What About Japan?

YiLi Chien Harold Cole Hanno Lustig

Japan's Sovereign Debt Puzzle

- The general government runs large deficits, mostly driven by a secular increase in social security spending as Japan's population ages.
- Average primary deficit of 5.1% of GDP (1998–2023); cumulative primary deficit of 133% of GDP.
- Central & local government gross liabilities rose from 93% to 233% of GDP (1997–2023); net liabilities from 66% to 158% of GDP.
- Highest debt/GDP ratio among advanced economies—without fiscal crisis. How? JP is not in $r < g$ region.

Takeaway: Japan faces rising age-related spending and persistent deficits despite being outside the $r < g$ debt-stabilizing region. How does Japan pull this off?

How does Japan fund these deficits?

- We consolidate the full Japanese public sector (central/local government, BoJ, and pension funds).
- **Carry trade:** the public sector earns about 2–3% of GDP (6% in past decade) on risky assets financed at below-market floating rates.
- **Duration mismatch:** liabilities are short, assets are long; falling real rates therefore expand fiscal space.
- **Currency mismatch:** liabilities are yen, assets are in foreign currencies; lower real rates (massive depreciation of JPY) therefore expand fiscal space.
- Net implication: large swings in fiscal capacity as rates move.

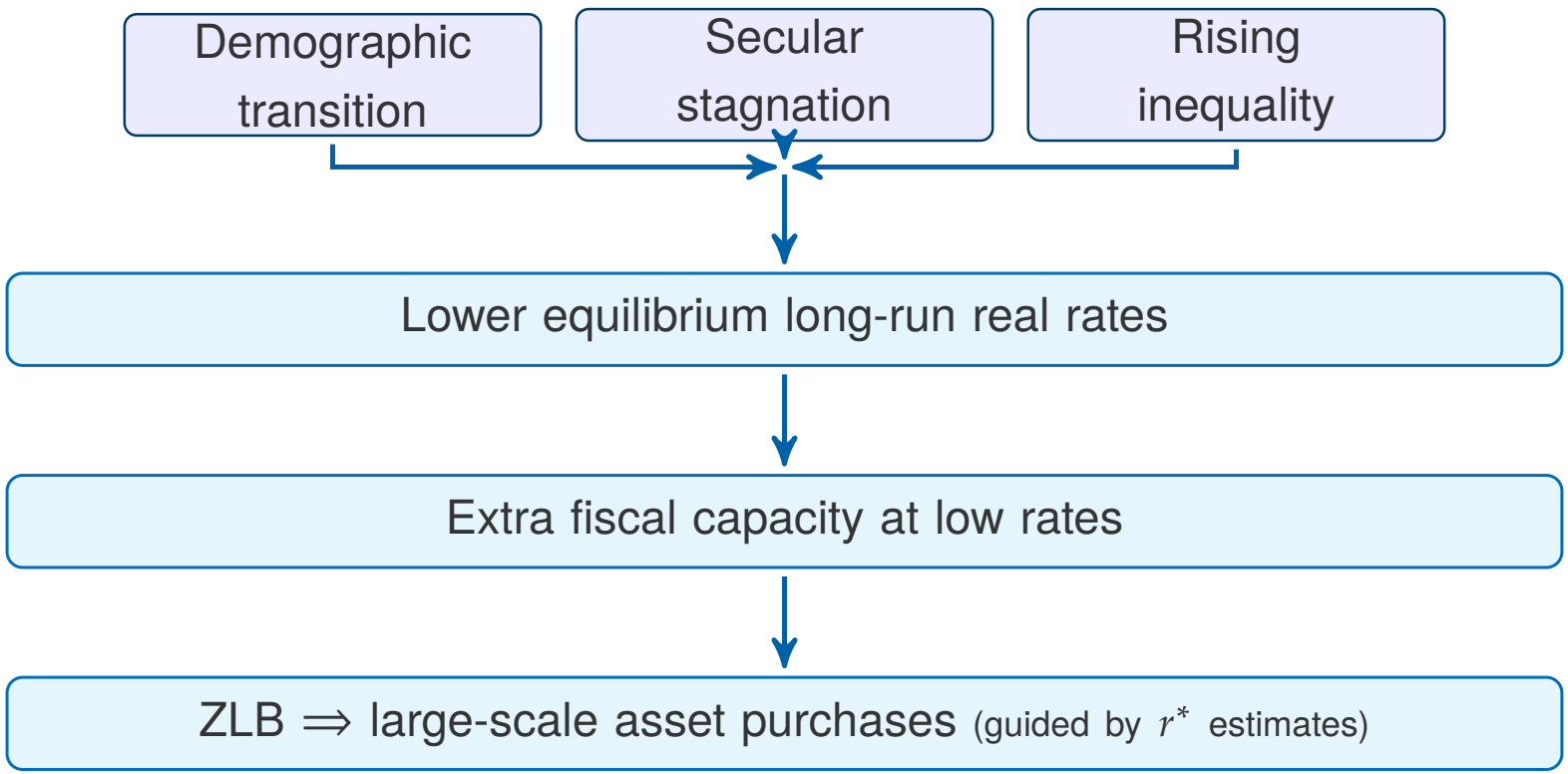
Takeaway: Japan's consolidated public sector runs a large-scale duration and risk transformation that harvests excess returns but increases rate sensitivity of fiscal capacity.

Who pays for all of this?

- Japanese households: Financial repression acts like an implicit tax on these households.
- Stand-in Japanese household holds 189% of GDP in deposits at end of 2023 (compared to 69% in the U.S).
- Household portfolios display a duration mismatch, especially for young, less financially sophisticated households saving in deposits (only 23% hold any securities).
  - Lower real rates reduce their consumption possibilities because implicit (consumption) liabilities are long duration while assets are short duration. (Greenwald et al., 2022)
  - This generates sizable welfare losses for young non-participants.

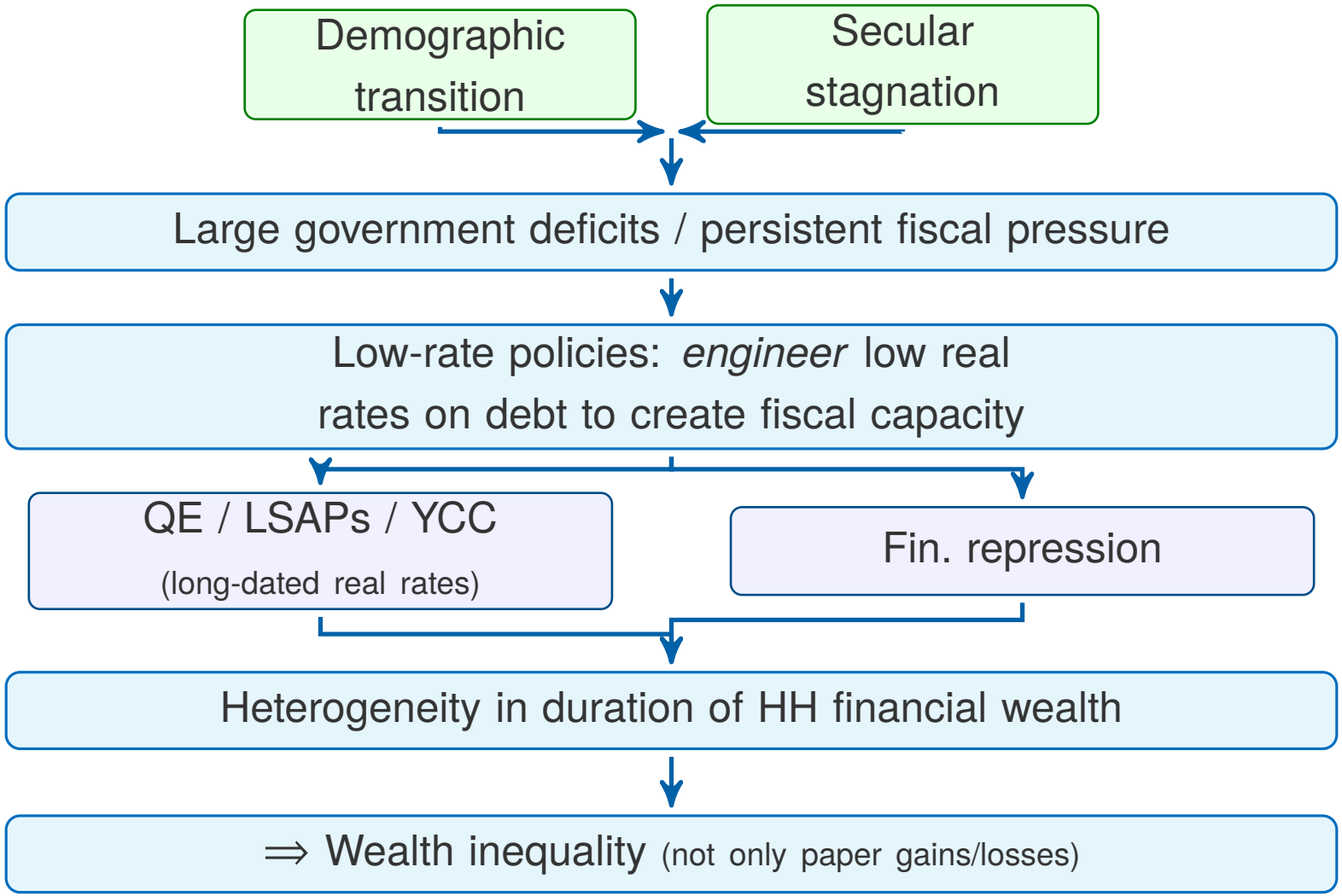
Takeaway: Rate policies that relax public financing constraints can simultaneously tighten intertemporal consumption constraints for younger households.

Traditional Macro View



Demographics (Auclert et al., 2021); secular stagnation (Eggertsson, Neil R Mehrotra, and Summers, 2016); inequality (Mian, Straub, and Sufi, 2020).
Fiscal capacity at low rates: (Blanchard, 2019; Neil R. Mehrotra and Sergeyev, 2021). r^* estimates: (Laubach and Williams, 2003; Laubach and Williams, 2016; Holston, Laubach, and Williams, 2017).

This Paper: Alternative (Complementary) View



QE and long-dated rates: (Bianchi, Lettau, and Ludvigson, 2022). Low yields on government debt: (Jiang et al., 2019; Di Tella et al., 2023).

Duration heterogeneity and wealth inequality: (Auclert, 2019; Greenwald et al., 2022).

Government Debt Dynamics

- By iterating *backwards* on the government budget constraint, we obtain the following expression for the debt/output ratio:

$$\frac{D_t}{Y_t} = \sum_{j=0}^{t} \left(\frac{G_{t-j} - T_{t-j}}{Y_{t-j}} \right) \frac{R^D_{t-j,t}}{X_{t-j,t}} + R^D_{0,t} \frac{D_{-1}}{Y_{-1}},$$

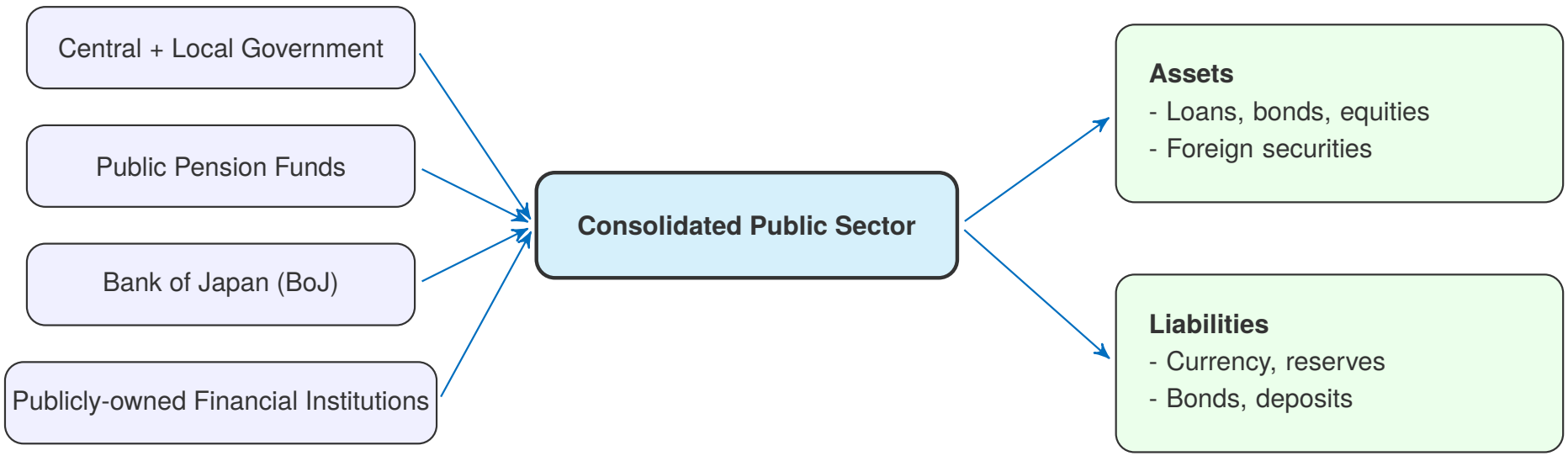
where $R^D_{t-j,t} = \prod_{k=1}^{j} R^D_{t-j+k}$ and $X_{t-j,t} = \prod_{k=1}^{j} X_{t-j+k}$. X_t denotes nominal GDP growth. R^D_t denotes the gross return on the entire portfolio of marketable debt D_t.

- **Steady state**:

$$\frac{D}{Y} = \frac{\frac{G-T}{Y}}{\frac{x-r^D}{1+x}}.$$

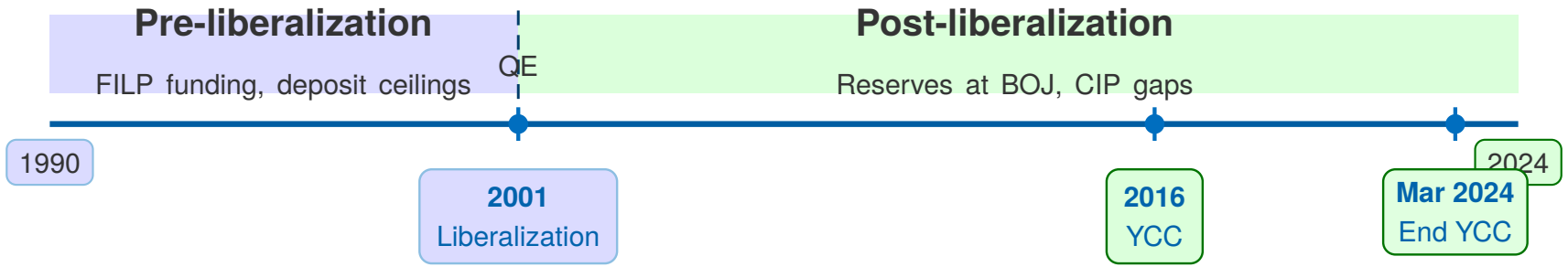
- When $r^D < x$, the government run steady-state deficits ($G > T$) with a constant debt/GDP ratio. (see, e.g., Blanchard, 2019; Neil R. Mehrotra and Sergeyev, 2021).
- Japan not in the Blanchard goldilocks region: r^D is 1.66% while x is 0.39%.

Consolidating the Public Sector



Takeaway: We measure debt dynamics at the consolidated public-sector level, not for central government in isolation.

Cheap funding for public sector



- Prior to 2001: Cheap funding for government.
  - HH trapped in deposits:
    - Interest rate ceilings on deposits.
    - HH deposits at Japan Post and pension fund reserves required to fund FILP.

- Post-2001 liberalization: Alternative sources of cheap funding.
  - Replacing FILP deposits with bank reserves at BoJ: BoJ starts large scale asset purchases (2001). BoJ starts YCC (2016).
  - Domestic market segmented by large CIP deviations.

Consolidated Public Sector Balance Sheet

December 1997			
Assets		**Liabilities**	
Deposits	5.9%	Currency	10.8%
Loans	102.8%	Bank Reserves	0.6%
Domestic Equities	10.7%	Bonds & T-Bills	41.8%
Foreign Securities	7.5%	Loans	55.1%
Other Assets	8.4%	Deposits FILP	46.4%
		Other Liabilities	5.2%
December 2023			
Deposits	18.0%	Currency	21.7%
Loans	60.8%	Bank Reserves	91.1%
Domestic Equities	38.7%	Bonds & T-Bills	107.7%
Foreign Securities	56.6%	Loans	36.0%
Other Assets	7.2%	Deposits FILP	1.6%
		Other Liabilities	10.1%

Consolidated public sector balance sheet (% of GDP). Central + local gov't + BoJ + pension funds + publicly owned banks.

Public Sector Harvesting $rx > 0$

- Start from static budget constraint for consolidated gov't.

$$G_t - T_t + D_{t-1}R_t^D - A_{t-1}R_t^A = D_t - A_t \equiv ND_t$$

where R_t^A denotes the gross return on the portfolio of assets, A_{t-1}.

- The net debt/output ratio dynamics:

$$\frac{\tilde{D}_t}{Y_t} = \sum_{j=0}^{t} \left(\frac{G_{t-j} - T_{t-j}}{Y_{t-j}} \right) \frac{R_{t-j,t}^D}{X_{t-j,t}} - \frac{R_{0,t}^A - R_{0,t}^D}{X_{0,t}} \frac{A_{-1}}{Y_{-1}} + R_{0,t}^D \frac{\tilde{D}_{-1}}{Y_{-1}}.$$

- **Steady state**. Even if $r^D > x$, the government can run steady-state deficits ($G > T$) with a constant $\tilde{D}/Y$ provided that $rx\frac{A}{Y} = (r^A - r^D)\frac{A}{Y}$ is large enough:

$$\frac{\tilde{D}}{Y} = \frac{\frac{T-G}{Y}}{\frac{r^D - x}{1+x}} + \frac{\frac{rx}{1+x}\frac{A}{Y}}{\frac{r^D - x}{1+x}}.$$

Returns on Consolidated Balance Sheet

- Japanese Gov't earns an additional 2.28% of GDP on its risky asset position.
  - Japanese Gov't earns rx of 1.90% per annum above its cost of funding.
  - The spreads really started to increase after 2013.
- Asset side: Larger allocations to risky asset classes.
- Liability side: Shift to funding at floating rates.

	r^D	r^A	$r^A - r^D$	$(r^A A - r^D D)$
1998-2023	0.69%	2.59%	1.90%	2.28%
1998-2012	0.92%	0.89%	−0.04%	−0.63%
2013–2023	0.38%	5.04%	4.66%	6.25%
Counterfactual: No QE (yields up 200 bps) + full currency hedging				
1998-2023	1.34%	1.89%	0.55%	−0.55%
1998-2012	1.03%	1.07%	0.04%	−0.67%
2013-2023	1.77%	3.05%	1.28%	−0.38%
				as % of GDP.

Takeaway: Without repression, Japan's consolidated public sector would be *losing* money on its balance sheet.

Consolidated Public Sector Balance Sheet

	% of GDP, Year End	1997	2012	2023	97 to 23 Diff
Assets	Deposits	5.9%	8.5%	18.0%	12.1%
	Loans	102.8%	63.1%	60.8%	-42.1%
	Domestic Equities	10.7%	20.9%	38.7%	28.0%
	Foreign Securities	7.5%	29.7%	56.6%	49.1%
	Other Assets	8.4%	7.9%	7.2%	-1.1%
	Sum	**135.2%**	**130.1%**	**181.3%**	46.1%
Liabilities	Currency	10.8%	18.3%	21.7%	10.9%
	Bank Reserves	0.6%	9.5%	91.1%	90.4%
	Bonds & T-Bills	41.8%	162.3%	107.7%	65.9%
	Loans	55.1%	48.5%	36.0%	-19.1%
	Deposits FILP	46.4%	1.1%	1.6%	-44.9%
	BoJ External Debt	0.0%	0.1%	7.5%	7.5%
	Other Liabilities	5.2%	8.7%	10.1%	4.9%
	Sum	**159.9%**	**248.5%**	**275.6%**	115.7%
→	**Net Liabilities**	**24.7%**	**118.4%**	**94.3%**	69.6%

Who's paying for all this?

- Can you run a SWF (e.g., like Norway) with borrowed money? While keeping debt risk-free? Not if debt is priced correctly.

Assets	Liabilities
A Market value of risky assets	D Market value of debt
S PV of primary surpluses	

$$\mathbb{E}_t\left[R^D_{t+1} - R^f_t\right] = (1 - \tfrac{A_t}{D_t})\mathbb{E}_t\left[R^S_{t+1} - R^f_t\right] + \tfrac{A_t}{D_t}\mathbb{E}_t\left[R^A_{t+1} - R^f_t\right].$$

- Yields are too low –182 bps.
- Savers are taking on extra risk without being compensated for it.

Duration Mismatch in Public Sector

- Iterate forward on the government's budget constraint to obtain debt valuation expression:

$$\text{Debt} = \mathbb{E}_0 \sum_{t=0}^{\infty} R^{-t}(T_t - G_t).$$

- Gauge the effect of real rate declines on the government's spending possibilities:

(a) If $D^{Debt} < D^{T-G}$ then spending possibilities expand when the interest rate falls. ✓

(b) If $D^{Debt} > D^{T-G}$ then spending possibilities contract.

- Japan is in case (a): Negative $D^{NetDebt}$ of 22 yrs because $D^{A} \gg D^{D}$, and D^{T-G} of 55 yrs.

$$\text{Debt} \searrow \ll \mathbb{E}_0 \sum_{t=0}^{\infty} R'^{,-t}(T_t - G_t) \nearrow$$

- Rate decrease generates lots of extra fiscal capacity.

Japanese HH Balance Sheet: Trapped in Deposits.

December 1997			
Assets		**Liabilities**	
Currency and Deposits	127.6%	Loans	64.8%
Debt Securities	11.7%	Other Liabilities	10.5%
Equities	20.4%		
Insurance & Pension	63.1%		
Other Assets	12.8%		
December 2023			
Currency and Deposits	188.9%	Loans	61.9%
Debt Securities	4.8%	Other Liabilities	2.4%
Equities	63.4%		
Insurance & Pension	90.2%		
Other Assets	11.9%		

Japan household sector (% of GDP).

Takeaway: Japanese HH hold 189% of GDP in deposits, compared to 69% in the U.S. Deposits are short-duration assets funding long-duration consumption needs.

Duration Mismatch in Household Sector

- Iterate forward on the HH budget constraint to obtain expression for financial wealth:

$$\theta_0 = \mathbb{E}_0 \sum_{t=0}^{\infty} R^{-t}(C_t - Y_t).$$

- HH consumption possibilities (Greenwald et al., 2022):

(a) If $D^{\theta} > D^{c-y}$ then consumption possibilities expand when the rate fall. (old)
(b) If $D^{\theta} < D^{c-y}$ then consumption possibilities contract. (young)

- In case (b), when rates fall:

$$\theta_0 \nearrow \ll \mathbb{E}_0 \sum_{t=0}^{\infty} R'^{,-t}(C_t - Y_t) \nearrow \nearrow .$$

  - Lower real rates $\longrightarrow$ young Japanese households (deposit savers) are worse off.
  - Lower real rates $\longrightarrow$ older fin. sophisticated households with bonds/equities are better off.

Conclusion

- Consolidate Japanese government's balance sheet.
- Japanese government engaged in risky maturity transformation (with financial repression).

- Japanese government has engineered large maturity mismatch between surpluses and debt.
  - Duration mismatch on government balance sheet: fiscal capacity boost from lower real rates.

- Japanese households have large maturity mismatch between spending needs and assets.
  - Duration and currency mismatch on HH balance sheet: large welfare losses (gains) for young non-participants (older participants).

- As the BoJ normalizes rates, the carry trade unwinds—fiscal pressure increases again, but household savers benefit.

References I

- Auclert, Adrien (June 2019). “Monetary Policy and the Redistribution Channel”. In: American Economic Review 109.6, pp. 2333–67. DOI: 10.1257/aer.20160137. URL: https://www.aeaweb.org/articles?id=10.1257/aer.20160137.
- Auclert, Adrien et al. (2021). Demographics, wealth, and global imbalances in the twenty-first century. Tech. rep. National Bureau of Economic Research.
- Bianchi, Francesco, Martin Lettau, and Sydney C Ludvigson (2022). “Monetary policy and asset valuation”. In: The Journal of Finance 77.2, pp. 967–1017.
- Blanchard, Olivier (2019). “Public debt and low interest rates”. In: American Economic Review 109.4, pp. 1197–1229.

References II

- Di Tella, Sebastian et al. (2023). The Zero Beta Rate. Tech. rep. Working paper, Stanford Graduate School of Business.
- Eggertsson, Gauti B, Neil R Mehrotra, and Lawrence H Summers (May 2016). "Secular stagnation in the open economy". en. In: Am. Econ. Rev. 106.5, pp. 503–507.
- Greenwald, Daniel et al. (July 2022). "Financial and Total Wealth Inequality with Declining Interest Rates".
- Holston, Kathryn, Thomas Laubach, and John C Williams (May 2017). "Measuring the natural rate of interest: International trends and determinants". In: J. Int. Econ. 108, S59–S75.
- Jiang, Zhengyang et al. (Dec. 2019). "The U.S. Public Debt Valuation Puzzle". SSRN Working Paper No. 3333517.

References III

- Laubach, Thomas and John C Williams (Nov. 2003). “Measuring the Natural Rate of Interest”. In: Rev. Econ. Stat. 85.4, pp. 1063–1070.
- — (Apr. 2016). “Measuring the Natural Rate of Interest Redux”. In: Bus. Econ. 51.2, pp. 57–67.
- Mehrotra, Neil R. and Dmitriy Sergeyev (2021). “Debt sustainability in a low interest rate world”. In: Journal of Monetary Economics 124. ISSN: 0304-3932. DOI: https://doi.org/10.1016/j.jmoneco.2021.09.001. URL: https://www.sciencedirect.com/science/article/pii/S0304393221000945.
- Mian, Atif R, Ludwig Straub, and Amir Sufi (Apr. 2020). “Indebted Demand”.