

# A Party without a Hangover? On the Effects of U.S. Government Deficits

Michael Kumhof, International Monetary Fund

Douglas Laxton, International Monetary Fund

# 1 INTRODUCTION

## The Question

- Did U.S. fiscal deficits contribute significantly to U.S. current account deterioration?
- Therefore: Could U.S. fiscal consolidation help resolve global current account imbalances?

## The Data Since 2001

- Large decrease in U.S. savings, but large increase in rest of the world savings.
- The main reason for low U.S. national savings has been low U.S. fiscal savings.
- Despite this, world real interest rates have been low: “World Savings Glut”?

# The Model:

## Global Integrated Monetary and Fiscal Model (GIMF)

- Equipped for monetary policy analysis:
  - Nominal and real rigidities.
  - Monetary policy reaction function.
- Equipped for fiscal policy analysis:
  - Multiple and powerful non-Ricardian features.
  - Fiscal policy reaction function.

# Four Reasons for the Breakdown of Ricardian Equivalence in GIMF

(in INCREASING order of importance)

1. Multiple (up to four) distortionary taxes.
2. Liquidity constrained agents: For *short-run* fiscal policy effects *only*.
3. Lifecycle income patterns: For *long-run* fiscal policy effects.
4. Finite economic lifetimes: For *long-run* fiscal policy effects.

# The Role of Government Spending in GIMF

1. The relative importance of wasteful government spending and of productive (output generating) government spending can be calibrated.
2. Government investment adds to a public capital stock  $\implies$  It affects the productivity of private factors of production.

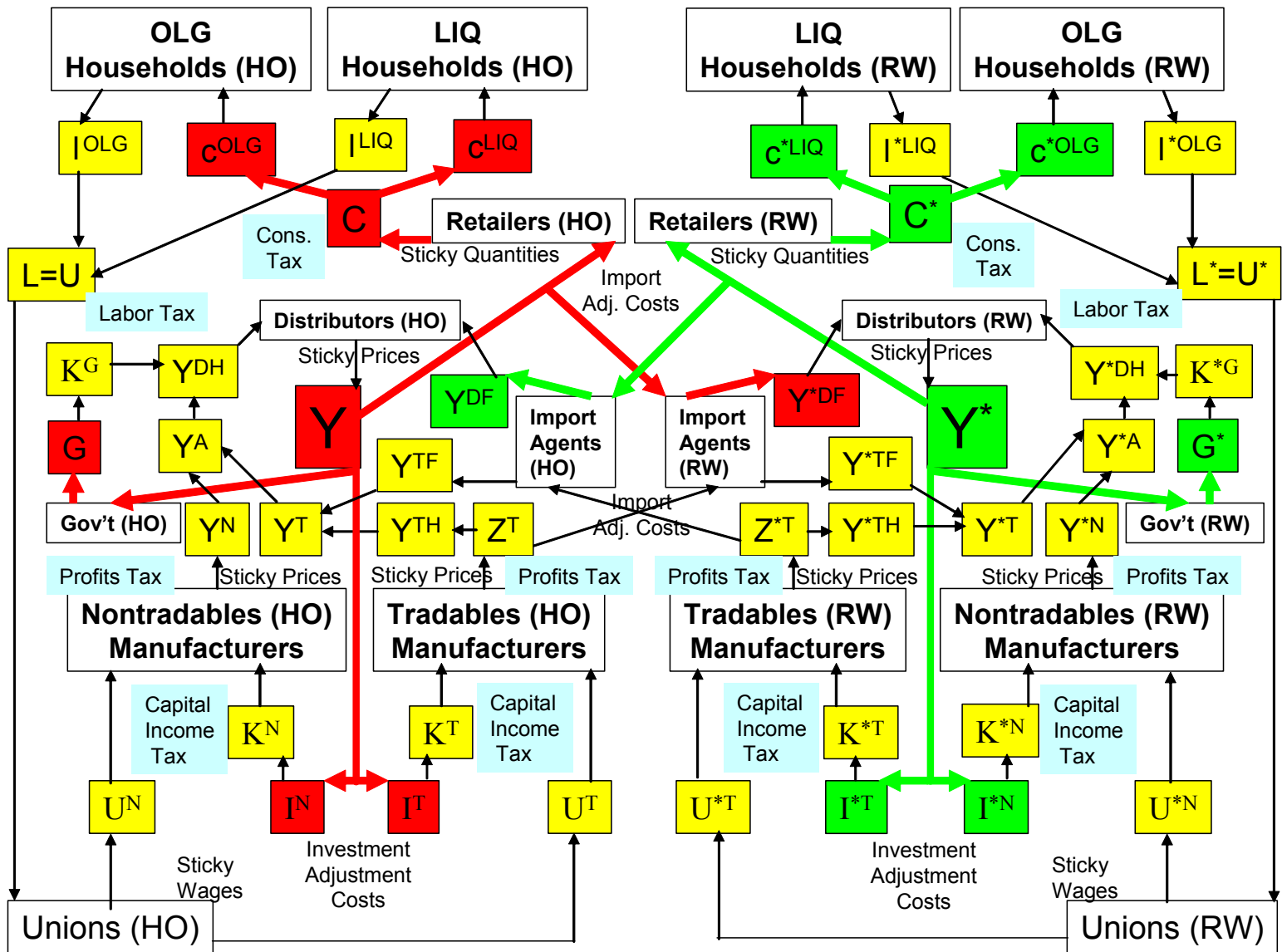
## Other Features of GIMF

- Household Preferences:
  1. Households are either myopic or liquidity constrained.
  2. General CRRA (not log): Intertemporal EoS is critical.
  3. Endogenous labor supply.
- Firm Technology:
  1. Firms are owned by myopic households and are themselves myopic.
  2. Traded and nontraded goods.
  3. Endogenous capital formation: Important for crowding-out effects.

## Other Features of GIMF (continued)

- Nominal Rigidities:
  1. Multiple (cascading) price rigidities.
  2. Nominal wage rigidity.
  3. Pricing to market.
- Real Rigidities:
  1. Consumption: Habit persistence (external) and retail quantity adjustment costs.
  2. Investment: Investment adjustment costs.
  3. Trade: Import adjustment costs.

## **2 THE MODEL**



## 2.1 OLG Households

### Objective Function

$$\sum_{s=t}^{\infty} (\beta\theta)^{s-t} \left[ \frac{1}{1-\gamma} \left( \left( \frac{c_{a+s,t+s}^{OLG}}{h_{a+s,t+s}^{OLG}} \right)^{\eta^{OLG}} \left( 1 - \ell_{a+s,t+s}^{OLG} \right)^{1-\eta^{OLG}} \right)^{1-\gamma} \right]$$

### Income Sources

1. Government bonds  $B_{a,t}$ : Complete home bias, in domestic currency.
2. Private bonds  $F_{a,t}$ : Only internationally traded asset, denominated in US\$.
3. Dividend income: Complete home bias, lump-sum dividend distributions  $\implies$  firms can be modeled as myopic.
4. Labor income: Declining lifecycle productivity:  $\Phi_a = \kappa\chi^a$

## Aggregated Key FOC

$$\check{c}_t^{OLG} \Theta_t = \check{f}w_t + \check{h}w_t^L + \check{h}w_t^K$$

Financial Wealth: 
$$\check{f}w_t = \frac{1}{\pi_t g} \left[ i_{t-1} \check{b}_{t-1} + i_{t-1}^* \varepsilon_t \check{f}_{t-1} e_{t-1} \right]$$

Human Wealth 1: 
$$\check{h}w_t^L = \left( n(1 - \psi)(\check{w}_t(1 - \tau_{L,t})) \right) + \frac{\theta \chi g}{r_t} \check{h}w_{t+1}^L$$

Human Wealth 2: 
$$\check{h}w_t^K = \left( \sum_{j=N,T,D,R,U,M} \check{d}_t^j - \check{\tau}_{T,t} \right) + \frac{\theta g}{r_t} \check{h}w_{t+1}^K$$

Inverse of MPC: 
$$\Theta_t = \frac{p_t^R + \tau_{c,t}}{\eta^{OLG}} + \frac{\theta j_t}{r_t} \Theta_{t+1}$$

- Large discount factors = **highly non-Ricardian**.

# Optimal Consumption - The Intuition

Example: Debt increase through initially lower taxes.

- Lower taxes today, higher taxes tomorrow.
- Government: *Unchanged PDV of taxes at the market interest rate  $r_t$ .*
- Households: *Higher PDV of human wealth evaluated at subjective interest rate  $r_t/\theta$  or  $r_t/\theta\chi$ .*
  - Short run effect: Higher consumption.
  - Long run effect: Lower consumption.
- Government debt that today's households do not expect to repay themselves (through taxes) is net wealth.
- More household myopia  $\implies$  government debt represents more net wealth.

# The Infinite Horizon Representative Agent Alternative

- Changed assumptions:
  1. *OLG* households replaced by infinitely lived households:  $\theta = \chi = 1$ .
  2. *LIQ* households have a higher population share: 50% instead of 33%.
  3. Steady state net foreign assets pinned down by an upward sloping supply curve of international funds.

- New consumption Euler equation:
$$\check{c}_{t+1}^{OLG} = \frac{j_t}{g} \check{c}_t^{OLG}$$

## 2.2 Other Agents

### 2.2.1 Liquidity Constrained Households

- Intratemporal budget constraint = **highly non-Ricardian**.

### 2.2.2 Manufacturers ( $N = \text{Nontraded}$ , $T = \text{Traded}$ )

- **FOC**. Standard except capital Euler equation, which features an equity premium due to myopia.

### 2.2.3 Unions

- **FOC**: Sticky wage inflation.

### 2.2.4 Import Agents

- **FOC**: Sticky import price inflation. For local currency pricing.

### 2.2.5 Distributors

- **FOC:** (i) Sticky final goods inflation. (ii) Factor demands with sluggish adjustment of imports.

### 2.2.6 Retailers

- **FOC:** Sluggish sales adjustment.

## 2.3 Government

### 2.3.1 Fiscal Policy

- Government Budget Constraint:

$$\check{b}_t = \frac{i_{t-1}}{\pi_{tg}} \check{b}_{t-1} - \check{s}_t$$

$$\check{s}_t = \tau_{L,t} \check{w}_t L_t + \tau_{c,t} \check{C}_t - \check{G}_t^{cons} - \check{G}_t^{inv}$$

- Fiscal Policy Rule: Exogenous path  $\check{r}_t$  for government surplus to GDP ratio, which automatically stabilizes debt:

$$\frac{\check{s}_t - \frac{(i_{t-1}-1)\check{b}_{t-1}}{\pi_{tg}}}{\check{gdp}_t} = \frac{-\check{b}_t + \frac{\check{b}_{t-1}}{\pi_{tg}}}{\check{gdp}_t} = \check{r}_t$$

- Implementation: Endogenous adjustment of tax rates or expenditure items.

## 2.3.2 Monetary Policy

- Inflation Forecast Based Rule:

$$i_t = (i_{t-1})^{\mu_i} \left( r_t^{smooth} \pi_{t+1} \right)^{1-\mu_i} \left( \frac{\pi_{t+1}}{\bar{\pi}} \right)^{(1-\mu_i)\mu_\pi} \left( \frac{g\check{d}p_t}{g\check{d}p_{t-1}} \right)^{(1-\mu_i)\mu_{ygr}}$$

$$r_t^{smooth} = (r_{t-1}r_t r_{t+1})^{\frac{1}{3}}$$

- Equilibrium real interest rate  $r_t^{smooth}$  can change permanently due to fiscal policy.
- Output growth but no output gap: Because steady state output also depends on fiscal policy.

### 3 MODEL CALIBRATION FOR U.S./RW

- Annual version of the model.
- Liquidity constrained agents share: 33% in U.S. (50% in infinite horizon alternative), 50% in RW.
- 10-year planning horizon ( $\theta = 0.9$ ): Based on  $d(r)/d(100*Debt/GDP) = 4$  basis points (empirical evidence).
- 20-year average remaining working life ( $\chi = 0.95$ ).
- Government share coefficient in production function =  $\alpha_G = 0.1$ : To give elasticity of  $GDP$  w.r.t.  $K^G$  of 0.14 as in the literature.

## 4 Useful Steady-State Relationships

- Government Deficit (interest inclusive) and Government Debt:

$$\frac{govdef}{gdp} = \frac{g\pi - 1}{g\pi} * \frac{gdebt}{gdp} = 0.0341 * \frac{gdebt}{gdp}$$

- Current Account Deficit and Net Foreign Liabilities:

$$\frac{curdef}{gdp} = 0.0341 * \frac{nfl}{gdp}$$

- 10 percentage point increase in stock ratio  $\implies$  0.34 percentage point increase in flow ratio.

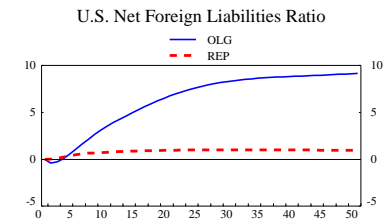
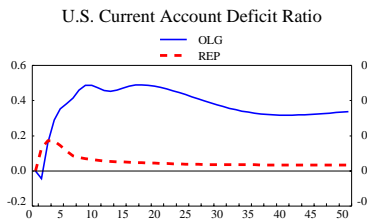
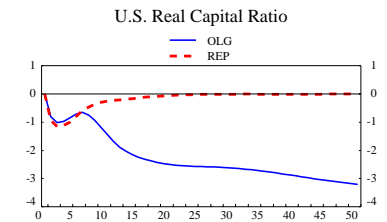
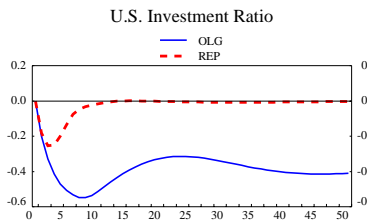
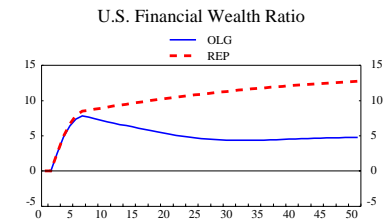
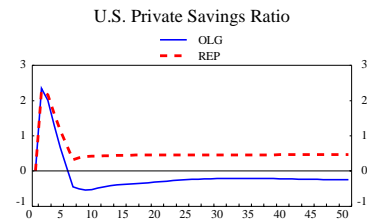
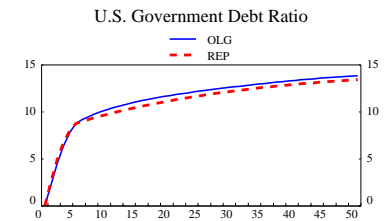
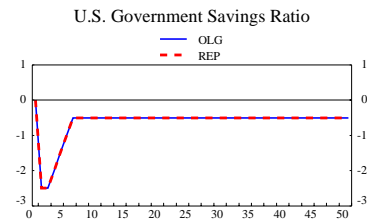
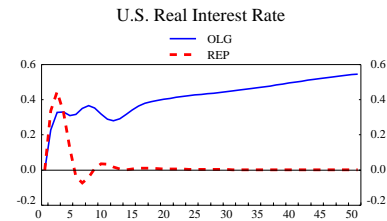
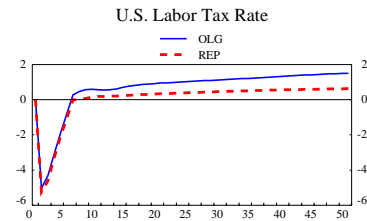
- *REP* model (even with *LIQ* agents): Consumers save sufficiently to pay future taxes  $\implies$  NFL independent of government debt  $\implies$  Long-run NFL must be exogenously imposed.
- *FH* (finite horizon) model: Consumers do not save sufficiently to pay future taxes  $\implies$  Investment in government debt crowds out investment in ...
  - physical capital  $\implies$  GDP contraction.
  - foreign assets  $\implies$  current account deficits.
- Therefore:

$$govdef \uparrow \implies gdebt \uparrow \implies nfl \uparrow \implies curdef \uparrow$$

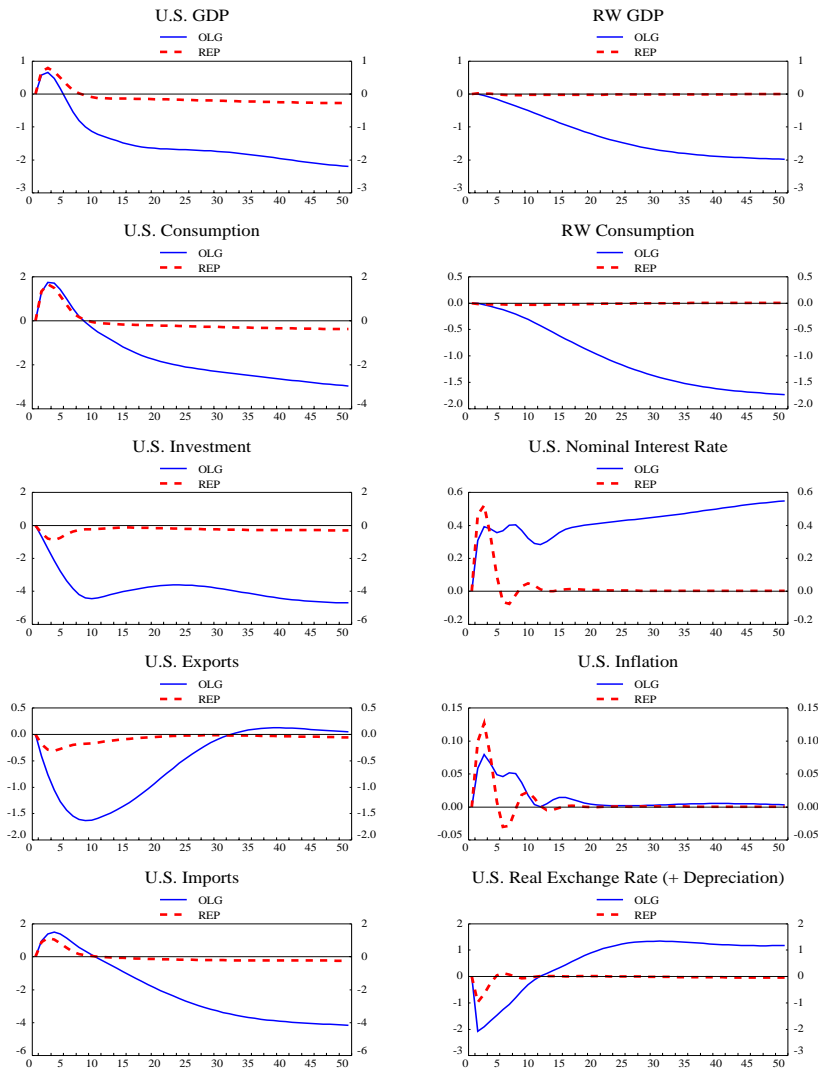
## 5 U.S. Tax Cut: OLG versus REP

- In both models government debt/GDP rises by 14.7 percentage points in the long run.
- Labor tax rates fall in the short run and rise in the long run. In the *OLG* model they rise much more because:
  1. Real interest rates rise and make debt service more expensive.
  2. Crowding out reduces the tax base.
- *Short-run* effects of both models are strikingly similar.
- *Long-run* effects of both models are completely different.

- *Long-run* effects of both models are completely different.
  - *REP*: *Higher* U.S. private savings rate after 5 years (complete Ricardian offset)  $\implies$  NFL never changes by much.
  - *OLG*: *Lower* U.S. private savings rate after 5 years  $\implies$  Big drop in U.S. and therefore world savings  $\implies$ 
    1. Higher world real interest rate  $\implies$  crowding out of physical capital.
    2. Higher U.S. NFL  $\implies$  higher U.S. current account deficit.



## Permanent Increase in Government Debt in OLG and REP - Part I

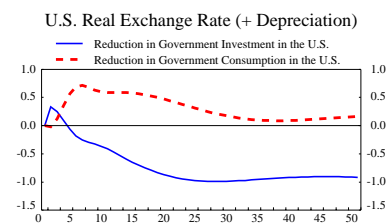
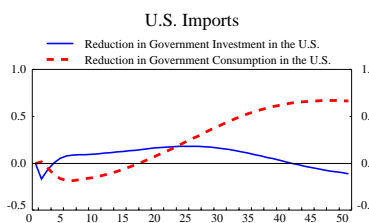
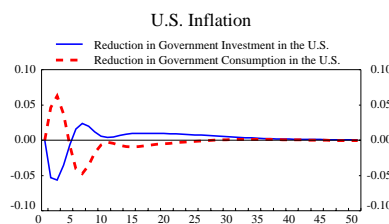
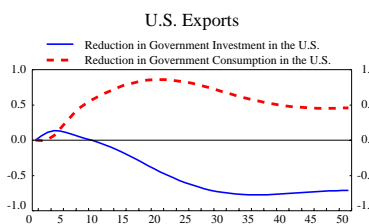
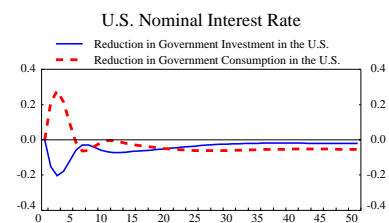
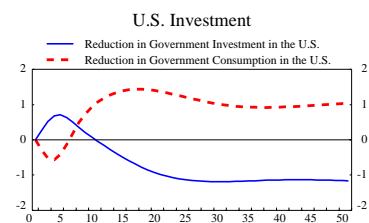
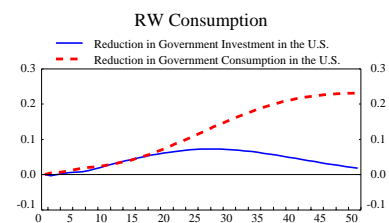
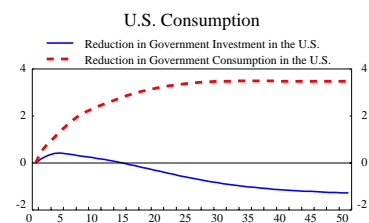
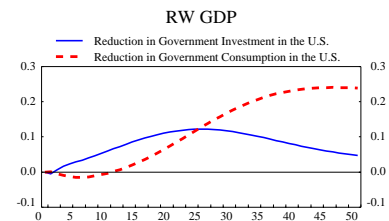
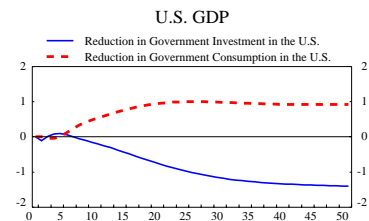


## Permanent Increase in Government Debt in OLG and REP - Part II

- Conclusion: Fiscal deficits may have contributed to the further U.S. CA deterioration since 2000.
- Main CA effects may still be to come (NFL takes time to build up).
- Resolving global imbalances: Improvement in U.S. fiscal deficits should be a part of the policy package.
- How can it be done?
  1. Higher taxes: Simply the reverse of the above.
  2. Government spending cuts: Next section.
- Will it be enough?
  - The role of private sector savings: Final section.

## 6 Government Spending Cuts

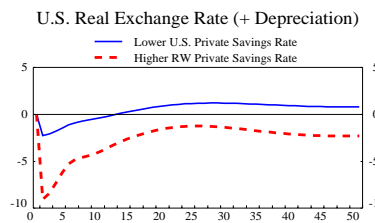
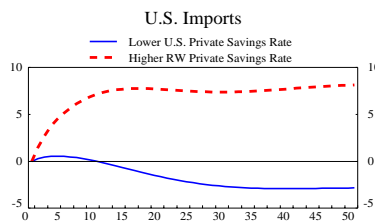
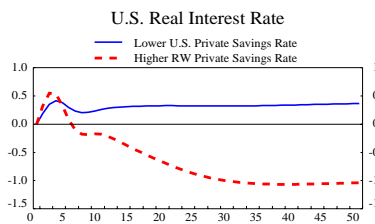
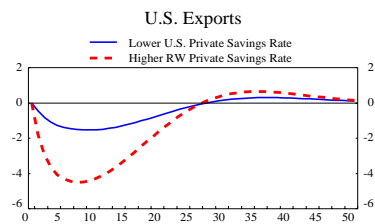
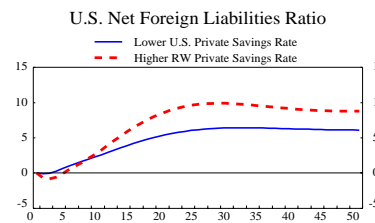
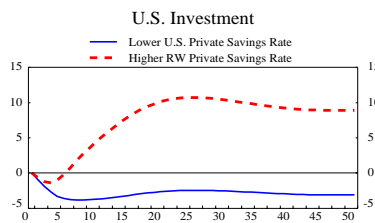
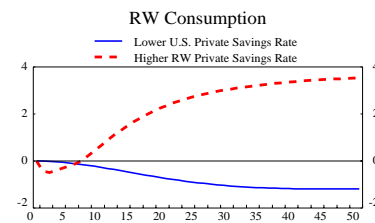
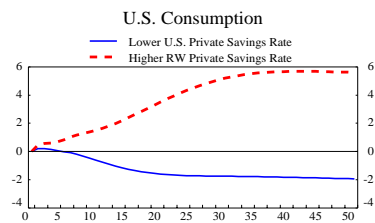
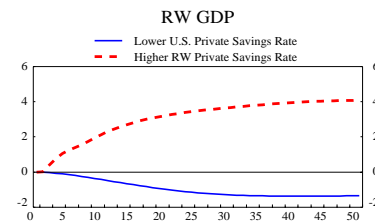
- Compare cuts to government consumption (wasteful) and government investment (output generating).
- Both stimulate private consumption demand in the short run.
- But the long run effects on GDP go in opposite directions:
  - Lower government consumption increases GDP.
  - Lower government investment decreases GDP.



# Cut in Government Investment versus Consumption

## 7 Private Sector Savings Behavior

- **Lower U.S. private savings:** Similar effects to lower U.S. public savings.
- **Higher RW private (or public) savings:** Explains the combination of
  1. Global current account imbalances.
  2. Low world real interest rates  $\implies$  Absence of U.S. or world contraction despite low U.S. savings.



Lower U.S. Rate of Time Preference and Higher RW Rate of Time Preference

## 8 Conclusions and Future Research

- **Policy:** U.S. fiscal consolidation can play an important role in reducing global current account imbalances.
- **Theory:** Infinite horizon models are ill-equipped to deal with issues that involve permanent changes in public or private sector savings rates.
- **Future Research:**
  - Interactions between monetary and fiscal policies.
  - Business cycle stabilization through fiscal policy:
    1. Structural fiscal balance rules for raw materials exporters (Chile).
    2. Optimized fiscal policy rules for a monetary union (Europe).
  - Bayesian estimation that allows for shocks to savings rates.