# The Safety Trap

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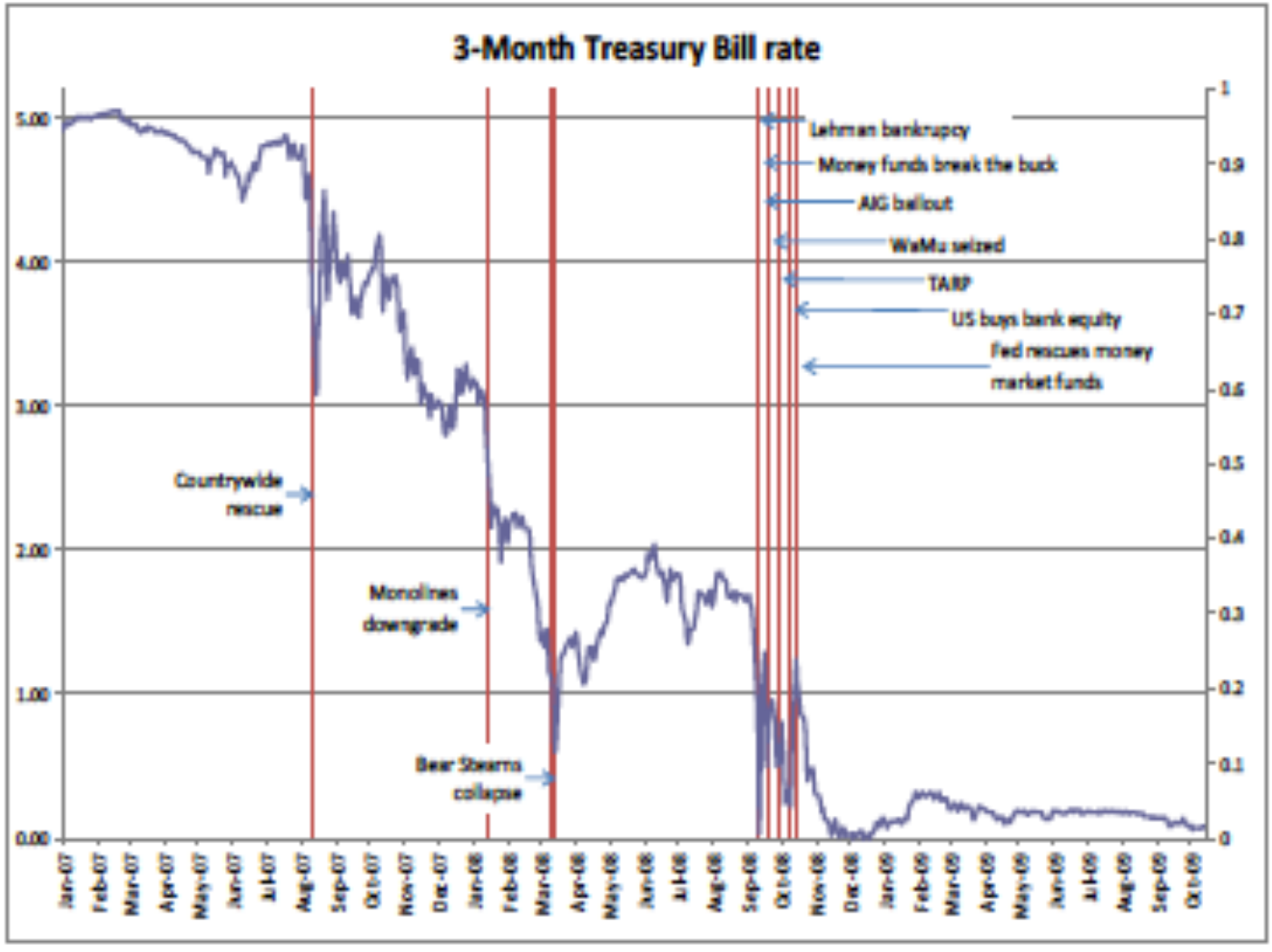
# Safe Asset Shortage

| | $ bn | | % of World GDP | |
|---|---|---|---|---|
| | 2007 | 2011 | 2007 | 2011 |
| US Federal Government Debt held by the public | 5,136 | 10,692 | 9.20% | 15.80% |
| Held by the Fed | 736 | 1,700 | 1.30% | 2.50% |
| Held by private investors | 4,401 | 8,992 | 7.90% | 13.30% |
| | | | | |
| GSE obligations | 2,910 | ~~2,023~~ | 5.20% | ~~3.00%~~ |
| Agency- and GSE-backed mortgage pools | 4,464 | ~~6,283~~ | 8.00% | ~~9.30%~~ |
| Private-issue ABS | 3,901 | ~~1,277~~ | 7.00% | ~~1.90%~~ |
| | | | | |
| German and French government debt | 2,492 | 3,270 | 4.50% | 4.80% |
| Italian and Spanish government debt | 2,380 | ~~3,143~~ | 4.30% | ~~4.70%~~ |
| | | | | |
| **Safe assets** | **20,548** | **12,262** | **36.90%** | **18.10%** |

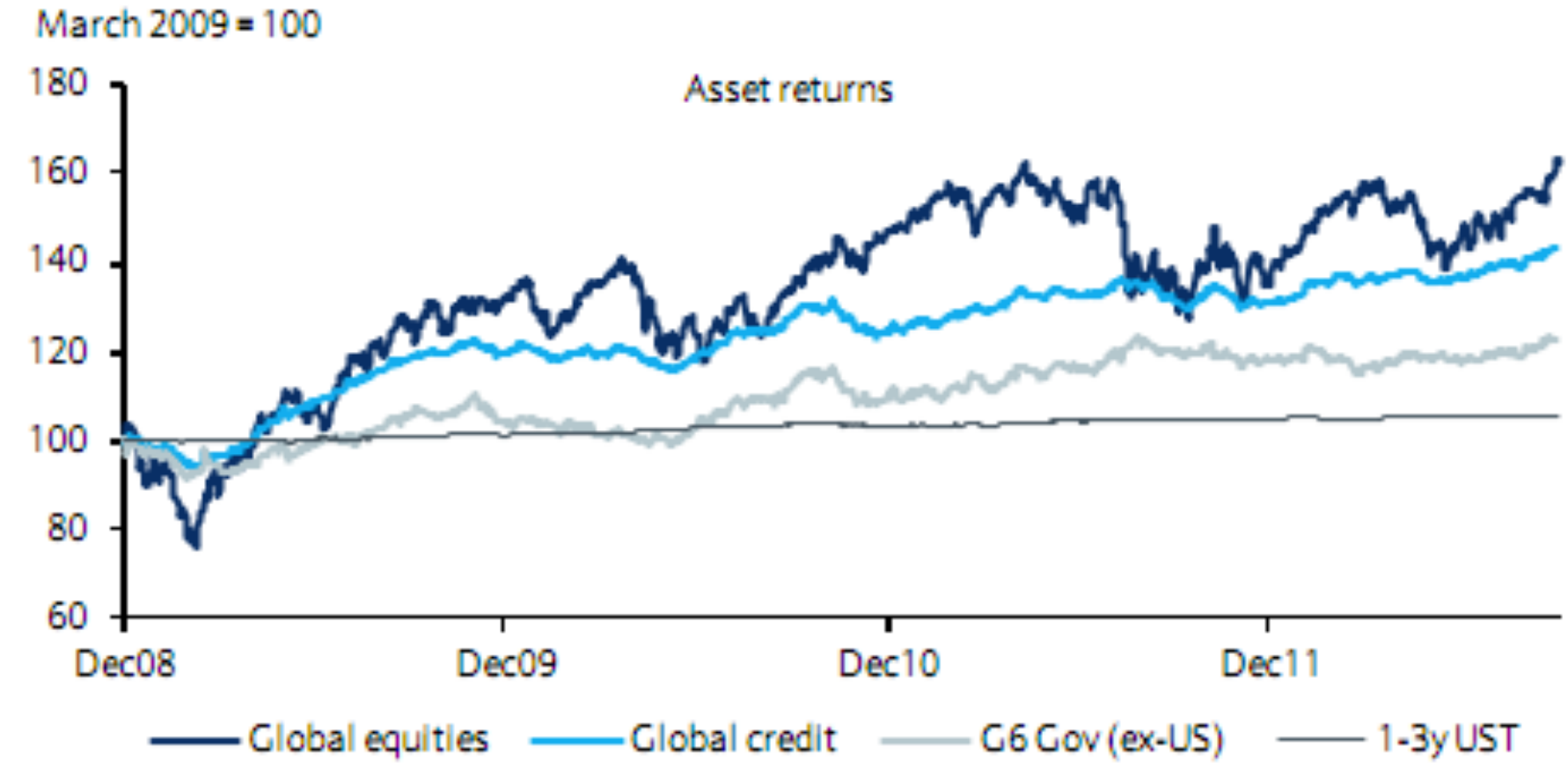
Note: Numbers are struck through if they are believed to have lost their "safe haven" status after 2007.
Source: Federal Reserve, Haver Analytics, Barclays Research

# Drop in Safe Interest Rate



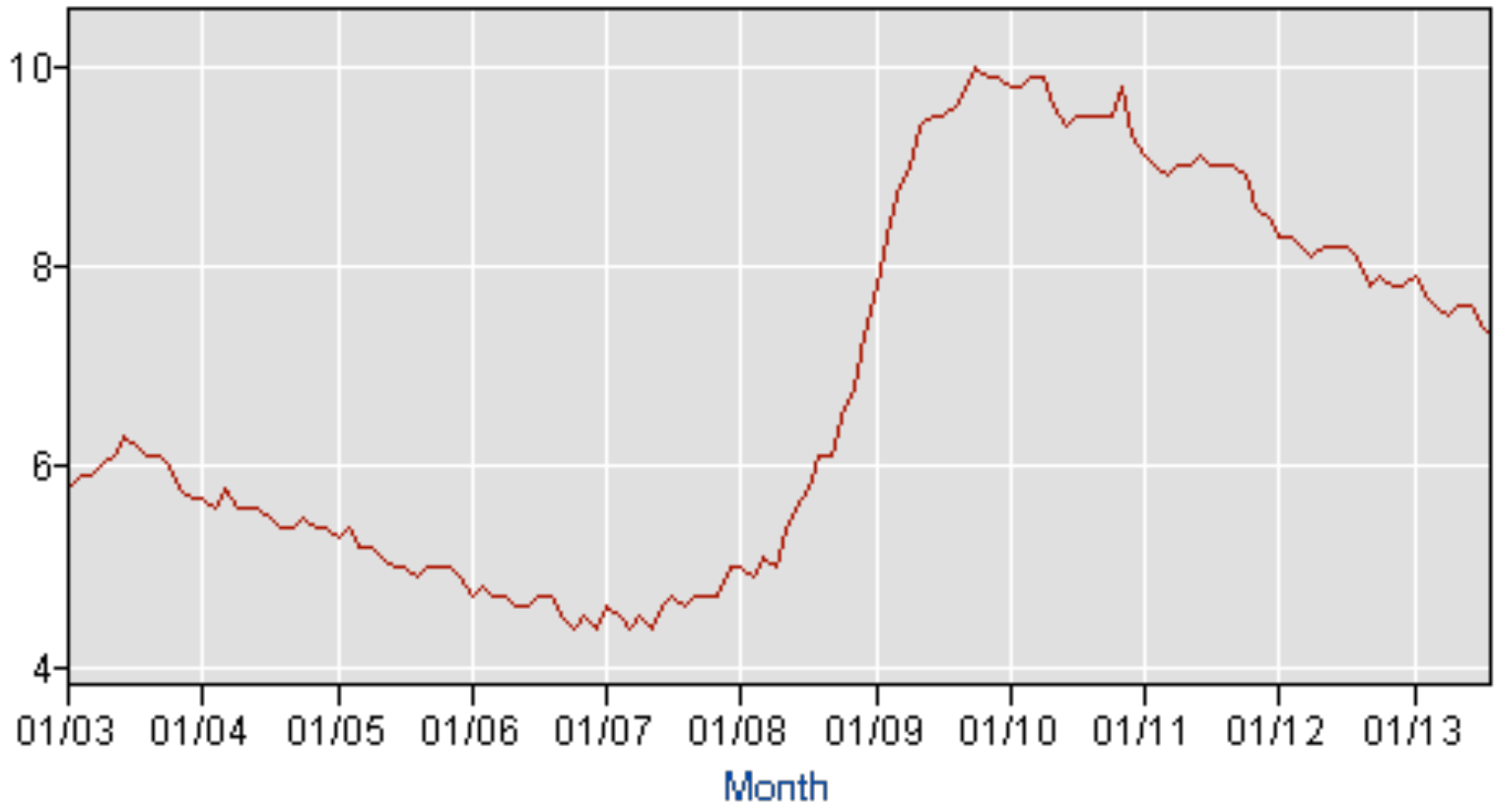

Source: Federal Reserve Bank of St. Louis.

# Risk Premia




Source: MSCI, Bloomberg, Barclays Research

# Increase in Unemployment



# Safe Asset Shortage

- Benign view: moving along demand curve
- Malign view: ZLB and recession
- Safety trap: reason behind decline in natural rate matters

# Kocherlakota (2013)

In my view, the biggest challenge for central banks is changes in the nature of asset demand and asset supply since 2007. Those changes are shaping current monetary policy, and are likely to shape policy for some time to come.
The demand for safe financial assets has grown greatly since 2007. At the same time, the supply of the assets perceived to be safe has shrunk over the past six years. Americans thought in 2007 that it was highly unlikely that American residential land, and assets backed by land, could ever fall in value by 30 percent. They no longer think that. Similarly, investors around the world viewed all forms of European sovereign debt as a safe investment. They no longer think that either.

The increase in asset demand, combined with the fall in asset supply, implies that households and firms spend less at any level of the real interest rate—that is, the interest rate net of anticipated inflation. It follows that the Federal Open Market Committee (FOMC) can only meet its congressionally mandated objectives for employment and prices by taking actions that lower the real interest rate relative to its 2007 level. The FOMC has responded to this challenge by providing a historically unprecedented amount of monetary accommodation.

# Outline

- Simple model
- Safety trap
- Policy
- Inflation
- Bubbles

# Basic Model

- Endowment $X$ unless Poisson event:
  - good $\mu^+ X > X$, intensity $\lambda^+$
  - bad $\mu^- X < X$, intensity $\lambda^-$
- Study limit $\lambda^+ \to 0$ and $\lambda^- \to 0$
- OLG "perpetual youth" with birth/death Poisson rate $\theta$
- Agents earn income at birth, save it, and consume at death
- Dividend $\delta X$ and income of newborns $(1-\delta)X$

# Knightians and Neutrals

- Fraction $\alpha$ of Knightians (infinite instantaneous risk aversion)
- Fraction $1-\alpha$ of Neutrals (risk neutral)
- Total and respective wealth $W_t = W_t^K + W_t^N$

# Safe and Risky Assets

- Lucas trees (claims to dividends) managed by Neutrals
- Neutrals own risky assets and issue safe assets to Knightians
- Financial friction limits securitization: fraction $1-\rho$ of dividends non-pledgeable (can be stolen by tree manager)
- Value of risky and safe assets (assuming $\rho > \alpha$)

$$V_t = V_t^R + V_t^S$$

$$V_t^S = \rho\mu^- \frac{X}{\theta}$$

# Equilibrium Equations

$$r_t^K V_t^S = \delta_t^S X + \dot{V}_t^S$$

$$r_t V_t^R = (\delta - \delta_t^S) X + \dot{V}_t^R$$

$$\dot{W}_t^K = -\theta W_t^K + \alpha (1 - \delta) X + r_t^K W_t^K$$

$$\dot{W}_t^N = -\theta W_t^N + (1 - \alpha)(1 - \delta) X + r_t W_t^N$$

$$W_t^K + W_t^N = V_t^S + V_t^R$$

$$V_t^S = \rho \mu^- \frac{X}{\theta} \quad \text{and} \quad W_t^K \leq V_t^S$$

# Total Wealth and Assets

- Focus on steady states
- Goods market clearing $W = \frac{X}{\theta}$
- Asset market clearing $V = W$
- Explains why $V^S = \rho\mu^- \frac{X}{\theta}$

# Safe and Risky Interest Rates

- Neutrals can hold safe and risky assets
- Knightians only hold safe assets $W^K \leq V^S$
- Safe and risky interest rates $r^K \leq r$

# Two Regimes

- Unconstrained regime if $\alpha \leq \rho\mu^{-}$:

$$r = r^{K} = \delta\theta$$

- Constrained regime if $\alpha > \rho\mu^{-}$:

$$r^{K} = \delta\theta - (1-\delta)\,\theta\frac{\alpha - \rho\mu^{-}}{\rho\mu^{-}} < \delta\theta < \delta\theta + (1-\delta)\,\theta\frac{\alpha - \rho\mu^{-}}{1-\rho\mu^{-}} = r$$

# Keynesian Model: NK+CIA

- Basic real model: real endowment economy
- Keynesian model: add sticky prices and production
- Two key features:
  - demand-determined output (NK)
  - ZLB (CIA + cashless limit)
- Flexible price (natural) allocation same as real model
- Can be implemented with $i = r^K$ as long as $r^K > 0$

# The Safety Trap

- Decrease in supply ($\rho\mu^-$ drops) or increase in demand for safe assets ($\alpha$ increases)
- At unchanged $r^K$:
  - excess demand for safe assets
  - excess supply of goods
- How is equilibrium restored?
  - if $r^K > 0$ reduction in $r^K$
  - if $r^K = 0$, reduction in output $\xi X < X$ (below potential)

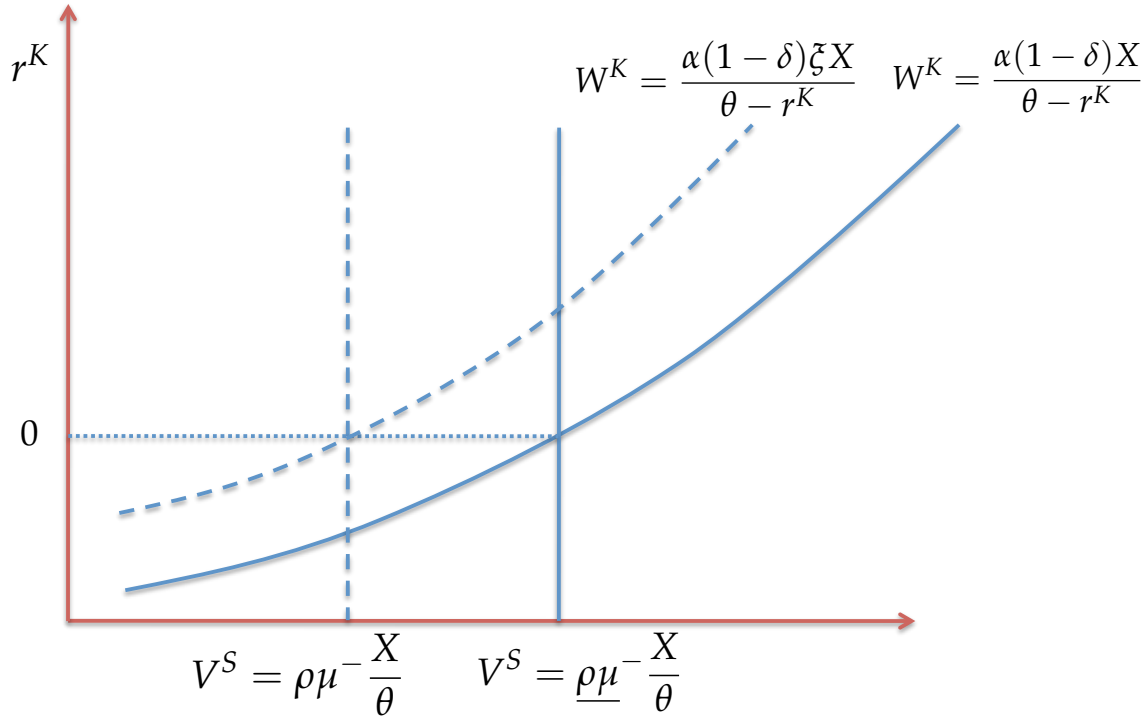



Figure : Safety trap.

Recession caused by a decrease in the supply of safe assets. The safe asset supply curve shifts left ($\rho\mu < \underline{\rho\mu}$), the endogenous recession shifts the safe asset demand curve left ($\xi < 1$), the safe interest rate remains constant at $\underline{r}^K$.

# The Safety Trap

- Two phases:
  - instantaneous fire sale (immediate adjustment in $W^K$)
  - permanent recession (adjustment in growth of $W^K$)
- AS-AD Keyesnian cross representation (with $r^K = 0$)

$$AS(\xi X) = \xi X$$

$$AD(\xi X) = (1-\alpha)(1-\delta)\xi X + \delta \xi X + (\theta - r^K)V^S$$

- Keynesian multiplier

$$d(\xi X) = \frac{\xi X}{\theta V^S}\theta dV^S$$

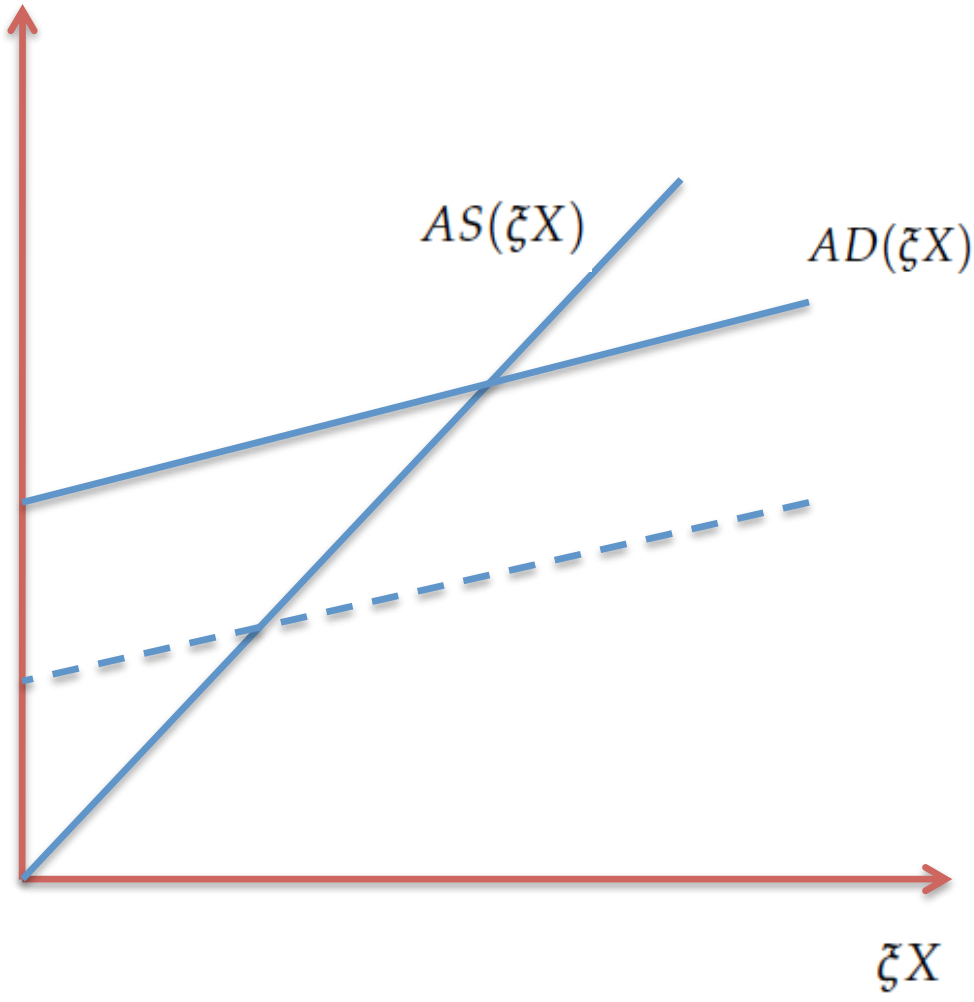



Figure : AS-AD and Keynesian cross.

$$AS(\xi X) = \xi X$$
$$AD(\xi X) = (1-\alpha)(1-\delta)\xi X + \delta\xi X + (\theta - r^K)V^S$$

# Secular Stagnation

- Secular stagnation?
- Safety trap can be very persistent...even permanent
- Permanent ZLB...despite long-dated assets (risk premia)

# Forward Guidance

- Low interest rates after good Poisson shock with $\lambda^+ > 0$
- Increases output and asset values after good Poisson shock
- No effect on output before Poisson shock in safety trap
- Failed attempt to stimulate AD by reflating risky assets
- Increase in $r$ without change in $V^R$ or $V = V^R + V^S$
- Rationalizes "forward guidance puzzle"

# Short-Term Public Debt

- ST public debt $D$ financed by taxes on dividends

$$V^S = [\rho(\tau^-) + \tau^-]\mu^- \frac{X}{\theta}$$

$$\rho\left(\tau^-\right) = \min\left\{\rho, 1 - \tau^-\right\}$$

$$\tau^- = \frac{\theta}{\mu^-}\frac{D}{X}$$

- Maps into basic model with $\rho$ replaced by $\rho(\tau^-) + \tau^-$

# Short-Term Public Debt: Crowd Out

- Crowd out $-\frac{d\rho}{d\tau^-}$ of private safe assets by public safe assets
  - 0 if $\rho < \tau^-$ (non-Ricardian)
  - 1 if $\rho > \tau^-$ (Ricardian)
  - $1 - F(1-\tau^-) \in [0,1]$ with distribution $F(\rho)$
- Link with Ricardian equivalence (taxes capitalized)

# Short-term Public Debt and QE

- Issue safe ST public debt
  - rebate lump sum
  - or buy private risky assets (risky tranches of trees)
- Increases supply of safe assets
- Stimulates output in a safety trap
- Government comparative advantage in "safety transformation" arising from taxation power as long as spare fiscal capacity and securitization sufficiently impaired

# OT

- Buy LT public debt and issue ST public debt
- LT debt risky, but risk is covariance, not variance
- If LT debt decreases in value after bad shock (positive beta), then OT acts like QE
- If LT debt increases in value after bad shock (negative beta):
  - OT reduces supply of safe assets
  - in a safety trap, reduces output

# Inflation

- Inspired by Eggertsson-Mehrota (2014)
- Capture downward wage rigidity
- Add Philipps curve

$$\pi_t = -(\gamma + \beta(1-\xi_t)) \quad \text{if} \quad \xi_t < 1$$
$$\pi_t \in [-\gamma, +\infty) \quad \text{if} \quad \xi_t = 1$$

- Truncated Taylor rule ($r_t^{K,n}$ natural safe interest rate)

$$i_t = \max\{0, r_t^{K,n} + \pi^* + \phi(\pi_t - \pi^*)\}$$

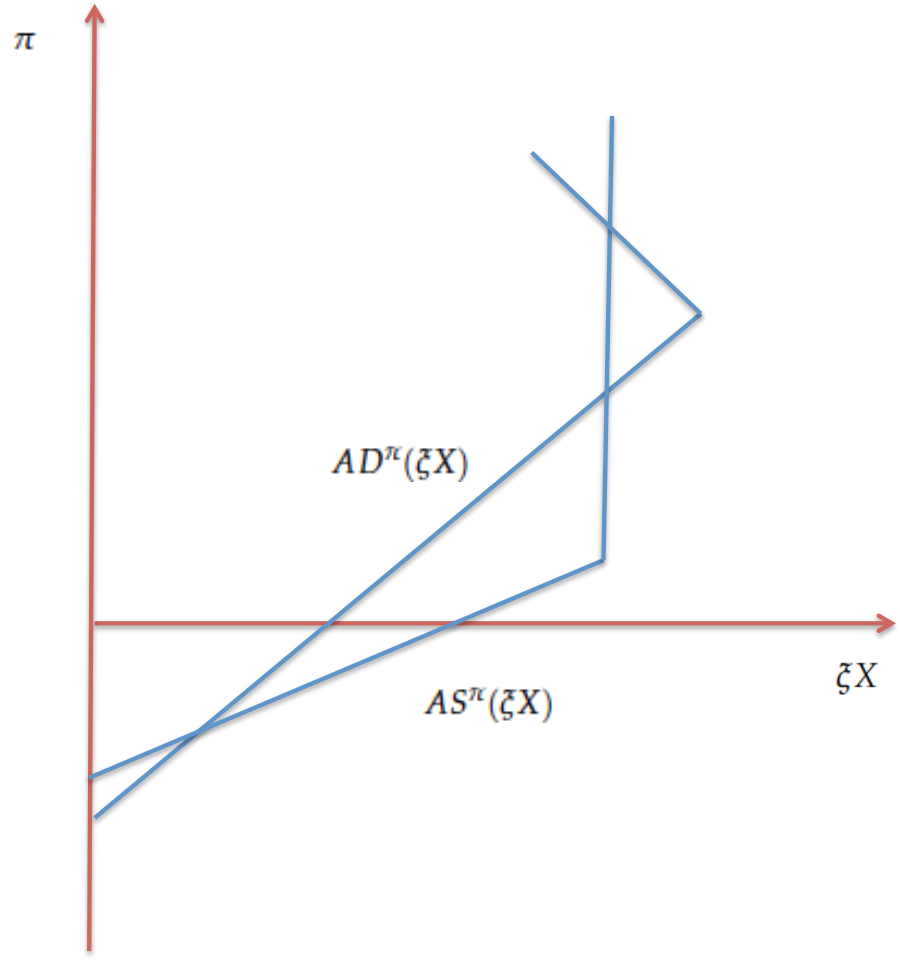



Figure : Aggregate supply and aggregate demand with inflation.

# Inflation

- Inflation increases Keynesian multiplier through output inflation-feedback loop
- No qualitative change in policy conclusions:
  - public debt and QE effective
  - forward guidance ineffective
- Increase in inflation target:
  - creates good equilibrium with no recession and inflation...
  - ...if large enough...
  - does not eliminate bad equilibrium with recession and deflation

# Bubbles

- Introduce growth and bubbles
- Risky bubbles do not stimulate output in safety traps (limited expansions associated with financial bubbles in secular stagnation environments)
- Safe bubbles stimulate output in safety traps
- Government debt as safe bubble...can create safe assets without mobilizing fiscal capacity

# Conclusion

- Problems associated with scarcity of safe assets
- ZLB, safety traps and secular stagnation
- Differences with standard liquidity trap analyses:
  - forward guidance
  - QE and OT
  - bubbles

# NK: Monopolistic Competition

- Differentiated non-traded inputs indexed by $k \in [0,1]$ used to produce different varieties of goods $x_k$
  - Index trees by $i \in [0,\delta]$ so that each tree yields $X$ units of non-traded input $i$
  - Index newborns by $j \in [\delta,1]$ so that each newborn has $X$ units of non-traded input $j$
  - Each variety of goods $x_k$:
    - produced and sold by monopolistically competitive firm
    - firm posts price $p_k$ in units of numeraire

# NK: Monopolistic Competition

- Differentiated goods value by consumers according to a Dixit-Stiglitz aggregator

$$\xi X = \left( \int_0^1 x_k^{\frac{\sigma-1}{\sigma}} dk \right)^{\frac{\sigma}{\sigma-1}}$$

  - Consumption expenditure $P\xi X = \int_0^1 p_k x_k dk$
  - Price index $P = \left( \int_0^1 p_k^{1-\sigma} dk \right)^{\frac{1}{1-\sigma}}$
  - Resulting demand for good $k$ is $x_k = \left( \frac{p_k}{P} \right)^{-\sigma} \xi X$

# NK: Nominal Rigidities

- Extreme form of nominal rigidity $p_k = P$ fixed ($P = 1$)
  - monetary authority sets safe nominal interest rate $i$
  - because prices are rigid, $r^K = i$
  - output demand-determined $x_k = \xi X$

# CIA: Introducing Money

- Individuals with wealth $w_t$ and money holdings $m_t$ can only consume $\min(w_t, \frac{m_t}{\varepsilon})$
  - zero lower bound $i \geq 0$
  - When $i > 0$, money only held for transaction purposes
  - When $i = 0$, money also held as safe store of value
  - Money supply is
    - $\varepsilon M^{\varepsilon}$ with $M^{\varepsilon} = \frac{X}{\theta}$ before Poisson shock
    - $\varepsilon M^{\varepsilon+}$ with $M^{\varepsilon+} = \mu^{+}\frac{X}{\theta}$ after good Poisson shock
    - $\varepsilon M^{\varepsilon-}$ with $M^{\varepsilon-} = \mu^{-}\frac{X}{\theta}$ after bad Poisson shock
    - buying back money requires fiscal capacity...taxes on dividends

# Forward Guidance in Standard Liquidity Trap

- Intensity of good Poisson shock $\lambda^+ > 0$
  - forward guidance: commit to low interest rate after good shock
  - stimulates output after good shock

$$\zeta_\tau = e^{\int_t^{\tau+T}(\delta\theta - i_s)ds} > 1$$

  - before Poisson shock in liquidity trap, increases output to $\hat{\xi}X$ where

$$\hat{\xi} = \xi \frac{\frac{\lambda}{\lambda+\lambda^G}\mu^- + \frac{\lambda^G}{\lambda+\lambda^G}\zeta_\tau\mu^+}{\frac{\lambda}{\lambda+\lambda^G}\mu^- + \frac{\lambda^G}{\lambda+\lambda^G}\mu^+} > \xi$$

  - wealth effect through increase in asset values

# QE in Standard Liquidity Trap

- No effect of QE
  - essentially Ricardian
  - caveat: taxing labor income...non-Ricardian effects...