Modern Debt Sustainability Analysis

Markus K. Brunnermeier

Based on work with
Sebastian Merkel and Yuliy Sannikov

ADB, ADBInstitute, KDI

2022-03-01

Motivation

- How much government debt can the market absorb?
  - When can governments run a deficit without ever paying back its debt, like a Ponzi scheme?
  - "Debt Laffer Curve" and debt sustainability analysis?

- Advanced Economies: Safe asset nature of government debt
  - Service flow and cash flow (primary surplus)
  - Flight-to-Safety into government debt
  - Government debt as a countercyclical safe asset (negative β)
  - Role of emergency fiscal space to fend off crisis

- Emerging Economies: Competition with US Treasury

Value of Government Debt

- Value of Gov. Debt $= E_t[PV_{SDF}(\text{cash flows})] \quad + \cdots$

- For Gov. Debt: Cash flows = primary fiscal surpluses

(Taxing power)

- Procyclicality, β, of cash flow lowers value
  - High in booms
  - Low in recessions

Primary Surpluses of Governments

- United States
  - Average surplus ≈ 0
  - Procyclical surplus (> 0 in booms, < 0 in recessions)

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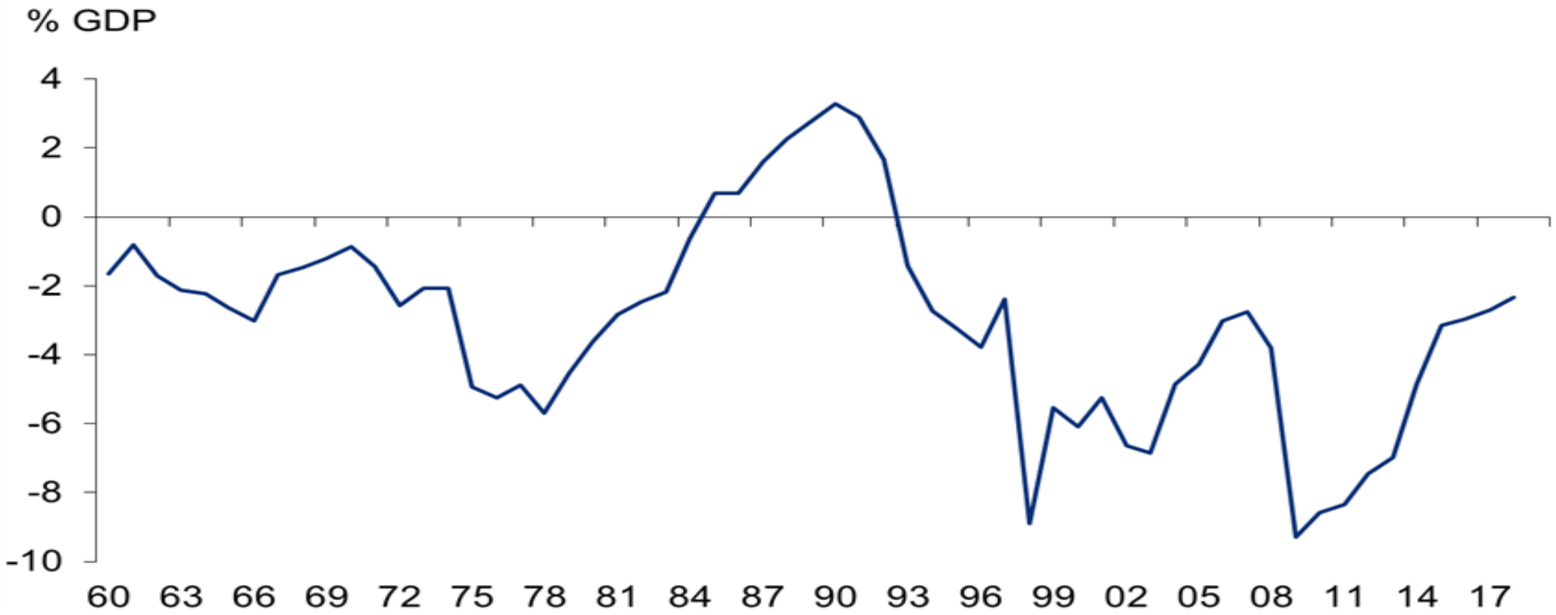
- Japan
  - Negative for most of the years – and future



Value of Government Debt

- Two valuation puzzles from standard perspective:
  (Jiang, Lustig, van Nieuwerburgh, Xiaolan, 2019, 2020)

1. "Public Debt Valuation Puzzle"
   - Empirical: $E[PV(surpluses)] < 0$, yet real value $\frac{\mathcal{B}}{\wp} > 0$
   - Add bubble/service flow term

2. "Gov. Debt Risk Premium Puzzle"
   - Cash flow β is positive, but market don't price it this way
   - bubble/service flow term has negative β

3 Forms of Seigniorage – Interaction with Monetary Policy

$$\frac{\mathcal{B}_t + \mathcal{M}_t}{\wp_t} = E_t \int_t^\infty \frac{\xi_s}{\xi_t}(T_s - G_s)ds + E_t \int_t^\infty \frac{\xi_s}{\xi_t} \Delta i_s \frac{\mathcal{M}_s}{\wp_s} ds + \lim_{T\to\infty} E_t \frac{\xi_T}{\xi_t} \frac{\mathcal{B}_T + \mathcal{M}_T}{\wp_T}$$

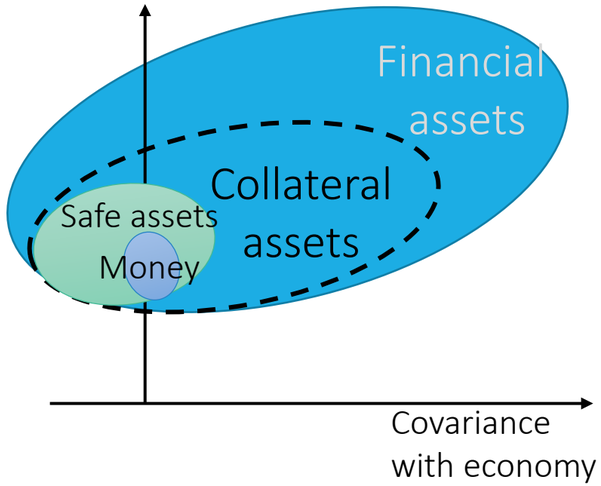
1. Surprise devaluation
   - Irrational expectations
   - Small (Hilscher, Raviv, Reis 2014)
     - Inflation options imply likelihood of exceeding 5% of GDP is less than 1%
   - Depends on maturity of debt

2. Exploiting liquidity benefits of "narrow" cash
   - Only for "narrow" cash that provides medium-of-exchange services
   - $\Delta i = i - i^M$
   - 0.36 % of GDP, NPV = 20% (at most 30%) of GDP, (Reis 2019)

3. Ponzi scheme with inflation

Adding service flow

- Asset Price $= E_t[PV_{SDF^{**}}(\text{cash flow})] + E_t[PV_{SDF^{**}}(\text{service flow})]$
  dividends/interest
  - Service flows/convenience yield
    1. Money (narrow): relax double-coincidence of wants
    2. Collateral: relax constraints (Lagrange multiplier)
    3. Safe asset: [good friend analogy]
       - When one needs funds, one can sell at stable price … since others buy
         - Personal/idiosyncratic shocks
         - Aggregate shocks
       - Partial insurance through retrading - market liquidity!
  - Higher Asset Price = lower expected return

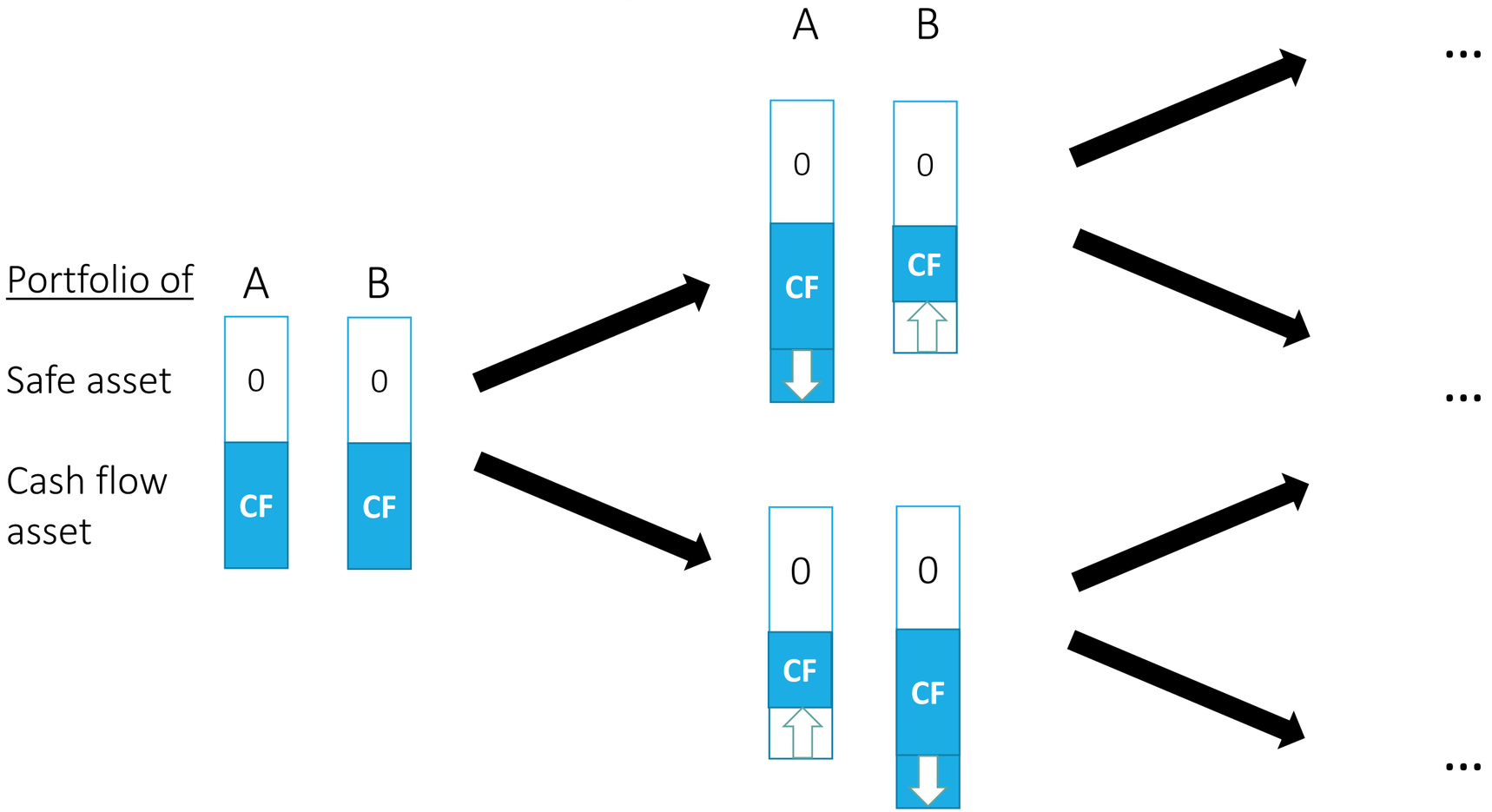


- Problem: safe asset + money status might burst like a bubble
  - Multiple equilibria: [safe asset tautology]

What's a Safe Asset? What is its Service Flow?

- $P_t = E_t\left[PV_{\xi^{**}}(\text{cash flows})\right] + E_t\left[PV_{\xi^{**}}(\text{service flows})\right]$

Example: = 0

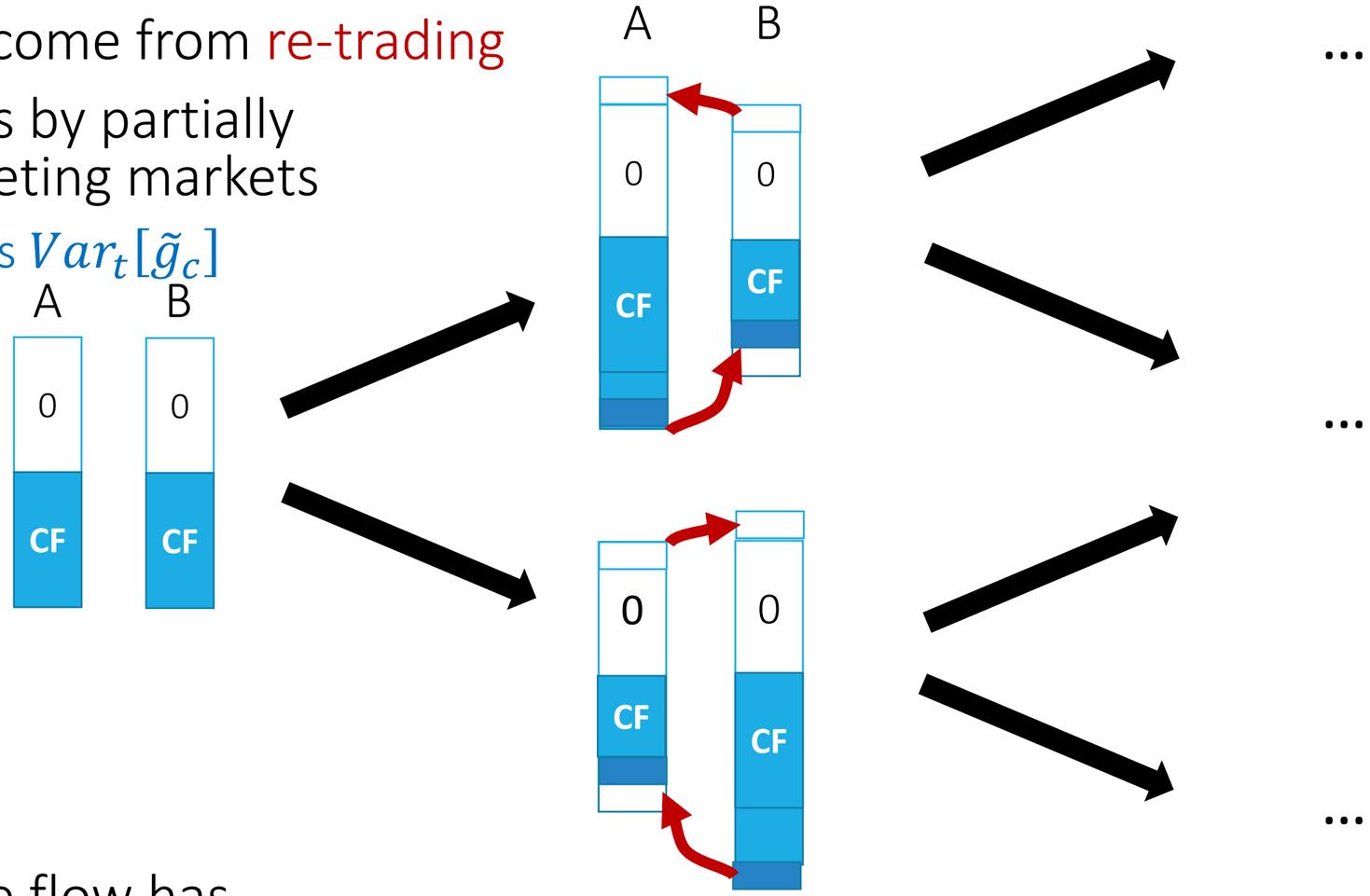


What's a Safe Asset? What is its Service Flow?

- $P_t = E_t\left[PV_{\xi^{**}}(\text{cash flows})\right] + E_t\left[PV_{\xi^{**}}(\text{service flows})\right]$

- Value come from re-trading
- Insures by partially completing markets

  Reduces $Var_t[\tilde{g}_c]$



- Service flow has self-fulfilling component: higher price of asset = higher service flow

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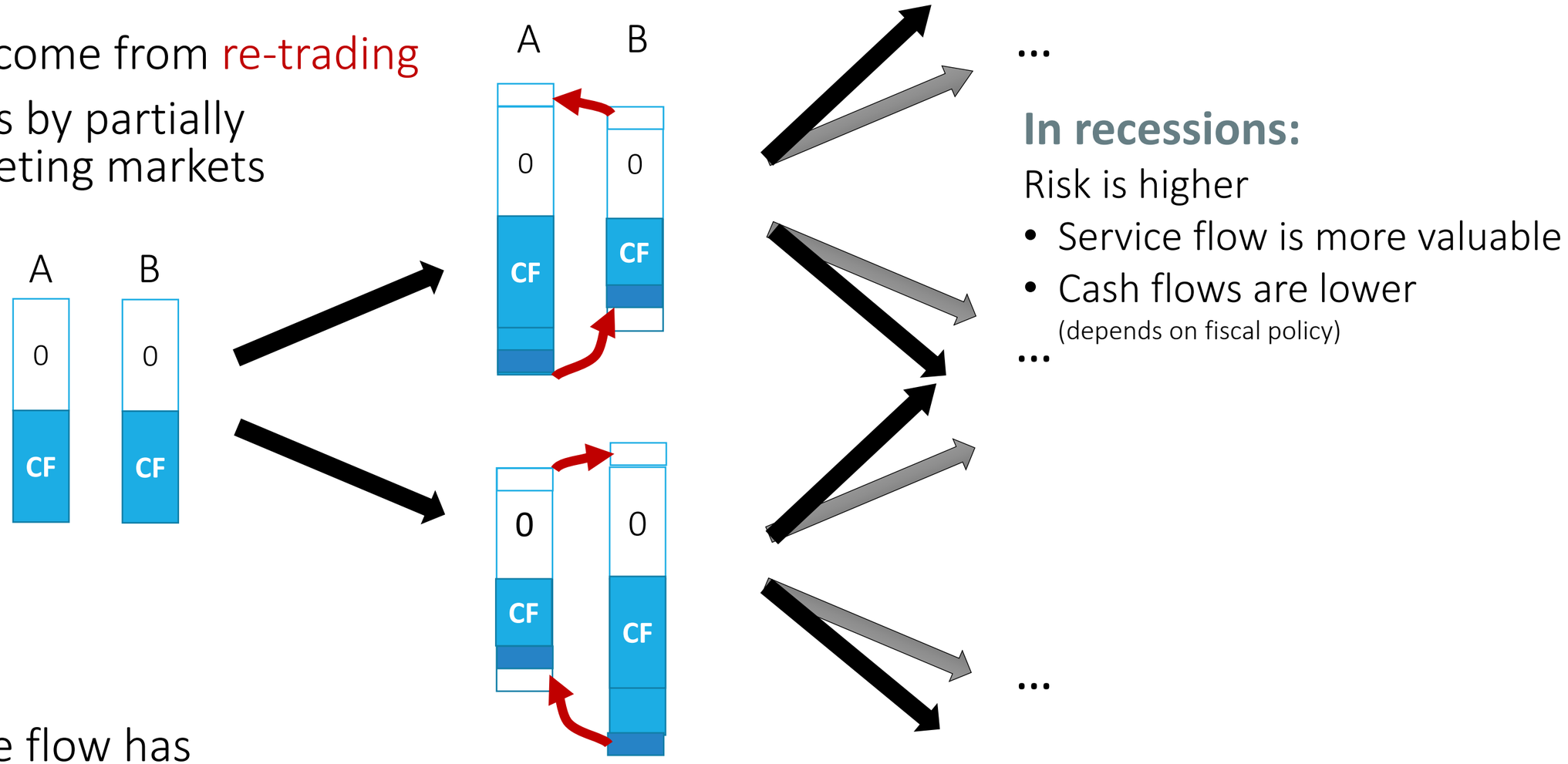


In recessions:

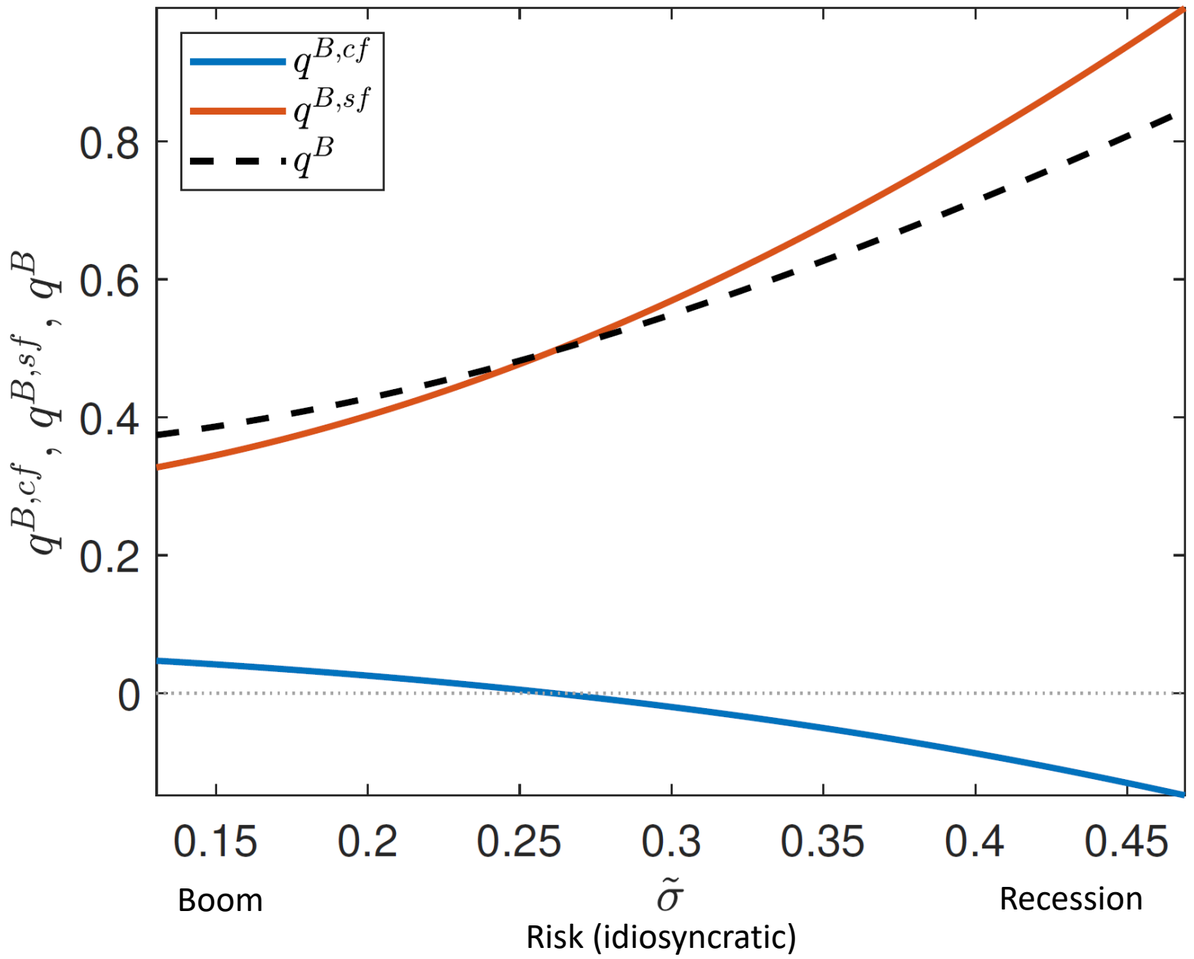
Risk is higher

- Service flow is more valuable
- Cash flows are lower
  (depends on fiscal policy)

- Service flow has self-fulfilling component: higher price of asset = higher service flow

Safe Asset – Cash flow and Service flow

- Asset Price = E[PV(cash flows)] + E[PV(service flows)]



Negative primary surplus forever? When Ponzi scheme?

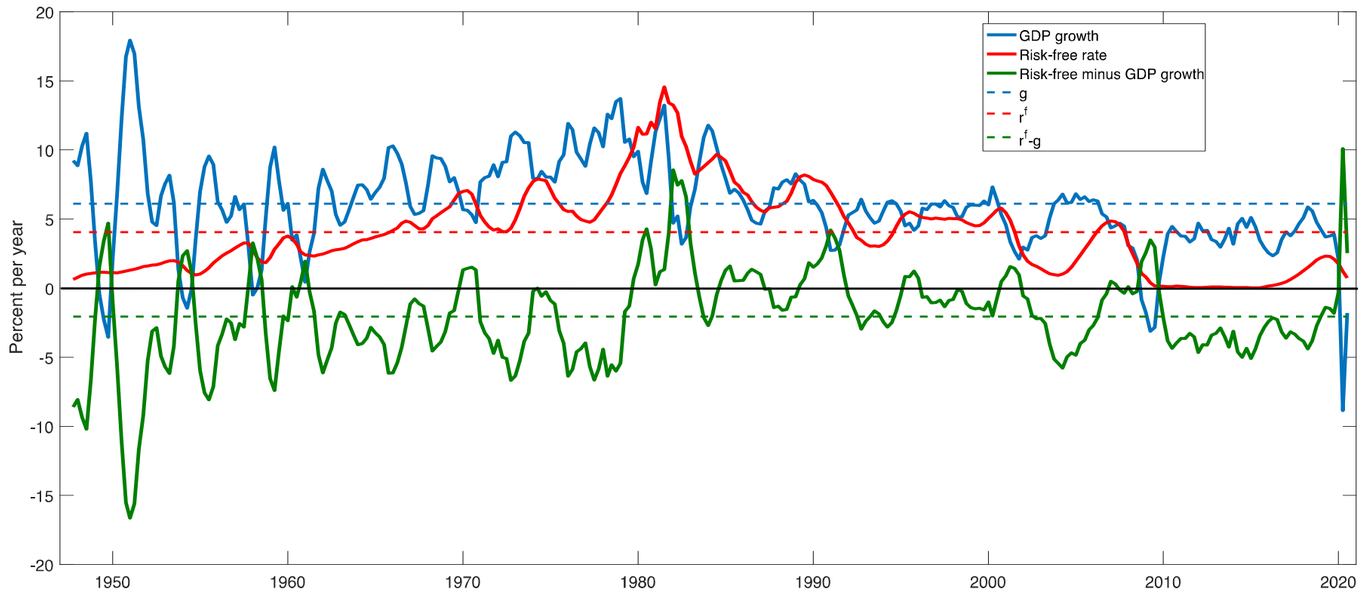
- without creating inflation (devaluing debt)?
- Yes, if $r + \text{risk permium} < g$ Ponzi scheme!
- $$\frac{\mathcal{B}_t}{\wp_t} = E_t[PV_{SDF}(\text{primary surpluses})] + \underbrace{\lim_{T\to\infty} PV_{SDF}\frac{\mathcal{B}_T}{\wp_T}}_{\text{Bubble}}$$

  discount at r (agents' SDF)

  grows at g with constant deficit/GDP $\to -\infty$

  $\to +\infty$
- "Emergency fiscal space"

r vs. g for the United States

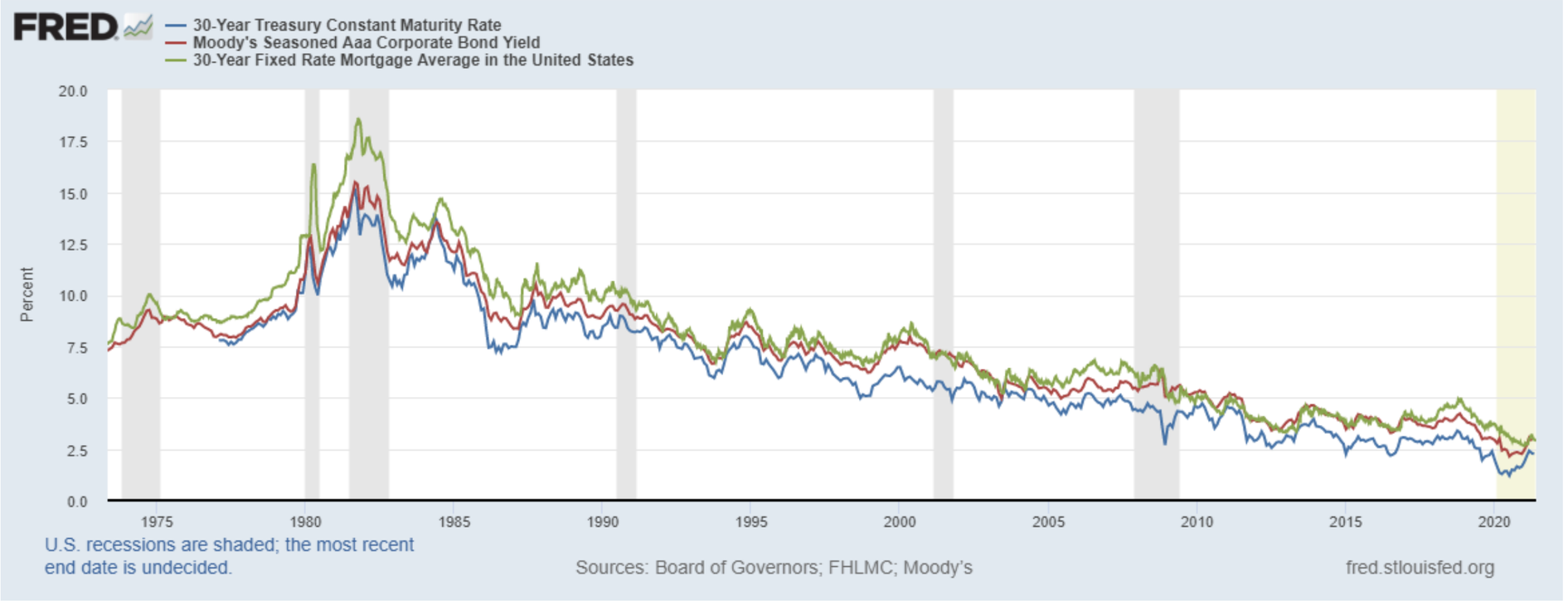


- g GDP growth
- r
- $r - g$

Understandings rs for log utility, $\gamma = 1$

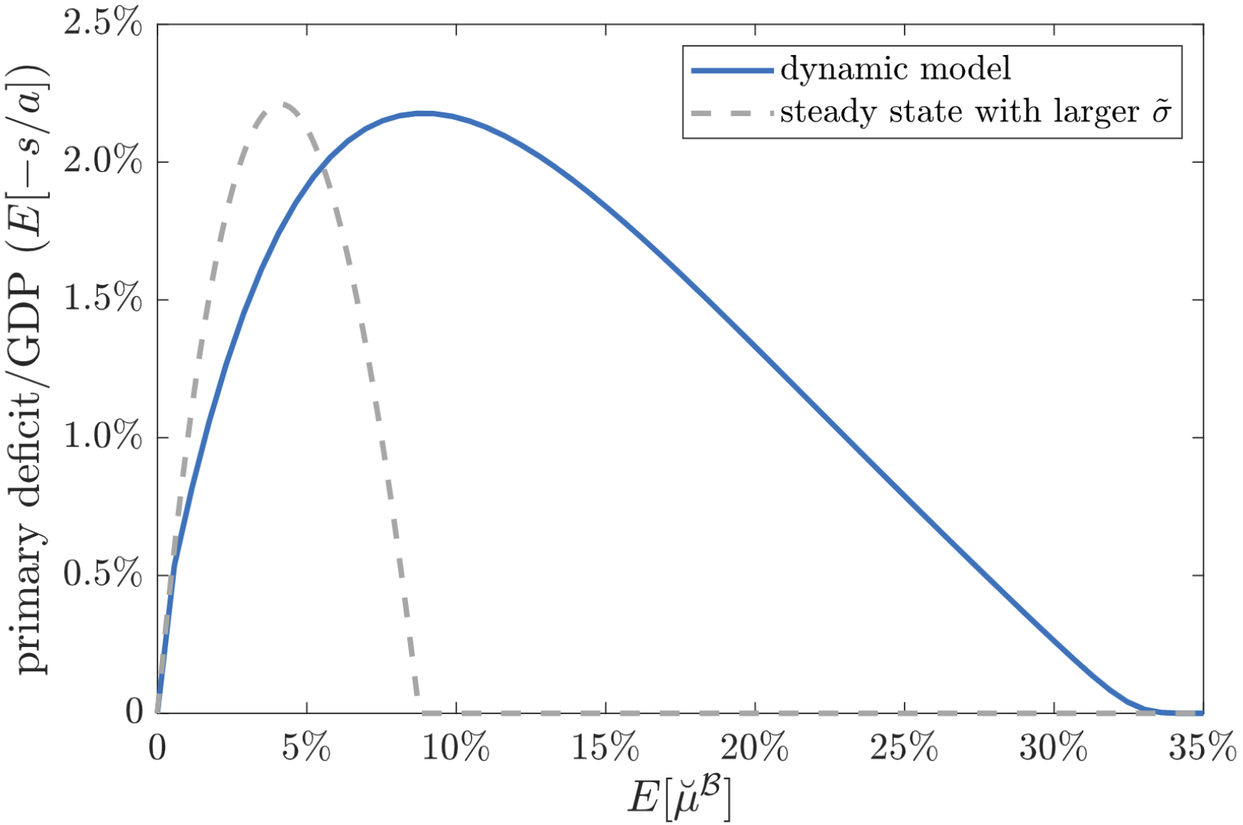
Time Preference rate | Expected Growth | *Precautionary savings/self-insurance*: aggregate risk, idiosyncratic risk | Risk Premium (inflation + loss of safe asset status) | Convenience yield: on money/ reserves

$$\underbrace{\rho + E[g_c] - \{Var_t[g_c] + Var_t[\tilde{g}_c]\}}_{\text{risk-free rate } r^f} + \text{Risk Premium} - \{\lambda(\text{Collateral Constr}) + \Delta i\}$$



Debt Laffer Curve ≠ MMT Debt Sustainability Analysis 1

- Issue bonds at a faster rate $\check{\mu}^B$ (esp. in recessions)
  - ⇒ tax precautionary self insurance ⇒ tax rate ↑
  - ⇒ real value of bonds, $\frac{\mathcal{B}}{\wp}$, ↓ ⇒ "tax base" ↓
    - Less so in recession due to flight-to-safety



Loss of Safe Asset Status – Debt Sustainability Analysis 2

1. Safe asset: Retrading requires low bid-ask spread
   - Informationally insensitive asset
   - Central Banks as Market Maker of Last Resort
   - 10-year US Treasury in March 2020

2. Bubbles can pop ⇒ more difficult to maintain $\beta < 0$
   - Able to prop up the bubble/safe-asset status by (off-equilibrium) hiking taxes (fiscal space)
   - Bubble condition: $r = r^f + \text{risk premium} < g$

   - + credible "Emergency Fiscal Space" to fend off bad equilibrium
     - Depends on political system and cohesion
     - Commitment power to raise taxes for a long time

If safe-asset-status is “wobbly”

- If government bond is risky, Bubble/Ponzi Scheme is possible if

$$r + \text{risk premium} < g \qquad (1)$$

Risk premium

- Negative if safe asset appreciates in crises times (AE)
  - (1) easy ➡ Safe asset status easy to maintain

- Positive if safe asset status might burst (EMDE)
  - (1) fails occasionally ➡ loss of safe asset status

Self-fulfilling nature (safe asset tautology)

- Capital controls: Gov. debt only safe asset
- Next, no capital controls: US Treasury competes as safe asset

Competition with US Treasury

- EMDE safe asset status is even more wobbly

$$r + \text{RISK PREMIUM} < g$$

$$r > r^{\$}$$

Sandwiched

- Note: risk is endogenous
  due to self-fulfilling expectations
  - So is the risk premium
    = price of risk * (exogenous + endogenous risk)
- Note: growth g is endogenous

➡ Multiple equilibria (invites speculative attacks)

- Calvo (1988), Obstfeld (1996)

Conclusion

- Safe Asset = good friend ⇒ lowers r
  - **Individually:** allows self-insurance through retrading
  - **Aggregate:** appreciates in bad times (negative β)
- Fiscal Debt Sustainability Analysis
  - $r < g$ gov can "mine the bubble" within limits (max 2% of GDP)
  - Extra space, but Debt Laffer Curve (≠ MMT)
  - Bubble can pop: loss of safe asset status
    - Need credible "emergency fiscal space"
- Asset pricing with safe assets
  - Service Flow term >> convenience yield
  - Flight to Safety creates
    - Countercyclical safe asset valuation
    - Large stock market volatility

- **Remark:** Competing Safe Assets
  - Within country private bonds are partial safe assets
  - Across countries ⇒ Spillover of US Monetary Policy

Based on

- Brunnermeier and Sannikov, 2016, “The I Theory of Money”
- Brunnermeier, Merkel and Sannikov, 2019, “Fiscal Theory of the Price Level with a Bubble”
- Brunnermeier, Merkel and Sannikov, 2020, “Debt as Safe Asset”
- Brunnermeier, Merkel and Sannikov, 2020, “Integrated Policy Framework: A Safe Asset Perspective”