A Lost Decade of Fiscal Misallocation

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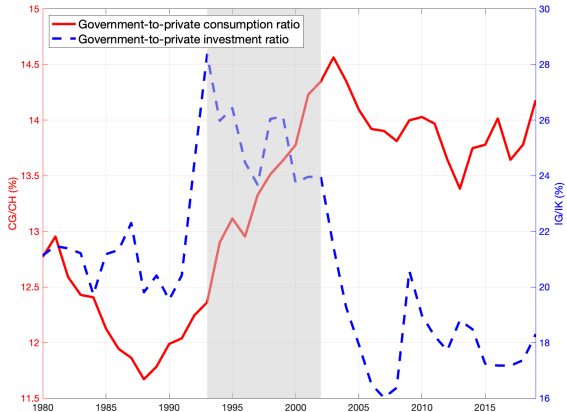
Government-Private Allocation of Consumption and Investment

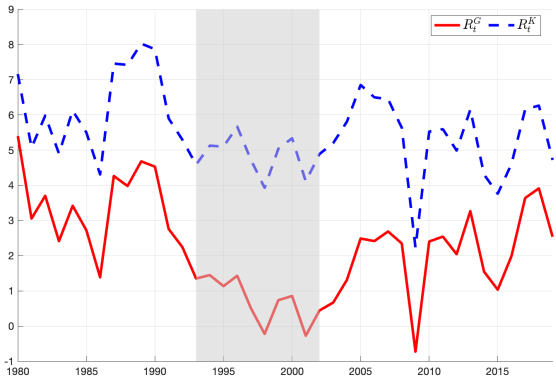
Figure 1: Government-to-Private Consumption and Investment Ratios (%)



- Government consumption: government actual final consumption (excluding social transfers in kind) Expenditure GDP Ratio

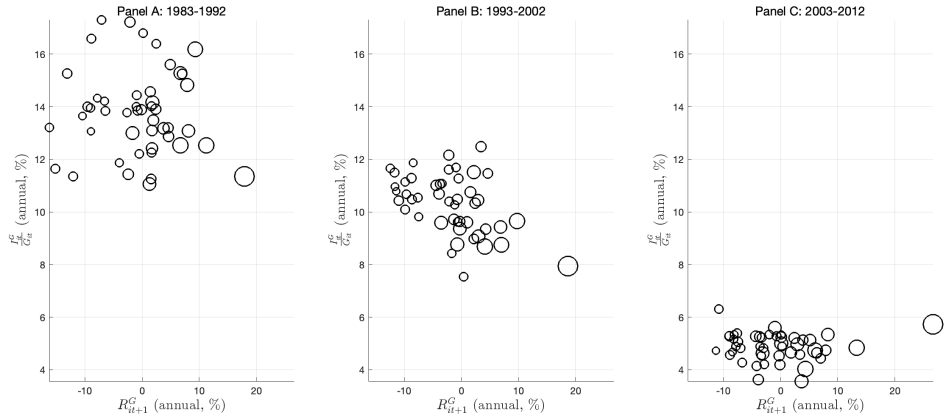
Misallocation of Government and Private Capital

Figure 2: Aggregate Returns to Government and Private Capital (%)



Spatial Misallocation of Government Investment

Figure 3: $\frac{I^G_{it}}{G_{it}} \sim R^G_{it+1}$



- Capital Return: $R^G_{it} \equiv \alpha_G \frac{\partial Y_t}{q_{t-1} \partial G_{it}} + \frac{q_t}{q_{t-1}} (1 - \delta) - 1$, $\frac{\partial Y_t}{\partial G_{it}}$ follows equation (16)

Correlations

Table 1: $\frac{I^G_{it}}{G_{it}} \sim R^G_{it+1}$

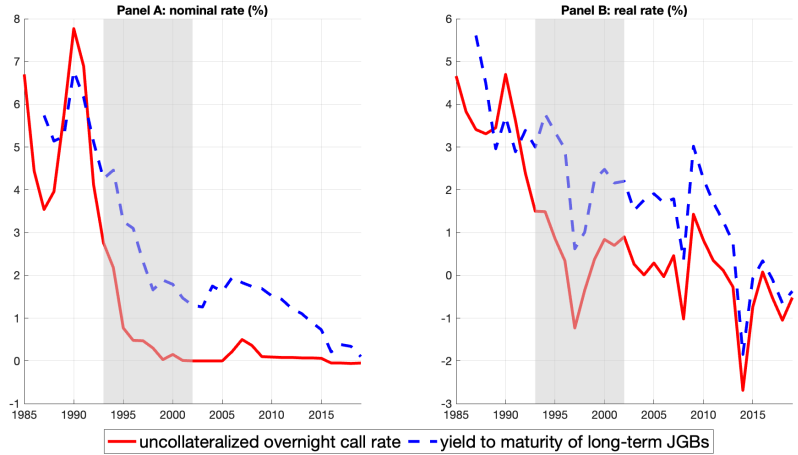
$\frac{I^G_{it}}{G_{it}}$	1983-1992	1993-2002	2003-2012
R^G_{it+1}	-0.008	**-0.084*****	-0.002
	(0.033)	(0.023)	(0.011)
Observations	47	47	47
R^2	0.001	0.223	0.001

Spatial Allocation of Government Consumption

- Spatial allocation of government consumption is highly persistent.
  - Growth of C_{it}^G: strong correlation across periods
  - Growth of I_{it}^G: zero correlation
- Abstract away from C_{it}^G

Interest Rate Cuts

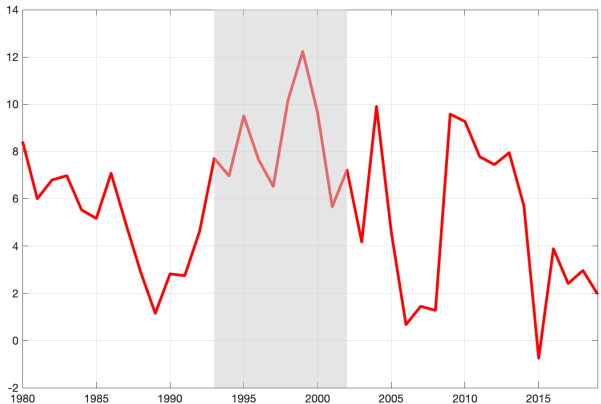
Figure 4: Interest Rate



- Real rate = Nominal rate - inflation.

More Government Borrowing

Figure 5: Government Borrowing (in percent of GDP)



- Central and local government borrowing (excluding Fiscal Investment and Loan Program (FILP) bonds)

Fiscal Windfalls from "Constrained" Government's Perspective (to fix ideas)

- Government budget constraint and fiscal windfalls

$$C_t^G + I_t^G = NB_t + B_t - r_t^D D_t, \tag{1}$$

$$\text{Windfall}_t = \Delta\mathbb{E}_t\left[NB_t\right] + \Delta\mathbb{E}_t\left[B_t\right] - \Delta\mathbb{E}_t\left[r_t^D D_t\right]. \tag{2}$$

- $\mathbb{E}_t\left[X_{t+j}\right]$: expectation of X_{t+j} in period t.
  - $\Delta\mathbb{E}_t\left[X_{t+j}\right] \equiv \mathbb{E}_t\left[X_{t+j}\right] - \mathbb{E}_{t-1}\left[X_{t+j}\right]$
- $B_t \equiv D_{t+1} - D_t$: government borrowing.
- NB_t: government non-borrowing income

In this paper

- Much lower government borrowing cost relaxes government budget constraint through lower interest payment and more borrowing.
- A simple model to show "Government Resource Curse": More resource, more misallocation.
- Quantitative results:
  - "Fiscal windfalls" largely explain the deterioration in fiscal allocation during the Lost Decade;
  - Transferring fiscal windfalls to households could increase aggregate TFP by 0.23% and welfare by 0.87% during the Lost Decade.

One-Period Model: The Economy

- There are N regions. For each region i, the production function is given by:

$$Y_i = A_i G_i^{\alpha} \tag{3}$$

- The representative household's utility function follows:

$$U^H = u(C), \quad C = \left(C^H\right)^{\rho} \left(C^G\right)^{1-\rho} \tag{4}$$

  - $u' > 0$, $u'' < 0$

- Recource constraint:

$$C^G + C^H + G = W^G + W^H + Y, \tag{5}$$

  - Aggregation: $G \equiv \sum_i G_i$ and $Y \equiv \sum_i Y_i$

First-Best Allocation

- A benevolent planner maximizes U^H by choosing $\{G_i\}_i, C^G, C^H$, subject to (5).
- FOC w.r.t. G_i yields:

$$R_i^G \equiv \frac{\partial Y}{\partial G_i} = \alpha \frac{Y_i}{G_i} = 1. \tag{6}$$

  - Aggregate TFP $A \equiv \frac{Y}{G^\alpha}$ maximized by equalizing R_i^G: $\bar{A} \equiv \left(\sum_i A_i^{\frac{1}{1-\alpha}} \right)^{1-\alpha}$.

- FOC w.r.t. C^G and C^H yields:

$$\frac{C^G}{C^H} = \frac{1-\rho}{\rho}. \tag{7}$$

Political Economy

- Government objective function:

$$U^G = u(C) + \sum_i \kappa_i v(G_i) \tag{8}$$

  - $v' > 0$, $v'' < 0$
  - $\kappa_i > 0$: local lobbying capacity (e.g., Sato (2002); Ihori et al. (2009))

- Budget constraint:

$$C^G + \sum_i G_i + T = W^G + \tau Y, \tag{9}$$

  where T and τ: lump-sum transfers and output tax rate.

- Government chooses C^G and $\{G_i\}$. T and τ are exogeneous.

Wedges

- Consumption wedge

$$\text{Consumption Wedge} = \frac{\rho}{1-\rho}\frac{C^G}{C^H} - 1 \tag{10}$$

  - Positive consumption wedge: distorted consumption allocation favoring C^G

- FOC w.r.t. C^G and $\{G_i\}$:

$$\left[1 + \underbrace{\frac{\kappa_i C^G}{(1-\rho)\,\alpha Y_i}\frac{v'(G_i)\,G_i}{u'(C)C} + (1-\tau) \times \text{Consumption Wedge}}_{\text{Government Capital Wedge}}\right] R_i^G = 1 \tag{11}$$

  - $\tau \to 1$ or consumption wedge $= 0$: overinvestment of $\{G_i\}$ relative to the first-best allocation

"Government Resource Curse"

- Assumption: $u(\cdot) = v(\cdot) = \log(\cdot)$, sufficiently high τ
- Oversupply of Government Capital: The discrepancy between G_i and its first-best level increases monotonically with government wealth W^G.
- Spatial Misallocation of Government Capital: Aggregate TFP A decreases monotonically with government wealth W^G.
  - As $W^G \to \underline{W}^G$, $\{G_i\}$ converges to $G_i \propto A_i^{\frac{1}{1-\alpha}}$: efficiency-driven allocation rule.
  - As $W^G \to \infty$, $\{G_i\}$ converges to , $\{G_i\}$ converges to $v'(G_i) \propto \frac{1}{\kappa_i}$: purely politically-driven allocation.

Sketch of Full-Blown Model

- The central government at period t, subject to an exogenous exit rate, allocates C^G_{t+j}, B_{t+j}, and $\{I^G_{it+j}\}$ for $j \geq 0$;
- Overlapping generations of households;
- Small open economy with mobile labor and private capital across regions; evidence
- Region-specific and time-varying parameters κ_{it}, τ^K_{it}, , τ^L_{it} calibrated to match I^G_{it}, K_{it}, and L_{it};
- MIT shocks.

Household

- The representative household solves

$$\max_{C^H_{t,t}, C^H_{t,t+1}, W^H_{t+1}} U^H_t = \log\left(\left(C^H_{t,t}\right)^{\rho}\left(C^G_t\right)^{1-\rho}\right) + \beta \log\left(\left(C^H_{t,t+1}\right)^{\rho}\left(C^G_{t+1}\right)^{1-\rho}\right)$$

subject to the budget constraint $C^H_{t,t} + W^H_{t+1} = Y^H_t + T_t$ and $C^H_{t,t+1} = (1 + r_{t+1}) W^H_{t+1}$.

  - T_t : lump-sum government transfer or tax
  - Household takes $\{C^G_t, C^G_{t+1}\}$ as given

Closed-form solutions:

$$C^H_{t,t} = \frac{1}{1+\beta}\left(Y^H_t + T_t\right), \quad C^H_{t,t+1} = \frac{\beta\,(1 + r_{t+1})}{1+\beta}\left(Y^H_t + T_t\right). \tag{12}$$

Firm

- Local output by the production of a representative firm:

$$Y_{it} = A_{it} G_{it}^{\alpha_G} K_{it}^{\alpha_K} L_{it}^{\alpha_L} \tag{13}$$

  - Land's share in production is $1 - \alpha_G - \alpha_K - \alpha_L$.

- The firm faces a proportional tax rate τ_t, labor and private capital wedges τ_{it}^L and τ_{it}^K:

$$\max_{K_{it}, L_{it}} (1 - \tau_t) Y_{it} - \left(1 + \tau_{it}^K\right) (1 + r_t^K) K_{it} - \left(1 + \tau_{it}^L\right) w_t L_{it} \tag{14}$$

Local and Aggregate Output

- Exogenous rental rate of capital r_t^K and exogenous aggregate labor supply $L_t \equiv \sum_i L_{it}$.

- Firm's first-order conditions imply

$$Y_{it} \propto \left(\frac{A_{it}}{\left(1+\tau_{it}^K\right)^{\alpha_K} \left(1+\tau_{it}^L\right)^{\alpha_L}} \right)^{\frac{1}{1-\alpha_K-\alpha_L}} G_{it}^{\frac{\alpha_G}{1-\alpha_K-\alpha_L}}. \tag{15}$$

- $Y_t \equiv \sum_{i=1}^N Y_{it}$. The marginal product of G_{it} at the aggregate level is

$$\frac{\partial Y_t}{\partial G_{it}} = \frac{\alpha_G}{1-\alpha_K-\alpha_L} \frac{Y_{it}}{G_{it}} - \frac{\alpha_G \alpha_L}{(1-\alpha_K-\alpha_L)(1-\alpha_K)} \frac{L_{it}}{L_t} \frac{Y_t}{G_{it}}, \tag{16}$$

Fiscal Institution

- Central government objective function:

$$U_t^C = \omega \log \left(\left(C_{t-1,t}^H \right)^{\rho} \left(C_t^G \right)^{1-\rho} \right) + \sum_{j=0}^{\infty} \beta_C^j \left(U_{t+j}^H + \sum_{i=1}^{N} \kappa_{it+j} \log G_{it+j+1} \right) \quad (17)$$

- $\beta_C = \beta p$, $p \in (0,1)$ is the probability of staying in office next period.
- κ_{it}: Institutional parameter for local governor's lobbying capacity.
- ω: The weight on the current old generation. We assume $\omega = \frac{\beta}{\beta_C}$ such that the central government's preference is time-consistent.

Budget

- Central government budget constraint:

$$C_t^G + \sum_{i=1}^{N} q_t^G I_{it}^G + T_t + \Phi_t = \tau_t Y_t + D_{t+1} - (1 + r_t^D) D_t \\ + D_{t+1} - (1 + r_t^D) D_t - \frac{\psi_t^D}{2} \left(r_{t+1}^D D_{t+1} - \overline{rD} \right)^2, \tag{18}$$

  - Quadratic adjustment cost parameter: ψ_t^D; D v.s. $r^D D$

- Φ_t: Residual component.

Government Optimization

- FOCs imply:

$$\frac{C^G_{t+j+1}}{C^G_{t+j}} = \beta_C \frac{1 + r^D_{t+j+1}}{1 - \psi^D_{t+j} r^D_{t+j+1} \left(r^D_{t+j+1} D_{t+j+1} - \overline{rD} \right)}, \tag{19}$$

$$\begin{aligned} \frac{C^G_{t+j+1}}{C^G_{t+j}} =& \beta_C \left(\tau_{t+j+1} \frac{\partial Y_{t+j+1}}{\partial G_{it+j+1}} + q^G_{t+j+1} (1 - \delta) \right) \\ &+ \frac{1}{(1-\rho)(1+\omega) q^G_{t+j}} \left(\beta_C \rho \frac{C^G_{t+j+1}}{C^H_{t+j+1,t+j+1}} \frac{\partial Y^H_{t+j+1}}{\partial G_{it+j+1}} + \kappa_{it+j} \frac{C^G_{t+j+1}}{G_{it+j+1}} \right). \end{aligned} \tag{20}$$

- RHS of equation (20): Economic returns; spillover effects through household consumption; political gains.

External Calibration: Time-Invariant Parameters

Table 2: Externally Calibrated Time-Invariant Parameters

Parameters	Value	Target
α_K	0.312	$\alpha_G + \alpha_K = \alpha = 0.362$ (Hayashi and Prescott (2002))
α_G	0.050	Song and Xiong (2024)
α_L	0.538	land share = 0.1
annualized δ	0.089	capital depreciate rate in Hayashi and Prescott (2002)
annualized β	0.980	
annualized β_C	0.850	25% probability of staying in office in a full decade
ρ	0.965	government to household consumption ratio in 1983-1992
annualized g_A	0.005	0.5% annual TFP growth

External Calibration: Time-Varying Parameters

Table 3: Externally Calibrated Time-Varying Parameters

Parameters	$t = 0$ (83-92)	$t = 1$ (93-02)	$t = 2$ (03-12)	Target
q_t	1.40	1.41	1.45	relative price of fixed capital formation
τ_t (%)	23.26	21.26	21.17	total government revenue to GDP ratio
r_t^K(annualized, %)	3.56	1.77	0.61	rental rate of private capital

Table 4: Calibration of Regional Parameters

Parameters	Target
A_{it}	$\log A_{it} = \log Y_{it} - \alpha_G \log G_{it} - \alpha_K \log K_{it} - \alpha_L \log L_{it}$
τ_{it}^K	$1 + \tau_{it}^K \propto \frac{Y_{it}}{K_{it}}$, $\sum_{i=1}^N \tau_{it}^K K_{it} = 0$
τ_{it}^L	$1 + \tau_{it}^L \propto \frac{Y_{it}}{L_{it}}$, $\sum_{i=1}^N \tau_{it}^L L_{it} = 0$

Expectation

- Variables for $t > 2$ ($t = 1$ for Lost Decade):
  - $A_{it} = \hat{A}_{it} A_t$, where A_t grows at the constant rate g_A for $t > 2$.
  - $X_t = X_2$ for the other time-varying parameters with $t > 2$.
- Expectations:
  - Perfect foresight for aggregate TFP growth.
  - MIT-shock on $X_t = \{i_{t+1}, \pi_t, i_t(m), \psi_t^D, \tau_t, \Phi_t, T_t, \{\tau_{it}^K\}, \{\tau_{it}^L\}, \{\kappa_{it}\}, \{\hat{A}_{it}\}\}$,

$$\mathbb{E}_t [X_{t+j}] = X_t, \quad \forall j \geq 1. \tag{21}$$

Expected Interest Rate

- Expected real interest rate: $\forall j \geq 1$,
  - $\mathbb{E}_t[r^D_{t+j}] = \mathbb{E}_t[i^D_{t+j} - \pi_{t+j}]$

Table 5: Expected Interest Rates (%)

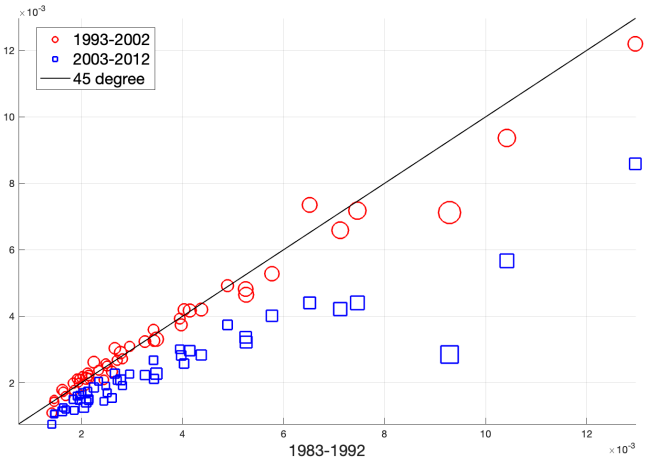
	$t = 1$ (93-02)	$t = 2$ (03-12)	$t = 3$ (13-22)
i^D_t	3.71	1.40	0.95
$\mathbb{E}_0[i^D_t]$	5.03	4.60	4.60
$\mathbb{E}_1[i^D_t]$	-	1.12	0.85
$\mathbb{E}_2[i^D_t]$	-	-	0.96
r^D_t	3.53	1.53	0.94
$\mathbb{E}_0[r^D_t]$	3.24	2.80	2.80
$\mathbb{E}_1[r^D_t]$	-	0.95	0.67
$\mathbb{E}_2[r^D_t]$	-	-	1.09

Internal Calibration

- The remaining parameters are interally calibrated to match the observed data:
  - $\{\kappa_{it}\}_{i=1}^{N}$ to match $\{G_{it+1}\}_{i=1}^{N}$;
  - Φ_t to match C_t^G;
  - T_t to match C_t^H;
  - ψ_t^D to match D_{t+1};
  - $\overline{rD}$ to match an average adjustment cost that accounts for half of interest payments and management fees.

Prefecture-level κ_{it}

Figure 6: Prefecture-level κ_{it}

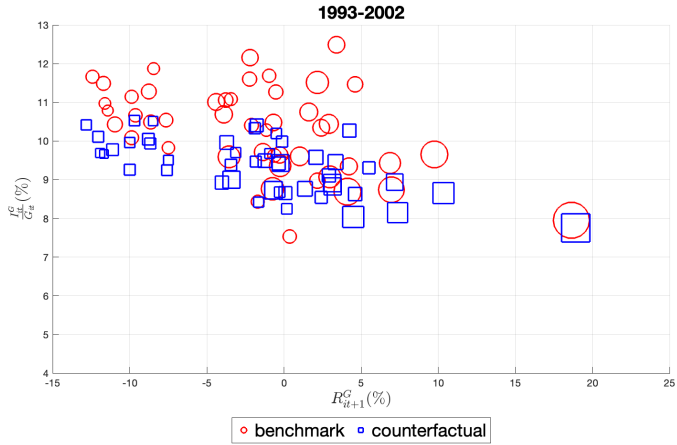


Counterfactual: Lobby Incentives and Prefecture-level Wedges

- Set the local lobby capacity parameter in the lost decade to the average of pre- and post-Lost Decade levels: $\kappa_{i1} = \frac{1}{2}(\kappa_{i0} + \kappa_{i2})$
- Set the local private capital or labor wedge in the lost decade to the average of pre- and post-Lost Decade levels: $\tau_{i1}^K = \frac{1}{2}(\tau_{i0}^K + \tau_{i2}^K)$ or $\tau_{i1}^L = \frac{1}{2}(\tau_{i0}^L + \tau_{i2}^L)$

Counterfactual: Lobby Incentives

Figure 7: $\kappa_{i1} = \frac{\kappa_{i0}+\kappa_{i2}}{2}$



"Fiscal Windfalls"

- Following equation (2), $\forall j \geq 0$:

$$\mathbb{E}_t\left[\text{Windfall}_{t+j}\right] = -\Delta\mathbb{E}_t[r^D_{t+j} D_{t+j}] + \Delta\mathbb{E}_t\left[B_{t+j}\right] + \Delta\mathbb{E}_t\left[NB_{t+j}\right] \qquad (22)$$

where $NB_t \equiv \tau_t Y_t - \Phi_t - T_t$.

Table 6: "Fiscal windfalls" perceived at 1993-2002 ($t = 1$, in percent of GDP)

	$t+j=1$ (93-02)	$t+j=2$ (03-12)	$t+j=3$ (13-17)	steady state
$\Delta\mathbb{E}_1[-r^D_{t+j} D_{t+j}]$	-0.27	1.40	1.39	1.47
$\Delta\mathbb{E}_1[B_{t+j}]$	5.55	7.68	1.38	1.08
$\Delta\mathbb{E}_1[NB_{t+j}]$	-1.79	-2.14	-2.14	-2.88
$\mathbb{E}_1[\text{Windfall}_{t+j}]$	3.49	6.94	0.63	-0.33

Counterfactual: Transferring "Fiscal Windfalls"

- Government commits to transferring "windfalls" perceived during 1993-2002 ($\mathbb{E}_1[\text{Windfall}_{1+j}]$, $j \geq 0$).
- Government prohibited from adjusting its borrowing (the same debt trajectory).
- Government can only optimize C^G_{t+j} and $\{G_{it+j+1}\}_i$ for $j \geq 0$ in each period $t \geq 1$.

Counterfactual: $I_{it}^{G} \sim R_{it+1}^{G}$ at 1993-2002

Figure 8: $\kappa_{i1} = \frac{\kappa_{i0}+\kappa_{i2}}{2}$

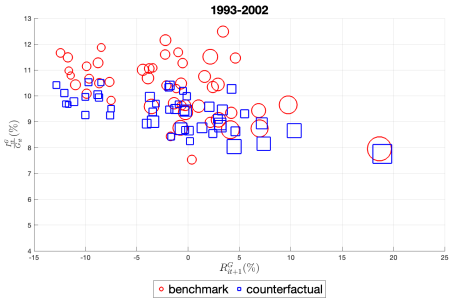
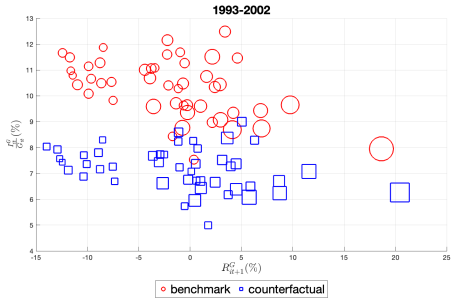


Figure 9: Transferring "Fiscal Windfalls"



Counterfactual: Welfare Analysis

Table 7: Aggregate TFP, output and welfare changes (%)

	$\kappa_{i1} = \frac{\kappa_{i0}+\kappa_{i2}}{2}$	$\tau^K_{i1} = \frac{\tau^K_{i0}+\tau^K_{i2}}{2}$	$\tau^L_{i1} = \frac{\tau^L_{i0}+\tau^L_{i2}}{2}$	transfers
	(1)	(2)	(3)	(4)
Aggregate TFP change in 03-12	0.12	-0.28	-0.08	0.23
Aggregate output change in 03-12	-0.35	-0.60	-0.17	-1.46
Households income change in 93-02	0	-1.18	-0.49	4.41
in 03-12	-0.26	-0.77	-0.28	8.92
Welfare change (φ)	-0.04	-0.38	-0.14	0.87

The End of the Decade of Fiscal Misallocation

- Our story: Low interest rate regime (windfalls are gone)
- FILP Reform
- "Trinity Reforms" on central government transfers to local governments
  - Sticks: Fiscal restructuring (Yubari city)
  - Carrots: "Great Heisei Mergers"

Conclusion

- Low-interest-induced misallocation as an understudied channel
  - Complementary to the literature on low interest rate and stagnation (zombie lending, Caballero, Hoshi and Kashyap (2008); overvalued (intangible) assets, Kiyotaki, Moore and Zhang (2021); misallocation via financial frictions,Asriyan et al. (2024))
- Implications for today's China
  - κ_{it} as career incentives (Song and Xiong (2024))
  - Potential fiscal misallocation and welfare losses by debt swap and low interest rate

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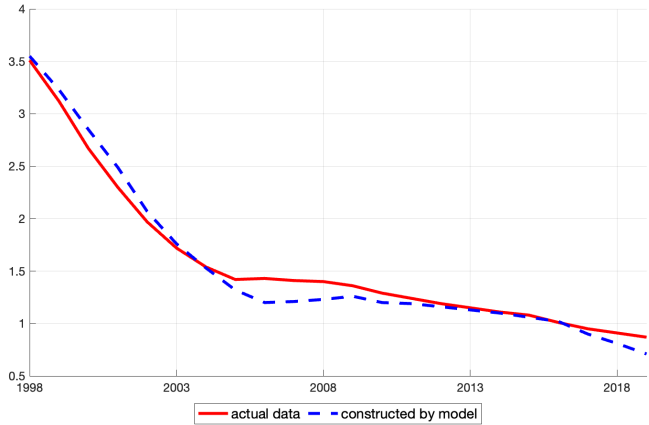
Forecasts Using Bond Issuance Data

Figure 10: Nominal borrowing rate



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Mobile Factors

Table 8: Cross-Region Allocation

	1978-82	1983-87	1988-92	1993-97	1998-02	2003-07	2008-12	2013-17
				$\log K_{it}$				
$\log G_{it}$	1.091***	1.126***	1.188***	1.225***	1.230***	1.266***	1.276***	1.270***
	(0.072)	(0.075)	(0.081)	(0.086)	(0.088)	(0.099)	(0.104)	(0.107)
Observations	47	47	47	47	47	47	47	47
R^2	0.838	0.834	0.828	0.818	0.813	0.784	0.770	0.758
				$\log L_{it}$				
$\log G_{it}$	1.030***	1.108***	1.184***	1.186***	1.194***	1.249***	1.284***	1.291***
	(0.046)	(0.051)	(0.057)	(0.057)	(0.062)	(0.073)	(0.075)	(0.076)
Observations	47	47	47	47	47	47	47	47
R^2	0.918	0.912	0.904	0.907	0.892	0.868	0.867	0.865

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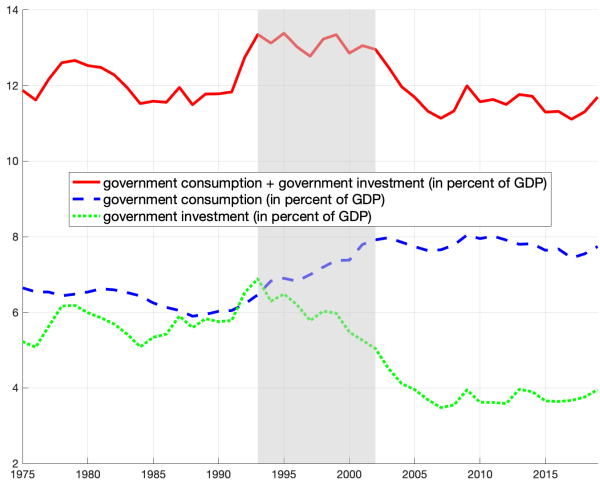
Government Expenditure GDP Ratio

Figure 11: Government-to-Private Consumption and Investment Ratios (%)



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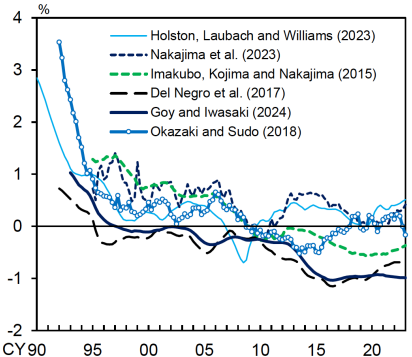
Nature Rate of Interest and Expected Growth Rate

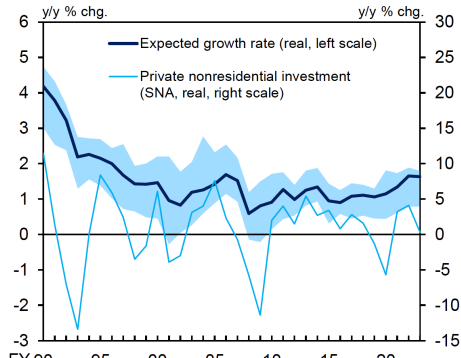
Figure 12: Natural Rate of Interest and Expected Growth Rate

Chart 1-1-1: Natural Rate of Interest



Sources: Bank of Japan; Ministry of Finance; Ministry of Health, Labour and Welfare; Cabinet Office; Ministry of Internal Affairs and Communications; Bloomberg; Consensus Economics Inc., "Consensus Forecasts."
Note: The estimates are based on staff calculations using the models proposed in the different papers.

Chart 1-1-4: Expected Growth Rate



Source: Cabinet Office.
Note: The "expected growth rate" is the average of firms' forecasts of the real growth rate of industry demand over the next five years. The shaded area indicates the 20-80 percentile band of the expected growth rate.

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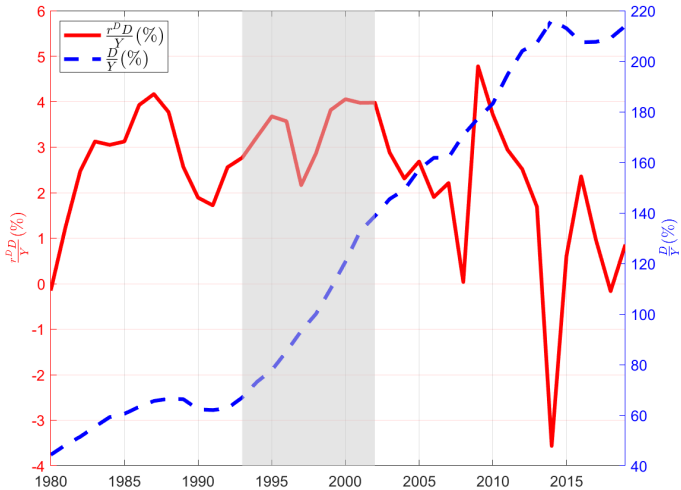
D v.s. $r^D D$

Figure 13: D and $r^D D$ (in percent of GDP)



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