Dollar Upheaval

Conference on International Roles of the U.S. Dollar, September 25, 2025
Federal Reserve Bank of New York

Arvind Krishnamurthy (Stanford GSB and NBER)

Drawn from work with Antonio Coppola, Zhengyang Jiang, Hanno Lustig, Rob Richmond, Chenzi Xu

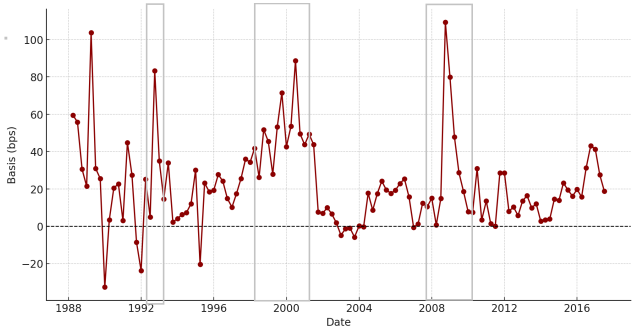
Question

How much will U.S. interest rates and the dollar exchange rate change if the world moves to an equilibrium where the U.S. is no longer the world's reserve currency?

Safe assets, liquidity, and currencies

1. Economies use a stock of homogeneous safe assets as private liquidity
   - To settle payments, to store value, and as collateral
   - For example, in US:
     - safe assets == reserves, Treasuries, private debt (bank and high-grade non-bank)
     - These assets carry a *"convenience yield"*
2. True both both within countries (local liquidity) and across countries (international liquidity)
3. Dollar liquidity has been of particular importance in the world: *globally highest convenience yield*

US Treasury vs G10 1-year Government Bond CIP wedge



- $\hat{y}_{G10,1year} = y_{G10,1year} + logF_{G10,1year} - logX_{G10,1year} \quad \Rightarrow \quad$ CIP-wedge $= \hat{y}_{G10,1year} - y_{\$Tbill,1year}$
- Jiang, Krishnamurthy, Lustig (2021):
  UIP-wedge $= M \times$ CIP-wedge; exchange rate moves with UIP-wedge to estimate M.
- Estimate foreign safe asset investors were willing to forgo around 2% per annum to own dollar safe assets

Note: sign flipped relative to Du, Im, Schreger (2018) and Jiang, Krishnamurthy, Lustig (2021)

Dollar contract denomination

- >$30 trillion of dollar-denominated debt outside U.S.
  - firms, government, across the credit spectrum in both advanced and emerging economies
- Trade contracts denominated in dollars
- Firms choose to denominate contracts in the unit of the safe asset
  1. Safe private borrowers issue to add to the stock of safe assets to harvest the convenience yield
  2. Riskier ones whose debts do not carry a convenience yield still denominate in liquid medium:
     - Liquidity: it is easier to source the dollar liquidity to rollover and make debt payments
     - Given stock of dollar liquidity (unit = $1), agents denominate debt in $ units
  3. Foreign issuers tap dollar debt markets at the cost of revenue (currency of goods) mismatch
     - But these costs can be reduced if trade in goods is also contracted to have dollar denomination

Liquidity and size of of the dollar safe asset market ties together all features of the dollar hegemony

Why the Dollar?

- Need a stock of safe assets to facilitate payment needs, store of value, collateral
- World financial system "builds" on dollar safe assets, producing more dollar assets, in a virtuous feedback

Same argument applies historically:

- Financial technology centered the reserve currency in the Dutch Florin rather than much larger Spain and France
- Financial technology in England relative to the U.S. delayed the transition from the Sterling to the dollar

Coppola, Krishnamurthy and Xu (2025)

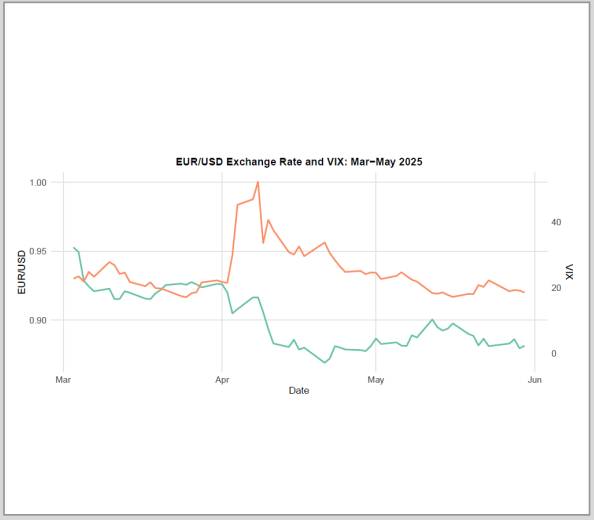
What underpins safety and liquidity?

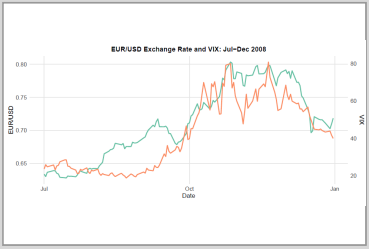
- Quantity tension
  - Size of float is important (e.g. Switzerland provides too small a quantity) in coordinating on dollar safe assets
  - But... too much debt relative to fiscal capacity and safety is compromised
- Fed swap lines provide state-contingent quantity of safe assets, easing roll-over worries – will they continue?
- Inflation concerns reduce safety

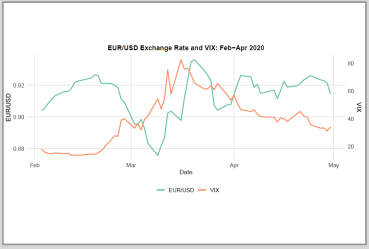
What underpins safety and liquidity?

- Quantity tension
  - Size of float is important (e.g. Switzerland provides too small a quantity) in coordinating on dollar safe assets
  - But... too much debt relative to fiscal capacity and safety is compromised
- Fed swap lines provide state-contingent quantity of safe assets, easing roll-over worries – will they continue?
- Inflation concerns reduce safety
- Recent data provide cause for concern:
  - Convenience yield on long-term Treasuries has fallen substantially (Du, Hebert and Li, 2023)
  - April 2 shock played out differently than past shocks

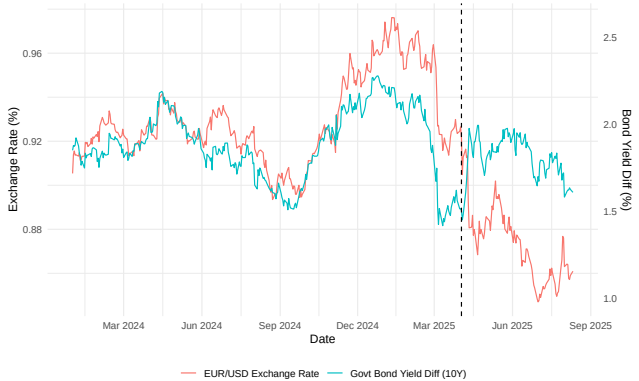
Flight to dollar?





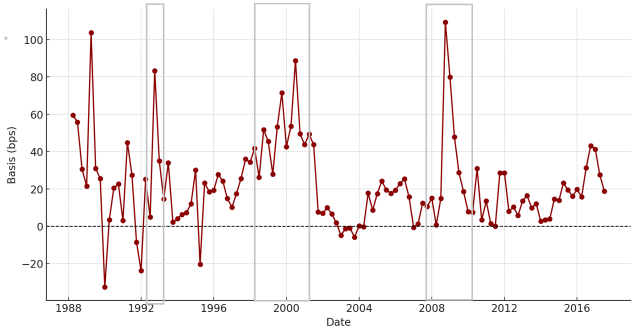


Flight to Treasuries? 10 year Euro-USD yield differences vs Euro/USD exchange rate



- Back-of-envelope: 10-year yield differences widen by 50 bps; LR UIP for 10 years $\Rightarrow$ dollar should appreciate at least 5%
- Dollar depreciates 6.5%

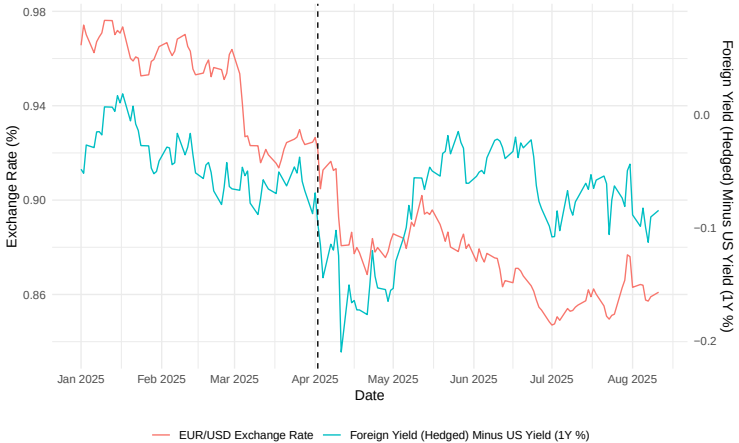
US Treasury vs G10 1-year Government Bond CIP wedge



- $\hat{y}_{G10,1year} = y_{G10,1year} + logF_{G10,1year} - logX_{G10,1year} \quad \Rightarrow \quad$ CIP-wedge $= \hat{y}_{G10,1year} - y_{\$Tbill,1year}$
- Jiang, Krishnamurthy, Lustig (2021):
  UIP-wedge $= M \times$ CIP-wedge; exchange rate moves with UIP-wedge to estimate M.
- Estimate foreign safe asset investors were willing to forgo around 2% per annum to own dollar safe assets

Note: sign flipped relative to Du, Im, Schreger (2018) and Jiang, Krishnamurthy, Lustig (2021)

Flight away from Treasury: 1-year Government Bond Basis



- spread = 1-year Bund FX swapped to dollars − US 1 year Treasury

Euro/USD Safe Asset Basis

- Premium on short-term Treasury relative to Euro short-term safe asset rate (Euro ESTR)
- spread = Euro ESTR FX swapped to dollars − US 1 year Treasury

Euro/USD Safe Asset Basis

- spread = Euro ESTR FX swapped to dollars − US 1 year Treasury
- spread = Euro ESTR FX swapped to dollars − US repo rate (SOFR)

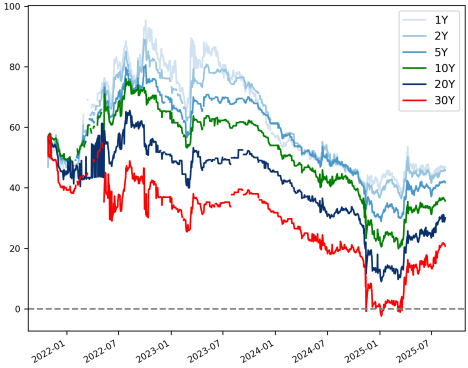
1-year Euro, DKK, Yen Asset Basis

- $v_t^{(1)}$ = Foreign short-term swapped to dollars − short-term US$ repo

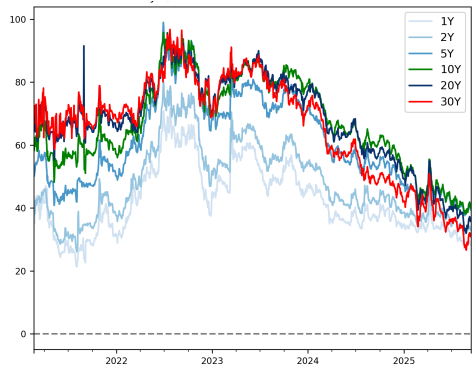
Euro/USD Safe Asset Basis, Expectations Hypothesis

- $v_t^{(1)}$ = Foreign short-term swapped to dollars − short-term US$ repo
- Term swap is based on floating rates, reset every 3 months, US$ repo vs Euro: $S_{t,30} = E_t\left[\frac{1}{30}\sum_{j=t}^{t+30} v_j^{(1)}\right]$

1-year Euro, DKK, Yen Asset Basis

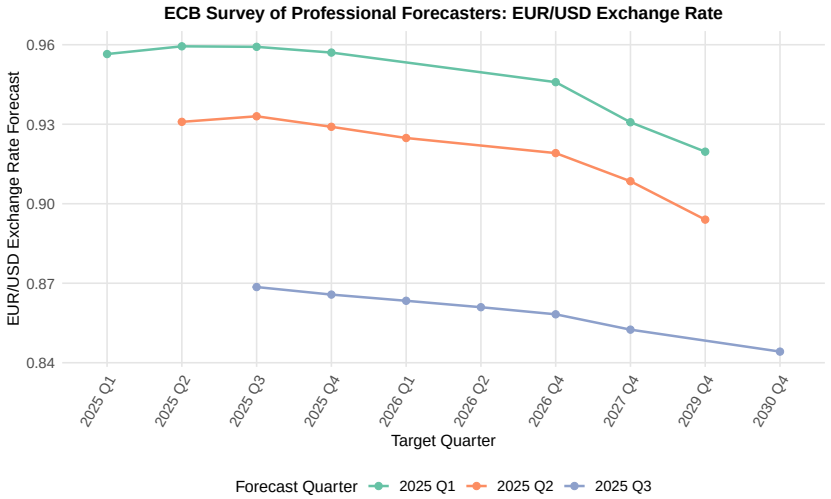


(a) DKK 3mo LIBOR, swapped, vs SOFR



(b) JPY overnight, swapped, vs SOFR

Shifting market expectations



Taking stock

1. Dollar depreciated after April 2 – not appreciated!
2. Flight away from Treasurys
3. The richness of dollar short-term safe assets relative to Euro safe assets has fallen over the last 5 years to near zero over the last 6 months.
4. Also fallen relative to other currency safe assets, but less so
5. Pricing from the term-structure of basis swaps (downward slope) indicates that the markets had anticipated some of this occurrence, although the realized fall in the convenience yield has been larger than the term-structure based expectation.

Model-based computation

Question: How much will U.S. interest rates and the dollar exchange rate change if the world moves to an equilibrium where U.S. safe assets are no longer demanded as international liquidity?

- Model where U.S. exports "liquidity services" to the rest of the world
- What happens if demand for those services go to zero?

Model

- Two country, US and ROW ($*$), endowment economy
- Foreign endowment with y_t^* of a foreign good. Chooses consumption to maximize,

$$c_t^* = \left[(\alpha^*)^{1-\eta^*} (c_{F,t}^*)^{\eta^*} + (1-\alpha^*)^{1-\eta^*} (c_{H,t}^*)^{\eta^*} \right]^{1/\eta^*}.$$

- Bond utility over the market value of 1-period dollar bond holdings:

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \delta^t u(C_t^*) \right], \quad \text{with} \quad C_t^* \equiv c_t^* + \frac{1}{1-\sigma} \omega_H^* \exp(x_t) (b_{H,t}^*)^{1-\sigma}, \quad b_{H,t}^* \geq 0$$

- The foreign household's flow budget constraint is,

$$\begin{aligned} \exp(x_t)(b_{H,t}^*) + b_{F,t}^* - \exp(r_{t-1} - x_t)(b_{H,t-1}^*) - \exp(r_{t-1}^*) b_{F,t-1}^* \\ = g_t^* + p_t^* y_t^* - p_t^* c_{H,t}^* - (1+\nu_t^*) \exp(x_t) p_t c_{F,t}^*. \end{aligned}$$

Tariff: ν_t^*, rebated by government as g_t^*

Model

- US (home) household with endowment of y_t of home good. Consumption:

$$c_t = \left[\alpha^{1-\eta} c_{H,t}^{\eta} + (1-\alpha)^{1-\eta} c_{F,t}^{\eta}\right]^{1/\eta}.$$

Utility from dollar 1-period bond holdings $b_{H,t} \geq 0$:

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \delta^t u\left(C_t\right)\right], \quad \text{with} \quad C_t \equiv c_t + \frac{1}{1-\sigma}\omega_H (b_{H,t})^{1-\sigma}, \quad b_{H,t} \geq 0$$

$$b_{H,t} + \exp(-x_t) b_{F,t} - \exp(r_{t-1})(b_{H,t-1}) - \exp(r_{t-1}^* - x_t) b_{F,t-1} = g_t + p_t y_t - p_t c_{H,t} - (1+\nu_t)\exp(-x_t) p_t^* c_{F,t}.$$

Government budget: net revenue from net bond issuance and tariff (ν_t) collection:

$$g_t = B_{H,t} - B_{H,t-1}\exp(r_{t-1}) + \nu_t p_t^* \exp(-x_t) c_{F,t}.$$

Equilibrium

Bond markets:

$$b_{H,t} + b^*_{H,t} = B_{H,t}$$
$$b_{F,t} + b^*_{F,t} = 0$$

Goods market:

$$c_{H,t} + c^*_{H,t} = y_t$$
$$c_{F,t} + c^*_{F,t} = y^*_t$$

Equilibrium and Steady State (1)

US household budget:

$$b_{H,t} + \exp(-x_t) b_{F,t} - \exp(r_{t-1})(b_{H,t-1}) - \exp(r^*_{t-1} - x_t) b_{F,t-1} = g_t + p_t y_t - p_t c_{H,t} - (1+\nu_t)\exp(-x_t) p^*_t c_{F,t}.$$

Government budget:

$$g_t = B_{H,t} - B_{H,t-1}\exp(r_{t-1}) + \nu_t p^*_t \exp(-x_t) c_{F,t},$$

Equilibrium and Steady State (2)

$$b_{H,t} + \exp(-x_t) b_{F,t} - \exp(r_{t-1})(b_{H,t-1}) - \exp(r^*_{t-1} - x_t) b_{F,t-1} - B_{H,t} + B_{H,t-1} \exp(r_{t-1}) = p_t y_t - p_t c_{H,t} - \exp(-x_t) p^*_t c_{F,t}.$$

Equilibrium and Steady State (2)

$$b_{H,t} + \exp(-x_t) b_{F,t} - \exp(r_{t-1})(b_{H,t-1}) - \exp(r^*_{t-1} - x_t) b_{F,t-1} - B_{H,t} + B_{H,t-1} \exp(r_{t-1}) = p_t y_t - p_t c_{H,t} - \exp(-x_t) p^*_t c_{F,t}.$$

$$-\overbrace{(B_{H,t} - b_{H,t})}^{b^*_{H,t}} + \exp(r_{t-1}) \overbrace{(B_{H,t-1} - b_{H,t-1})}^{b^*_{H,t-1}} - \exp(r^*_{t-1} - x_t) b_{F,t-1} + \exp(-x_t) b_{F,t} = p_t y_t - p_t c_{H,t} - \exp(-x_t) p^*_t c_{F,t}.$$

Equilibrium and Steady State (2)

$$b_{H,t} + \exp(-x_t) b_{F,t} - \exp(r_{t-1})(b_{H,t-1}) - \exp(r^*_{t-1} - x_t) b_{F,t-1} - B_{H,t} + B_{H,t-1} \exp(r_{t-1}) = p_t y_t - p_t c_{H,t} - \exp(-x_t) p^*_t c_{F,t}.$$

$$-\overbrace{(B_{H,t} - b_{H,t})}^{b^*_{H,t}} + \exp(r_{t-1}) \overbrace{(B_{H,t-1} - b_{H,t-1})}^{b^*_{H,t-1}} - \exp(r^*_{t-1} - x_t) b_{F,t-1} + \exp(-x_t) b_{F,t} = p_t y_t - p_t c_{H,t} - \exp(-x_t) p^*_t c_{F,t}.$$

Steady state:

$$\underbrace{b_F(\exp(r^*) - 1) - b^*_H(\exp(r) - 1) +}_{\text{home investment income}} = \underbrace{p c_H + \exp(-x) p^* c_F - p y}_{\text{home trade balance}}.$$

Steady State

$$\underbrace{b_F(\exp(r^*)-1) - b_H^*(\exp(r)-1)+}_{\text{home investment income}} = \underbrace{pc_H + \exp(-x)p^* c_F - py}_{\text{home trade balance}}.$$

The net foreign asset position for the foreign household is $NFA^* = b_H^* - b_F$:

$$\underbrace{NFA^* r^*}_{\text{interest on NFA to foreign}} + \underbrace{b_H^*(r^* - r)}_{\text{US seignorage income}} = \underbrace{pc_H + \exp(-x)p^* c_F - py}_{\text{trade balance}}.$$

Steady State

$$\underbrace{b_F(\exp(r^*)-1) - b_H^*(\exp(r)-1)+}_{\text{home investment income}} = \underbrace{pc_H + \exp(-x)p^*c_F - py}_{\text{home trade balance}}.$$

The net foreign asset position for the foreign household is $NFA^* = b_H^* - b_F$:

$$\underbrace{NFA^* r^*}_{\text{interest on NFA to foreign}} + \underbrace{b_H^*(r^* - r)}_{\text{US seignorage income}} = \underbrace{pc_H + \exp(-x)p^*c_F - py}_{\text{trade balance}}.$$

- Both US and Foreign demand dollar bonds $\Rightarrow r < r^*$, convenience yield.
- Foreign buys b_H^* dollar bonds
- US supplies those bonds via sales of government debt (total B_H)
  - The benefits of government borrowing at $r < r^*$ are effectively rebated to household via g_t and invested at r^*
  - *Not presented, but part of analysis: US households sell dollar claims on their endowment stream*
- Foreign household pays the convenience yield $r^* - r$ to US household on their holdings

Prices

Interest rates:

$$1 - \omega_H (b_H)^{-\sigma} = 1 - \omega_H^* (b_H^*)^{-\sigma} = \delta \exp(r)$$
$$1 = \delta \exp(r^*)$$

Exchange rate:

$$\frac{c_H}{c_F} = \frac{\alpha}{1-\alpha} \left(\frac{p}{p^* \exp(-x)(1+\nu)} \right)^{1/(\eta-1)}$$
$$\frac{c_F^*}{c_H^*} = \frac{\alpha^*}{1-\alpha^*} \left(\frac{p^*}{p \exp(x)(1+\nu^*)} \right)^{1/(\eta^*-1)}$$

Quantitative Exercise

Bonds: $(B_H + D_H, \sigma_H, \omega_H, \omega^*)$:

- Bond demand elasticity (σ) from Krishnamurthy-Vissing Jorgensen (2012).
- US data from Q42016 on foreign dollar safe asset holdings (Flow of Funds)
  - Treasury securities, agency securities, commercial paper, and net short-term bank liabilities
    - Total quantity = 150% of US GDP
  - Foreign holdings = 60% of US GDP (30% of total)
- Total quantity gives $B_H + D_H$
- Choose ω_H, ω_H^* to target share and 2% convenience yield.

Trade:

- US data from 2016 on imports/exports to pin down α. Multiply imports/exports by 0.5 to reflect intermediate goods share.
- Baseline: $\eta = \eta^* = 0.3$ from Itskhoki-Mukhin (2021)
- Asymmetric $\eta > \eta^*$ based on recent assessment of long-run trade elasticities.

Convenience Lost: $\omega_H^* = 0$, $\eta = \eta^* = 0.3$

	Baseline	Convenience Loss	Difference
Debt Held Abroad/GDP (%)	45.00	0.00	-45.00
Seigniorage/GDP (%)	0.90	0.00	-0.90
Trade Balance/GDP (%)	-0.90	0.00	0.90
Import/GDP (%)	5.37	5.11	-0.26
Export/GDP (%)	4.47	5.11	0.65
H Goods Consumed by H (%)	95.53	94.89	-0.65
F Goods Consumed by F (%)	94.16	94.89	0.73
Log Dollar FX (%)	7.62	0.00	-7.62
Conv Yield (%)	2.00	1.08	-0.92
Dollar Interest Rate (%)	0.53	1.45	0.92

Note: Baseline steady state is 2016; Convenience loss is a future date where $\omega_H = 0$.

Reciprocal Tariff of 50% and Loss of Convenience

	Baseline	Convenience Loss	Difference
Debt Held Abroad/GDP (%)	45.00	0.00	-45.00
Seigniorage/GDP (%)	0.90	0.00	-0.90
Trade Balance/GDP (%)	-0.90	-0.00	0.90
Import/GDP (%)	5.37	2.85	-2.52
Export/GDP (%)	4.47	2.85	-1.62
H Goods Consumed by H (%)	95.53	97.15	1.62
F Goods Consumed by F (%)	94.16	97.15	3.00
Log Dollar FX (%)	7.62	0.00	-7.62
Conv Yield (%)	2.00	1.11	-0.89
Dollar Interest Rate (%)	0.53	1.42	0.89

With asymmetric elasticity: $\eta = 0.80$, $\eta^* = 0.67$. Convenience Loss and 50% tariffs

	Baseline	Convenience Loss	Difference
Debt Held Abroad/GDP (%)	45.00	0.00	-45.00
Seigniorage/GDP (%)	0.90	0.00	-0.90
Trade Balance/GDP (%)	-0.90	0.00	0.90
Import/GDP (%)	5.37	1.05	-4.32
Export/GDP (%)	4.47	1.05	-3.41
H Goods Consumed by H (%)	95.53	98.95	3.41
F Goods Consumed by F (%)	94.50	98.82	4.32
Log Dollar FX (%)	2.23	10.82	8.59
Conv Yield (%)	2.00	1.09	-0.91
Dollar Interest Rate (%)	0.53	1.44	0.91

- $\eta > \eta^*$: U.S. import demand is more price-sensitive than foreign demand for U.S. goods.
- Tariffs and convenience loss means trade fall and has to balance to zero.
- Foreign less elastic so relative price tilt to make US goods more expensive for foreign (reducing exports).
- Tariffs, despite dollar appreciation, lead US to cut back on foreign goods (imports)

PV of lost seignorage

- Seignorage of 45% of GDP of dollar bonds $\times$ 2% convenience yield
- Loss of 0.90% of GDP.
- Asset values should reflect part of this in franchise values of safe asset issuers (banks) and value of collateral assets (housing)
- PV of future tax burden on US households falls

PV using finance

- Loss of 0.90% of GDP.
- Loss on a slice of GDP, a risky growing stream
- Current AQR discount rate model is 1.7% risk free plus equity risk premium of 1.6%, and growth of 1.8%
- Assume beta on GDP is 2/3 (Jiang et. al., 2024):

$$\frac{seigniorage}{r-g} = \frac{0.90\%}{0.97\%} = 93\%$$

or roughly $29 trillion.

Conclusion

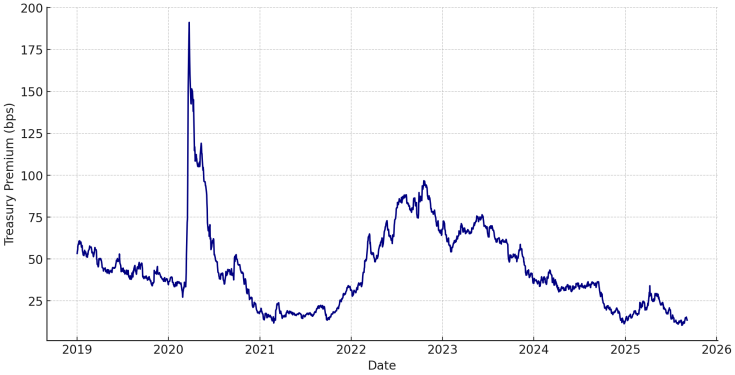
- April 2, and events leading up to it, reflect loss of dollar convenience/reserve demand and not direct impact of tariffs
- Exchange rate effects are present but modest in the calibrated exercise
- Interest rate and valuation effects are large

Conclusion

- April 2, and events leading up to it, reflect loss of dollar convenience/reserve demand and not direct impact of tariffs
- Exchange rate effects are present but modest in the calibrated exercise
- Interest rate and valuation effects are large
- Is the right way to think about the evolving equilibrium in terms of erosion of dollar dominance or increased probability of an equilibrium switch?

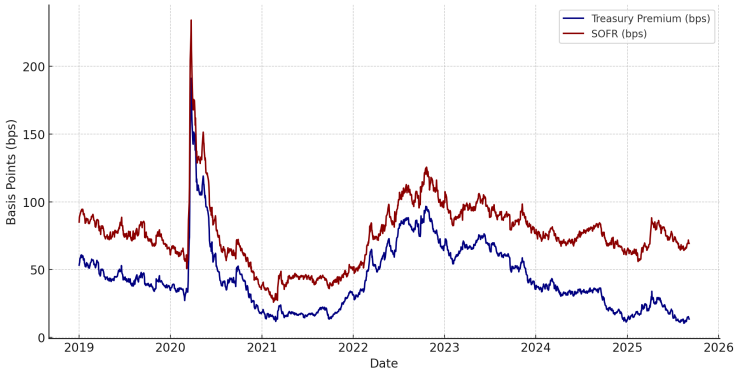
EXTRA SLIDES

10 Year Treasury CY



- spread = BBB Corporate + CDS Hedge $ − US 10 year Treasury

Short (SOFR) and long (10 Year) Basis



- SOFR spread = BBB Corporate + CDS Hedge \$ − SOFR swap rate

$$S_{t,30} = E_t \left[\frac{1}{30} \sum_{j=t}^{t+30} v_j^{(1)} \right]$$

Double US safe asset quantity

	Baseline	More Debt	Difference
Log Dollar FX (%)	7.62	4.47	-3.15
Conv Yield (%)	2.00	0.60	-1.40
Seigniorage/GDP (%)	0.90	0.54	-0.36
Debt Held Abroad/GDP (%)	45.00	90.00	45.00
Dollar Interest Rate (%)	0.53	1.94	1.40
Trade Balance/GDP (%)	-0.90	-0.54	0.36
Import/GDP (%)	5.37	5.26	-0.11
Export/GDP (%)	4.47	4.72	0.26
H Goods Consumed by H (%)	95.53	95.28	-0.26
F Goods Consumed by F (%)	94.16	94.47	0.31
NFA/GDP (%)	0.00	0.00	0.00

- Seignorage falls: B_H^* rises, conv yield falls, but product falls (...σ matters for this result)
- Dollar depreciates
- US interest rates rise substantially