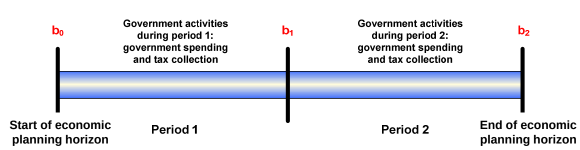
GOVERNMENT AND FISCAL POLICY IN THE CONSUMPTION-SAVINGS MODEL

SEPTEMBER 28, 2011

A DYNAMIC MODEL OF THE GOVERNMENT

- So far only consumers in our two-period framework
- Introduce government in very simple form
  - Exists for both periods
  - Has spending in each period it needs to finance – can be financed via
    - Taxes
    - Issuing government debt / assets



- Notation
  - g_1: real government spending in period 1
  - g_2: real government spending in period 2
  - b_0: government asset position at beginning of period 1 / end of period 0
  - b_1: government asset position at beginning of period 2 / end of period 1
  - b_2: government asset position at beginning of period 3 / end of period 2
  - r: real interest rate between periods

A Dynamic Model of the Government

- Economic activities/actions described by period budget constraints
  - Period-1 government budget constraint

$$\underbrace{g_1 + b_1}_{\substack{\text{Total expenditure in period 1:} \\ \text{period-1 spending + wealth to} \\ \text{carry into period 2}}} = \underbrace{(1+r)b_0 + t_1}_{\substack{\text{Total income in period 1:} \\ \text{period-1 tax collections +} \\ \text{income from wealth carried into} \\ \text{period 1 (inclusive of interest)}}}$$

  - Period-2 government budget constraint

$$\underbrace{g_2 + b_2}_{\substack{\text{Total expenditure in period 2:} \\ \text{period-2 spending + wealth to} \\ \text{carry into period 3}}} = \underbrace{(1+r)b_1 + t_2}_{\substack{\text{Total income in period 2:} \\ \text{period-2 tax collections +} \\ \text{income from wealth carried into} \\ \text{period 2 (inclusive of interest)}}}$$

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- **Definition: A government's savings during a given period is the *change* in its wealth during that period**
  - **"Fiscal surplus"** if government savings is positive
  - **"Fiscal deficit"** if government savings is negative

Surplus/deficit is a *flow* measure

GOVERNMENT BUDGET CONSTRAINT(S)

- Adopt a **lifetime** view of the budget constraint(s)
  - All analysis conducted from perspective of beginning of period 1
  - Period-1 government budget constraint $g_1 + b_1 = t_1 + (1+r)b_0$
  - Period-2 government budget constraint $g_2 + \cancel{b_2} = t_2 + (1+r)b_1$

Asset position at end of period 1 / beginning of period 2 the key link

Assume = 0 (no defaults + strictly increasing "utility")

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Assume = 0 (no defaults + strictly increasing "utility")

  - Combine into **lifetime budget constraint (LBC)**
    - Solve period-2 budget constraint for b_1…
    - …and substitute into period-1 budget constraint

$$\underbrace{g_1 + \frac{g_2}{1+r}}_{\text{Present discounted value (PDV) of all lifetime government expenditure}} = \underbrace{t_1 + \frac{t_2}{1+r} + (1+r)b_0}_{\text{Present discounted value (PDV) of all lifetime government income}}$$

IMPORTANT: Government must balance budget over its *lifetime*, not necessarily in each period

For graphical simplicity, will often assume $b_0 = 0$ (i.e., government begins life with zero net wealth). Note this is a *different* assumption than $b_2 = 0$.

Consumer Budget Constraint(s)

- Introduce tax payments into consumer side of framework
  - All in real terms for simplicity – can cast in nominal terms by multiplying by *P*
  - Period-1 budget constraint $c_1 + t_1 + a_1 - a_0 = y_1 + ra_0$
  - Period-2 budget constraint $c_2 + t_2 + a_2 - a_1 = y_2 + ra_1$
  - Combine into lifetime budget constraint (LBC)
    - Solve period-2 budget constraint for a_1…
    - …and substitute into period-1 budget constraint

$$\underbrace{c_1 + \frac{c_2}{1+r}}_{\substack{\text{Present discounted}\\ \text{value (PDV) of all}\\ \text{lifetime expenditure}}} = \underbrace{y_1 - t_1 + \frac{y_2 - t_2}{1+r} + (1+r)a_0}_{\substack{\text{Present discounted value (PDV)}\\ \text{of all lifetime disposable income}\\ \text{(i.e., after-tax income)}}}$$

Economy-Wide Resource Frontier

- Consumer lifetime budget constraint

$$c_1 + \frac{c_2}{1+r} = y_1 - t_1 + \frac{y_2 - t_2}{1+r} + (1+r)a_0$$

- Government lifetime budget constraint

$$g_1 + \frac{g_2}{1+r} = t_1 + \frac{t_2}{1+r} + (1+r)b_0$$

- Summing the two yields economy-wide resource frontier

$$c_1 + \frac{c_2}{1+r} = y_1 - g_1 + \frac{y_2 - g_2}{1+r} + (1+r)(a_0 + b_0)$$

  - aka “production possibilities frontier” (PPF)
  - The GDP accounting equation in two-period form

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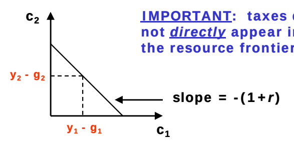

Resource Frontier

IMPORTANT: taxes do not *directly* appear in the resource frontier…

THEOREM (intermediate micro): If taxes are *lump-sum*, then consumer optimal choices can be analyzed using *either* the consumer LBC *or* the economy-wide resource frontier (superimpose indifference map), and either approach will yield the same predictions.

An important theoretical result for the analysis of tax policy.

National Savings

- **National savings = savings by consumers + savings by government + savings by firms**
  - **No firms in our model (yet..), so** $s_1^{firm} = 0$
  - $s_1^{priv} = y_1 - t_1 - c_1$
  - $s_1^{govt} = t_1 - g_1$
  - $s_1^{nat} = s_1^{priv} + s_1^{govt} = y_1 - \cancel{t_1} - c_1 + \cancel{t_1} - g_1 = y_1 - c_1 - g_1$

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- **Policy Experiment: Is national savings affected by a decrease in t_1?**
  - **Suppose g_1 and g_2 do not change**
  - **Question 1: Effect on t_2?**
  - **Question 2: Effect of tax changes on consumers' optimal choice of period-1 consumption?**

Crucial logic
  - Using intermediate micro theorem, NO EFFECT ON optimal c_1
    - Taxes are lump sum (will define/discuss next time…)
    - Economy-wide resource constraint does not depend on taxes → optimal choice of c_1 unaffected by the change in tax policy

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Analyzing effects of changes in tax policy on optimal consumption choices is the key

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  - **Question 3: Effect of tax changes on period-1 national savings?**
    - NONE – because neither g_1 nor c_1 changed

RICARDIAN EQUIVALENCE

- Ricardian Equivalence Theorem: For a given PDV of government spending, neither consumption nor national savings is affected by the precise timing of lump-sum taxes

- A benchmark result/concept in the theory of macroeconomic policy

- Economic Interpretation: Rational consumers understand that a tax cut today means a tax increase in the future (because total government spending is unchanged)
  - Thus entire tax cut is saved by consumers in order to pay higher taxes in the future
  - Private savings and government savings move in exactly offsetting ways

$s_1^{priv} = y_1 - t_1 - c_1$ ← Rises when t_1 decreases, *GIVEN* that we have *CONCLUDED* that c_1 does not change

$s_1^{govt} = t_1 - g_1$ ← Decreases when t_1 decreases

Fiscal Policy and National Savings

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- Ricardian Equivalence is to tax theory what perfect competition is to standard economic theory
  - Prediction relies crucially on lump-sum taxes