A Contagious Malady? Open Economy Dimensions of Secular Stagnation

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Secular Stagnation Hypothesis

Secular stagnation hypothesis:

- Alvin Hansen (1938) and Lawrence Summers (2013)
- Highly persistent decline in the natural rate of interest
- Chronically binding zero lower bound

Secular stagnation in a closed economy:

- ZLB of arbitrary duration
- Distinct policy responses
- Eggertsson and Mehrotra (2015)

Research Question and Key Findings

Research questions:

- Does secular stagnation survive in a open economy framework?
- What are the channels by which secular stagnation spreads?
- What are the interactions in policy across countries?

Key findings:

- Capital integration spreads recessions
- Substantial policy externalities
  - Fiscal policy (+ externalities)
  - Neomercantilism/competitiveness (- externalities)

HOUSEHOLDS

Objective function:

$$\max_{C_t^y, C_{t+1}^m, C_{t+2}^o} U = \mathbb{E}_t \left\{ \log\left(C_t^y\right) + \beta \log\left(C_{t+1}^m\right) + \beta^2 \log\left(C_{t+2}^o\right) \right\}$$

Budget constraints:

$$\begin{aligned}
C_t^y &= B_t^y \\
C_{t+1}^m &= Y_{t+1} - (1 + r_t) B_t^y + A_{t+1}^d + A_{t+1}^{int} \\
C_{t+2}^o &= (1 + r_{t+1}) A_{t+1}^d + (1 + r_{t+1}^*) A_{t+1}^{int} \\
(1 + r_t) B_t^y &\leq D_t \\
0 &\leq A_{t+1}^{int} \leq K
\end{aligned}$$

Case of $r > r^*$

Credit-constrained youngest generation:

$$C_t^y = B_t^y = \frac{D_t}{1+r_t}$$
$$C_t^{y*} = B_t^{y*} = \frac{D_t^*}{1+r_t^*}$$

Saving by the middle generation:

$$\frac{1}{C_t^m} = \beta \mathbb{E}_t \frac{1+r_t}{C_{t+1}^o}$$
$$\frac{1}{C_t^{m*}} = \beta \mathbb{E}_t \frac{1+r_t^*}{C_{t+1}^{o*}}$$

Spending by the old:

$$C_t^o = (1+r_{t-1})A_{t-1}^d$$
$$C_t^{o*} = (1+r_{t-1}^*)A_{t-1}^{d*} + (1+r_{t-1})K^*$$

Natural Rate under Imperfect Integration

Case of $r > r^*$:

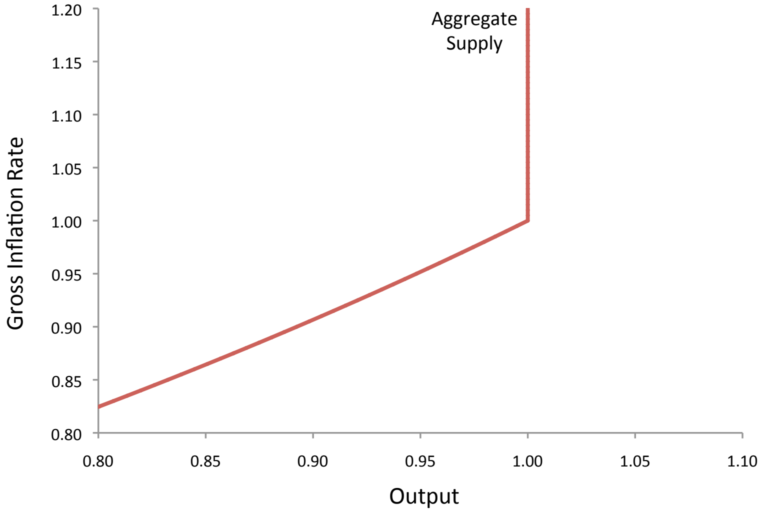
$$
\begin{aligned}
N_t B_t^y &= N_{t-1} A_t^d + N_{t-1}^* A_t^{int*} \\
N_t^* B_t^{y*} &= N_{t-1} A_t^{d*}
\end{aligned}
$$

Expression for the domestic and foreign real interest rate:

$$
1 + r_t = \frac{1+\beta}{\beta} \frac{(1+g_t) D_t}{Y_t - D_{t-1} + \frac{1-\omega_{t-1}}{\omega_{t-1}} \frac{1+\beta}{\beta} K^*}
$$

$$
1 + r_t^* = \frac{1+\beta}{\beta} \frac{(1+g_t^*) D_t^* + \frac{1+r_t}{1+\beta} K^*}{Y_t^* - D_{t-1}^* - K^*}
$$

Aggregate Supply Relation



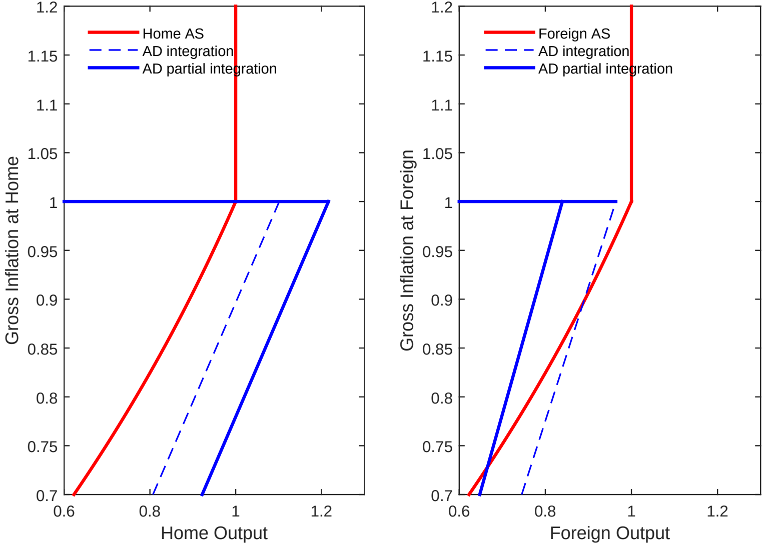
Monetary Policy

Inflation targeting:

$$\Pi_t = \bar{\Pi} \text{ if } i > 0$$
$$\Pi_t^* = \bar{\Pi}^* \text{ if } i^* > 0$$

- Monetary policy attempts to track the natural rate of interest
- Cannot attain the natural rate once it falls below inverse of inflation target
- Inflation target equivalent to simple Taylor rule as Taylor coefficient becomes large

Asymmetric Stagnation under Imperfect Integration



Neomercantilism

Natural rate of interest:

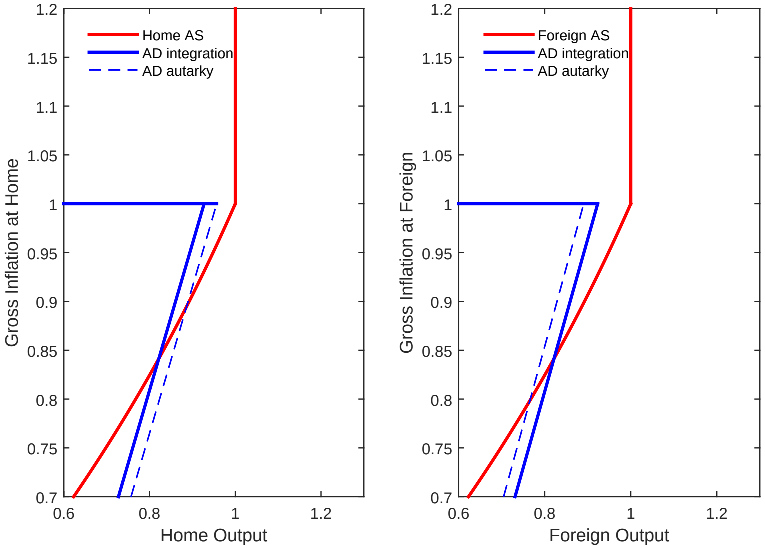
$$1 + r = \frac{1+\beta}{\beta} \frac{D}{Y_f - D + \frac{1+\beta}{\beta}\left(K - B^g + IR\right)}$$

$$1 + r^* = \frac{1+\beta}{\beta} \frac{D^* + \frac{1+r}{1+\beta} K}{Y_f^* - D^* - K - \frac{1+\beta}{\beta} B^{g*}}$$

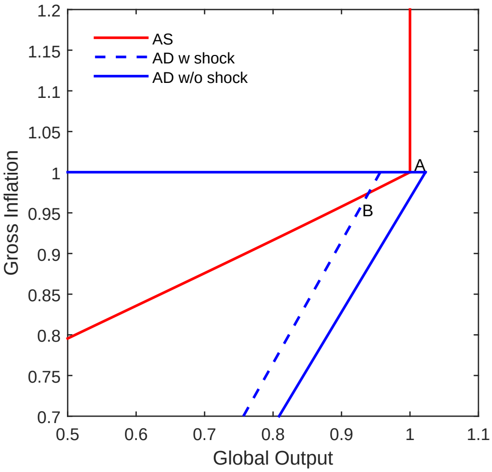
Implications:

- Policies that target positive NFA positions or CA surpluses
- Reserve acquisition lowers natural rate in debtor country
- May raise natural rate in creditor country depending on financing (debt v. taxation)

NEOMERCANTILISM

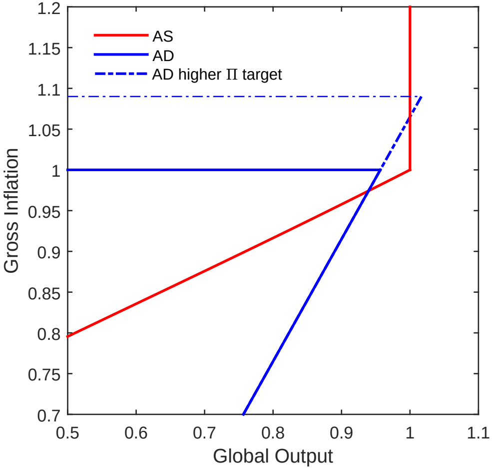


Symmetric Stagnation under Perfect Integration



Linearized Equations

Raising the Inflation Target



Effects of Fiscal Policy

Balanced budget government purchases:

$$1 + r = \frac{(1+g)\,\frac{1+\beta}{\beta}\,(\omega D + (1-\omega)\,D^*)}{\omega\,(Y - D) + (1-\omega)\,(Y^* - D^*) - \omega G - (1-\omega)\,G^*}$$

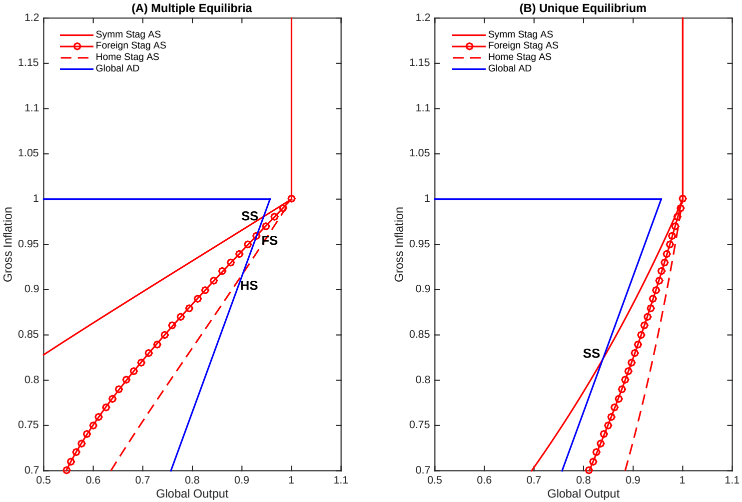
Interest rate with domestic and foreign public debt:

$$1 + r = \frac{(1+g)\,\frac{1+\beta}{\beta}\,(\omega D + (1-\omega)\,D^*)}{\omega\,(Y - D) + (1-\omega)\,(Y^* - D^*) - \frac{1+\beta}{\beta}\,(\omega B^g + (1-\omega)\,B^{g*})}$$

Implications of fiscal expansion:

- Role for coordinated fiscal expansion since benefits are shared across countries
- Absent coordination, fiscal expansion would be undersupplied
- Coordination problem worsens with number of countries

MULTIPLE EQUILIBRIA UNDER PERFECT INTEGRATION



Currency Wars

Nominal exchange rate:

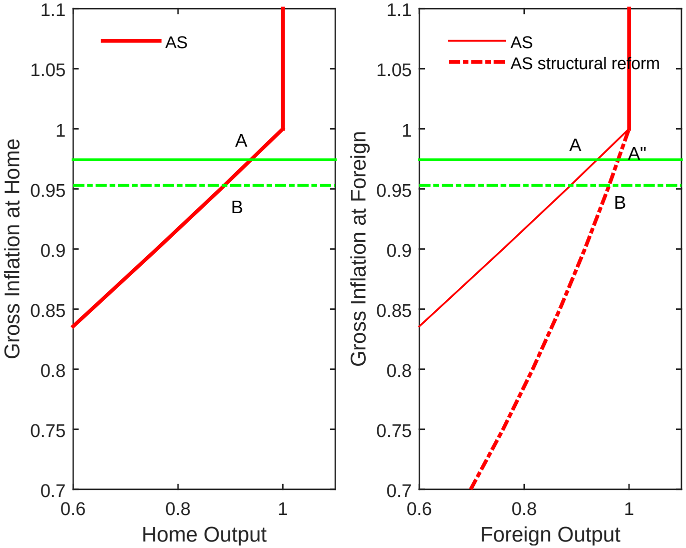
$$S_t = \frac{P_t^*}{P_t}$$

$$\Delta S_t = \frac{\Pi_t^*}{\Pi_t}$$

Exchange rate policy when $r^{w,Nat} < 0$:

- A pegged exchange rate $S_t = \bar{S}$ eliminates any asymmetric stagnation equilibrium
- Benefits the nation in stagnation at the expense of the nation not in stagnation
- Sufficiently aggressive depreciation eliminates the symmetric stagnation as equilibrium

Effects of Structural Reform

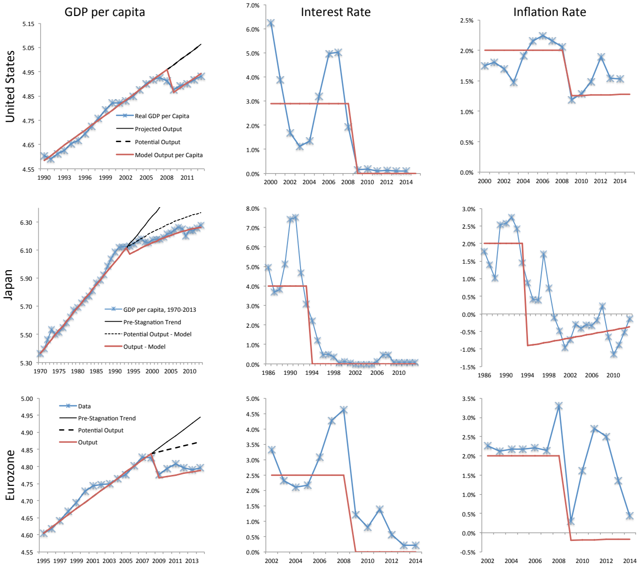


Conclusions for Policy

1. Importance of a policy response
    - ZLB can persist for arbitrarily long periods
2. Importance of fiscal policy coordination
    - Fiscal expansions will tend to be undersupplied
    - Fiscal austerity will tend to be oversupplied
3. Risks of beggar-thy-neighbor policies
    - Exchange rate policies may alleviate stagnation in one country while worsening in the other
    - Structural reform and targeting trade surplus similar effects
4. Fiscal policy focused on diminishing oversupply of saving

Additional Slides

Secular Stagnation Episodes



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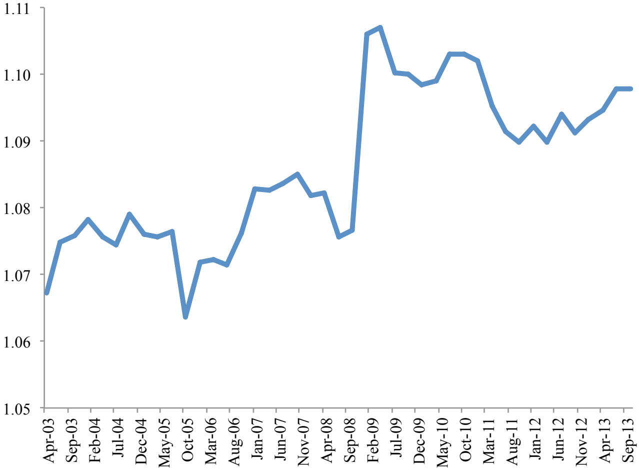
US Real Wage, 2003-2013

Employer cost index divided by PCE price index



Source: BLS and BEA

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Money

Money demand condition:

$$C_t^m v'(M_t) = \frac{i_t}{1+i_t}$$

Government budget constraint:

$$B_t^g + M_t + T_t^m + \frac{1}{1+g_{t-1}} T_t^o = G_t + \frac{1}{1+g_{t-1}} \left(\frac{1+i_{t-1}}{\Pi_t} B_{t-1}^g + \frac{1}{\Pi_t} M_{t-1} \right)$$

Implications:

- Assume that money demand is satiated at the zero lower bound
- Fiscal policy keeps *real* government liabilities constant
- Open market operations and QE leave constant the consolidated level of government liabilities

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Calvo Pricing

Equilibrium conditions:

$$
\begin{aligned}
Y_t &= \frac{\bar{L}}{\Delta_t} \\
\Delta_t &= \int \left(\frac{p_t\left(l\right)}{P_t} \right)^{-\theta} dl \\
1 &= \chi \Pi_t^{\theta-1} + (1-\chi) \left(\frac{p_t^*}{P_t} \right)^{1-\theta} \\
\Delta_t &= \chi \Pi_t^{\theta} \Delta_{t-1} + (1-\chi) \left(\frac{p_t^*}{P_t} \right)^{-\theta}
\end{aligned}
$$

Aggregate supply relation:

$$
Y = \bar{L} \frac{1-\chi\Pi^{\theta}}{1-\chi} \left(\frac{1-\chi}{1-\chi\Pi^{\theta-1}} \right)^{\frac{\theta}{\theta-1}}
$$

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Temporary Increase in Public Debt

Under constant population and set $G_t = T_t^y = B_{t-1}^g = 0$:

$$T_t^m = -B_t^g$$
$$T_{t+1}^o = (1 + r_t)\, B_t^g$$

Implications for natural rate:

- Loan demand and loan supply effects cancel out
- Temporary increases in public debt ineffective in raising real rate
- Temporary monetary expansion equivalent to temporary expansion in public debt at the zero lower bound
- Effect of an increase in public debt depends on beliefs about future fiscal policy

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Incorporating Capital

Objective function:

$$\max_{C_t^y, C_{t+1}^m, C_{t+2}^o} U = \mathbb{E}_t \left\{ \log\left(C_t^y\right) + \beta \log\left(C_{t+1}^m\right) + \beta^2 \log\left(C_{t+2}^o\right) \right\}$$

Budget constraints:

$$\begin{aligned} C_t^y &= B_t^y \\ C_{t+1}^m + p_{t+1}^k K_{t+1} + (1 + r_t) B_t^y &= w_{t+1} L_{t+1} + r_{t+1}^k K_{t+1} + B_{t+1}^m \\ C_{t+2}^o + (1 + r_{t+1}) B_{t+1}^m &= p_{t+2}^k (1 - \delta) K_{t+1} \end{aligned}$$

Rental rate and real interest rate:

$$\begin{aligned} r_t^k &= p_t^k - p_{t+1}^k \frac{1-\delta}{1+r_t} \geq 0 \\ r &\geq -\delta \end{aligned}$$

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Land

Land with dividends:

$$p_t^{land} = D_t + \frac{p_{t+1}^{land}}{1 + r_t}$$

- Land that pays a real dividend rules out a secular stagnation

Land without dividends:

- If $r > 0$, price of land equals its fundamental value
- If $r < 0$, price of land is indeterminate and land offers a negative return r

Absence of risk premia:

- No risk premia on land
- Negative short-term natural rate but positive net return on capital

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Dynamic Efficiency

Planner's optimality conditions:

$$\frac{C_o}{C_m} = \beta\left(1+g\right)$$

$$\left(1-\alpha\right)K^{-\alpha} = 1 - \frac{1-\delta}{1+g}$$

$$D\left(1+g\right) + C_m + \frac{1}{1+g}C_o = K^{1-\alpha}\bar{L}^{\alpha} - K\left(1 - \frac{1-\delta}{1+g}\right)$$

Implications:

- Competitive equilibrium does not necessarily coincide with constrained optimal allocation
- If $r > g$, steady state of our model with capital is dynamically efficient
- Negative natural rate only implies dynamic inefficiency if population growth rate is negative

Dynamic Efficiency

Is dynamic efficiency empirically plausible?

- Classic study in Abel, Mankiw, Summers and Zeckhauser (1989) says no
- Revisited in Geerolf (2013) and cannot reject condition for dynamic inefficiency in developed economies today

Absence of risk premia:

- No risk premia on capital in our model
- Negative short-term natural rate but positive net return on capital
- Abel et al. (2013) emphasize that low real interest rates not inconsistent with dynamic efficiency

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Linearized Dynamics under Symmetric Stagnation

Equilibrium conditions:

$$
\begin{aligned}
E_t \pi_{t+1} &= \bar{\omega} s_y y_t + (1-\bar{\omega})\, y_t^* + shocks \\
y_t &= \gamma_w y_{t-1} + \gamma_w \phi \pi_t \\
y_t^* &= \gamma_w^* y_{t-1}^* + \gamma_w^* \phi \pi_t
\end{aligned}
$$

Local determinacy condition:

$$
1 + \gamma_w \gamma_w^* \left(1 + s_y \phi\right) < \phi s_y \left(\bar{\omega} \gamma_w - (1-\bar{\omega})\, \gamma_w^*\right) + \gamma_w + \gamma_w^*
$$

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