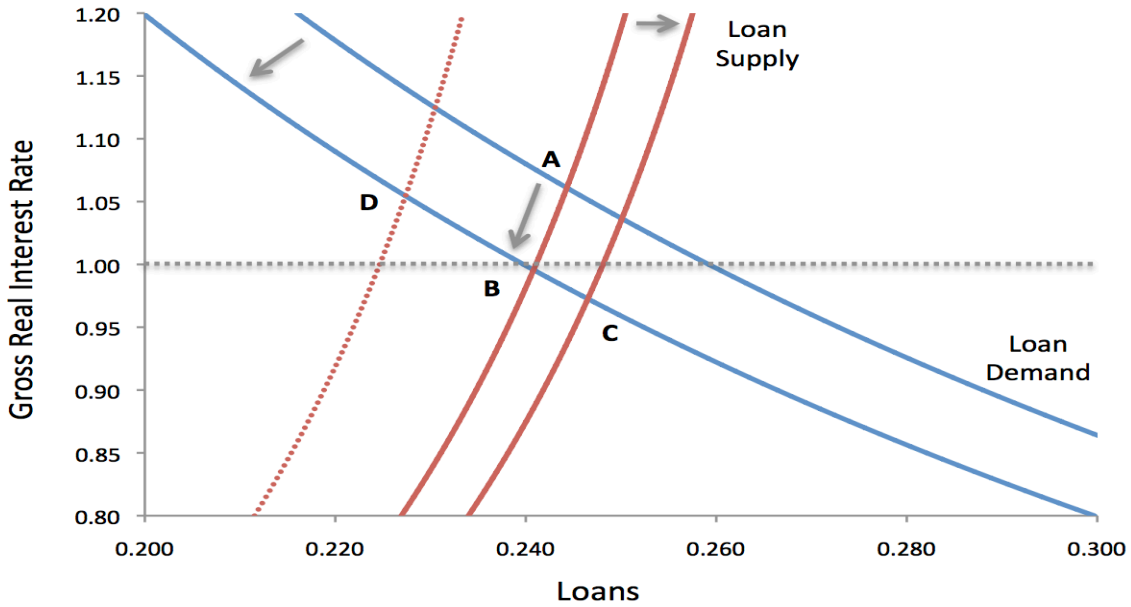
  where $x_t \equiv A_t / A_{t-1} - 1$

- Three factors that can push down real interest rate
  1. g_t: Demographics (Carvalho, Ferrero and Nechio, 2016)
  2. x_t: Productivity (Gordon, 2015)
  3. $\tilde{D}_t$: Deleveraging (Eggertsson and Krugman, 2012)

Summary

- **First part:** Three-period OLG model with borrowing constraint

Figure 1: Equilibrium in the asset market

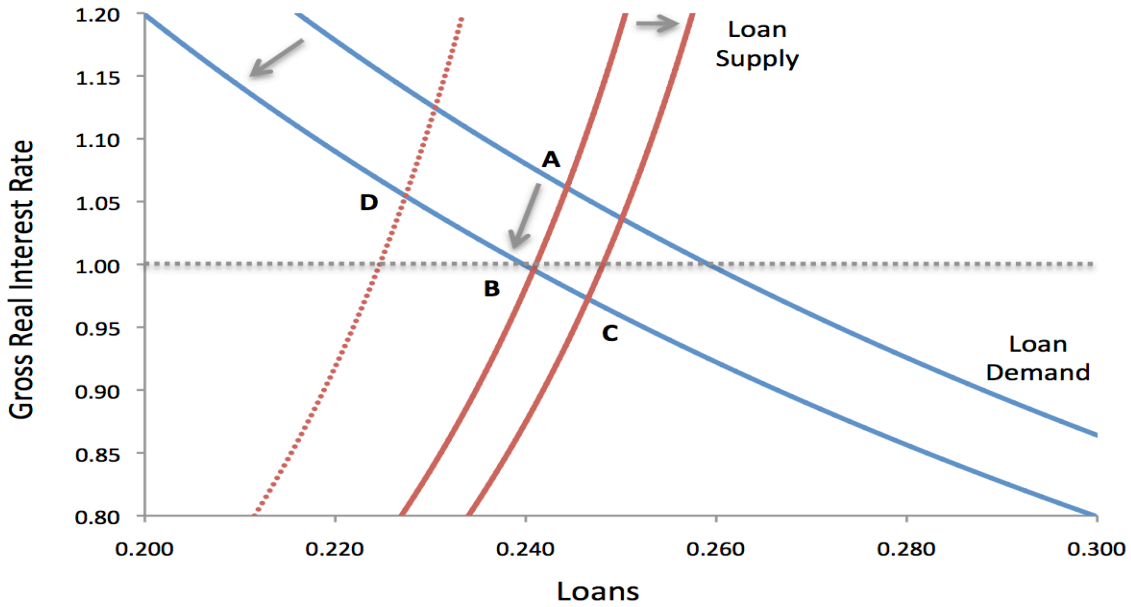


- Temporary deleveraging shock ⇒ Permanently low real rate

Summary

- **First part:** Three-period OLG model with borrowing constraint

Figure 1: Equilibrium in the asset market



- Nice narrative:
  - Real rate already on decline due to trends in demographics and productivity
  - Becomes permanently negative because of crisis (deleveraging)

Summary

- **Second part:** Quantitative life-cycle model with
  - Age-specific income profile
  - Mortality risk
  - Bequest motive
  - Capital and CES production
  - Exogenous process for relative price of capital
  - Distortionary labor taxes
- Calibrated to US data in 2015: Two options
  - No output gap (Stock and Watson, 2012)
  - Large output gap (Hall, 2016)

Summary

- **Second part:** Quantitative life-cycle model

- Legitimate to consider 2015 observed real rate as natural real rate but
  - No output gap $\not\Longrightarrow$ Observed real interest rate $=$ Natural rate
  - Need additional assumption economy is in steady state

Summary

- **Second part:** Quantitative life-cycle model

- Legitimate to consider 2015 observed real rate as natural real rate but
  - No output gap $\not\Rightarrow$ Observed real interest rate $=$ Natural rate
  - Need additional assumption economy is in steady state

- Results robust to alternative measures of output gap $\in (-15\%, 0)$?
  - Interesting that no deflation arises with large output gap

Summary

- **Second part:** Quantitative life-cycle model

- Legitimate to consider 2015 observed real rate as natural real rate but
  - No output gap $\not\Longrightarrow$ Observed real interest rate $=$ Natural rate
  - Need additional assumption economy is in steady state

- Results robust to alternative measures of output gap $\in (-15\%, 0)$?
  - Interesting that no deflation arises with large output gap

- Paradox of wage flexibility (Galí and Monacelli, 2016)
  - Need more flexibility to generate more deflation and larger output gap

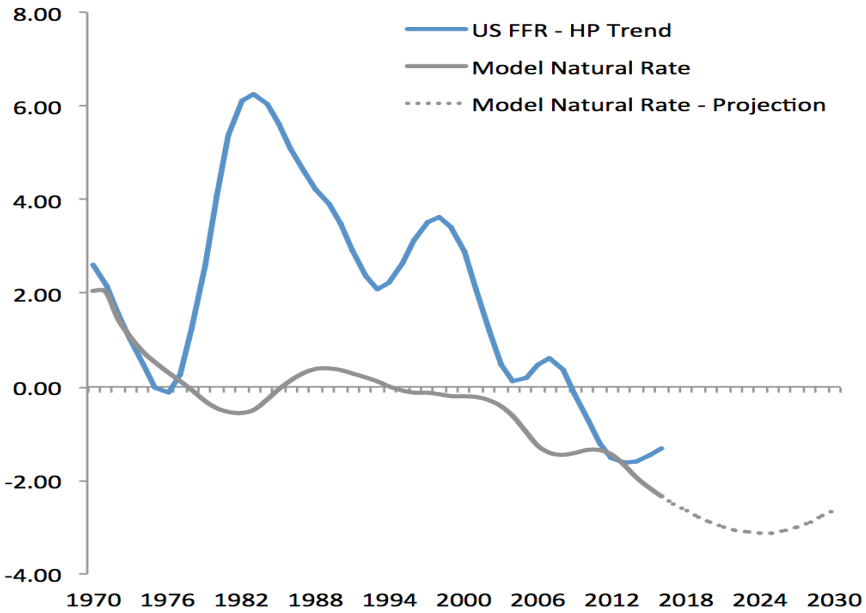
Outline of Discussion

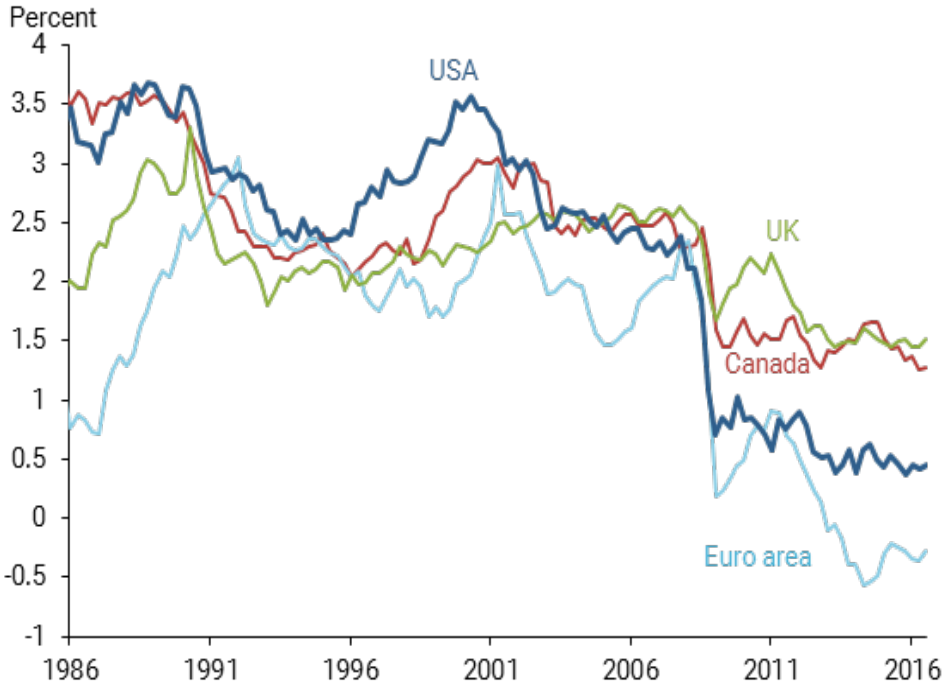
1. Brief summary and key findings
2. **Decline of natural rate**
3. Policy implications

Level

- Very low level of r^* throughout sample (1970-2016)
  - Compare with estimates from Holston, Laubach and Williams (2016)

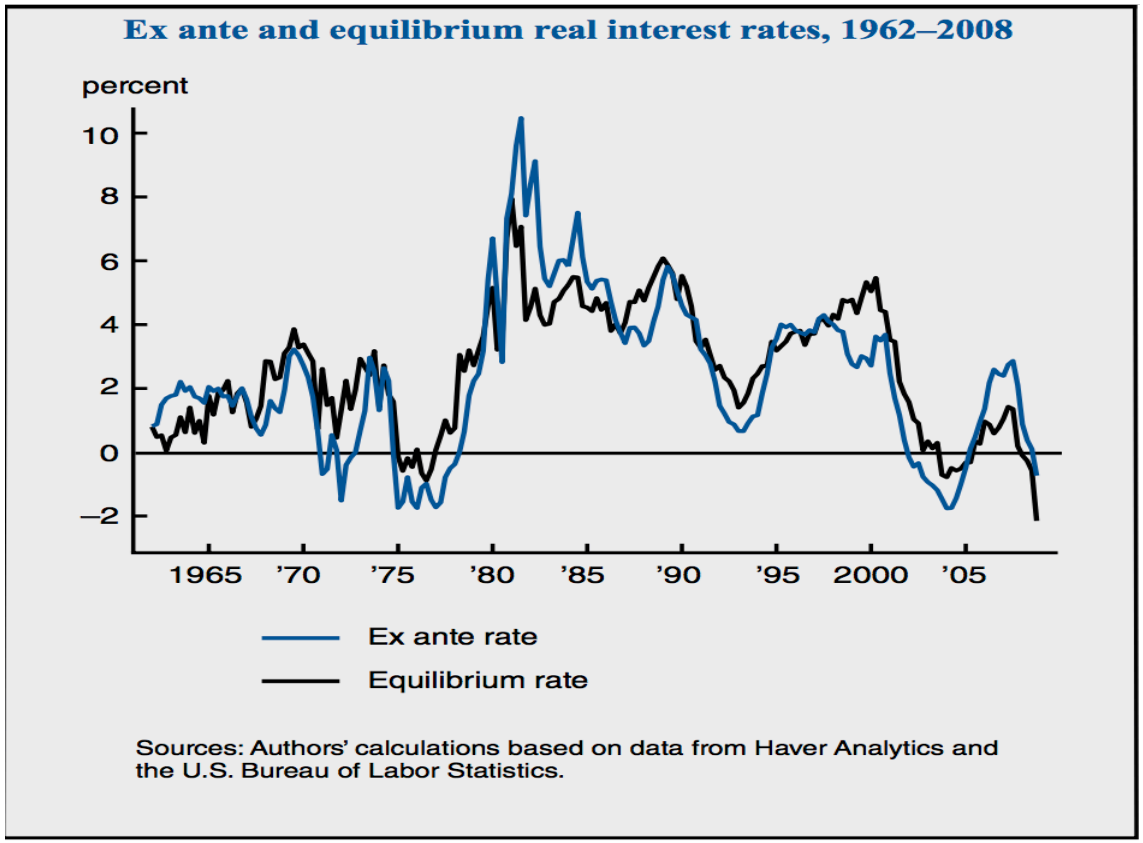
Figure 7: Transition path of the natural rate of interest





Level

- Very low level of r^* throughout sample (1970-2016)
  - Large real interest rate gap since early 1980s?



Source: Justiniano and Primiceri (2010)

What Explains a Falling r^*?

Table 6: Decomposition of decline in natural rate of interest: 1970-2015

Forcing variable	Δ in r	% of total Δ
Total interest rate change	-4.02%	100%
Mortality rate	-1.82	43%
Total fertility rate	-1.84	43%
Productivity growth	-1.90	44%
Government debt (% of GDP)	$+2.11$	-49%
Labor share	$-.52$	12%
Relative price of investment goods	-0.44	10%
Change in debt limit	$+.13$	-3%

- Major role of demographics and productivity growth
- Government debt only factor that avoided much lower level

What Explains a Falling r^*?

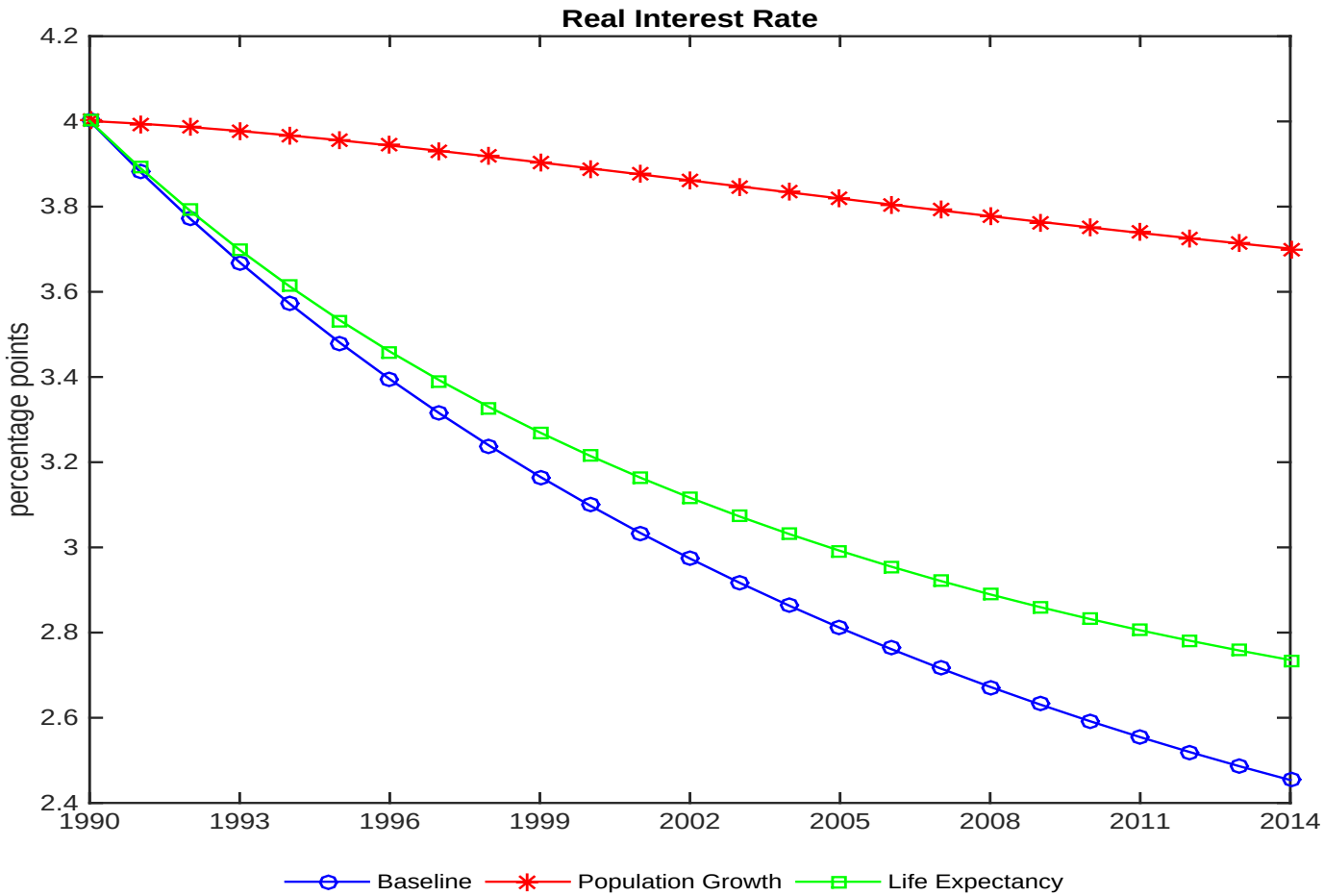
Table 6: Decomposition of decline in natural rate of interest: 1970-2015

Forcing variable	Δ in r	% of total Δ
Total interest rate change	-4.02%	100%
Mortality rate	-1.82	43%
Total fertility rate	-1.84	43%
Productivity growth	-1.90	44%
Government debt (% of GDP)	$+2.11$	-49%
Labor share	$-.52$	12%
Relative price of investment goods	-0.44	10%
Change in debt limit	$+.13$	-3%

- Some factors "disappear" from discussion
  - How would have r^* looked like without crisis?
  - Role of increased inequality?
  - Would be interesting to see counterfactuals with major driving forces

Demographics and the Natural Real Rate

- Carvalho, Ferrero and Nechio (2016) find similar role for demographics
  - Larger relative contribution of increase in life expectancy



Demographics and the Natural Real Rate

- Carvalho, Ferrero and Nechio (2016) find similar role for demographics
  - Larger relative contribution of increase in life expectancy
- Main difference: In EMR, fixed lifetime horizon but decrease in mortality risk
  - Cannot live more than 81 years
- Life expectancy currently at about 80 in most OECD countries
  - Increased over time and projected to keep increasing
  - Makes natural rate likely to keep falling

Demographics and the Natural Real Rate

- Carvalho, Ferrero and Nechio (2016) find similar role for demographics
  - Larger relative contribution of increase in life expectancy
- Main difference: In EMR, fixed lifetime horizon but decrease in mortality risk
  - Cannot live more than 81 years
- Life expectancy currently at about 80 in most OECD countries
  - Increased over time and projected to keep increasing
  - Makes natural rate likely to keep falling
- Also, empirical consumption profile much less hump-shaped than in EFR

Outline of Discussion

1. Brief summary and key findings
2. Decline of natural rate
3. **Policy implications**

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound
  - Bubbles and financial stability

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability: Better raise r^* than increase π^*

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability: Better raise r^* than increase π^*
- Also, in this model, limited effects of forward guidance
  - What about quantitative easing?

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability: Better raise r^* than increase π^*
- Also, in this model, limited effects of forward guidance
  - What about quantitative easing?
- Implication: Expansionary fiscal policy
  - Debt/GDP from 118% to 215% raises r^* from -1.47% to $+1\%$
  - But risk premia likely to rise

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability: Better raise r^* than increase π^*
- Also, in this model, limited effects of forward guidance
  - What about quantitative easing?
- Implication: Expansionary fiscal policy
  - Debt/GDP from 118% to 215% raises r^* from -1.47% to $+1\%$
  - But risk premia likely to rise
- Other policies options are challenging
  - Hard to increase fertility rates and productivity growth
  - Probably don't want to increase mortality...

Policy Implications

- Why is negative r^* a problem?
  - Zero lower bound: Level of r^* puts lower bound on π^*
  - Bubbles and financial stability: Better raise r^* than increase π^*
- Also, in this model, limited effects of forward guidance
  - What about quantitative easing?
- Implication: Expansionary fiscal policy
  - Debt/GDP from 118% to 215% raises r^* from -1.47% to $+1\%$
  - But risk premia likely to rise
- Similar conclusions in Carvalho, Ferrero and Nechio (2016)
  - Additional option: Raise retirement age
  - But need increase well beyond currently contemplated reforms (OECD, 2010)

Conclusions

- Very nice paper, definitely useful to think about current policy challenges
- Decline in natural real interest rate product of
  - Financial crisis
  - Interacting with long-term trends
- May still require some fine tuning on quantitative part
- If Secular Stagnation is relevant scenario
  - Limited options for monetary policy?
  - Shift to more activist fiscal policy?