What About Japan?

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Roadmap

Why Japan?

- Advanced economies experiencing demographic transition.
- Governments projected to run large deficits and run up debt/output ratio as a result.

- Japan at leading edge of transition.
- Eurozone and China following.

Traditional Macro View

- Advanced economies experiencing
  1. Demographic transition (see, e.g., Auclert et al., 2021) and
  2. Secular stagnation (see, e.g., Eggertsson et al., 2016).
  3. Increase in inequality (Mian et al., 2020)
- Forces lead to lower equilibrium long-run real rates (neutral w.r.t. monetary and fiscal policy).
- Creates extra fiscal capacity (Blanchard, 2019; Mehrotra and Sergeyev, 2021)
- Economies bump into ZLB and CBs deploy large-scale asset purchases to lower long-term nominal rates.
  - Guided by r^* estimates. (Laubach and Williams, 2003, 2016; Holston et al., 2017)

This Paper: Alternative (Complementary) View

- Advanced economies experiencing:
  1. Demographic transition
  2. Secular stagnation
- Forces lead to large governments deficits.

- Financial repression: Governments resort to measures to lower real rate on government debt *in order to create extra fiscal capacity*.
  - CBs deploy large-scale asset purchases just to lower long-dated real rates (Bianchi et al., 2022).
  - Government debt appears expensive (Jiang et al., 2019; Di Tella et al., 2023).
- Heterogeneity in duration of HH fin. wealth $\Longrightarrow$ increased wealth inequality (Auclert, 2019; Greenwald et al., 2022)
  - Not just paper gains and losses.

Duration Mismatch on Japanese Gov't Balance Sheet

- Consolidate the Japanese government's balance sheet (including BoJ).
- Carry trade: Government to earn an additional 3.4% of GDP from its risky investments.
  - Risky maturity transformation on a large scale by borrowing at floating rates and investing in long-duration assets.

- **Duration mismatch** on JP's consolidated government balance sheet.
  - A decrease in real rates increases government's spending possibility set, because
    1. Net debt position has negative duration,
    2. But its future surpluses have long duration.

- Lots of extra fiscal capacity created (destroyed) when rates decline (increase).

Duration Mismatch on Japanese HH Balance Sheet

- **Duration mismatch** on JP stand-in HH balance sheet.
- Mismatch especially pronounced for young JP households who hold mainly deposits.
  - A decrease in real rates shrinks consumption possibility set, because
    1. The young's financial wealth has little duration,
    2. But the young need to finance future consumption out of savings (excess consumption has high duration). (Greenwald et al., 2022)
- Large welfare losses for young non-participants.
- Financial Repression is a tax on young non-participants.

Roadmap

Intro: Why Japan?

Looking Backwards: Debt Dynamics

Quantifying Financial Repression

Gov't Duration Mismatch and Fiscal Capacity

HH Duration Mismatch and Welfare Losses

Conclusion

Debt Dynamics Accounting

- Let G_t denote nominal government spending before interest, T_t denote nominal government tax revenue.
- Start from the static government budget constraint,

$$G_t - T_t + D_{t-1}R_t = D_t,$$

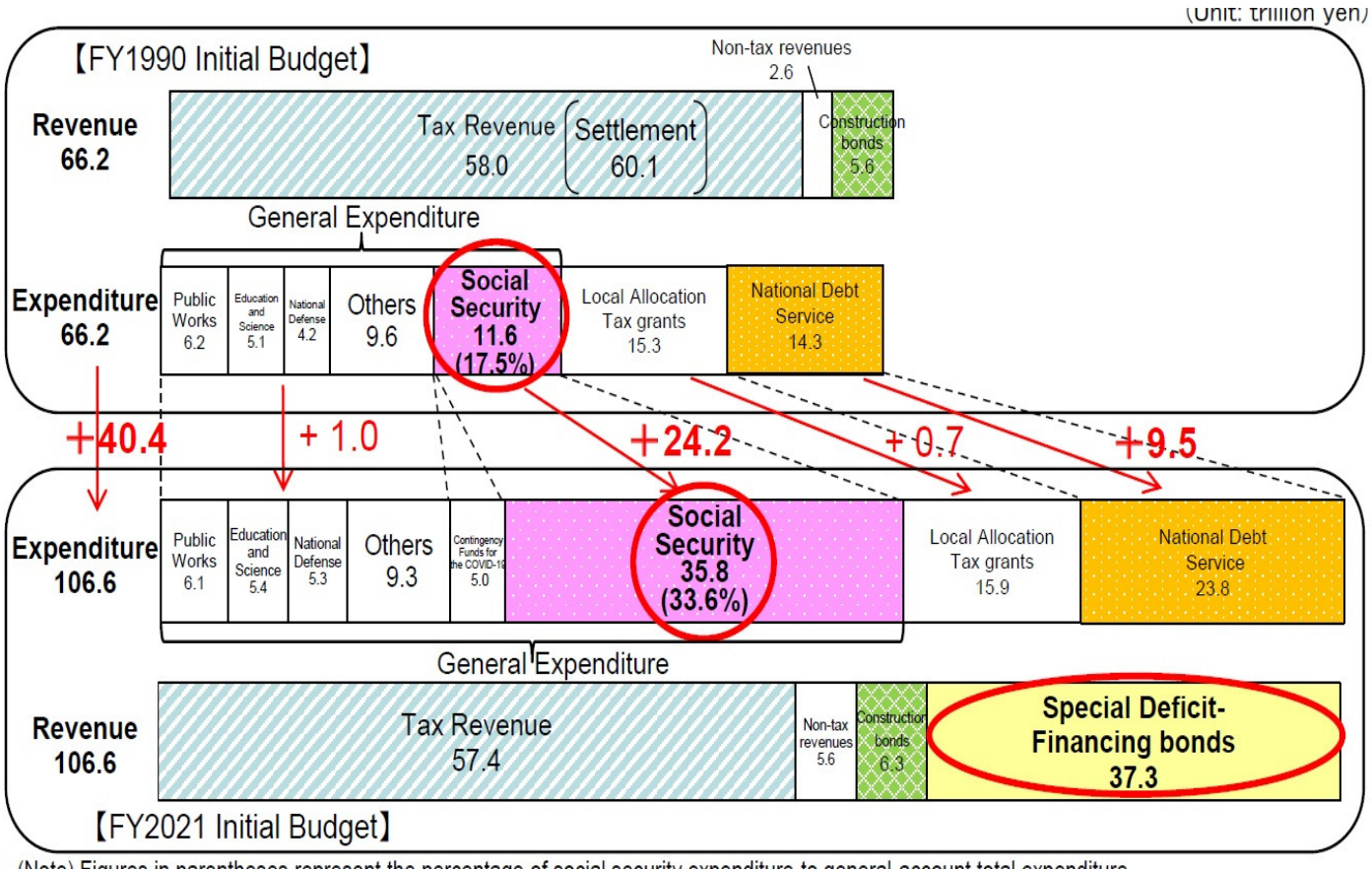
where R_t denotes the gross return on the entire portfolio of marketable debt D_t.

- By iterating *backwards*, we obtain the following expression for the debt/output ratio.

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

where $R_{t-j,t} = \prod_{k=1}^{j} R_{t-j+k}$ and $X_{t-j\to t} = \prod_{k=1}^{j} X_{t-j+k}$.

Central Government Budget



- In the past three decades, Japan's social security payments have increased from 17 to 35% of government expenditures.
- Japan running large deficits as a result

Debt Dynamics

- Consider a deterministic environment.

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

- When $r < x$, the government can roll over its debt in perpetuity and run steady-state deficits ($G > T$) with a constant debt/GDP ratio. (see, e.g., Blanchard, 2019; Mehrotra and Sergeyev, 2021).

- Japan not in the Blanchard goldilocks region.

	x	π	r	$r - x$
1997-2023	-0.03%	0.36%	1.30%	1.27%

BofA Ice Japan Government Bond Index Fund (excluding T-bills).

r minus x

Consolidated Government and BoJ Balance Sheet

- Consolidated Balance Sheet

  1. Central Government,
  2. Local Government,
  3. Pension Funds,
  4. Government-owned Financial Institutions and BoJ.

BOJ Balance Sheet

- BOJ launched QE in 2001
- BOJ adopted YCC in 2016

% of GDP, Year End	1997	2023
Assets		
Currency and Deposits	0.0%	0.5%
Domestic Loans	4.2%	17.1%
Bonds & T-Bills	**9.6%**	**99.3%**
Liabilities		
Currency	10.8%	21.6%
Bank Reserves	**0.6%**	**90.9%**
Government Deposits	0.1%	2.8%

Consolidated Balance Sheet (BoJ + Gen Gov't + PFIs)

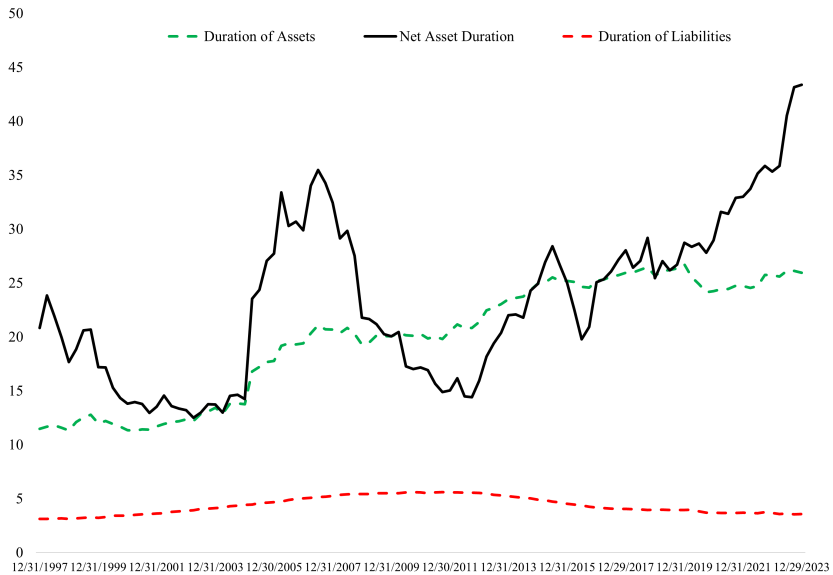
- Gov't replaced FILF deposits with Bank Reserves.

% of GDP, Year End	1997	2023	Difference
Assets			
Currency and Deposits	6.0%	20.8%	14.8%
Domestic Loans	**102.8%**	**60.7%**	**-42.1%**
Other Domestic Securities	11.2%	14.4%	3.2%
Domestic Equities	**13.9%**	**37.5%**	**23.7%**
Foreign Securities	**6.8%**	**56.1%**	**49.3%**
Sum	**140.6%**	**189.5%**	**48.9%**
Liabilities			
Currency and Deposits	10.9%	24.5%	13.6%
Bank Reserves	**0.6%**	**90.9%**	**90.3%**
Bonds & T-Bills	**50.4%**	**123.4%**	**73.0%**
Loans	52.1%	35.2%	−16.9%
Deposits FILF	**75.4%**	**5.8%**	**-69.6%**
Sum	**189.5%**	**279.8%**	**90.4%**
Net Liabilities	**48.9%**	**90.4%**	**41.5%**

Negative Duration of Net Debt

- Net debt $\tilde{D}$ of about 90% of GDP.
- Negative duration of 43 years for its net debt $\tilde{D}$.
  1. The duration of its A is around 26 years.
  2. The duration of its D is only 3.6 years.

Figure: Duration of Japanese Government's Balance Sheet



The duration of equity is 75.66 years. The duration of bonds is 7.19 years. The duration of loans is 3 years. The duration of deposits (cash and bank reserves) is 1 year (0 years).

Net Debt Dynamics Accounting

- Start from static budget constraint for consolidated government.
- The net debt/output ratio can be stated:

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

where $\tilde{R}_{0,t} = \prod_{k=1}^{t} \tilde{R}_{t-j+k}$.

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

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

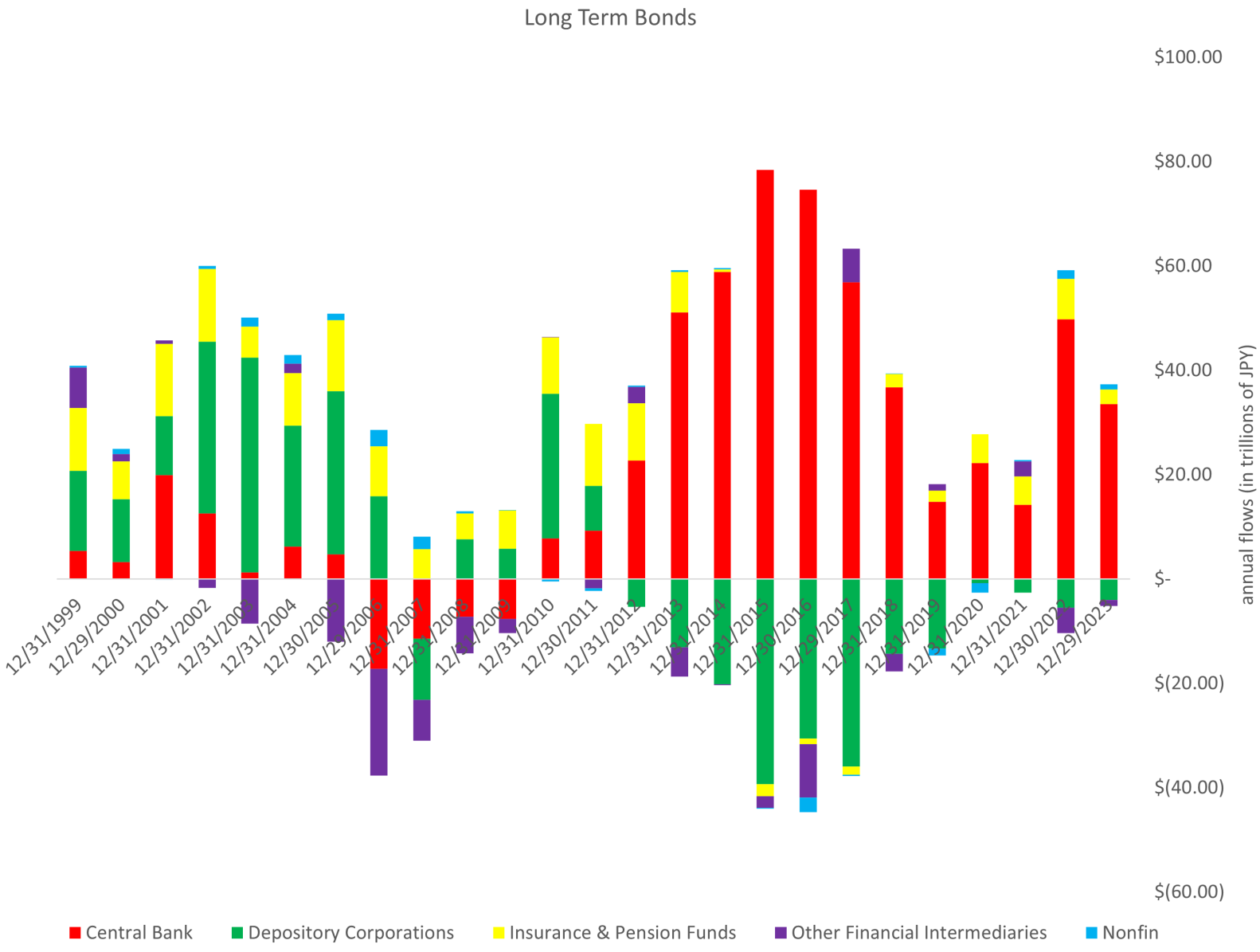
Carry Trade Returns

- Japanese Gov't earns an additional 3.4% of GDP on its risky asset position.
  - Japanese Gov't earns rx of 2.46% per annum above the cost of its funding position.
  - The spreads really started to increase after the GFC.

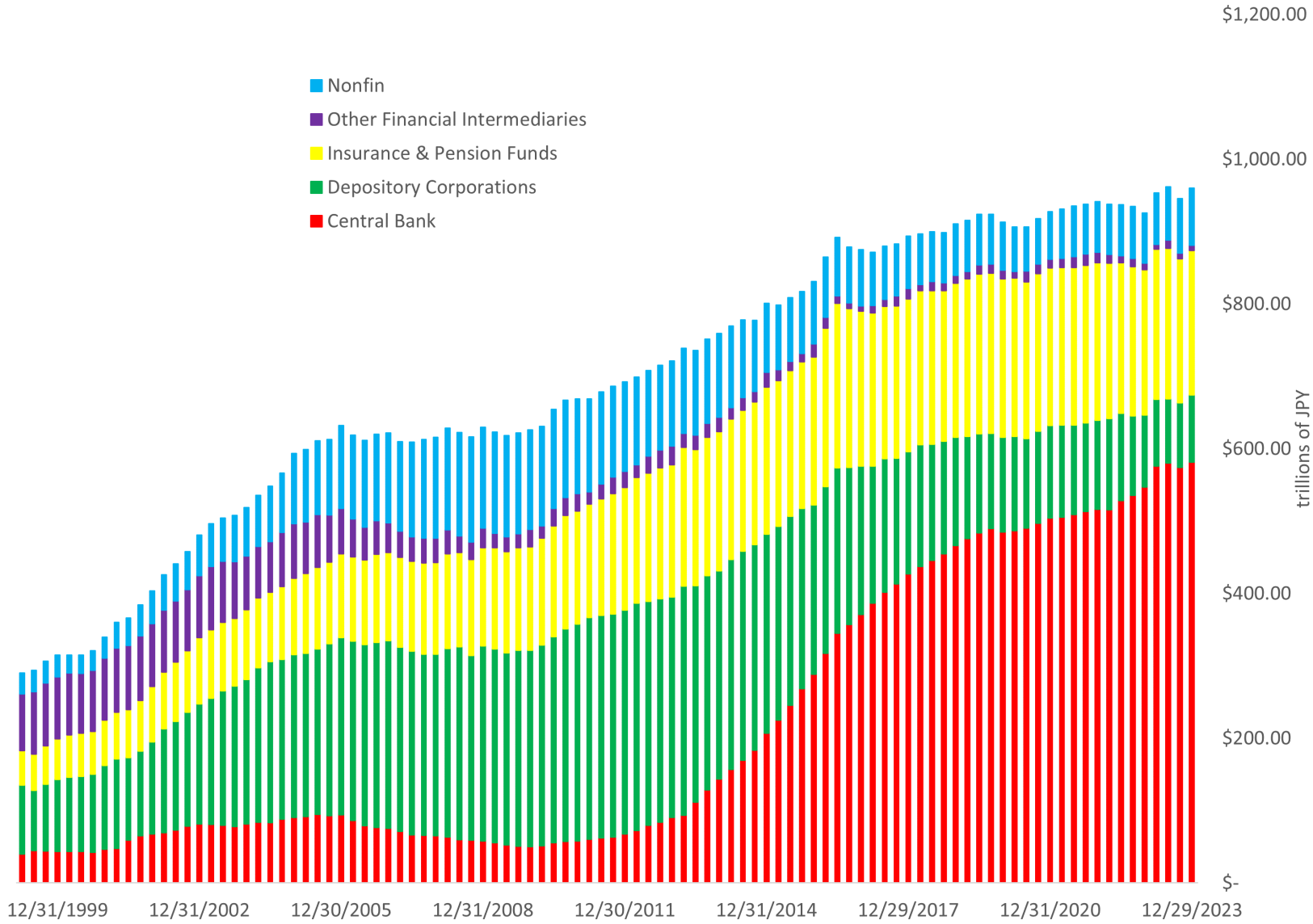
	Returns			Profits
Periods	Liabilities	Assets	Difference	% of GDP
1997-2023	**0.72**%	**3.18**%	**2.46**%	**3.41**%
2000-2009	0.88%	1.37%	0.49%	0.23%
2010-2019	1.08%	4.84%	3.76%	4.72%
2020-2023	−0.65%	3.36%	4.00%	8.02%

International Returns

Japanese Government Bond Purchases.



Japanese Government Bond Holdings.



Roadmap

Balance Sheet of Consolidated Government

- **No Arbitrage:** EER on the government debt portfolio's:

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

- The implied spread on A minus D:

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

- Claim to S needs to be much safer than D.

$$\mathbb{E}\left[R^A_{t+1} - R^S_t\right] = \mathbb{E}\left[R^A_{t+1} - R^D_t\right] \times \frac{1}{1 - 0.68} = \frac{2.46\%}{0.32} = 7.68\%.$$

  - Realized ER on risky assets $\mathbb{E}\left[R^A_{t+1}\right]$ is 3.18%
  - Implied ER on the surplus claim $\mathbb{E}\left[R^S_t\right]$ is -4.5% .
    - S needs $\beta < 0$, i.e. counter-cyclical. But surpluses are strongly pro-cyclical.

Measuring the FR Wedge

- Government debt is overpriced :

$$\mathbb{E}_t \left[M_{t+1} R^D_{t+1} \right] < 1.$$

- **Simple case**: T and G are constant fractions of Y:

$$\beta^D_t = (1 - \frac{A_t}{D_t})\beta^Y_t + \frac{A_t}{D_t}\beta^A_t.$$

  - In 2023, the unlevered beta of equity β^Y_t in Japan is 0.45.
  - The ratio of risky assets to debt $\frac{A_t}{D_t}$ is 0.68.

- The FR wedge between realized and implied ER:

$$\alpha_t = E_t \left[R^D_{t+1} - R^f_t \right] - \left((1 - \frac{A_t}{D_t})\beta^Y_t + \frac{A_t}{D_t}\beta^A_t \right) \frac{var_t \left(M_{t+1}, R^i_{t+1} \right)}{\mathbb{E}_t (M_{t+1})}.$$

α_t denotes the Euler equation wedge: 223 bps.

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Government IBC

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

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

- Gauge the effect of real rate declines on the government's spending possibilities:
  (a) If $D^{NetDebt} < D^{T-G}$ then the government's spending possibilities expand when the interest rate falls,
  (b) if $D^{NetDebt} > D^{T-G}$ the government's spending possibilities contract.
- Negative $D^{NetDebt}$ of 43 yrs because $D^{A} >> D^{D}$ and D^{T-G} of 53 yrs.

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

- Rate decrease generates lots of extra fiscal capacity:

Roadmap

Household IBC

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

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

- Gauge the effect of real rate declines on the household's consumption possibilities (Greenwald et al., 2022):
  (a) If $D^{\theta} > D^{c-y}$ then the HH's consumption possibilities expand when the interest rate falls,
  (b) if $D^{\theta} < D^{c-y}$ the HH's consumption possibilities contract.
- in case (b), when rates fall:

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

  - Lower Real Rates $\rightarrow$ Young Japanese households, especially those saving in deposits, are worse off.
  - Lower Real Rates $\rightarrow$ Older Japanese households, especially those with savings in bonds, equities are better off.

Japanese HH Balance Sheet: Trapped in Deposits.

	Japan		U.S.	
% of GDP, Year End	1997	2023	1997	2023
Assets				
Currency and Deposits	128%	189%	42%	61%
Other Securities	16%	5%	30%	22%
Equities	16%	46%	125%	199%
Insurance & Pension	63%	90%	110%	118%
Liabilities				
Loans	65%	62%	62%	69%

The Welfare Impact of a 1% decline in Interest Rate

- Define a money-metric measure of the welfare effect:

$$\frac{dV}{U_{c_0}} = \mathbb{E}_0 \sum \beta^t \frac{U_{c_t}}{U_{c_0}} dc_t.$$

- The welfare gain: (Greenwald et al., 2022; Fagereng et al., 2022):

$$Welfare\ gain_j(\theta, z) \approx \left(D^{c-y} - D^{\theta}\right) \theta_0 \times d \log R.$$

- Assumption: Euler equation holds.
- We compute D^{c-y} for X-section of Japanese households.
- Large Welfare losses for young non-participants.

Roadmap

Conclusion

- Japan is engaged in massive financial repression.

- Japanese government engaged in risky maturity transformation.
- Japanese government has engineered large maturity mismatch between surpluses and debt.

- Duration mismatch on government balance sheet: fiscal capacity boost from lower real rates
- Duration mismatch on HH balance sheet: large welfare losses (gains) for young non-participants (older participants)

Financial Repression

- Financial repression

  occurs when governments implement policies to channel to themselves funds that in a deregulated market environment would go elsewhere.

  (Reinhart et al., 2011)

  - Directed lending by national pension funds, banks, central banks etc.
  - Caps on interest rates.
  - Government ownership of banks.
  - Macroprudential regulation.
  - Commonly used to finance wars, even in U.S (WW-I, WW-II, pandemic) .
    - See Hall and Sargent (2022) for a comparison of the pandemic and two World Wars.
    - See Sargent et al. (2019) for detailed discussions of the U.K., U.S. French and Italian experiences during the interbellum.

Japanese Financial Repression

- Prior to 2001: Cheap funding for government.
  - Participation by HH in capital markets was expensive (Hoshi and Kashyap, 1999).
  - HH Trapped in deposits:
    - Interest rate ceilings on deposits.
    - HH Deposits at Japan Post and pension fund reserves required to fund FILF (Fiscal Investment and Loan Program).

- Post-2001 liberalization: Alternative sources of cheap funding.
  - HH participation rates still low.
  - Replacing FILF 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 Government

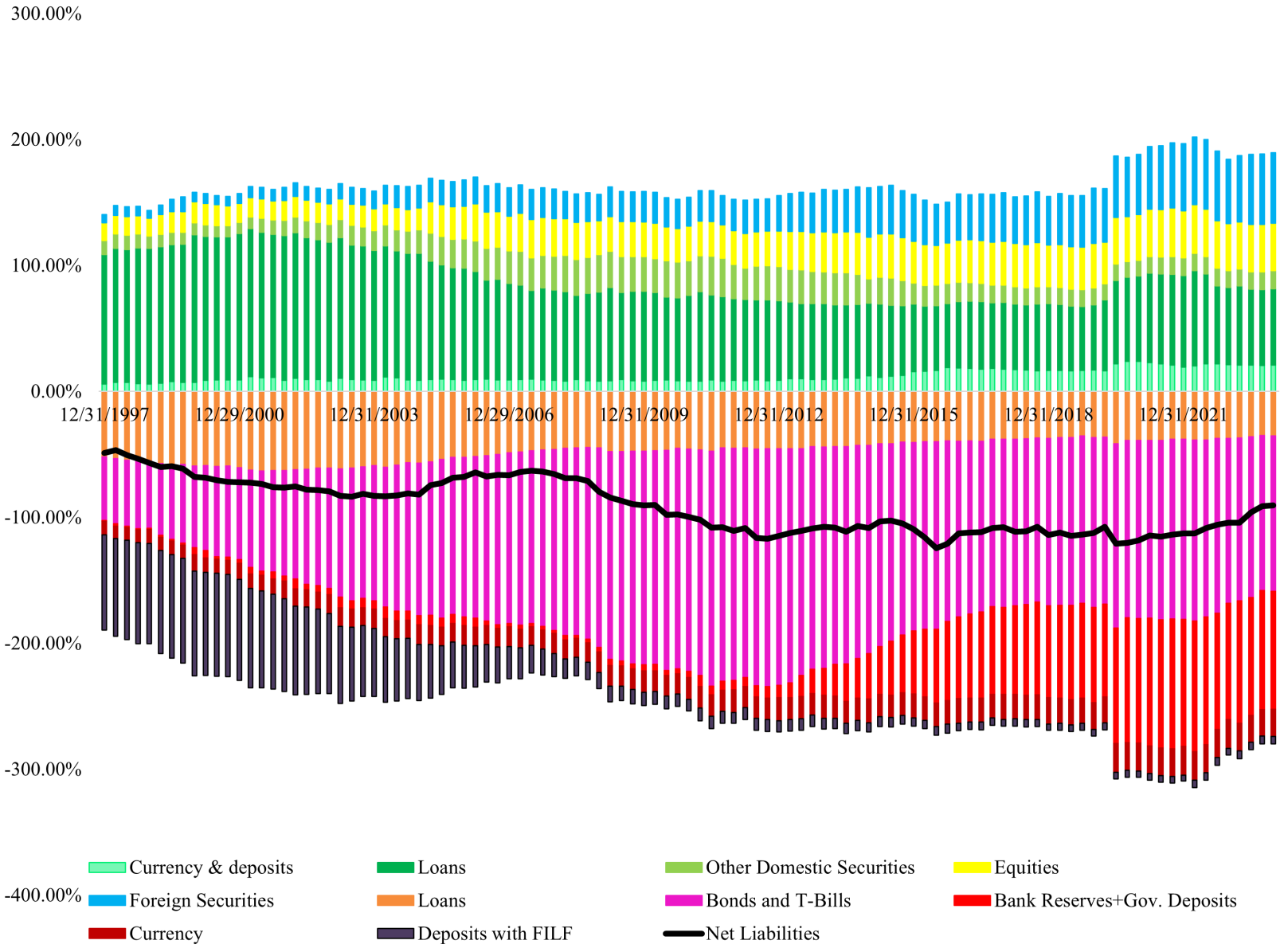
- Consolidated Japanese General Gov't Balance Sheet

  1. Central Government,
  2. Local Government,
  3. Pension Funds.

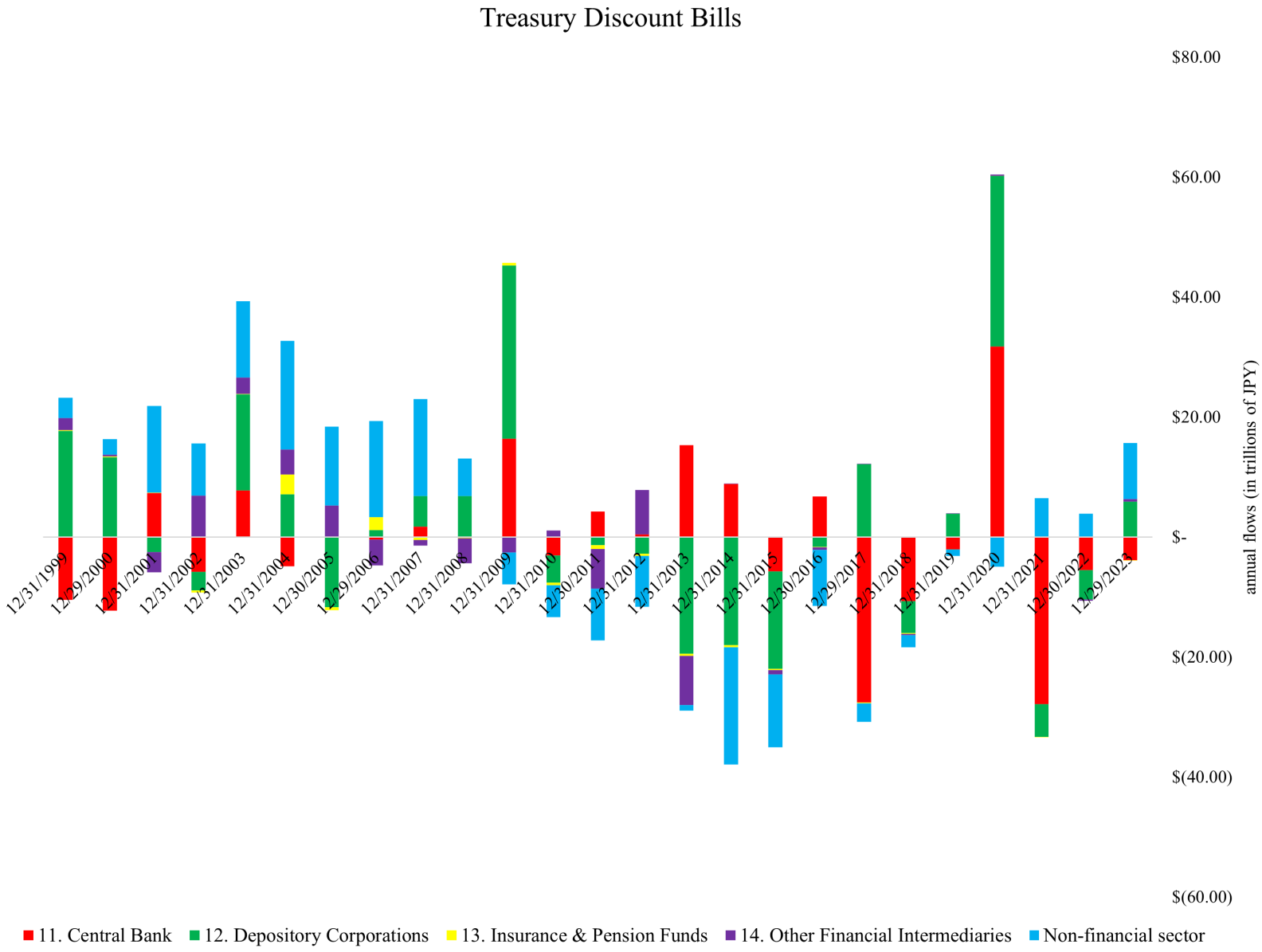
Japanese General Gov't Balance Sheet

% of GDP, Year End	1997	2023
Assets		
Currency and Deposits	5.7%	18.7%
Domestic Loans	6.5%	3.4%
Other Domestic Securities	5.7%	14.1%
Domestic Equities	**11.7%**	**34.7%**
Foreign Securities	**6.8%**	**56.1%**
Sum	36.3%	126.9%
Liabilities		
Loans	25.2%	25.7%
Bonds & T-Bills	**67.8%**	**201.1%**
Sum	93.0%	226.8%

Consolidated Japanese Government Balance Sheet



Japanese T-bill Purchases.



Bond Returns, Inflation and Growth; $r > x$

	x	π	r	$r - x$
1997-2023	**0.03%**	**0.20%**	**1.30%**	**1.27%**
2000-2009	-0.33%	-0.26%	1.96%	2.29%
2010-2019	0.56%	0.48%	1.41%	0.84%
2020-2023	0.75%	1.38%	-1.85%	-2.60%

Source: Bond Returns from BofA Ice Japan Government Bond Index Fund (excluding T-bills)

International Equity and Bond Returns

Country	JP	ROW	ROW-JP
	Nominal Equity Returns		
1997-2023	5.4%	10.5%	5.2%
2000-2009	-2.4%	3.3%	5.6%
2010-2019	10.0%	12.5%	2.5%
2020-2023	12.1%	17.4%	5.4%
	Nominal Bond Returns		
1997-2023	1.6%	4.9%	3.2%
2000-2009	1.9%	7.3%	5.5%
2010-2019	2.0%	4.3%	2.3%
2020-2023	-1.5%	4.5%	6.0%

Source: Equity Returns computed using MSCI Equity Index for World ex Japan (ROW) and Japan. Quarterly Returns (annualized). Table reports returns on ROW index in JPY. ROW Bond Returns computed using FTSE ex Japan Bond Index (BofA Ice Japan Government Bond Index Fund).

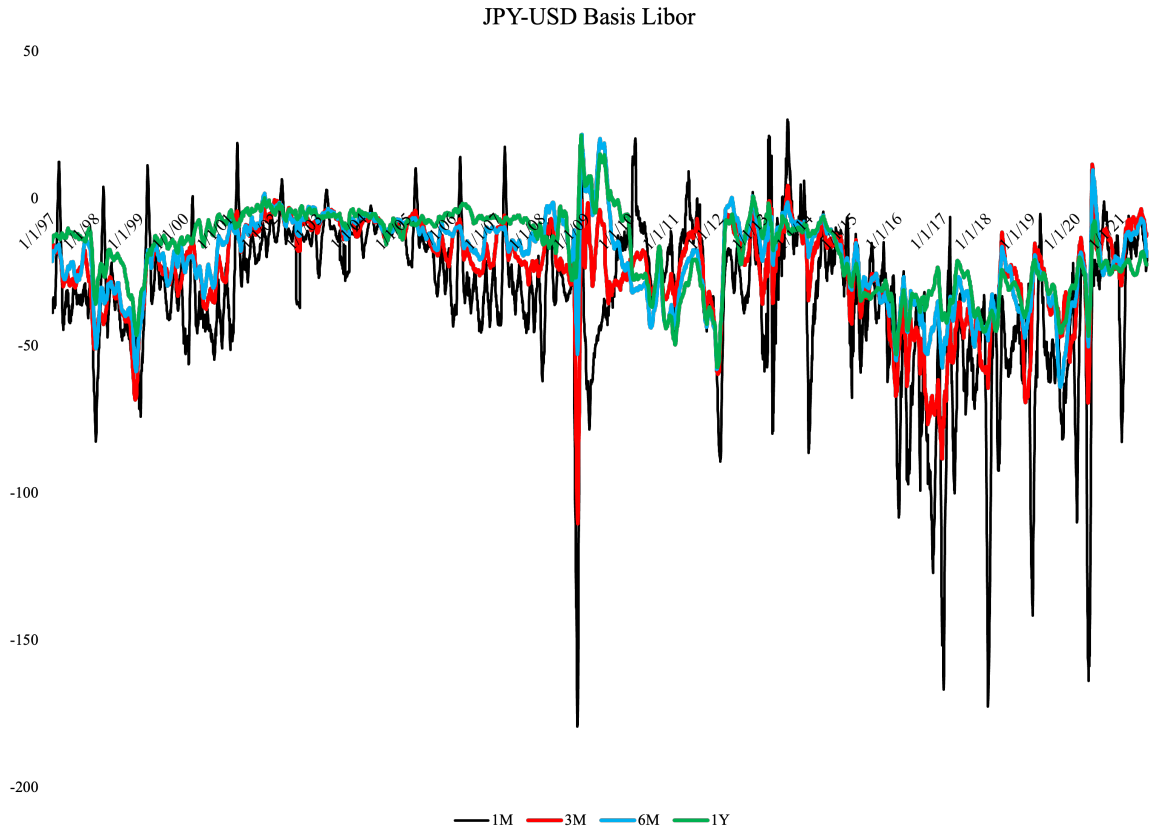
Foreign Investment

- Why don't Japanese financial intermediaries invest abroad? they have to hedge currency risk.
- CIP deviations.
- Let S_t denote Yen per dollar.
- The Libor basis USD/Yen basis is defined as :

$$x_{t,t+n} = r^{\$,Libor}_{t,t+n} - (r^{Libor}_{t,t+n} - \rho_{t,t+n}),$$

where $\rho_{t,t+n} = (1/n)(f^n_t - s_t)$ denotes the forward premium (in logs) obtained from the forward f^n_t and spot s_t.

LIBOR CIP Deviations



The Libor USD/Yen basis: $x_{t,t+n} = r^{\$,Libor}_{t,t+n} - (r^{Libor}_{t,t+n} - \rho_{t,t+n})$, where $\rho_{t,t+n} = (1/n)(f^n_t - s_t)$ denotes the forward premium (in logs) obtained from the forward f^n_t and spot s_t exchange rates.

Hedging Demand Pressure

- Since the GFC, large negative bases have opened up in the USD/Yen market and these bases have not decreased.
- Financial intermediaries in Japan have to intermediate about $3\times$ GDP in bank deposits, insurance and pensions.

- Financial intermediaries cannot replicate the government's strategy of foreign investments.
  - When they invest abroad, the Japanese banks have to hedge at least part of the currency risk.
  - To hedge the currency risk exposure, the banks will demand synthetic dollars, creating upward pressure on the synthetic USD LIBOR rate.
  - This creates downward pressure on the basis.

$$x_{t,t+n} = r^{\$,Libor}_{t,t+n} - (r^{Libor}_{t,t+n} - \rho_{t,t+n}).$$

CIP Deviations as Footprint of Financial Repression

- Low interest rate currencies (of surplus countries) tend to have more negative bases against the USD, as investors seek higher returns abroad (Du, Tepper and Verdelhan, 2018) .

- connection with financial repression:
  - The BoJ's Quantitative and Qualitative Monetary Easing (QQE) announcements, starting in 2014, as well as its move to negative policy rates causes a widening of the USD/JPY basis (Borio, McCauley, McGuire and Susho, 2016).
  - As the BoJ further depresses the term premium in Japan, this induces financial intermediaries to seek higher bond returns abroad, thus causing the CIP basis to widen.

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