ECON7520 Int'l Macroeconomics and Finance Lecture 06

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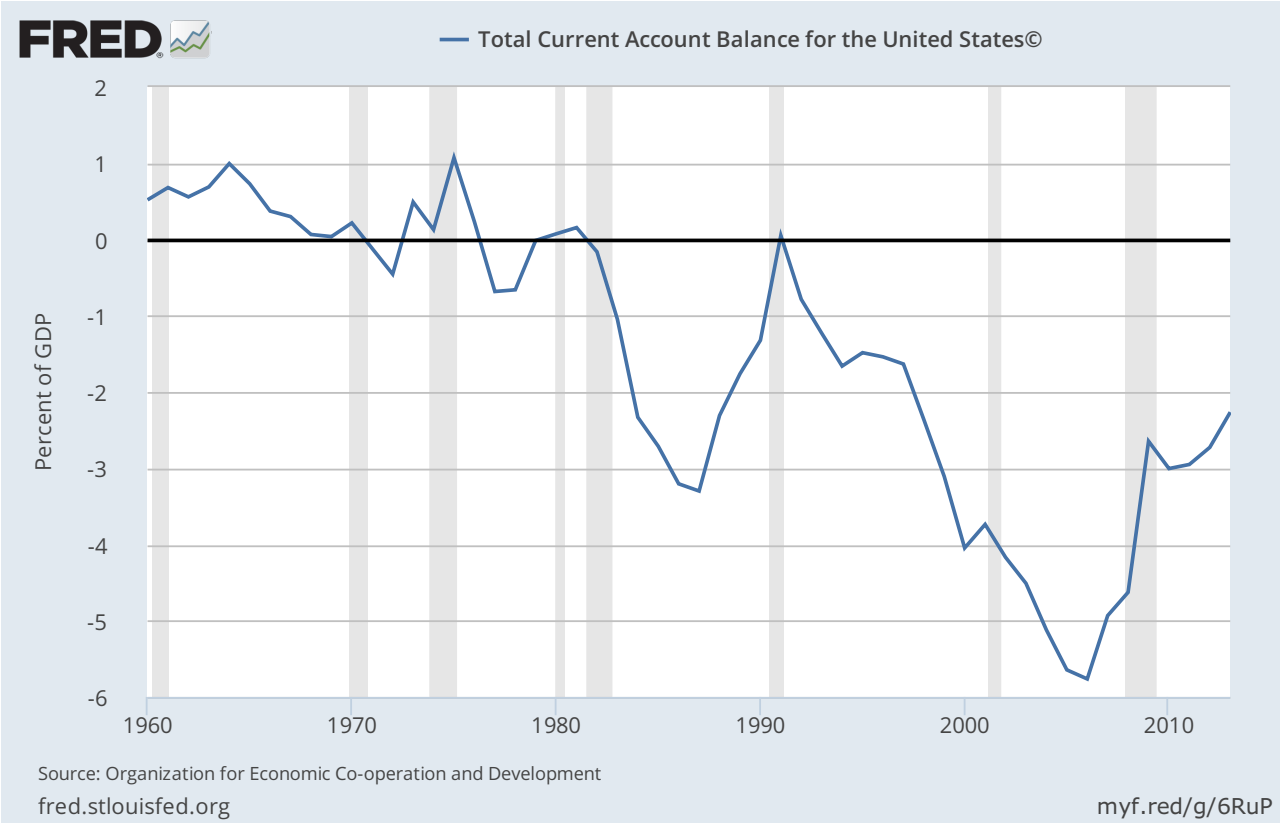
Week 6: Fiscal Deficits and Current Account Imbalances

From the Last Week: World Interest Rate

- The book approximated the world interest rate by the difference between the rate on 10-year US treasury securities and expected inflation.
- “World Interest Rates and Investment” - Robert Barro published in NBER No. 3849. The World Interest Rate in this paper is computed as the aggregation of 9 OECD countries: Belgium, Canada, France, Germany, Japan, Netherlands, Sweeden, US and UK from 1958 to 1988.

Motivation: Twin Deficits in the U.S.

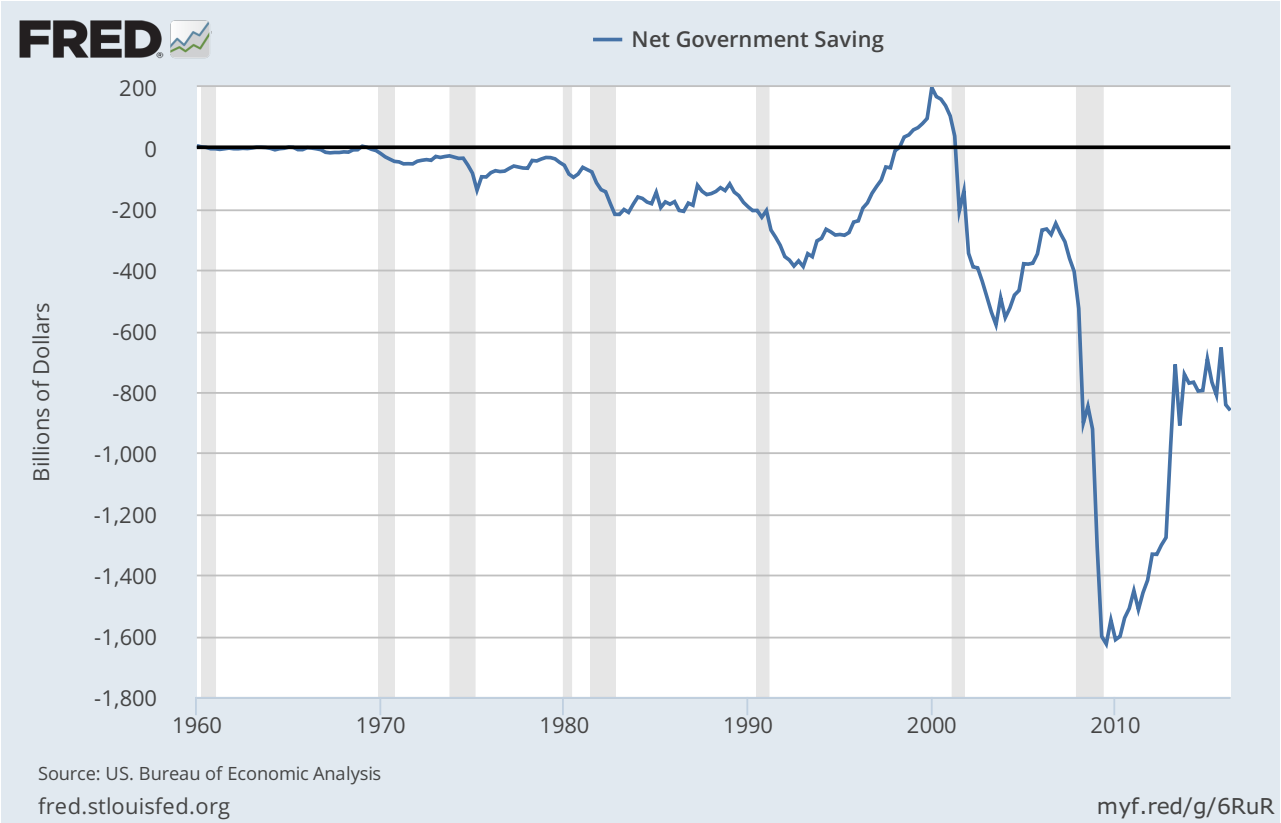
Figure: The U.S. Current Account Balance, 1960 - 2016



- The current account balance got worse remarkably during 1980s.

Motivation: Twin Deficits in the U.S.

Figure: The U.S. Net Government Asset, 1960 - 2016



- In 1980s, the U.S. fiscal deficits also increased significantly.

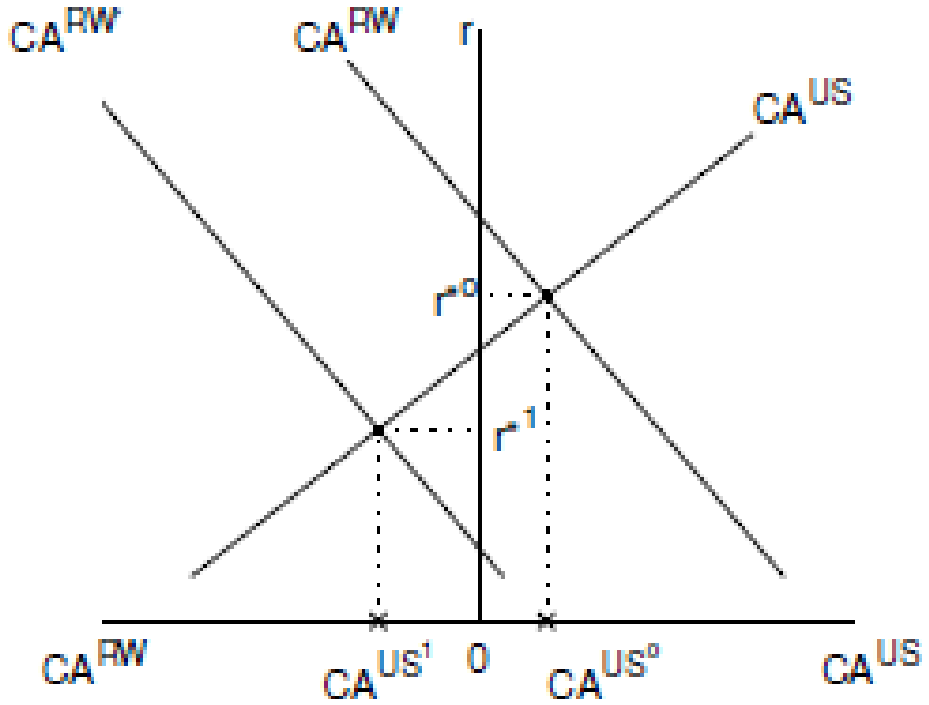
Motivation: Twin Deficits in the U.S.

- Ronald Reagan (U.S. President, 1982 - 1989)
  - Implemented the tax cut.
  - Increased the military spending.
  - As a result, the fiscal deficits increased by roughly 3% of GDP.
- Question: Does it explain the rise of the U.S. current account deficits during the period?
  - The CA deficits also increased by roughly 3% of GDP in 1980s.

Testable Implications

- View 1: The rest of the world wanted to send their savings to the US, so the US had to run a CA deficit.
- View 2: The US wanted to save less and spend more at any level of the interest rate.

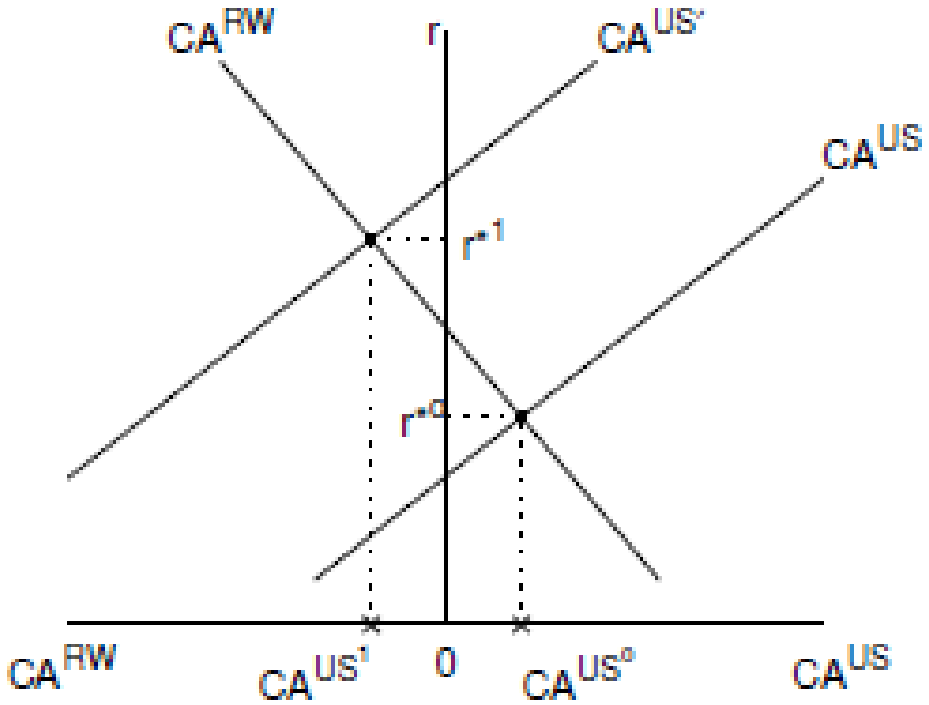
Figure: The US CA in the 1980s: view 1



As a result, $r^{*0} > r^{*1}$.

View 2

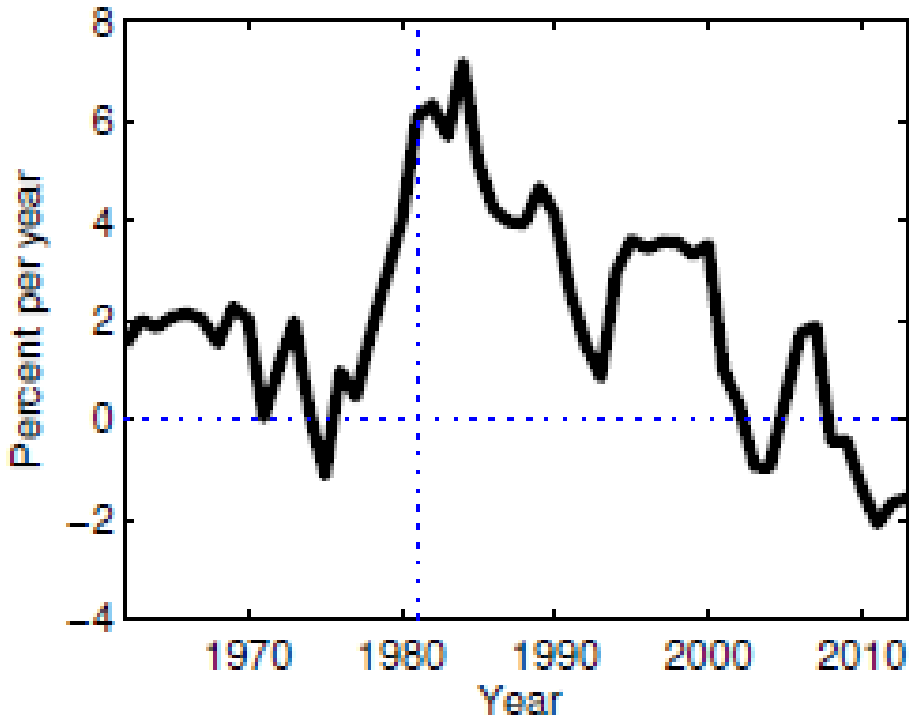
Figure: The US CA in the 1980s: view 2



As a result, $r^{*0} < r^{*1}$.

Empirical Evidence

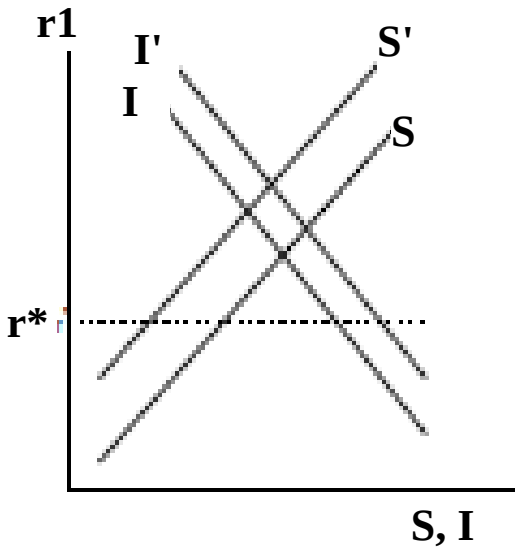
Figure: Real Interest Rates in the US 1962-2013



The US experienced a large increase in real interest rates. $\Rightarrow$ View 2

View 2 and Graphical Illustration

Figure: View 2 in the S-I schedule



Under view 2, savings decrease or investments increase.

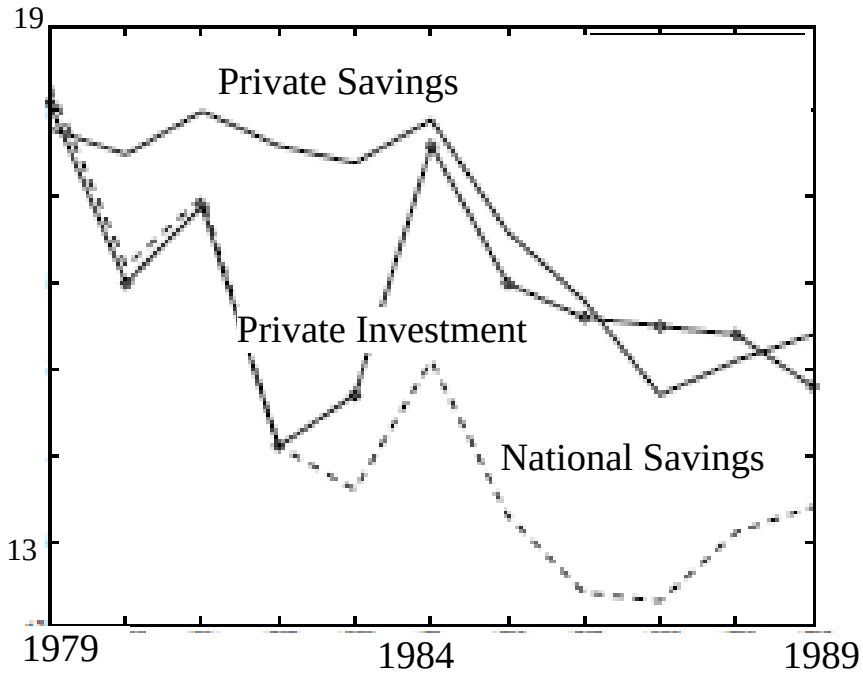
Savings and Investments

- National savings are the sum of private savings and government savings.

$$S = S^p + S^g.$$

The US Saving and Investment

Figure: The US Saving and Investment in Percent of GNP



Twin-deficits hypothesis

- The twin-deficits hypothesis claims that fiscal deficits lead to current account deficits.
- The figure shows that national savings and private savings begin to diverge in 1980 and national savings kept falling consistently below private savings.
- The claim is that the CA balance is roughly equal to the decline in government savings.
- The key point of the claim: Fiscal Deficit $\Uparrow\Rightarrow$ Current Account $\Downarrow$.

Once Again: Twin Deficits in the U.S.

- Ronald Reagan (U.S. President, 1982 - 1989)
  - Implemented the tax cut.
  - Increased the military spending.

Counter-argument

- Can we really assume that the increase in the government deficit shifted the US savings schedule to the left?
- Could changes in fiscal policy that cause the increased fiscal deficit induce increases in private savings?
- If so, total savings would keep unchanged.

The Government Sector in the Open Economy

Key Points

- We first establish famous Ricardian equivalence.

Ricardian Equivalence

If the government expenditures don't change, changes in the schedule of taxes and bond issuance don't affect the household's consumption.

- This is because rational households adjust their savings so that the change in the tax schedule doesn't affects their consumptions.

- To explain the coincidence of the U.S. twin deficits, we thus explore alternative explanations:

  1. The rise in the government expenditures.
  2. The environments where Ricardian equivalence fails.

Setup: (Similar to the Economy in Lecture 03)

- Time period: 1 and 2.
- Agent: A representative household and the government.
- Good: A single consumption good in this world.
- Asset: Two types of assets, private and government bond.
- Endowment: The household endowed with;
  - Q_1 units of goods in period 1.
  - Q_2 units of goods in period 2.
- Interest Rate: r_0 for the initial asset, and r_1 for the asset held at the end of period 1.

Government

- The government spends expenditures, and finances them by taxes and/or by issuing debts.
- Government Expenditure: G_1 in period 1. G_2 in period 2.
  - These expenditures are exogenously given.
- Taxes: Lump-sum taxes. T_1 in period 1. T_2 in period 2.
- Government Asset (or Debt if negative):
  - B_0^g is exogenously given at the beginning of period 1.
  - B_1^g denotes the amount of government assets at the end of period 1.
  - A negative value of B_t^g implies that the government is issuing debts.

What Government Faces in each Period

- In period 1,

$$G_1 + (B_1^0 - B_0^0) = r_0 B_0^0 + T_1.$$

- In period 2,

$$G_2 + (B_2^0 - B_1^0) = r_1 B_1^0 + T_2.$$

Government's Budget Constraint

- The government's budget constraints are given by

$$\underbrace{G_1}_{\text{Expenditure}} = \underbrace{-B_1^g + (1+r_0)B_0^g}_{\text{Changes in Asset/Debt}} + \underbrace{T_1}_{\text{Tax Revenue}}, \tag{1}$$

$$G_2 = -B_2^g + (1+r_1)B_1^g + T_2. \tag{2}$$

- Assume the terminal condition for the government's asset holding

$$B_2^g = 0.$$

- Then, by combining (1) and (2), we can derive

$$G_1 + \frac{G_2}{1+r_1} = (1+r_0)B_0^g + T_1 + \frac{T_2}{1+r_1}. \tag{3}$$

- The above is the intertemporal government budget constraint.

Household

- The household's budget constraint in period 1 is:

$$C_1 + T_1 + B_1^p = (1 + r_0) B_0^p + Q_1, \tag{4}$$

- Similarly, the budget constraint in period 2 is:

$$C_2 + T_2 + B_2^p = (1 + r_1) B_1^p + Q_2. \tag{5}$$

- Assume the terminal condition for the asset holding:

$$B_2^p = 0.$$

- Then, by combining (4) and (5), we can get

$$C_1 + \frac{C_2}{1 + r_1} = (1 + r_0) B_0^p + Q_1 - T_1 + \frac{Q_2 - T_2}{1 + r_1}. \tag{6}$$

- This is the household's intertemporal budget constraint.

Intertemporal Resource Constraint

- The country's net international investment position at the beginning of period 1 is

$$\underbrace{B_0^*}_{\text{Country's NIIP}} = \underbrace{B_0^p}_{\text{Private NIIP}} + \underbrace{B_0^g}_{\text{Government's NIIP}}. \tag{7}$$

- By substituting (3) and (7) for (6), we can derive:

$$C_1 + \frac{C_2}{1+r_1} = (1+r_0)\, B_0^* + Q_1 - G_1 + \frac{Q_2 - G_2}{1+r_1}. \tag{8}$$

- This is the intertemporal resource constraint.

- Note that the government expenditures enter the constraint.

Equilibrium

- Suppose the household has a logarithmic utility function as

$$U(C_1, C_2) = \ln C_1 + \ln C_2.$$

An equilibrium requires three conditions

1. Optimality of the intertemporal allocation w.r.t. resource constraint

$$C_1 + \frac{C_2}{1 + r_1} = (1 + r_0) B_0^* + Q_1 - G_1 + \frac{Q_2 - G_2}{1 + r_1}.$$

2. Optimality of the intertemporal allocation w.r.t utility maximization

$$U_1(C_1, C_2) = (1 + r_1) U_2(C_1, C_2).$$

3. Condition for the interest rate

$$r_1 = r^*.$$

Optimality with Logarithmic Preferences

Substituting C_1 into the utility function yields

$$\ln\left(-\frac{C_2}{1+r_1}+(1+r_0)B_0^*+Q_1-G_1+\frac{Q_2-G_2}{1+r_1}\right)+\ln(C_2).$$

Take the first-order-condition and obtain

$$\frac{1}{-\frac{C_2}{1+r_1}+(1+r_0)B_0^*+Q_1-G_1+\frac{Q_2-G_2}{1+r_1}}\times(-1)\frac{1}{1+r_1}+\frac{1}{C_2}=0.$$

Remember $(\ln f(x))' = \frac{f'(x)}{f(x)}$.
Then

$$\frac{1}{C_2}=\frac{1}{-\frac{C_2}{1+r_1}+(1+r_0)B_0^*+Q_1-G_1+\frac{Q_2-G_2}{1+r_1}}\times\frac{1}{1+r_1}=\frac{1}{C_1(1+r_1)}.$$

So

$$C_1=\frac{C_2}{(1+r_1)}.$$

Solution with Logarithmic Preferences

- Then, we can obtain

$$C_1 = \frac{1}{2}\left[(1+r_0)B_0^* + Q_1 - G_1 + \frac{Q_2 - G_2}{1+r_1}\right]. \tag{9}$$

$$C_2 = \frac{1}{2}(1+r_1)\left[(1+r_0)B_0^* + Q_1 - G_1 + \frac{Q_2 - G_2}{1+r_1}\right]. \tag{10}$$

- Note that
  - The government expenditures show up in the consumption.
  - The taxes don't show up in the consumption.

Analysis

- From the solutions for the consumption, we can see
  1. The changes in G_1 and G_2 affect the household's consumption.
  2. The following changes don't affect the consumption as long as they satisfy Equation (3).
     - Changes in the tax schedule, T_1 and T_2.
     - Changes in the government's asset/debt position, B_1^g .
     - Therefore, even if the government increases B_1^g by reducing T_1 and instead increasing T_2, it won't affect the consumptions as long as they satisfy (3).
- The point 2 is called Ricardian equivalence.
- Ricardian equivalence holds because households react to tax changes by adjusting their savings.

Ricardian Equivalence

- To see the point of Ricardian equivalence, consider a change in period 1 tax

$$\Delta T_1.$$

- Note that the private saving is defined as

$$S_1^p = \underbrace{Q_1 + r_0 B_0^p - T_1}_{\text{Net Income}} - \underbrace{C_1}_{\text{Consumption}}. \tag{11}$$

- Then, from (11), we get

$$\Delta S_1^p = -\Delta T_1 \tag{12}$$

since other variables don't change.

- Also note that the government's saving is defined as

$$S_1^g = \underbrace{r_0 B_0^g + T_1}_{\text{Net Revenue}} - \underbrace{G_1}_{\text{Expenditure}}.$$

- Therefore, we have

$$\Delta S_1^g = \Delta T_1 \tag{13}$$

since other variables don't change.

Ricardian Equivalence

- Thus, the total saving in the economy doesn't change as

$$\Delta S_1 = \Delta S_1^p + \Delta S_1^g = -\Delta T_1 + \Delta T_1 = 0.$$

- The current account also doesn't change as

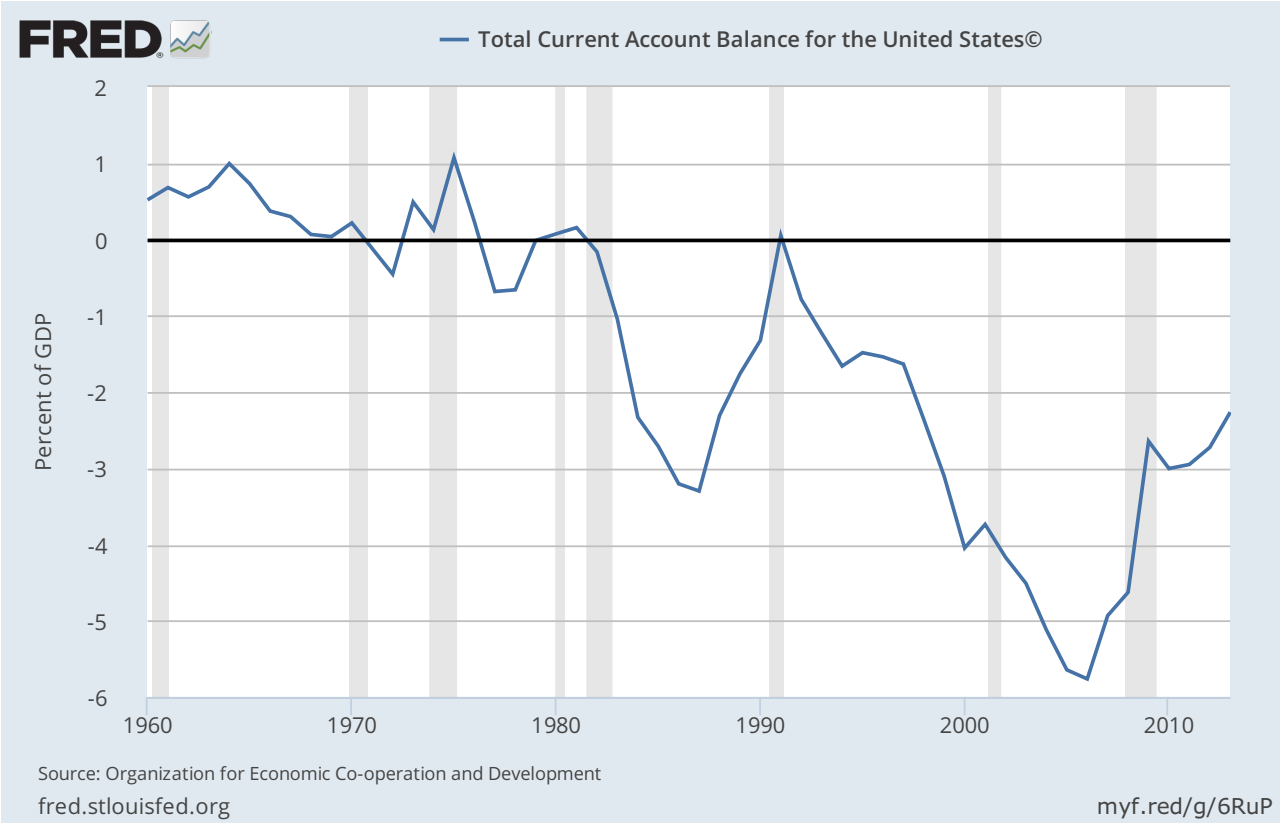
$$\Delta CA_1 = \Delta S_1 - \Delta I_1 = 0,$$

  because we assume taxes don't affect investments, $\Delta I_1 = 0$.
- Note that
  - Ricardian equivalence holds because the change in the private saving exactly offsets the change in the government's saving.
- In other words,
  - When the government changes the timing of taxes, rational households adjust their savings so that it doesn't affects their consumptions.
- As a result, the current account balance also doesn't change.

Twin Deficits in the U.S. by Reaganomics

Twin Deficits in the U.S.

Figure: The U.S. Current Account Balance, 1960 - 2016



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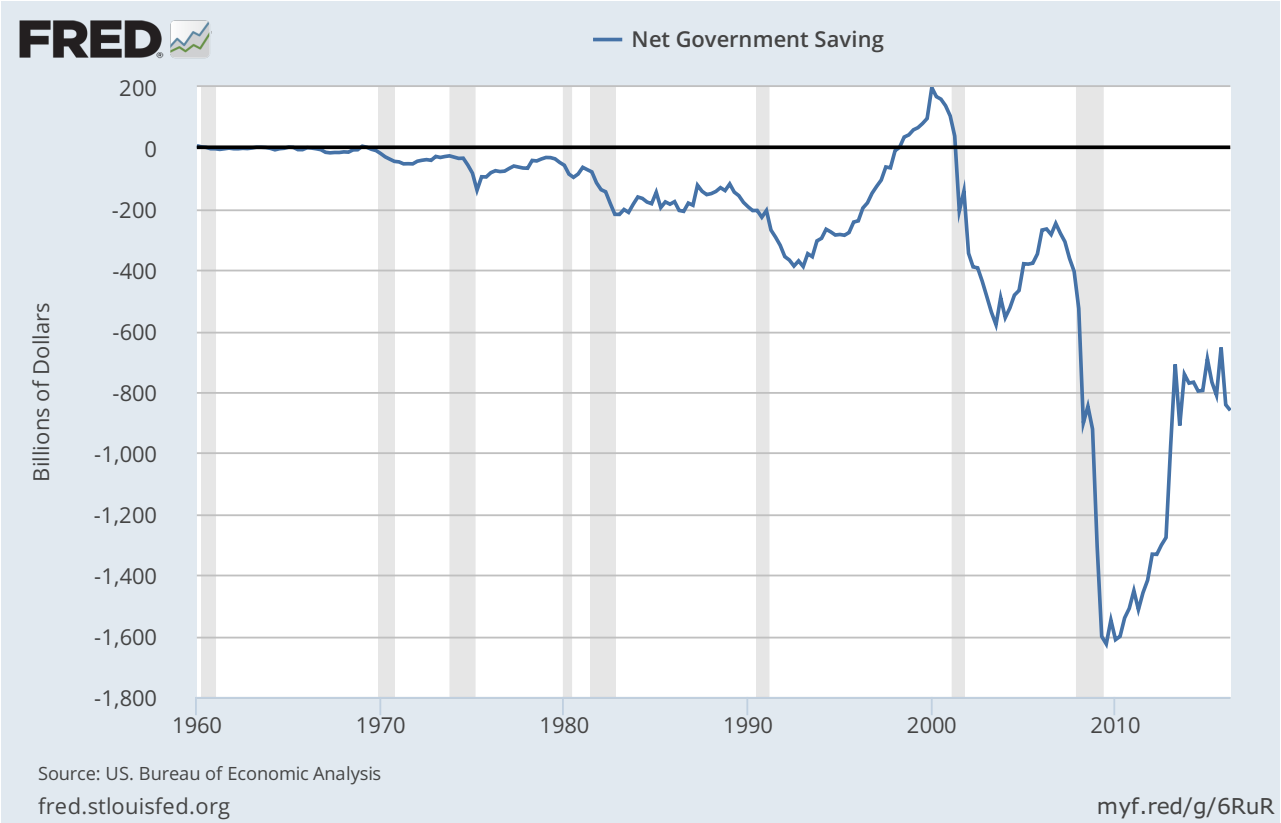

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- Ronald Reagan (U.S. President, 1982 - 1989)
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- Question: Does it explain the rise of the U.S. current account deficits during the period?
  - The CA deficits increased by roughly 3% of GDP.

Can Fiscal Deficits Explain the CA Deficits?

- Not necessarily.
- Ricardian equivalence says;
  - Changes in taxes (T_1, T_2) don't affect the CA.
  - Changes in the government's asset position B_1^g don't affect the CA balance.
- Therefore, even if B_1^g decreases, it should be offset by an increase in private savings.
- However, if (G_1, G_2) change, they can affect the CA balance.

Can Government Spending Explain the CA Deficits?

- Note that

$$TB_1 (= EX_1 - IM_1) = Q_1 - C_1 - G_1 - I_1.$$

- Also, from the second lecture,

$$CA_1 = rB_0^* + TB_1.$$

- Therefore, if G_1 increases, TB_1 and thus CA_1 can decreases.

- Note that an increase in G_1 can also decrease C_1, which could offset the change to some extent.

- But, we know, from Equation (9) that

$$-\Delta C_1 < \Delta G_1.$$

- Therefore, an increase in G_1 can decrease TB_1 and thus CA_1.

Can Government Spending Explain the CA Deficits?

- However, quantitatively, the change in G_1 during 1980s is too small.
  - The government spending increased only by 1.5% of GNP.
- Therefore, it can explain the change in the CA balance only up to a half.
  - Remember the change in the CA balance amounts to 3% of GDP.

Figure: The U.S. Military Spending

Year	Military Spending (% of GNP)
1978-79	5.1-5.2
1980-81	5.4-5.5
1982-84	6.1-6.3
1985-87	6.7-6.9

Failure of Ricardian Equivalence

- We consider three possible environment where the Ricardian Equivalence fails.
- If the Ricardian Equivalence fails, a change in tax schedule can affect consumptions.
- The possible channels are
  1. Borrowing constraints (on households)
  2. Intergenerational effects
  3. Distortionary taxation

Borrowing Constraint

- Suppose the government implements tax cut financed by future tax increases.
- Do you think all consumers increase their saving to offset the change?
- Probably, not.
- Young people would take the tax cut as an opportunity to increase their current-period consumption.
  - Youngs usually like to borrow for their future income.
  - But, they cannot because of borrowing constraints.
- We like to formalize this idea.

Borrowing Constraint

- Suppose the household faces a borrowing constraint,

$$B_1^p \geq 0.$$

- In this case, the household's consumption can deviate from the optimal consumption level C_1 (Point A).

- That is, the household is forced to choose the sub-optimal consumption level C_1^0 (Point B) where

$$C_1^0 = Q_1 - T_1 < C_1$$

because she cannot borrow for her future income.

Borrowing Constraint

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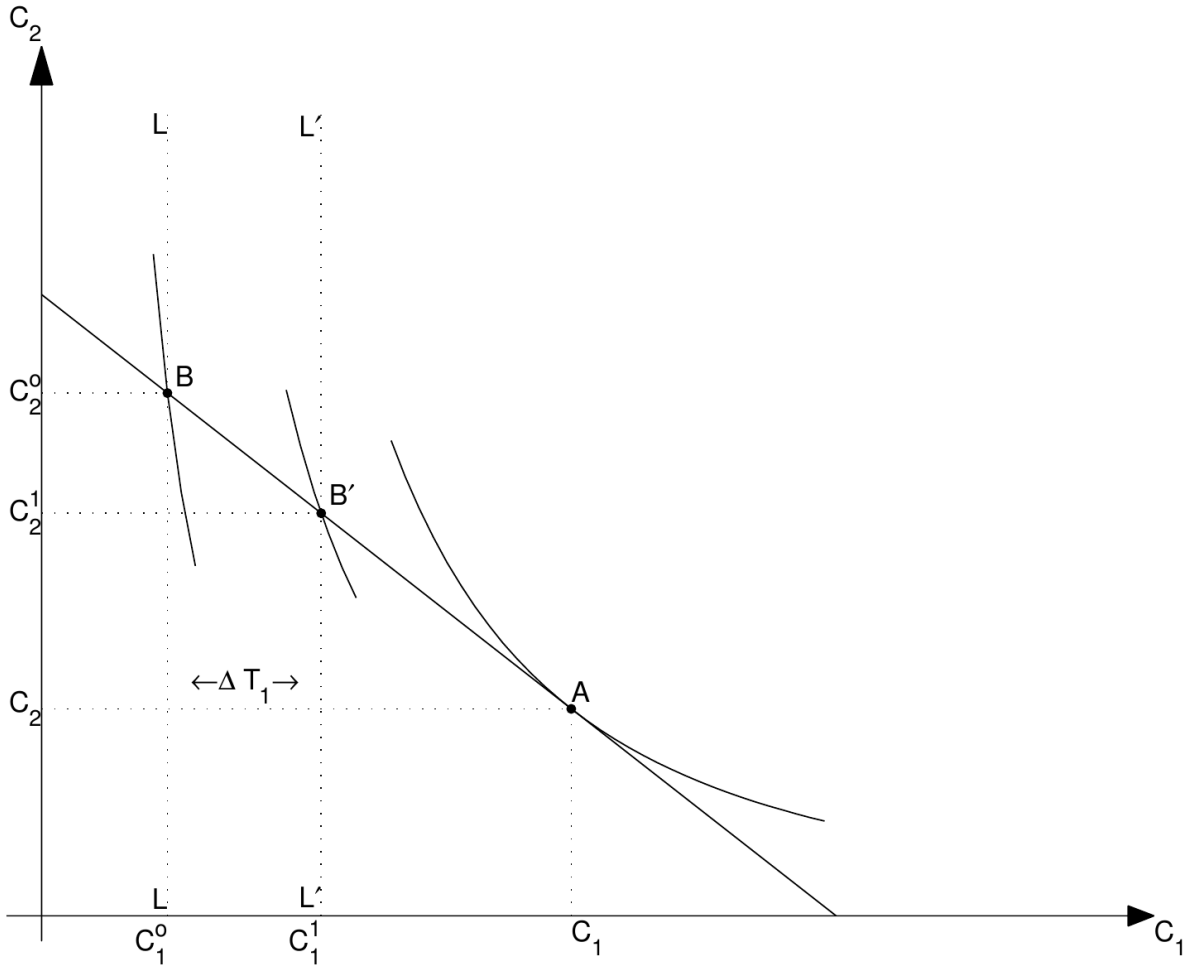

Borrowing Constraint

- If there is a tax cut by $\Delta T_1 < 0$, then the new consumption will be

$$C_1^1 = Q_1 - (T_1 + \Delta T_1)$$

  which is at point B'.

- Note that the consumption increased as $\Delta C_1 = -\Delta T_1$.

- However, to generate a quantitatively plausible effect, this channel is probably not enough.

- To generate the decline of the CA balance by 3% of GDP,

  - All households must be constrained.

Intergenerational Effects

- Another source of the failure of the Ricardian Equivalence is the intergenerational reason.
  - Those who benefit from the tax cut may not be the ones that pay for the tax increase.
- To formalize this idea, suppose the household only lives for one period.
- In this case, we have

$$C_1 + T_1 = Q_1.$$

- Therefore,

$$\Delta C_1 = -\Delta T_1.$$

- However, to obtain quantitatively plausible effect, all households have to die in one period.

Distortionary Taxes

- So far, we have assumed taxes take the form of lump-sum, which does not distort agent's decisions.
- However, in reality, taxes are typically specified as a fraction of consumption, income, firm's profits etc.
- In that case, changes in tax rates will tend to distort consumption, savings, and investment decisions.
- Consider consumption taxes (τ_1, τ_2) for example.
- After-tax cost of consumption is
  - $(1 + \tau_1)C_1$ for period 1.
  - $(1 + \tau_2)C_2$ for period 2.

Distortionary Taxes

- In this case, the relative price of period-1 consumption in terms of period-2 consumption is

$$(1 + r_1)\frac{1 + \tau_1}{1 + \tau_2}.$$

  1. If $\tau_1 \neq \tau_2$, this price is different from the price in the non-distortionary case
$$(1 + r_1).$$

- Suppose there is a tax cut as $\tau_1 < \tau_2$, then period-1 consumption becomes cheaper.

- As a result, the household increases period-1 consumption.

- The trade balance and the CA balance can thus decrease since

$$TB_1 = Q_1 - C_1 - G_1 - I_1,$$

$$CA_1 = rB_0^* + TB_1.$$

Summary of Twin Deficits in the U.S.

- If the current account deficit of the 1980s is to be explained by the fiscal imbalances of the Reagan administration,
- then, this explanation has to rely on a combination of
  1. an increase in government expenditure and
  2. multiple factors that break Ricardian equivalence
     - Borrowing constraints
     - Intergenerational effects
     - Distortionary taxes

Summary and Conclusion

- Today, we studied:
  1. A small open economy model with the government.
  2. Ricardian equivalence.
     - If the government expenditures don't change, changes in the schedule of taxes and bond issuance don't affect the household's consumption.
  3. Twin deficits in the U.S.
- Nest week, we will study international capital market integration.