

# External Adjustment, Global Imbalances and Global Safe Assets

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3-Global Safe Assets & Secular Stagnation

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# Outline

## ① Global Safe Assets

The Demand for Safe Assets

## ② Asset Scarcity and the Zero Lower Bound

A Simple Model of the ZLB

currency wars

with Inflation

Safe Asset Scarcity

# Back to Safe Assets

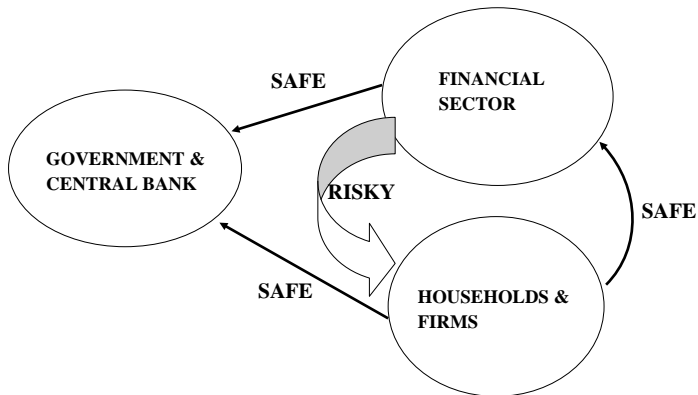
- Widespread concern that the global economy is running short of safe assets...
- ...and that this will affect negatively the global financial system

*“the shrinking set of assets perceived as safe, now limited to mostly high-quality sovereign debt, coupled with growing demand, can have negative implications for global financial stability.” (IMF GFS 2012).*

- analyzes the issue from a global perspective, with a focus on two dimensions:
  - how the financial system reacts to a scarcity of stores of value generally
  - the role of monetary backstops for public debt
- In what follows, define a ‘safe asset’ as a liquid debt claim with good insurance properties (low ‘beta’)

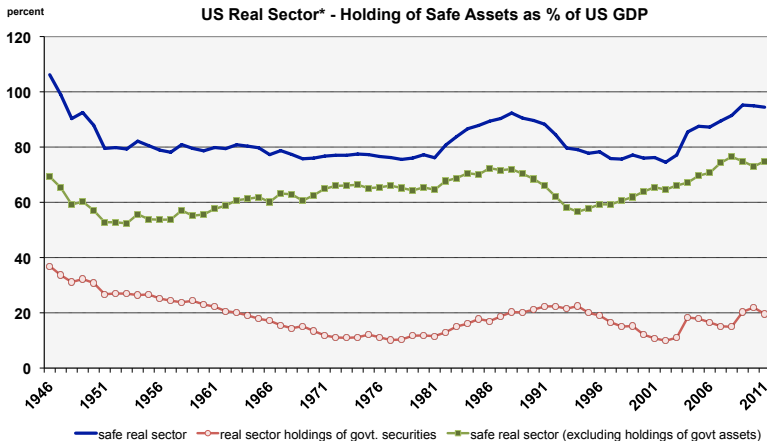
# Demand for safe assets

Demand for safe assets: a sectoral decomposition



# Demand for US safe assets: the real nonfinancial sector

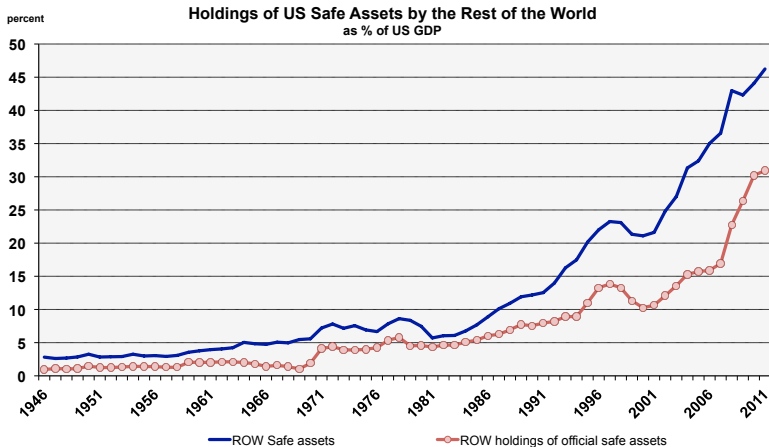
The private real sector's demand for safe assets has been remarkably stable (US) (also true for UK, Germany, France...).



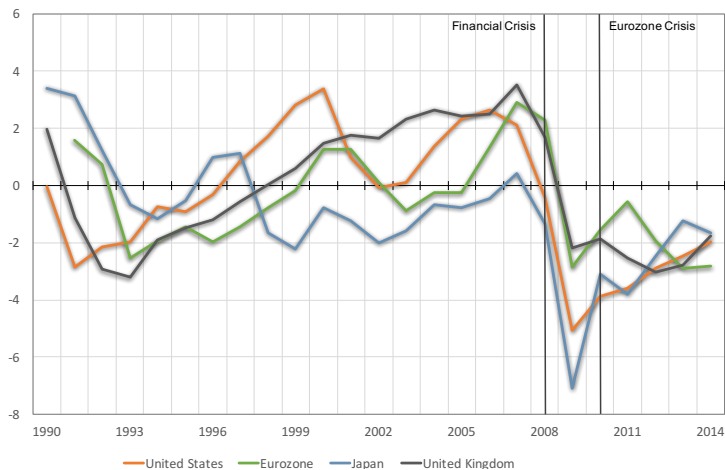
\*Households and Non-Profit Organizations + Non-financial Corporations

# Demand for US safe assets: the rest of the world

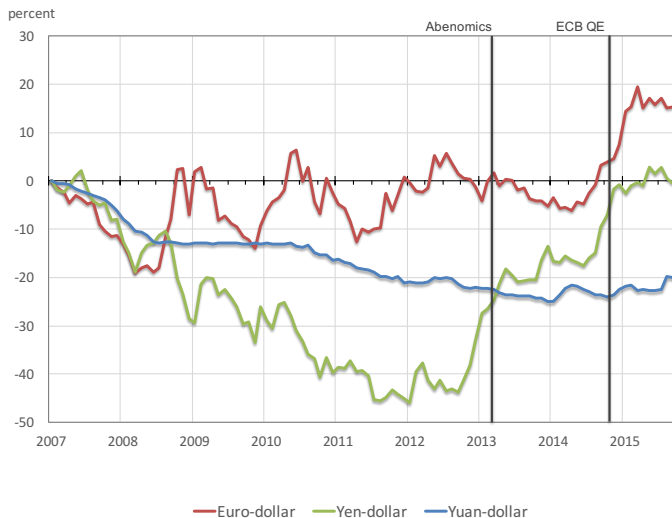
The increased demand for safe assets comes from (a) the US financial system and (b) the rest of the world (official and financial)



# Zero Lower Bound: Output Gap (Advanced Economies), percent



# ZLB: Global Exchange Rates



The figure reports  $\ln(E/E_{2007m1})$  where  $E$  denotes the foreign currency value of the dollar.

# Main Ideas

- ZLB tipping point for Global Imbalances (**benign** to **malign**):
  - no ZLB → propagation of **low interest rates** via CA surpluses
  - ZLB → propagation of **recessions** via CA surpluses
- Regime of increased policy interdependence ( $\pm$  spillovers):
  - FX (zero sum)
  - inflation targets (positive sum)
  - government spending (positive sum)
  - public debt issuance (positive sum)
  - helicopter drops of money (positive sum)
  - some forms of QE (positive sum)

# Two Countries

- Two countries: Home and Foreign
- Endowment  $X$  of  $H$  good grows at rate  $g$
- Endowment  $X^*$  of  $F$  good grows at rate  $g$
- Relative size (constant):  $x = \frac{X}{X+X^*}$ .

# Home Assets

- Dividends  $\delta X$  capitalized by Lucas trees:
  - rate of depreciation  $\rho$
  - rate of new trees creation  $\rho$
- Public debt  $D = dX$  financed by taxes  $\tau$

# Home Agents

- OLG “perpetual youth” with birth/death Poisson rate  $\theta$ ;
- Earn income at birth, save it, and consume at death;
- Consumption shares on  $(H, F)$ :  $(x, 1 - x)$ ;
- Income of newborns:  $(1 - \tau)(1 - \delta)X +$  value of new trees

# Financial Development/Securitization Capacity

- Interpret  $\delta$  as financial development/securitization capacity, not capital share
- Only small part of capital income pledgeable to outside investors as “dividend” on tradable assets
- Depends on financial development/securitization capacity
- Interpret  $\rho$  as technological churn and expropriation risk
- $V_t/PV_t$  depends on  $\delta$  and  $\rho$

$$PV_t = \int_t^{\infty} X_s e^{-\int_t^s r_u du} ds$$

$$V_t = \delta \int_t^{\infty} X_t e^{-\int_t^s (r_u + \rho) du} ds$$

# Nominal Rigidities and Monetary Policy

- Competitive CES final good sector in each country
- Reinterpret endowment as non-traded input
  - transformed into variety of intermediate good sold monopolistically
  - H prices rigid in H currency, F prices rigid in F currency (PCP)
  - accommodate demand at posted price
- Capacity utilization  $\xi \in [0, 1]$
- Truncated Taylor rule:  $i = \max\{r^n - \psi(1 - \xi), 0\}$
- Real interest rate  $r = i$

# Foreign

Same as H but different parameters:

- Financial development/securitization capacity:  $\delta^* \neq \delta$
- Public debt to GDP ratio  $d^* \neq d$  and taxes  $\tau^* \neq \tau$
- Other differences (extensions):
  - demographics and credit constraints (savers/borrowers)
  - securitization capacity & demand for safe assets
  - inflation targets

# Equilibrium Equations (along BGP)

- **Asset pricing** ( $V$ : value of H trees in H currency)

$$\begin{aligned}r^w V &= -\rho V + \delta \xi X \\ r^w V^* &= -\rho V^* + \delta^* \xi^* X^*\end{aligned}$$

- **Wealth accumulation** ( $W$ : H financial wealth in H currency):

$$\begin{aligned}\dot{W} &= gW = -\theta W + (1 - \delta)(1 - \tau)\xi X + r^w W + (\rho + g)V \\ \dot{W}^* &= gW^* = -\theta W^* + (1 - \delta^*)(1 - \tau^*)\xi^* X^* + r^w W^* + (\rho + g)V^*\end{aligned}$$

- **Government budget constraints:**

$$\begin{aligned}(r^w - g)D &= \tau(1 - \delta)\xi X \\ (r^w - g)D^* &= \tau^*(1 - \delta^*)\xi^* X^*\end{aligned}$$

- **Goods market clearing:** ( $E$ : nominal exchange rate)

$$\begin{aligned}x\theta(W + EW^*) &= \xi X \\ (1 - x)\theta(W + EW^*) &= E\xi^* X^*\end{aligned}$$

# ZLB “Complementary Slackness”

- No liquidity trap

$$r^w > 0 \quad \text{and} \quad \xi = \xi^* = 1$$

- Global liquidity trap

$$r^w = 0 \quad \text{and} \quad \xi, \xi^* \leq 1$$

- All or none world

# No Liquidity Trap

- World interest rate as “average” of autarky interest rates

$$r^w = r^{w,n} = -\rho + \frac{\bar{\delta}\theta}{1 - \theta\bar{d}}$$

with

$$r^{a,n} = -\rho + \frac{\delta\theta}{1 - \theta d} \quad \text{and} \quad r^{a,n*} = -\rho + \frac{\delta^*\theta}{1 - \theta d^*}$$

- Net Foreign Assets and Current Account

$$\frac{NFA}{X} = \frac{(1 - \theta d)(r^w - r^{a,n})}{(g + \theta - r^w)(\rho + r^w)} \quad \text{and} \quad \frac{CA}{X} = g \frac{NFA}{X}$$

- Exchange rate

$$E = 1$$

Figure 1a: Standard Metzler Diagram - Home

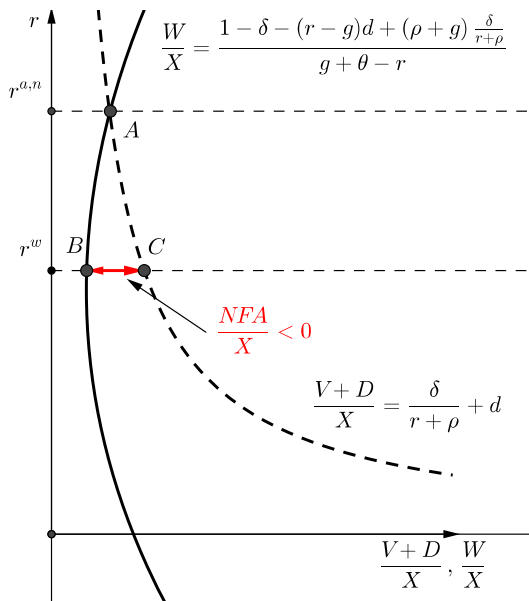
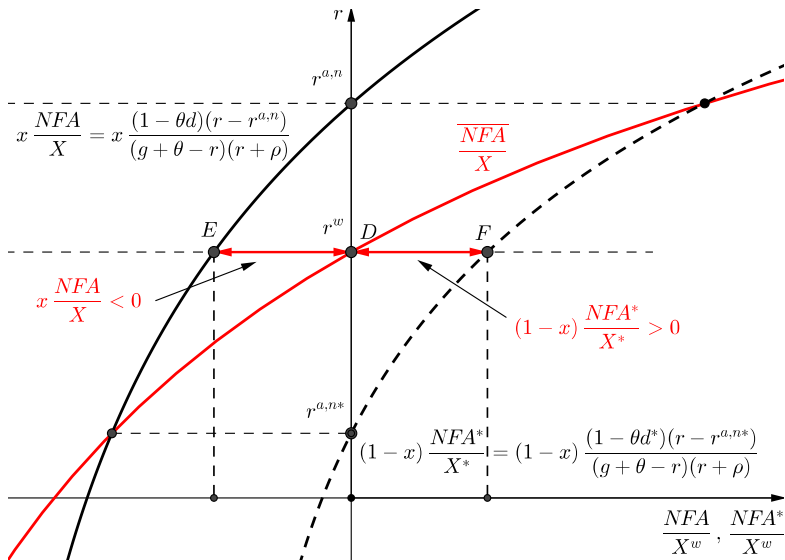


Figure 1b: Standard Metzler Diagram - Global



The global equilibrium interest rate  $r^w$  is such that world financial markets are in equilibrium:  $\frac{NFA}{X^w} = x \frac{NFA}{X} + (1-x) \frac{NFA^*}{X^*} = 0$ .

# Global Liquidity Trap

- World interest rate

$$r^w = 0$$

- Fixed-point equations for  $\xi$  and  $\xi^*$

$$\xi = \frac{\theta}{g + \theta} \left[ x\xi \left( 1 + \frac{g\delta}{\rho} \right) + (1-x)E\xi^* \left( 1 + \frac{g\delta^*}{\rho} \right) + xgd + (1-x)gd^* \right]$$

$$\xi^* = \frac{1}{E} \frac{\theta}{g + \theta} \left[ x\xi \left( 1 + \frac{g\delta}{\rho} \right) + (1-x)E\xi^* \left( 1 + \frac{g\delta^*}{\rho} \right) + xgd + (1-x)gd^* \right]$$

- Multiple equilibria indexed by  $E$ ... (Kareken-Wallace)

$$E = \frac{\xi}{\xi^*}$$

# Global Liquidity Trap

- Output gaps as “FX-weighted averages” of autarky output gaps

$$\xi = x \frac{1 - \frac{\delta\theta}{\rho}}{1 - \frac{\bar{\delta}\theta}{\rho}} \xi^{a,l} + (1-x) \frac{1 - \frac{\delta^*\theta}{\rho}}{1 - \frac{\bar{\delta}\theta}{\rho}} E \xi^{a,l*}$$

$$\xi^* = x \frac{1 - \frac{\delta\theta}{\rho}}{1 - \frac{\bar{\delta}\theta}{\rho}} \frac{1}{E} \xi^{a,l} + (1-x) \frac{1 - \frac{\delta^*\theta}{\rho}}{1 - \frac{\bar{\delta}\theta}{\rho}} \xi^{a,l*}$$

with

$$\xi^{a,l} = 1 + \frac{1 - \theta d}{1 - \frac{\delta\theta}{\rho}} \frac{r^{a,n}}{\rho} \quad \text{and} \quad \xi^{a,l*} = 1 + \frac{1 - \theta d^*}{1 - \frac{\delta^*\theta}{\rho}} \frac{r^{a,n*}}{\rho}$$

- Net Foreign Assets and Current Account

$$\frac{NFA}{X} = \frac{(1 - \frac{\delta\theta}{\rho})(\xi - \xi^{a,l})}{g + \theta} \quad \text{and} \quad \frac{CA}{X} = g \frac{NFA}{X}$$

# Output Determination in the Global ZLB

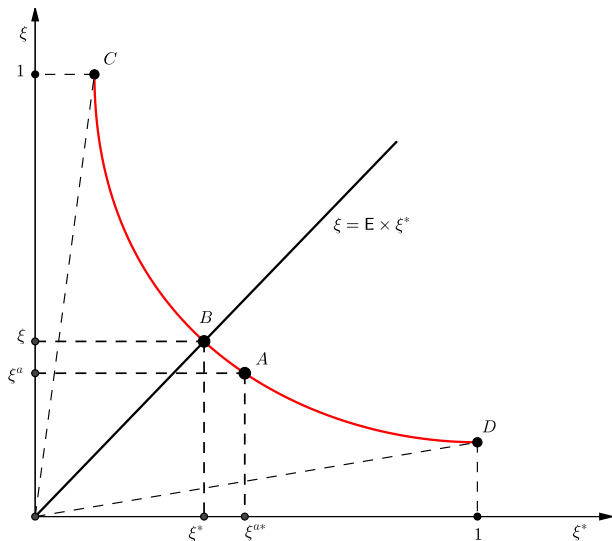
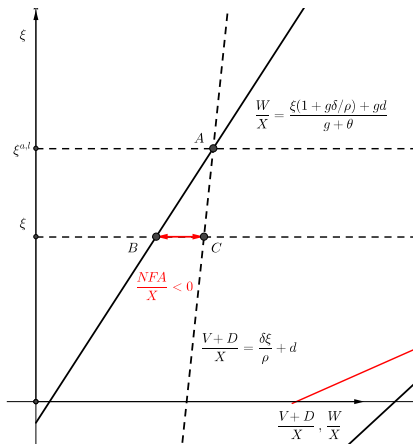


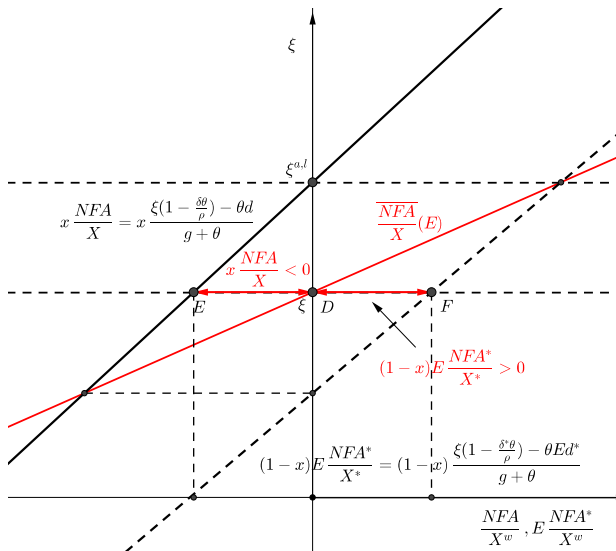
figure reports Home ( $\xi$ ) and Foreign ( $\xi^*$ ) output at the global ZLB, for different values of the exchange rate  $E \in [\underline{E}, \bar{E}]$ .

## Figure 2a: Metzler Diagram in Quantities - Home



Given  $E$ , Metzler diagram in quantities reports the size of the net foreign position as a function of the domestic liquidity trap  $\xi$ . Higher output (high  $\xi$ ) increases wealth more than asset supply, so NFA increases.

Figure 2b: Metzler Diagram in Quantities - Global



Given  $E$ ,  $\xi$  is such that world financial markets are in equilibrium:

$$\frac{NFA}{X}(E) = x \frac{NFA}{X} + (1-x)E \frac{NFA^*}{X^*} = 0.$$

# Alternative Representation with “FX-weighted” Debt

- Output gaps

$$\xi = \frac{\theta \bar{d}(E)}{1 - \frac{\bar{\delta}\theta}{\rho}} \quad \text{and} \quad \xi^* = \frac{1}{E} \frac{\theta \bar{d}(E)}{1 - \frac{\bar{\delta}\theta}{\rho}}$$

as function of “FX-weighted” average debt to GDP

$$\bar{d}(E) = xd + (1 - x)Ed^*$$

- Net Foreign Assets and Current Account

$$\frac{NFA}{X} = \frac{(1 - \frac{\delta\theta}{\rho})}{g + \theta} \left[ \frac{\theta \bar{d}(E)}{1 - \frac{\bar{\delta}\theta}{\rho}} - \frac{\theta d}{1 - \frac{\delta\theta}{\rho}} \right]$$

$$\frac{NFA}{X} = \frac{1 - \frac{\delta\theta}{\rho}}{1 - \frac{\bar{\delta}\theta}{\rho}} \frac{(1 - x)d^*(E - E^a)}{g + \theta}$$

# Currency Wars and Reserve Currency Paradox

- $E$  determined by market coordination or FX intervention (peg)
- Beggar-thy-neighbor devaluations (zero-sum)

$$E \uparrow \implies \xi \uparrow \xi^* \downarrow \frac{CA}{X} \uparrow$$

- Reserve currency paradox

# Inflation

- ‘Old’ Keynesian Phillips curves (downward sticky prices )

$$[\pi_{H,t} + \kappa_0 + \kappa_1(1 - \xi_t)](1 - \xi_t) = 0$$

$$[\pi_{F,t}^* + \kappa_0^* + \kappa_1^*(1 - \xi_t^*)](1 - \xi_t^*) = 0$$

- Taylor rules with inflation targets  $\bar{\pi} > 0$  and  $\bar{\pi}^* > 0$

$$i_t = \max\{0, r_t^n + \bar{\pi} + \phi(\pi_{H,t} - \bar{\pi})\}$$

$$i_t^* = \max\{0, r_t^{n*} + \bar{\pi}^* + \phi^*(\pi_{F,t}^* - \bar{\pi}^*)\}$$

# Inflation

- With  $r^{w,n} < 0$ , multiple equilibria with different TOT:  $S = \frac{EP_F^*}{P_H}$
- **No liquidity traps** equilibrium ( $i > 0, i^* > 0$ ) if inflation targets high enough:  $r^{w,n} + \min\{\bar{\pi}, \bar{\pi}^*\} > 0$
- **Global liquidity trap** equilibrium ( $i = i^* = 0$ ) with deflationary spiral
  - at world level, more wage flexibility  $\rightarrow$  deeper recession
  - at country level, more wage flexibility  $\rightarrow$  shallower recession
- **Asymmetric liquidity trap** equilibrium ( $i = 0, i^* > 0$ )
  - no recession in one country
  - worse recession in the other
- Inflation targets (positive sum) vs. FX interventions (zero sum)

# Government Spending, Public Debt, Helicopter Money

- Public debt expansion (positive sum)...

$$d \uparrow \implies \xi \uparrow \xi^* \uparrow \frac{CA}{X} \downarrow$$

...but not if used to finance asset purchases  
(different in model with safe and risky assets)

- Equivalent to helicopter drops of money
- Government spending (positive sum)

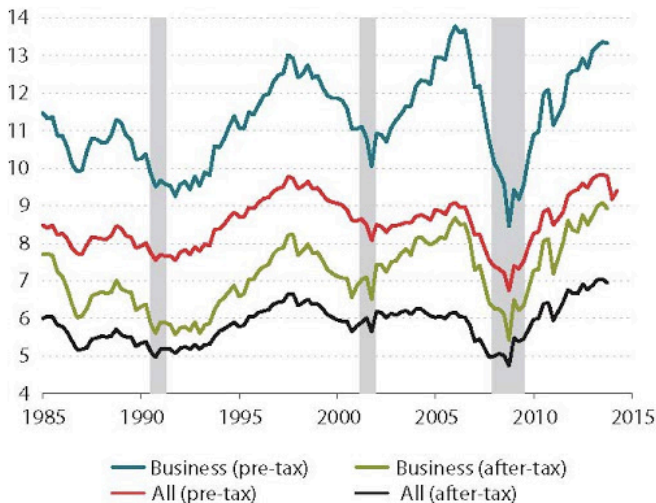
$$G \uparrow \implies \xi \uparrow \xi^* \uparrow \frac{CA}{X} \downarrow$$

Domestic multiplier  $> 1$  in SR

(net asset supply boost + inflation boost through stimulus) More  
foreign leakage in LR  
(TOT appreciation)

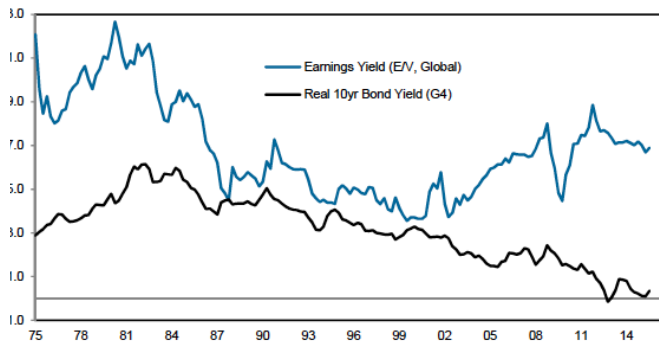
# U.S. MPK

**Real Returns on Capital (percent)**

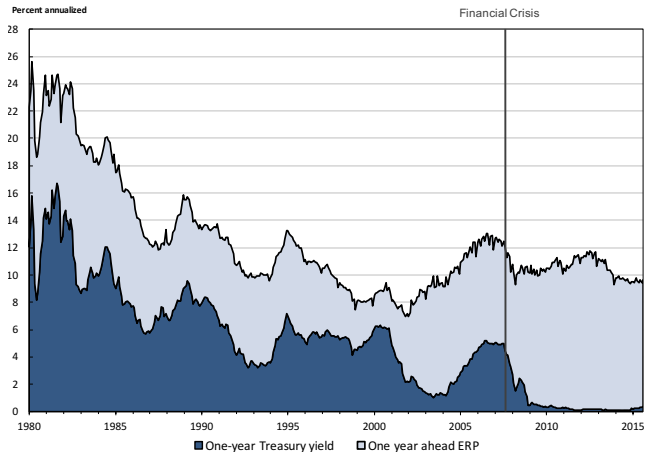


SOURCE: Authors' calculations; for details, see Gomme, Ravikumar, and Rupert

# U.S. Interest Rate and Equity Dividend Yield



# U.S. Interest Rate and Equity Risk Premium



Source: one-year Treasury yield: Federal Reserve H.15; ERP: Duarte & Rosa (2015).

# Safe Assets and Global Safe Asset Shortages

- Endogenous risk premia
- Links reserve currency paradox and exorbitant privilege
- Can have ZLB in one country but not other ( $\neq$  real interest rates)
- Policy:
  - QE issue debt/purchase risky (not safe!) assets (positive sum)
  - support private securitization capacity (positive sum)
  - forward guidance (reduced effectiveness)

# Safe Assets: Shocks and Preferences

- Disaster shock /w Poisson rate  $\lambda \rightarrow 0$ : output drops  $\mu < 1$
- Set  $d = d^* = 0$  and  $\delta = \delta^*$
- Fraction  $\alpha$  'Knightians' (infinitely risk averse),  $1 - \alpha$  Risk Neutral.
- Knightians have *full* home bias.
- Neutrals have '*some*' home bias

# Safe Assets: Securitization & Tranching

- Fraction  $\phi < 1$  of H dividend **tranching** and recombined.:
  - **Poisson puts** (pay nothing until Poisson shock)
  - **Poisson calls** (pay only until the Poisson shock)
- Knightians invest in **safe** assets combining puts and calls
- Neutrals invest in the rest
- **Constrained regime**: safe assets are scarce & Knightians price safe assets at the margin (safety premium).

# Modified UIP and Risk Premia

- Fix exchange rate immediately after the shock  $E^+$
- No-arbitrage requires:

$$\frac{r^w - r^K}{r^w - r^{K*}} = \frac{E}{E^+}$$

- **modified UIP equation**: the country with a high safety premium ( $r^K < r^{K*}$ ) has a currency that will appreciate when the shock occurs ( $E > E^+$ ).
- **Reserve Currency Paradox**: if Home's currency is expected to appreciate in bad times ( $E > E^+$ ), then  $r^K < r^{K*}$  and Home is more likely to experience a liquidity trap
- if  $\phi > \phi^*$  then  $NFA/X < 0$ : **exorbitant privilege**.
- Metzler diagram in **safe assets**

# Conclusion

- traps in one country propagate to other countries
- in the benchmark model, trap is global or not at all
- the relative size of traps is controlled by the exchange rate. Powerful beggar-thy-neighbor effects
- 'Metzler diagram in quantities' links global imbalances to relative traps
- general result: reserve countries suffer a disproportionate share of the trap ([the paradox of the reserve currency](#))