Deficits, public debt dynamics, and tax and spending multipliers

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Themes

- What are the **effects of fiscal austerity**?
- General point: the effects of any given instrument adjustment are **never unambiguously defined** unless we **define the policy regime** in which the adjustment occurs
- Paper calculates effects of short-run and long-run fiscal adjustments
  - Under various financing assumptions
  - Decomposes direct and indirect effects
- Paper compares how fiscal effects change when interest rates hit their lower bound
  - At zero bound, fiscal adjustments may have powerful effects on output
  - Warning: in severe crisis, cutting public spending or raising taxes **may increase the deficit**

Model summary

- The standard New Keynesian pieces:
  - IS curve; AS curve
  - (Sticky prices, flexible wages, no physical capital)
- Government budget constraint:
  - Public spending, income taxes, consumption taxes, lump sum taxes
  - Nominal public debt
- Monetary policy:
  - Inflation peg
  - Subject to zero lower bound

Model summary, continued.

- Crisis scenario
  - Shock to discount factor alters natural real interest rate
  - Zero lower bound may bind
- Simplified infinite-horizon timing
  - "Short run": Persistent preference shock lowers natural interest rate
  - "Short run" ends with probability $1 - \mu$ per period
  - "Long run": deterministic
- Study effects of fiscal adjustments
  - Compare adjustments of spending and taxes
  - Compare nonbinding/binding ZLB in short run
  - Distinguish direct short-run effects of fiscal adjustments ...
  - ... from the effects associated with financing those adjustments

Direct effects of policy changes

First study effects of short-run changes in instruments, without any further distortions.

- **(1). Change one fiscal instrument in the short run**, balance budget by adjusting lump sum taxes
  - Change spending, income taxes, or consumption taxes
  - Calculate short-run effects on output, deficit...
  - ... conditional on nonbinding/binding zero lower bound

Indirect budgetary effects of policy changes

Next, study policy adjustments required for long-term budget balance.

- **(2A.) Change one fiscal instrument in the long run**, balance budget by adjusting lump sum taxes
  - Calculate long-run effects on output
  - Calculate short-run effects on output and deficit with/without ZLB
- **(2B.) Faster debt growth in the short run**, then bring debt back to steady state in long run by **exponentially declining adjustment of one fiscal instrument**
  - Fix long-run half-life of deviations from steady state
  - Calculate long-run convergence path
  - Calculate short-run effect on output with/without ZLB
- **(2C.) Larger primary deficit in the short run**, then bring debt back to steady state in long run by **exponentially declining adjustment of one fiscal instrument**
  - Fix long-run half-life of deviations from steady state
  - Calculate long-run convergence path
  - Calculate short-run effect on output with/without ZLB

Comments on the scenarios compared

- To simplify the algebra, changes in interest payments are assumed financed by lump sum taxes
- Considering this simplification, is it really necessary to distinguish these two?

$$\text{(2B):} \quad \hat{b}_t - \hat{b}_{t-1} = \epsilon \tag{1}$$

$$\text{(2C):} \quad \hat{b}_t - \hat{b}_{t-1} - \frac{\bar{i}\bar{Y}}{\bar{b}}\hat{b}_{t-1} = \epsilon \tag{2}$$

- A more informative alternative might be:
  (2D.) Lower lump-sum taxes in the short run, then bring debt back to steady state in long run by **exponentially declining adjustment of one fiscal instrument**
  - Fix long-run half-life of deviations from steady state
  - Calculate long-run convergence path
  - Calculate short-run effect on output with/without ZLB

Putting the pieces together

Now study a short-run change in government spending financed by long-run adjustments in spending or distorting taxes.

- **Short-run output effect of changing government spending**
  - $\approx$ Direct effect of spending now on output now
  - $+$ Effect of spending now on deficit now
  - $\times$ Effect on output now of paying off later one unit of deficit now (conditional on instruments chosen to pay down the debt)

- That is:

$$\left.\frac{\Delta Y_t}{\Delta G_t}\right|_{TOTAL,\tau^I} \approx \left.\frac{\Delta Y_t}{\Delta G_t}\right|_{(1)} + \left.\frac{\Delta D_t}{\Delta G_t}\right|_{(1)} \times \left.\frac{\Delta Y_t}{\Delta D_t}\right|_{(2C),\tau^I}$$

Calculations for Great Depression ($i = 0$)

- **Short-run output effect of raising government spending**
  (conditional on lowering government spending later)

$$\left.\frac{\Delta Y_t}{\Delta G_t}\right|_{TOTAL,G} \approx \left.\frac{\Delta Y_t}{\Delta G_t}\right|_{(1)} + \left.\frac{\Delta D_t}{\Delta G_t}\right|_{(1)} \times \left.\frac{\Delta Y_t}{\Delta D_t}\right|_{(2C),G}$$

$$\approx 2.2 - 0.3 \times 1.8 = 1.7$$

- **Short-run output effect of raising government spending**
  (conditional on raising income taxes later)

$$\left.\frac{\Delta Y_t}{\Delta G_t}\right|_{TOTAL,\tau^I} \approx \left.\frac{\Delta Y_t}{\Delta G_t}\right|_{(1)} + \left.\frac{\Delta D_t}{\Delta G_t}\right|_{(1)} \times \left.\frac{\Delta Y_t}{\Delta D_t}\right|_{(2C),\tau^I}$$

$$\approx 2.2 - 0.3 \times (-1.9) = 2.8$$

- **Short-run output effect of raising government spending**
  (conditional on raising income taxes later)

$$\approx 2.2 - 0.3 \times 2.2 = 1.5$$

Is this an approximation?

- The formula might seem to have a chain rule in it, but it does not.
- Formula assumes the deficit that must be paid off is the one that would result **if the deficit were to be paid off using lump sum taxes**.
- Is there any reason to assume that the initial deficit occurring under lump-sum tax financing is approximately equal to the one occuring under distortionary financing?

Alternative decompositions

Consider:

B. History with $\Delta G_{SR} > 0$
financed by lump sums

A. Baseline history

C. History with $\Delta G_{SR} > 0$
financed by $\Delta G_{LR} < 0$

D. History with $\text{lumps}_{SR} < 0$
financed by $\Delta G_{LR} < 0$

- Approximation says:

$$\Delta Y_{A \to C} \approx \Delta Y_{A \to B} + \Delta D_{A \to B} \times \frac{\Delta Y_{A \to D}}{\Delta D_{A \to D}}$$

- Why should that be a good approximation?

Alternative decompositions

Consider:

B. History with $\Delta G_{SR} > 0$
financed by lump sums

A. Baseline history

C. History with $\Delta G_{SR} > 0$ financed by $\Delta G_{LR} < 0$

D. History with $\text{lumps}_{SR} < 0$
financed by $\Delta G_{LR} < 0$

- Exact depreciation is simply

$$\Delta Y_{A \to C} = \Delta Y_{A \to B} + \Delta Y_{B \to C}$$

- Can't $\Delta Y_{B \to C}$ be calculated analytically in this model (working backwards from LR equilibrium)?

The bigger picture

- Analytically tractable expressions for fiscal multipliers in standard textbook model are a valuable contribution
- Change at ZLB is strikingly large
- Important warning: in short run, **public spending reductions may cause higher deficits!**
- Nonetheless, let's remember that the effects of short-run adjustments are **not** the most important issue for Europeans to debate right now.
- For the Eurozone to function, member states must act to **ensure their long-run solvency**
  - What kinds of fiscal rules guarantee long-run solvency?
  - What structural reforms can get growth moving?
- "Austerity" is crucial, but the truly relevant constraint is the **intertemporal budget constraint**, not the short-run deficit *per se*.