Intermediate Macroeconomics (UN3213)
Recitation 12

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Q1

- Firms' profit maximization:

$$\max_{I_1} \quad 1.16I_1 - 0.1I_1^2 - (1+r_1)I_1$$

Take FOC and solve:

$$I_1^* = I(r_1) = 0.8 - 5r_1, \quad \Pi_2(r_1) = 2.5(0.16 - r_1)^2$$

- Households are unable to borrow or lend ($S_1^p = 0$), which also implies

$$C_1^* = \frac{Y_1}{1+\tau_1} = \frac{3}{1.5} = 2$$

$$C_2^* = \frac{\Pi_2(r_1)}{1+\tau_1} = \frac{2.5(0.16 - r_1)^2}{1+\tau_2}$$

Q1

- Saving schedule:

$$S_1(r_1) = S_1^g = \tau_1 C_1^* - G_1$$
$$= \frac{3\tau_1}{1+\tau_1} - 0.4$$

- Equilibrium: $S_1(r_1) = I(r_1)$ yields

$$r_1^* = 0.24 - \frac{0.6\tau_1}{1+\tau_1} = 0.04$$

- To solve for τ_2, C_2, use the government's intertemporal budget constraint:

$$\tau_1 C_1^* + \frac{\tau_2 C_2^*(\tau_2; r_1^*)}{1+r_1^*} = G_1 + \frac{G_2}{1+r_1^*}$$
$$\Longrightarrow 0.5(2) + \frac{\tau_2}{1.04} \cdot \frac{2.5(0.16-0.04)^2}{1+\tau_2} = 0.4 + \frac{0.36}{1.04}$$
$$\Longrightarrow \tau_2 = -0.88, \quad C_2^* = 0.3$$

Q2

- In the absence of financial constraints, HH faces the same optimization problem as in lectures

$$\max_{C_1, C_2} \quad \ln(C_1) + \ln(C_2)$$

$$\text{s.t.} \quad (1+\tau_1)C_1 + \frac{(1+\tau_2)C_2}{1+r_1} = Y_1 + \frac{\Pi_2(r_1)}{1+r_1}$$

- Optimal consumption bundles:

$$C_1^* = \frac{1}{2}\frac{1}{1+\tau_1}\left(Y_1 + \frac{\Pi_2(r_1)}{1+r_1}\right) = 1.011$$

$$C_2^* = \frac{1}{2}\frac{1+r_1}{1+\tau_2}\left(Y_1 + \frac{\Pi_2(r_1)}{1+r_1}\right) = 13.15 > 0.3$$

Using values of τ_2, r_1^* as solved in the previous step.
$\Pi_2(r_1) = 2.5(0.16 - 0.04)^2 = 0.036$

- *Intuition:* HH wants to save when there are no financial constraints. Huge subsidy on period 2 consumption ($\tau_2 = -0.88$) makes C_2^* go up sharply.

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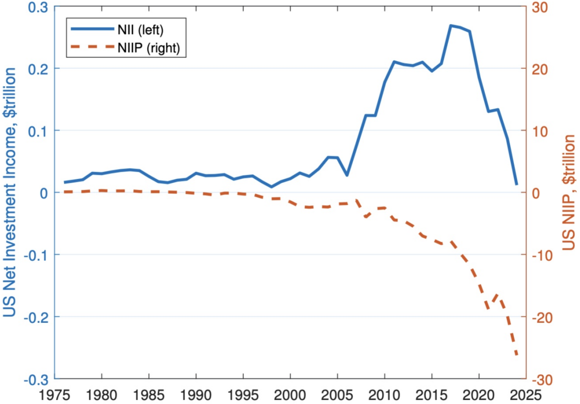
NII-NIIP paradox

- Recall $NIIP = A - L$, difference between foreign asset position and foreign liabilities position.
- Despite having a large negative international investment position ($NIIP < 0$), the US receives net positive investment income from RoW ($NII > 0$).



NII-NIIP paradox explanations: Dark matter

- A significant part of the true NIIP does not show up in official international accounts, e.g. intangible capital. Therefore, the true position (TNIIP) is greater than the observed (NIIP).
- Can use the observed rate of return to infer the true NIIP

$$NII = r \cdot TNIIP$$

$$TNIIP = \frac{NII}{r} = \frac{0.012}{0.05} = \$ + 0.24\text{tn}$$

- **Dark matter** is this unaccounted difference between TNIIP and NIIP:

$$\text{Dark Matter} = TNIIP - NIIP = 0.24 - (-26.2) = \$ + 26.44\text{tn}$$

NII-NIIP paradox explanations: Return differentials

- Interest rate payable on international liability position is lower than interest rate earned on foreign asset position. Uses observed positions A and L to infer rates of return.
- International asset position consists of risky high-return assets that pay a **risk premium** over safer low-return assets in the international liability position.

$$NII = r^A \cdot A - r^L \cdot L$$

  Even though $A - L < 0$, there is a **return differential** $r^A > r^L$ such that $NII > 0$
- Can use observed values of A, L and r^L to infer r^A:

$$0.012 = r^A \cdot (35.9) - (0.0037)(62.1)$$
$$r^A = 0.0067$$

  There is a return differential of 0.3% $(0.67 - 0.37)$.

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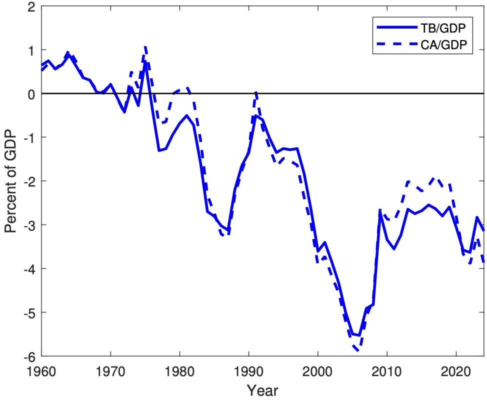
Financing trade balance

- Can a country run a perpetual trade deficit?

The U.S. Trade Balance and Current Account as Percentages of GDP



A 2-period open economy model

- Can a country run a perpetual trade deficit?
  - Yes, only if it is a net creditor ($NIIP > 0$) at some point.
- Consider an economy with 2 periods. It starts period 1 with a net foreign asset position B_0. The country's NIIP at the end of the two periods is given by

$$B_1 = (1+r)B_0 + TB_1$$
$$B_2 = (1+r)B_1 + TB_2$$

  For now we ignore international compensation to employees, net unilateral transfers and valuation changes.

- Imposing the no-Ponzi condition $B_2 = 0$, the above two equations yield

$$(1+r)B_0 = -TB_1 - \frac{TB_2}{1+r}$$

  If $TB_1, TB_2 < 0$, then $B_0 > 0$. To run a perpetual trade deficit, a country must have a positive NIIP (net creditor).

Financing current account

- Can a country run a perpetual current account deficit?
- Recall the relation between CA and TB:

$$\text{Current Account} = \text{Trade Balance} + \underbrace{\text{Net Investment Income} + \text{Net Compensation to Employees}}_{\text{Income Balance}} + \text{Net Unilateral Transfers}$$

- Recall $\Delta NIIP = CA$, ignoring valuation changes:

$$B_1 - B_0 = \underbrace{rB_0 + TB_1}_{CA_1}$$

CA is the sum of TB and net receipts on foreign asset position (rB_0)

$$B_1 - B_0 = CA_1$$
$$B_2 - B_1 = CA_2$$

Imposing $B_2 = 0$, and combining the two equations, the same rule applies.

$$B_0 = -CA_1 - CA_2$$

Saving, investment and current account

- In case of an open economy, the below condition holds.

$$CA_1 = S_1 - I_1$$

  Note that this is an identity, and not just an equilibrium condition.

- Recall the fundamental accounting identity of national income:

$$Y_1 + IM_1 = C_1 + I_1 + G_1 + X_1$$

  IM_1 denotes imports and X_1 denotes exports. The LHS is aggregate supply, and the RHS is aggregate demand. Rewriting the above,

$$\begin{aligned} Y_1 &= C_1 + I_1 + G_1 + X_1 - IM_1 \\ &= C_1 + I_1 + G_1 + TB_1 \end{aligned}$$

  Add $NII (= rB_0)$ to both sides.

$$Y_1 + rB_0 = C_1 + I_1 + G_1 + \underbrace{TB_1 + rB_0}_{CA_1}$$

$$\iff Y_1^n = C_1 + I_1 + G_1 + CA_1$$

Saving, investment and current account

- Continuing from previous slide,

$$\underbrace{Y_1^n - T_1 - C_1}_{\text{Private saving}} + \underbrace{T_1 - G_1}_{\text{Govt saving}} = I_1 + CA_1$$

$$\iff S_1 = I_1 + CA_1$$

which establishes the identity.

- Let A_1 denote domestic absorption:

$$A_1 = C_1 + I_1 + G_1$$

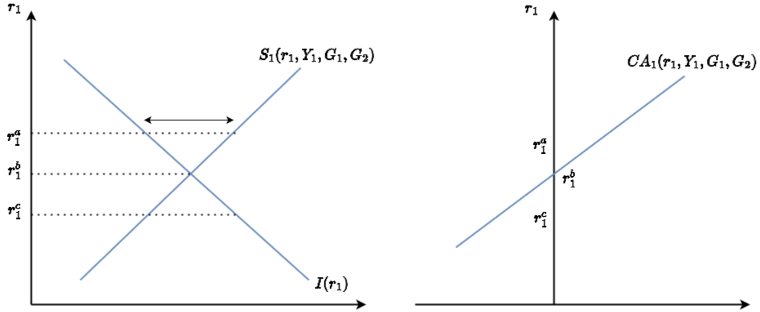
- Equivalent definitions of current account:

$$CA_t = B_t - B_{t-1}$$
$$CA_t = rB_{t-1} + TB_t$$
$$CA_t = S_t - I_t$$
$$CA_t = Y_t^n - A_t$$

Current account schedule

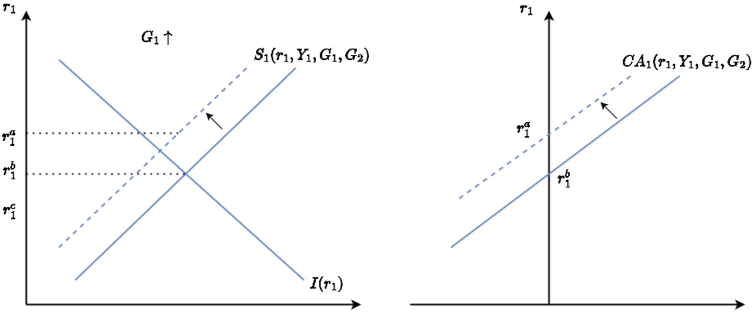
- The current account is the difference between saving and investment. Deriving the current account schedule

$$
\begin{aligned}
CA_1 = S_1 - I_1 &= S_1\left(\underset{+}{r_1}; \underset{+}{Y_1}, \underset{-}{G_1}, \underset{+}{G_2}\right) - I\left(\underset{-}{r_1}\right) \\
&\equiv CA_1\left(\underset{+}{r_1}; \underset{+}{Y_1}, \underset{-}{G_1}, \underset{+}{G_2}\right)
\end{aligned}
$$



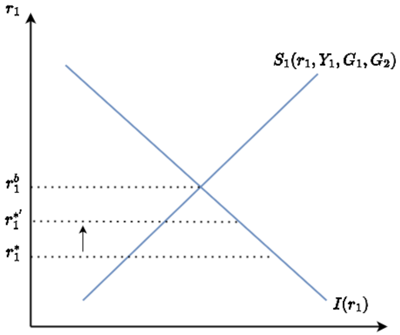
Current account schedule

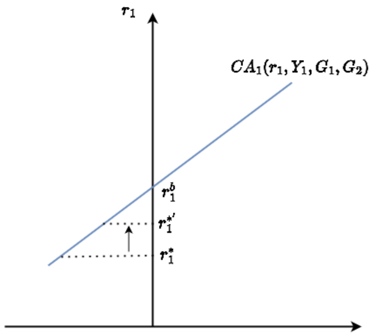
- Shifts in the saving schedule translate to shifts in the current account:



World interest rate

- Suppose the interest rate that a small open economy faces is r_1^*, constant and exogenous (world real interest rate).
- The closed economy equilibrium would have been at $r_1 = r_1^b$. Since the world interest is lower $r_1^* < r_1^b$, the economy maintains a current account deficit.
- When the world interest rate rises (for some external reason), $r_1^{*'} . r_1^*$, the current account deficit improves.





Twin deficits

- Suppose there is an increase in government spending in period 1, $G_1 \uparrow$ which is financed by increasing taxes in period 2, $T_2 \uparrow$. Period 1 taxes remain unchanged.
- Recall the expression for national saving:

$$S_1(r_1) = \frac{1}{2}\left[Y_1 - G_1 - \frac{\Pi_2(r_1) - G_2}{1 + r_1}\right]$$

- Both fiscal deficit $(G_1 - T_1)$ and current account deficit CA_1 worsen.