Fiscal Consolidation Strategies

John B. Taylor[1], Volker Wieland[2], Maik Wolters[2]

[1]Hoover Institution and Stanford University

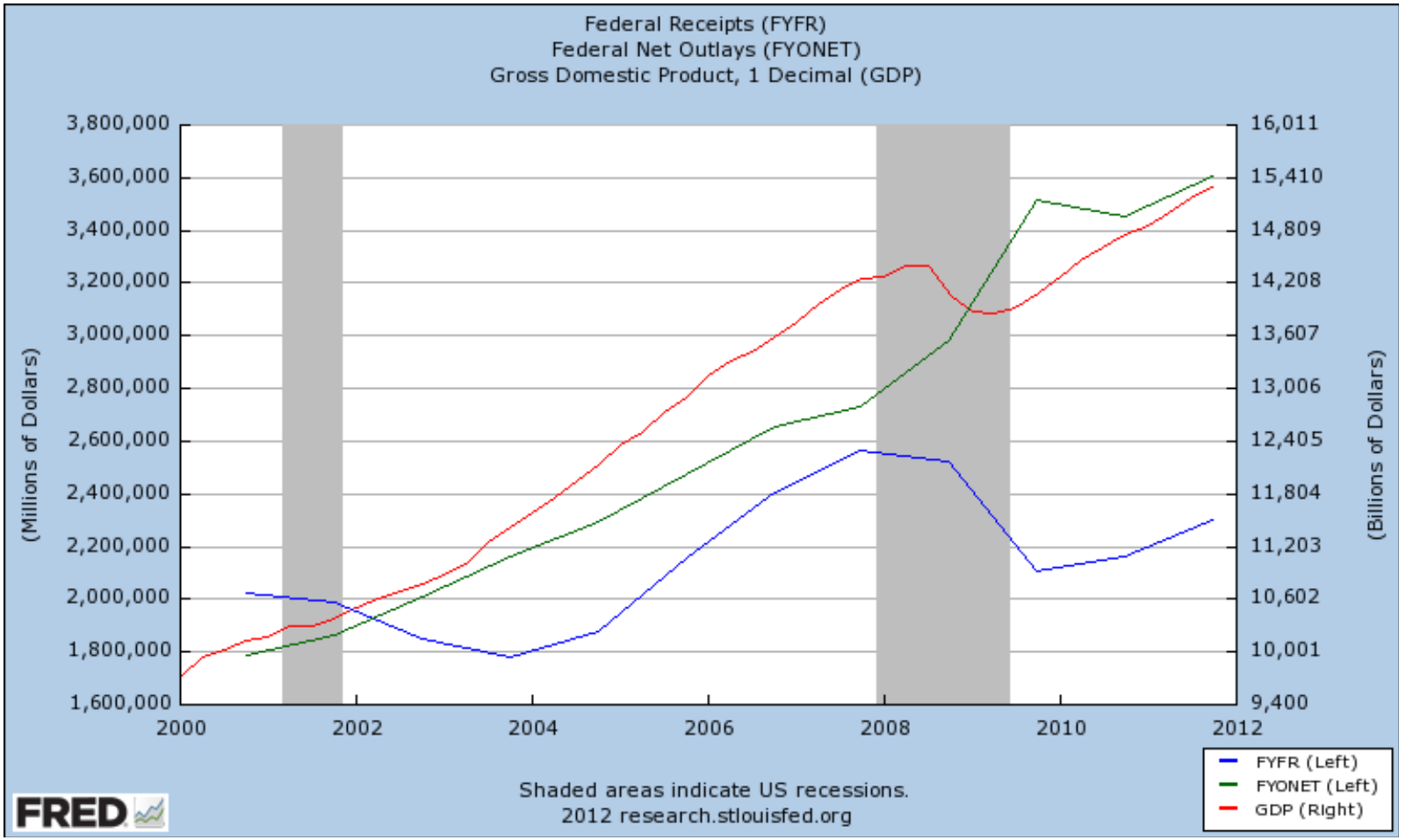
[2]Goethe University Frankfurt and Institute for Monetary and Financial Stability

Fiscal Policy in the Aftermath of the Financial Crisis
Brussels, March 2-3, 2012

U.S. fiscal developments after the financial crisis

- Financial crisis and recession have led to substantial government deficits and debt
- Recession → lower GDP and tax revenues
- Higher government outlays (purchases, transfers, stimulus +automatic)
- Higher expenditure-to-GDP ratio is projected to persist!

Federal Outlays, Federal Receipts and GDP



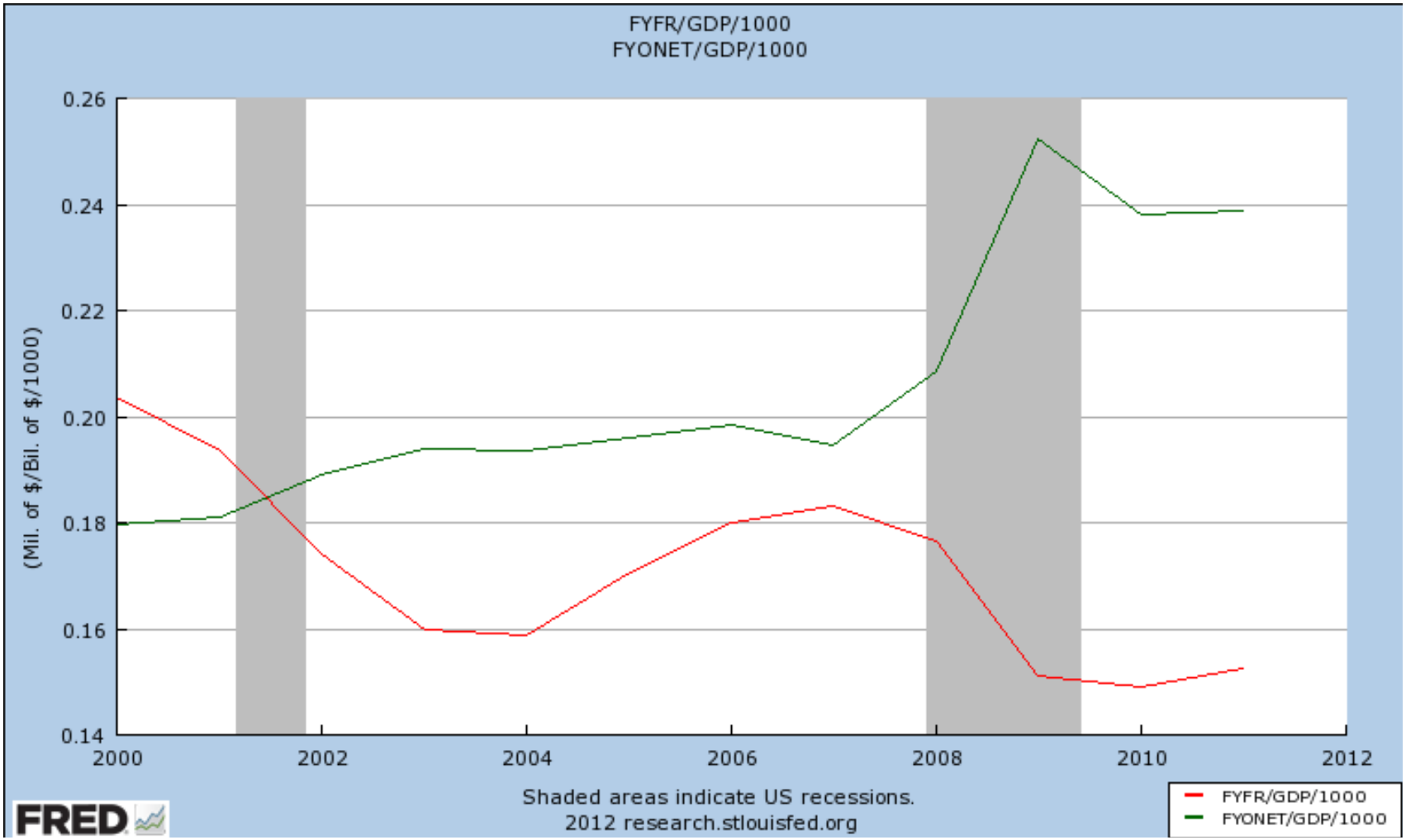
Blue: Federal Receipts (FYFR), Annual, Fiscal Year

Green: Federal Net Outlays (FYONET)

Red: Gross Domestic Product

Source: FRED Economic Data, St. Louis Fed

Federal Outlays/GDP and Federal Receipts/GDP

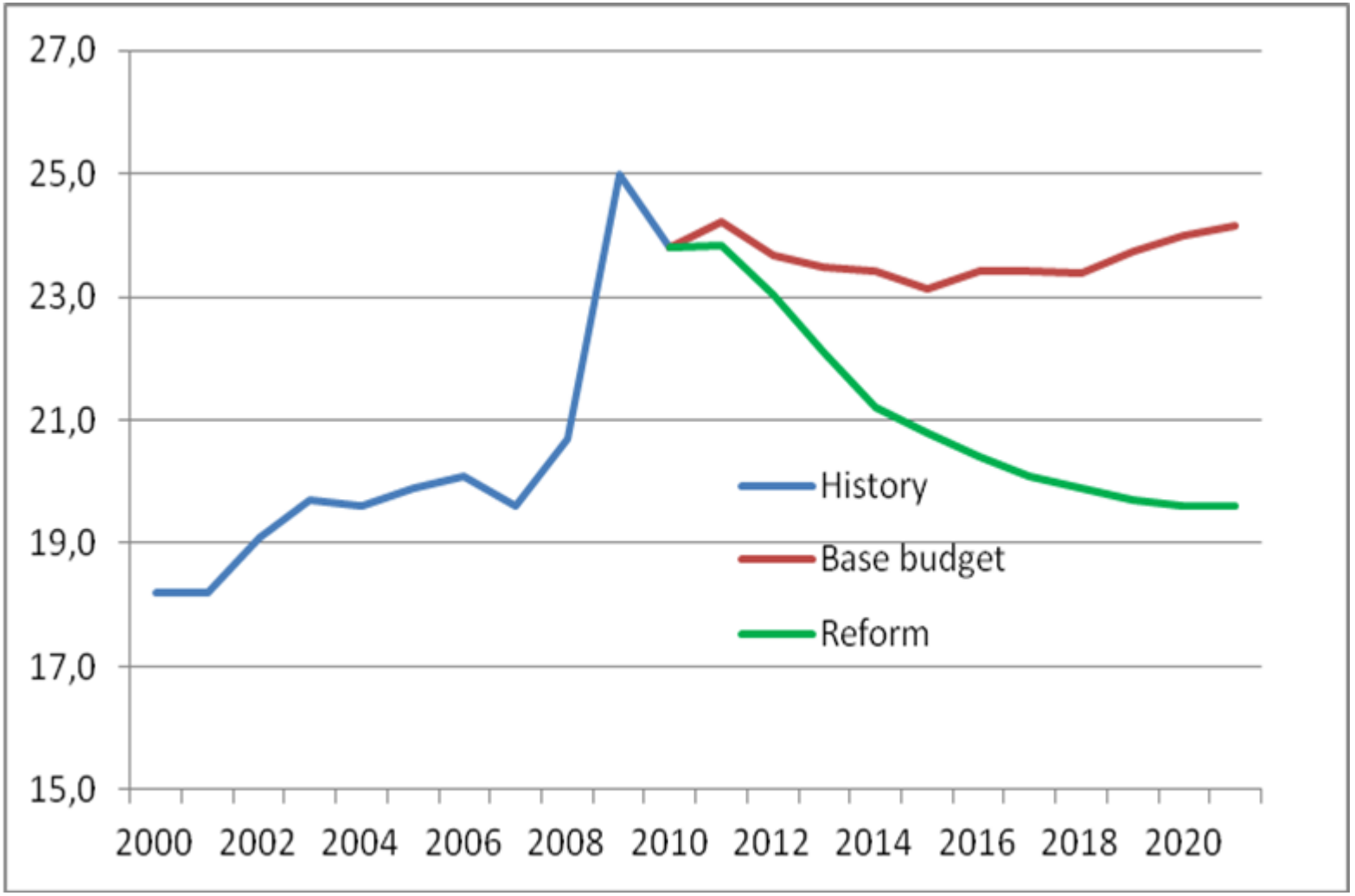


Red: Federal Receipts (FYFR), Annual, Fiscal Year divided by Gross Domestic Product

Green: Federal Net Outlays (FYONET) divided by Gross Domestic Product

Source: FRED Economic Data, St. Louis Fed

Outlays/GDP (CBO Forecast 2011)



Need for fiscal consolidation

- Higher spending has to be financed
- Currently: increased debt
- Increase of taxes in the future → distortionary taxes may dampen economic activity for a long time
- Proposal: Return outlays to GDP to pre-crisis levels

Need for model-based analysis

- We cannot simply choose paths for government spending *G*, transfers *TR* and taxes.
- Outlays/GDP ratio is also influenced by endogenous response of the economy.
- Need a structural economic model to explain endogenous response to specific modificiations to the fiscal regime.

From simple models to large DSGE models used at policy institutions

- Flexible prices with constant trend output. G/Y down, C/Y and I/Y up.
- Long-run: Simple neoclassical growth model.
  - (King-Plosser-Rebelo 1988, Ljunqvist-Sargent 2004)
- DSGE: Cogan-Cwik-Taylor-Wieland (2010)
  - Christiano-Eichenbaum-Evans 05 with Smets-Wouters modifications and estimation, extended with rule-of-thumb consumers.
- DSGE: Coenen-McAdam-Straub (2008), 2 countries, detailed government sector, …

Neoclassical model

- Used to review long-run effects of permanent changes in fiscal regime.
- Government purchases, lump-sum taxes and transfers, consumption tax rate, labor income and capital tax rates.

$$\tau_{ct},\ \tau_{lt},\ \tau_{kt},\ \tau_{ht},\ g_t$$

Households

- Households maximize:

$$\sum_{t=0}^{\infty} \beta^t U(c_t, l_t), \quad \beta \in (0,1) \qquad U(c_t, l_t) = \frac{c_t^{1-\sigma_1}}{1-\sigma_1} - \frac{l^{1+\sigma_2}}{1+\sigma_2}$$

- Household budget:

$$\sum_{t=0}^{\infty} \{p_t(1+\tau_{ct})c_t + p_t i_t\} \leq \sum_{t=0}^{\infty} \{r_t(1-\tau_{kt})k_t + w_t(1-\tau_{lt})l_t - p_t\tau_{ht}\}$$

Government budget

$$\sum_{t=0}^{\infty} p_t g_t \leq \sum_{t=0}^{\infty} \left\{ \tau_{ct} p_t c_t + r_t \tau_{kt} k_t + w_t \tau_{lt} l_t + p_t \tau_{ht} \right\}$$

Production, capital, investment

- Technology: $y_t = F(k_t, l_t) = k_t^{\alpha} l_t^{(1-\alpha)}$
- Capital accumulation: $k_{t+1} = (1-\delta)k_t + i_t$
- Market clearing: $y_t = c_t + i_t + g_t$
- Perfect foresight, perfect competition

Calibration

- $\beta = 0.95$
- $\sigma_1 = 2$
- $\sigma_2 = 2$ → labor supply elasticity = 0.5
- $\tau^C = 7.7\%$
- $\tau^N = 22.5\%$ $(\tau^N + \tau^{W_h} = 15.4\% + 7.1\%$ in NAWM)
- $\tau^K = 18.41\%$
- $\tau^h =$ residual

Solution

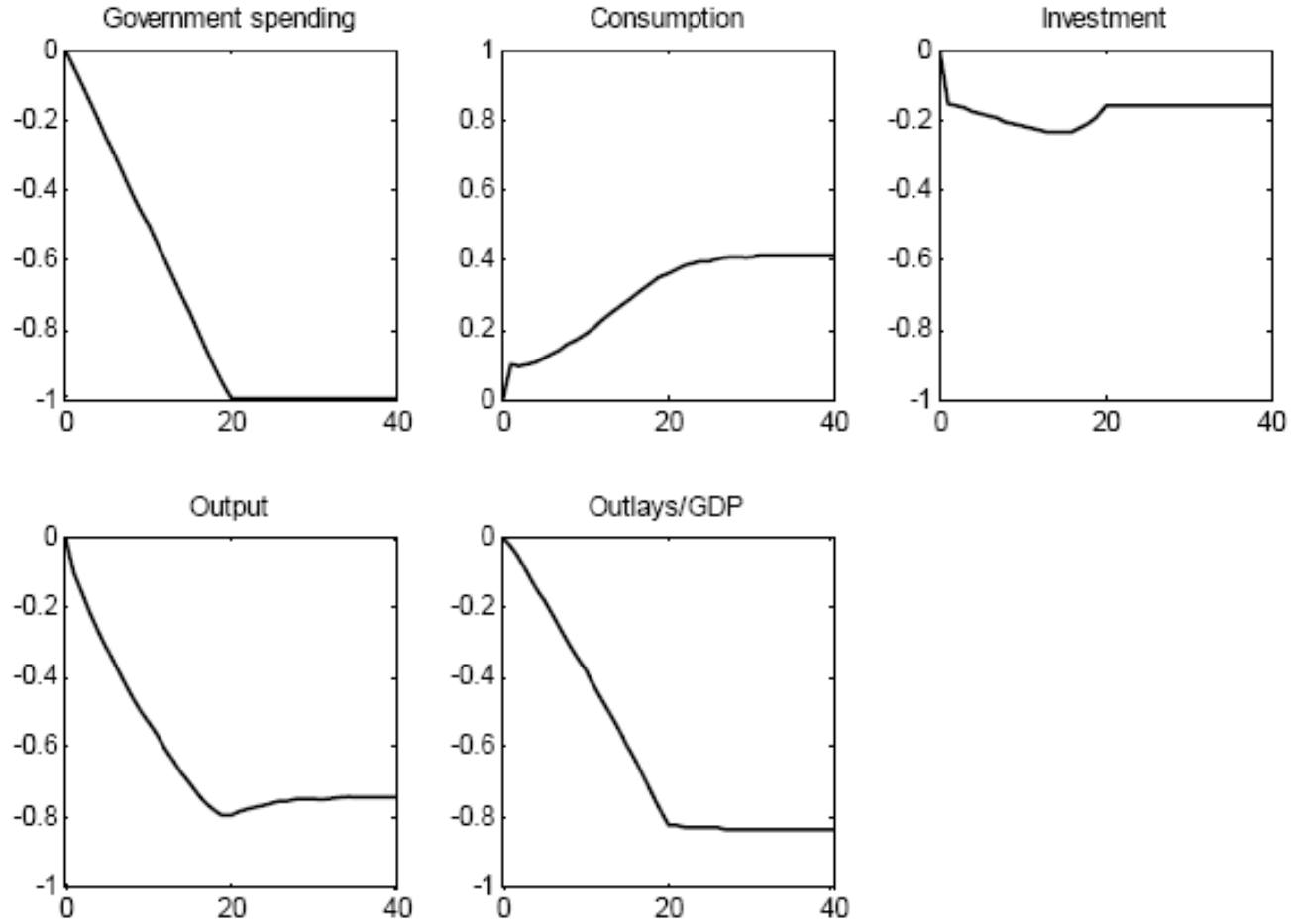
Euler equation: $c_t^{-\sigma_1} = \beta c_{t+1}^{-\sigma_1} R_{t+1}$

$$R_t = \frac{(1+\tau_{ct})}{(1+\tau_{ct+1})}\left[(1-\delta)+(1-\tau_{kt+1})\alpha\left(\frac{k_{t+1}}{l_{t+1}}\right)^{\alpha-1}\right]$$

Labor/leisure: $\frac{l_t^{\sigma_2}}{c_t^{-\sigma_1}} = \frac{(1-\tau_{lt})}{(1+\tau_{ct})}(1-\alpha)\left(\frac{k_t}{l_t}\right)^{\alpha}$

Capital accu.: $k_{t+1} = k_t^{\alpha} l_t^{1-\alpha} + (1-\delta)k_t - c_t - g_t$

Reduction of goverment consumption



A permanent reduction in government spending:
-1% of GDP, phased-in over 5 years
Variables are measured as $\frac{X_1}{GDP_1}\frac{X_t - X_1}{X_1}100$

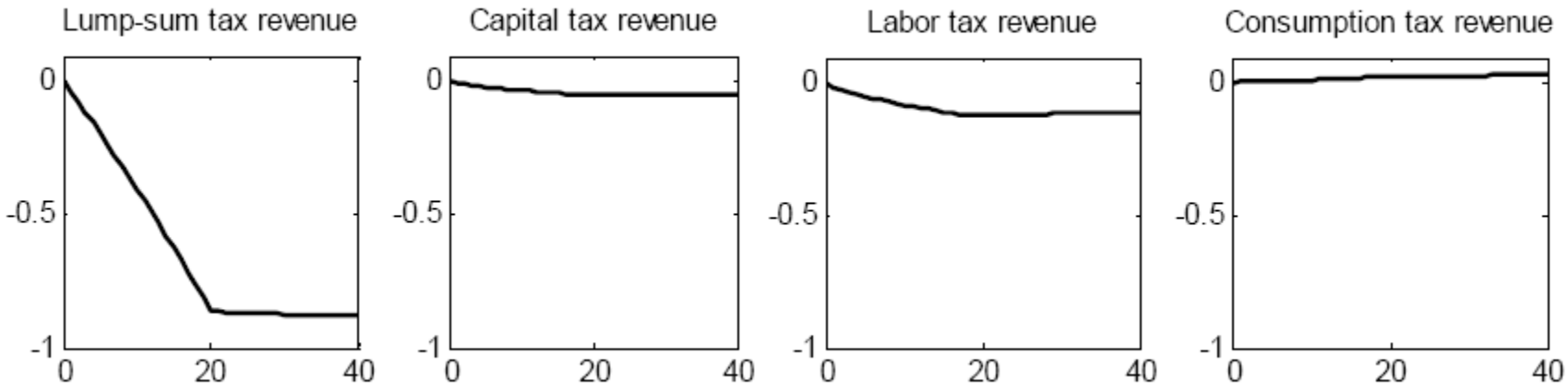
Reduction of goverment consumption

- Distortionary tax rates are unchanged
  - Implies a reduction in per-capita lump-sum taxes
  - Boost to households‘ life-time income
  - Increase consumption
  - Increase leisure

Depends crucially on the labor supply elasticity

  - Output falls (see Aiyagari et al., 1992, for analysis of positive income on leisure effect)
  - Capital and investment decline

Implications for government budget



- Almost all of the savings are used to decrease lump-sum taxes

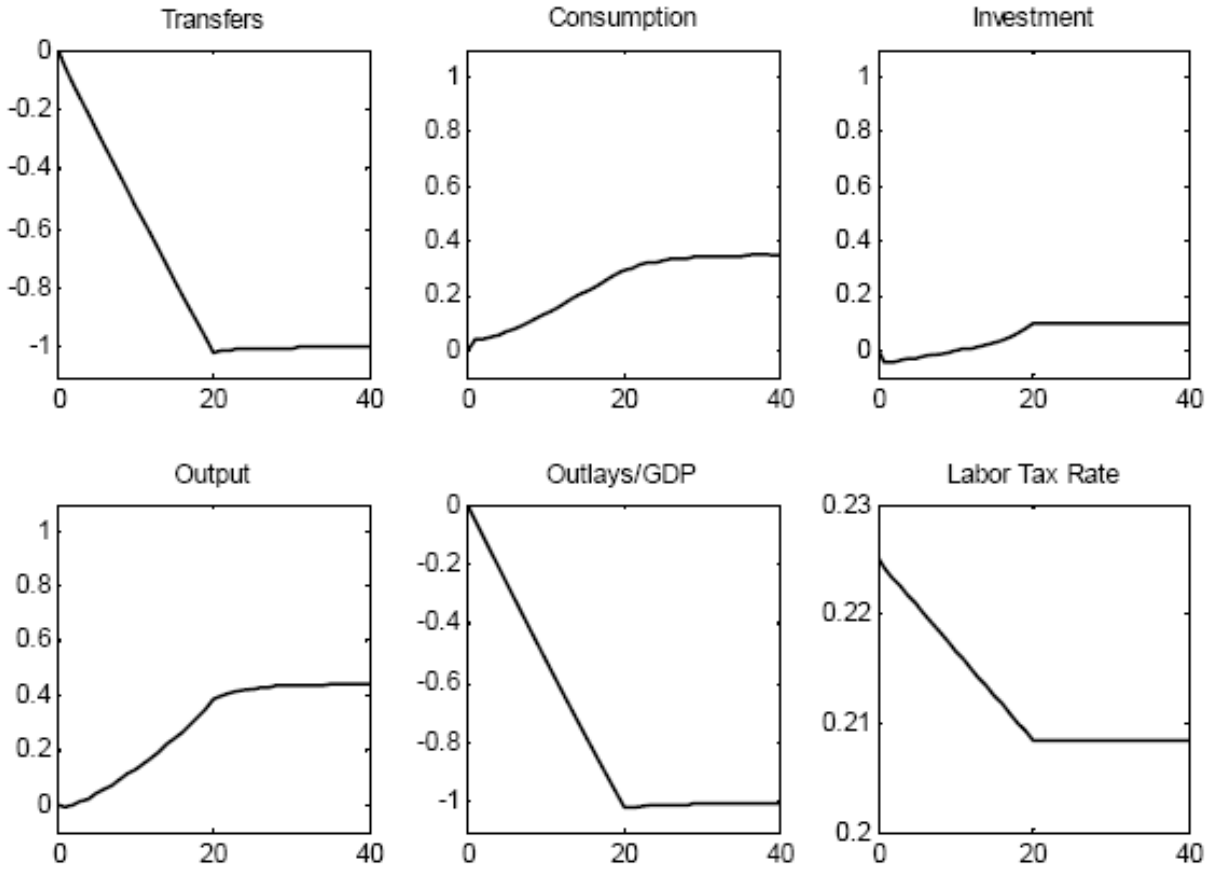
Reduction in transfers

- $\tau_{ht} = g_t - (\tau_{ct} c_t + r_t / p_t \tau_{kt} k_t + w_t / p_t \tau_{lt} l_t)$

- Reduction in transfer needs to be offset by another tax rate or government spending

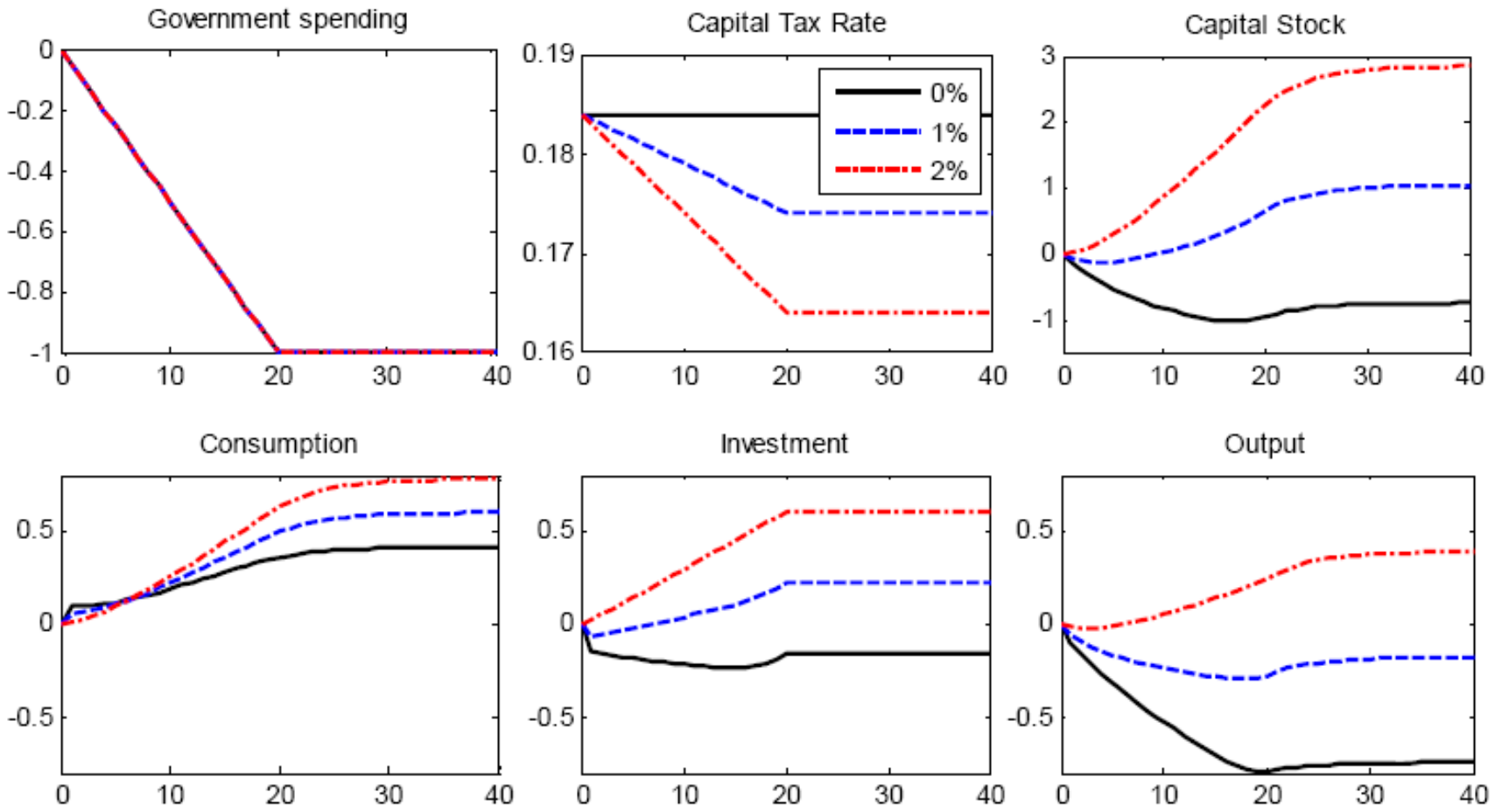
- Reduce income tax so that a decrease in transfers by 1% of GDP is achieved

Reduction in transfers and labor income tax



A permanent reduction in transfers with savings applied to labor taxes:
-1% of GDP, phased-in over 5 years
Variables are measured as $\frac{X_1}{GDP_1}\frac{X_t - X_1}{X_1}100$

Reduction of distortionary taxes: capital tax

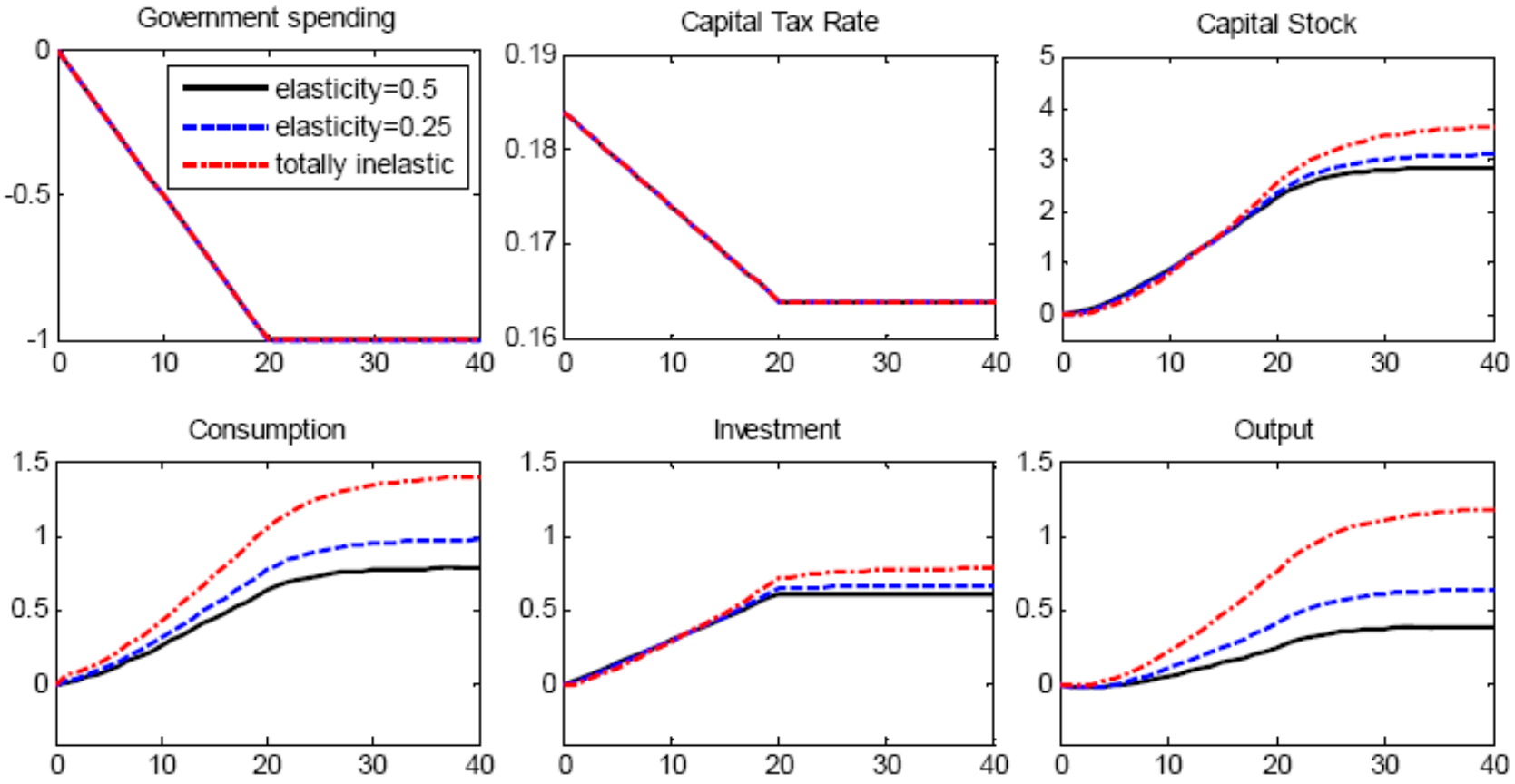


G reduced by 1% of GDP, capital tax by 1 and 2 percentage points

Sensitivity to the labor supply elasticity

- DSGE: 0.5 (Smets & Wouters, Coenen et al)
- Microevidence: 0.75 (Chetty et al, 2011)
- RBC literature: 4 (King and Rebelo, 1999), 2.61 (Cho and Cooley, 1994)
- Micro vs Macro: Heterogeneity of elasticities for different demographic groups
- Current situation: extensive margin for quitting a job is likely very low given the high unemployment rate

The role of the labor supply elasticity



Government consumption and household utility

- Some categories of government consumption might provide utility to households: infrastructure, policy, fire protection, national defence, education...

$$\sum_{t=0}^{\infty} \beta^t U(\tilde{c}_t, l_t), \quad \beta \in (0,1)$$

$$\tilde{c}_t = \tilde{c}_t(c_t, g_t) = \left[\alpha c_t^{\gamma} + (1-\alpha) g_t^{\gamma}\right]^{1/\gamma}, \quad \gamma \in (-\infty, 1), \ \alpha \in (0,1)$$

  – Amano-Wirjanto 1998, Linnemann-Schabert 2004

Public and private goods

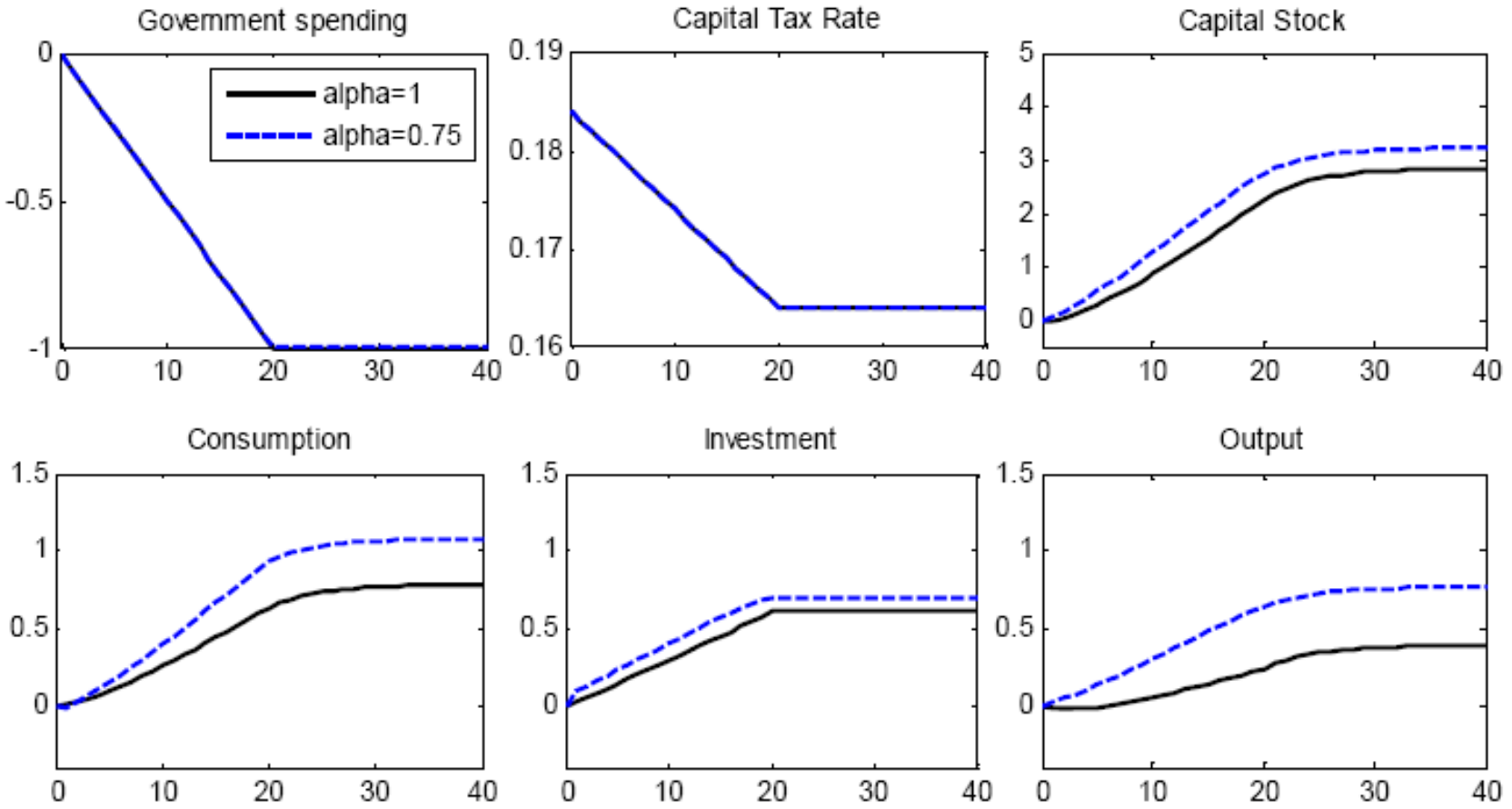
Amano and Wirjanto (1998) estimate $\gamma=0.36$

➔ private and public goods are substitutes

We then consider different values of α in simulation.

no private utility from g: $\alpha=1$

Government consumption and household utility



A permanent reduction in *G* and a decrease of the capital tax rate

Transition to new steady state in models with short run frictions

- We consider 2 state-of-the art medium size DSGE models
  - Cogan et al (2010): version of Smets & Wouters with rule-of-thumb consumers
  - Coenen et al (2008): ECB‘s New Area Wide Model (NAWM), two country model with rich fiscal sector

Cogan et al (2010)

- Christiano-Eichenbaum-Evans (2005) with Smets-Wouters 2007 modifications.
- Parameters are estimated with Bayesian methods and data as in Smets-Wouters.
- Extension to include also households that choose to consume their current income (28,5%).
- No Ricardian-equivalence, reaction function for lump-sum taxes to government debt.

Coenen-McAdam-Straub 2008 (NAWM)

- Two-country model covering the U.S. and euro area economies (blue-print for ECB‘s NAWM)
- 2 economies are largely symmetric, but differ in size.
- Same fiscal instruments as in neoclassical model + government debt and money supply
- Transfers are differently distributed than lump-sum taxes.

Fiscal sector in NAWM

Government Budget:

$$P_{G,t}G_t + TR_t + B_t + M_{t-1} = \tau_t^C P_{C,t}C_t + \tau_t^N (W_{I,t}N_t^I + W_{J,t}N_t^J)$$
$$+ \tau_t^K (R_{K,t}u_t - (\Gamma_u(u_t) + \delta)P_{I,t})K_t$$
$$+ \tau_t^{W_h} (W_{I,t}N_t^I + W_{J,t}N_t^J) + \tau_t^{W_f} W_t N_t$$
$$+ T_t + R_t^{-1}B_{t+1} - M_t$$

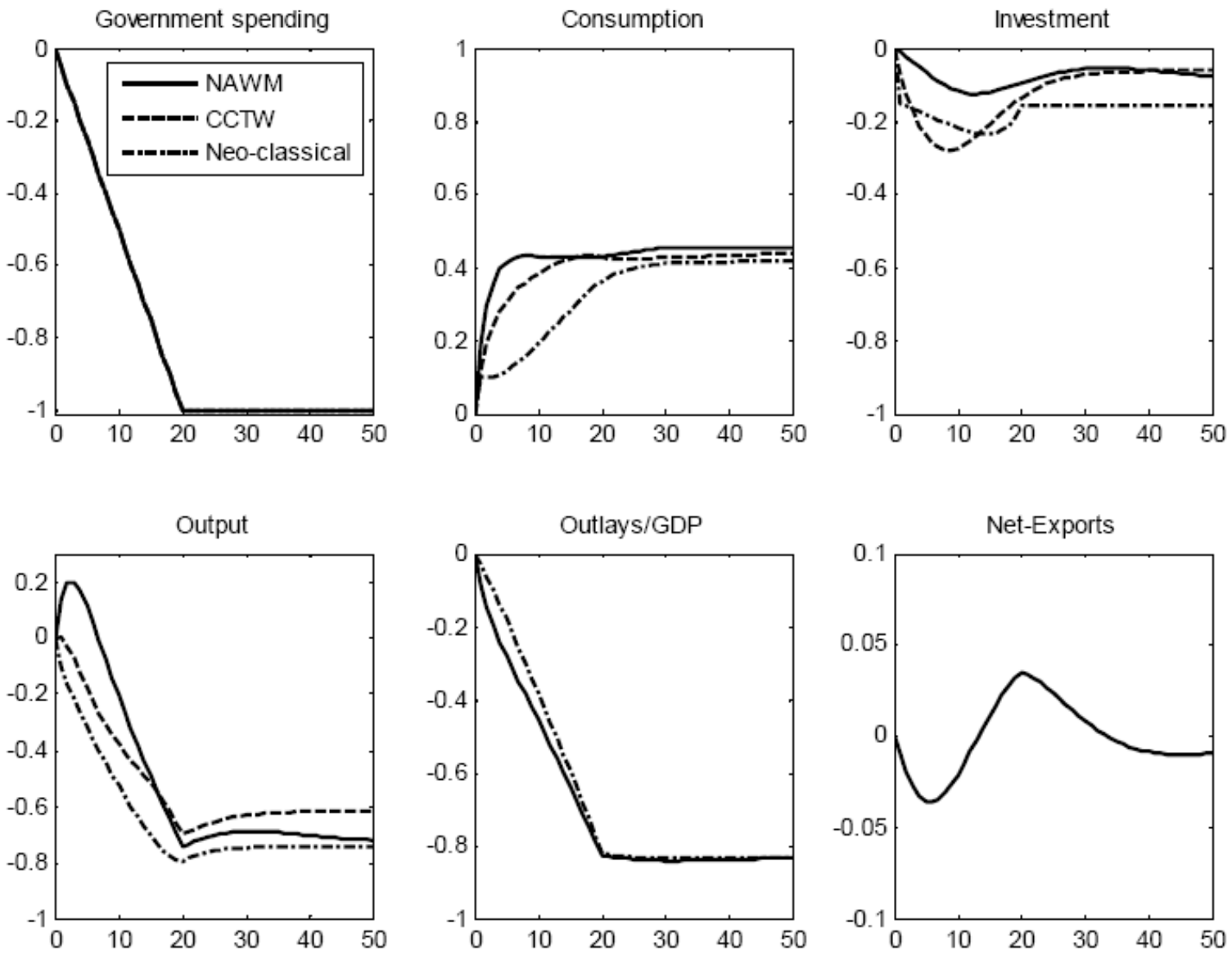
Reaction function of lump-sum taxes:

$$\frac{T_t}{P_{y,t}Y_t} = \phi_{B_Y}\left(\frac{B_t}{P_{y,t}Y_t} - B_Y\right)$$

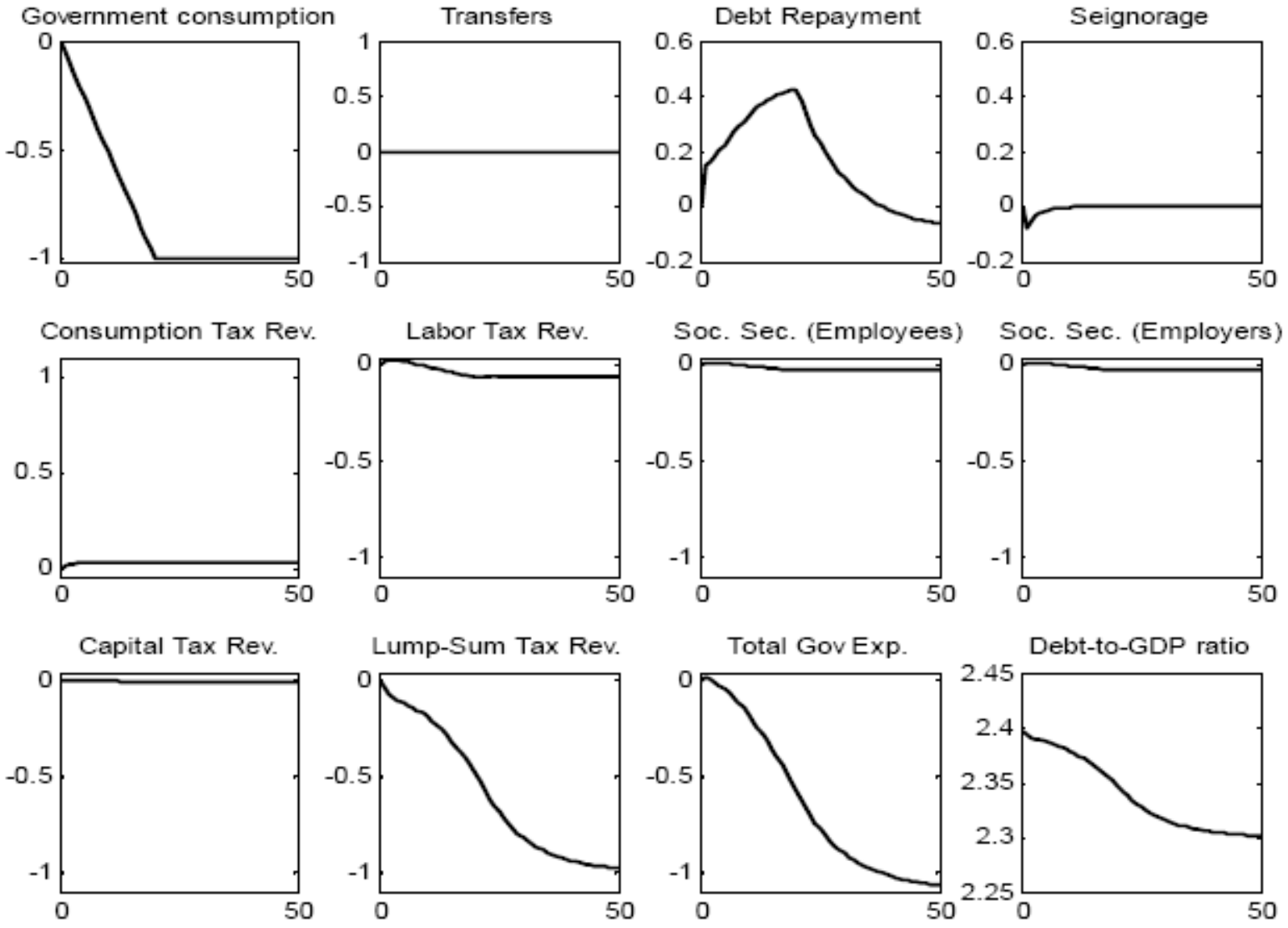
NAWM Parametrization

- Labor supply elasticity: 0.5
- Transfer are disributed in ratio 3:1 to households *J* and *I*
  - Households *J*: access to money market only
  - Households *I*: access to bonds, money, capital
- Lump-sum taxes are collected 1:3 for *J* and *I*
- Consumption and investment respond with low sensitivity to changes in the terms of trade.
- $\tau^{C,US} = 7.7\%,\ \tau^{l,US} = 15.4\%,\ ,\ \tau^{W_h,US} = 7.1\%,\ \tau^{W_f,US} = 7.1\%,$
  $\tau^{K,US} = 18.41\%,\ B_Y = 2.4\ \ (= 60\%\,\text{per annual GDP})$

Reduction in government purchases



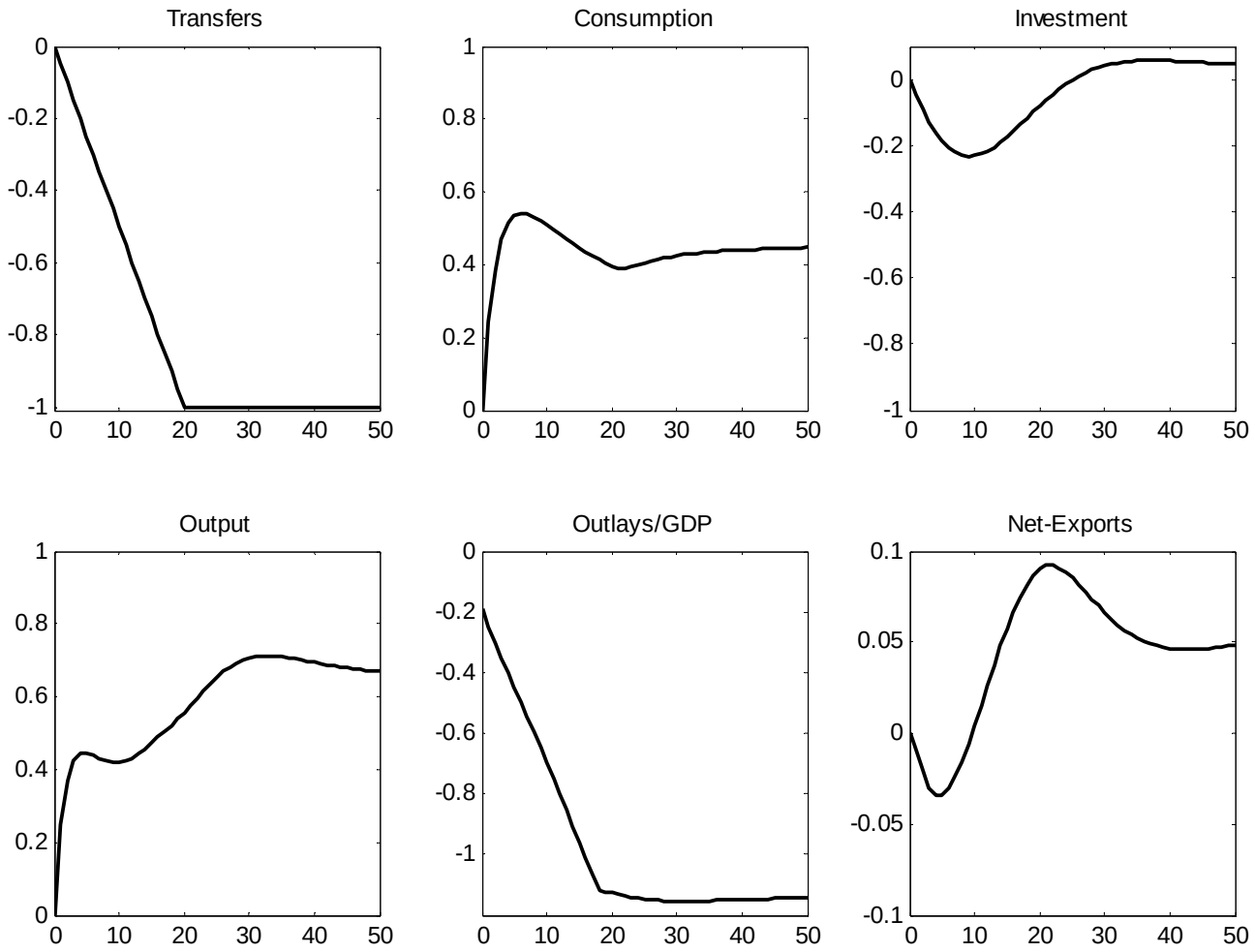
Tax revenues in NAWM



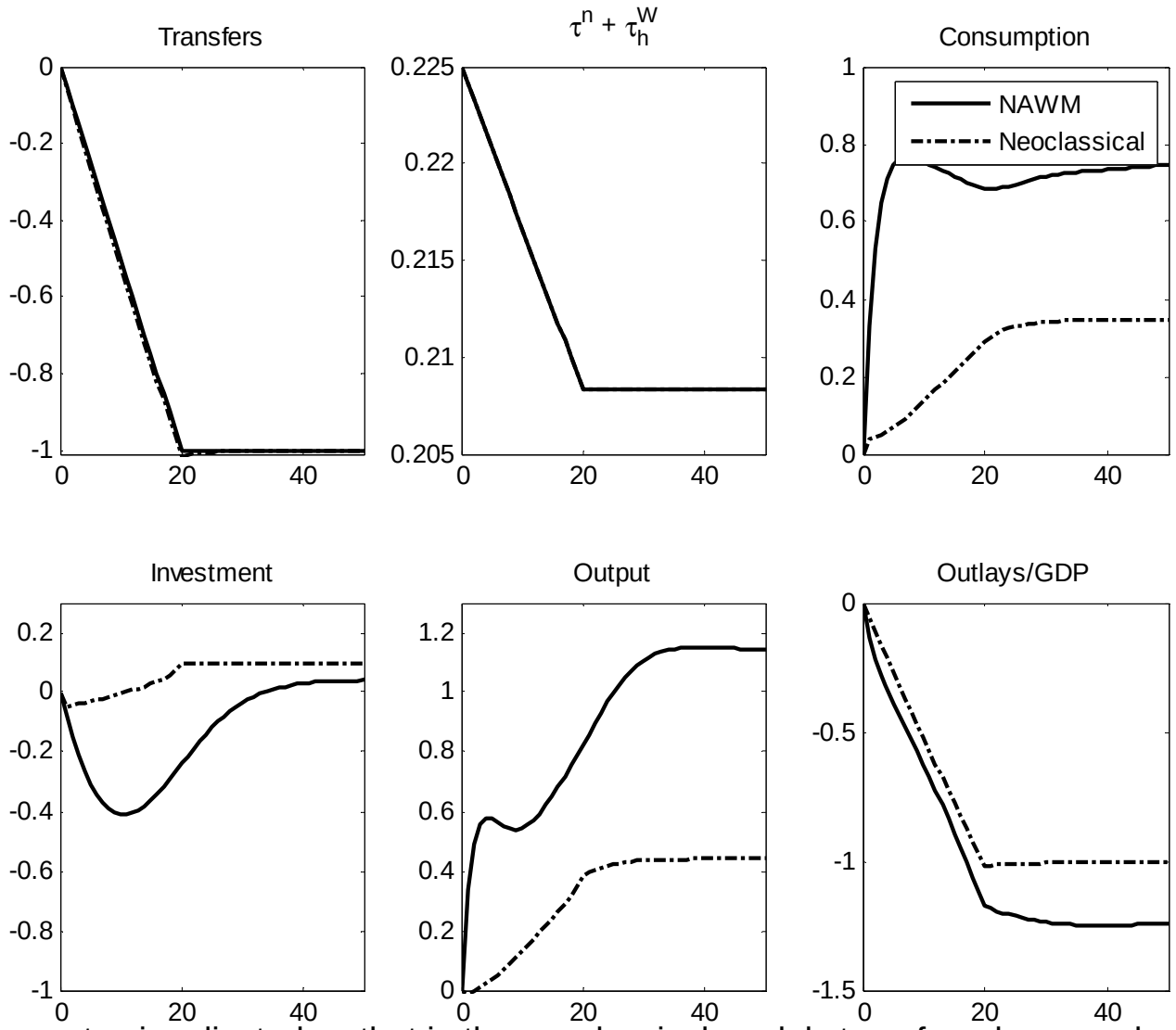
Results from fiscal policy simulations in NAWM

- Reduction of government consumption
  - Quicker reaction of consumption and investment
  - Long run effects very similar to neoclassical model and CCTW (2010)
  - Reduction of government consumption leads to substantial reduction in output
  - Debt-to-GDP ratio is reduced
  - Lump-sum taxes are reduced

Reduction in Transfers in NAWM (lump-sum taxes adjust)



Reduction in Transfers in NAWM and neoclassical model (labor tax adjusts)



- Labor Income tax is adjusted so that in the neoclassical models transfers decrease by 1% of GDP.
- There is an additional slight decrease in lump-sum taxes in the NAWM model.

Results from reduction of transfers

- Joint reduction of transfers and the income tax rate
- Consumption and output increase
- Increase is stronger in the NAWM model
- Investment decreases in the short run
- Outlays-to-GDP ratio is reduced by 1% in the neoclassical model and 1.2% in the NAWM model

Summary

Assessment of different strategies for reducing outlays/GDP ratio.

- Consumption/leisure effects depend strongly on the labor supply elasticity.
- Decrease in *G* leads to a decrease in *Y*
- Decrease in *TR* leads to an increase in *Y*
- Results on G and lump-sum taxes very similary across 3 models, transfers quite different.

Issues and Outlook

- Capital taxes in NAWM (not shown)
- Welfare
- Evolution of government debt
- Design a specific proposal for return to pre-crisis outlays/GDP.
- Include current state as starting point for simulations leading to different long-run steady states.
- Robustness across (estimated) models.