Comparative statics

given an equilibrium allocation, we can analyze what happens when there is a change in y_0 (Δy_0), y_1 (Δy_1), or in r (Δr):

1) Δy_0 (ie y_0 changes by Δy_0)

note: $W_0 = y_0 - t_0 + \frac{1}{1+r}[y_1 - t_1]$

$\downarrow$

$W_1 = \underbrace{y_0 + \Delta y_0}_{\text{new } y_0} - t_0 + \frac{1}{1+r}[y_1 - t_1]$

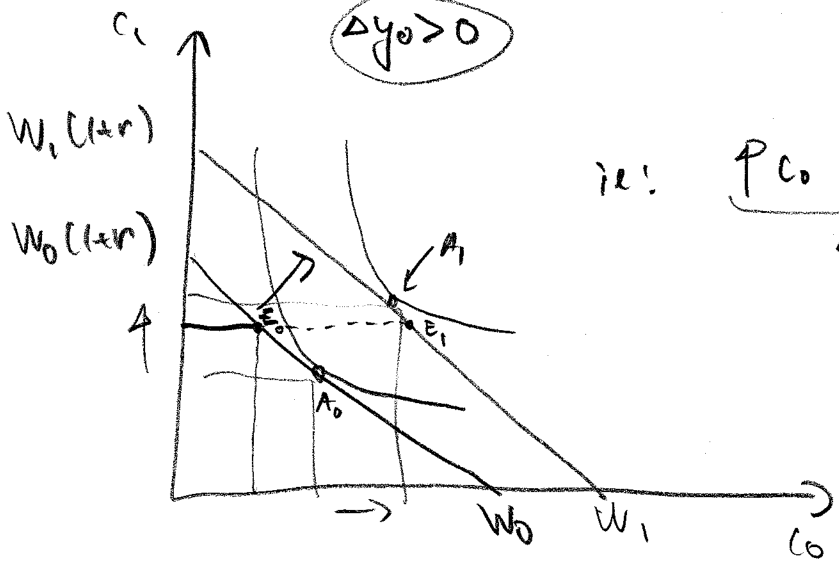
$\rightarrow W_1 - W_0 = \Delta y_0$

$\downarrow$

$\Delta W = \Delta y_0$

$\therefore$ $\uparrow$ y_0 by Δy_0 $\uparrow$ W by Δy_0

$\Delta y_0 > 0$



ie: $\underline{\uparrow c_0 \text{ and } \uparrow c_1}$

$\hookrightarrow$ pure income effect (there is no change in $\frac{Pc_0}{Pc_1} = 1+r$)

$\therefore$ both c_0 & c_1 $\uparrow$ because they are normal goods

$\uparrow y_0 \longrightarrow \underbrace{\uparrow c_0 \;\; \uparrow c_1}_{\text{consumption smoothing}}$ ($\uparrow S$)

note: A_1 is to the left of E_1 $\longrightarrow$ $\downarrow$ borrowing ($\uparrow$ saving)

2) Δy_1^e (expected)

$$W_0 = y_0 - t_0 + \frac{1}{1+r}[y_1 - t_1]$$

$$W_1 = y_0 - t_0 + \frac{1}{1+r}[y_1 + \Delta y_1 - t_1]$$

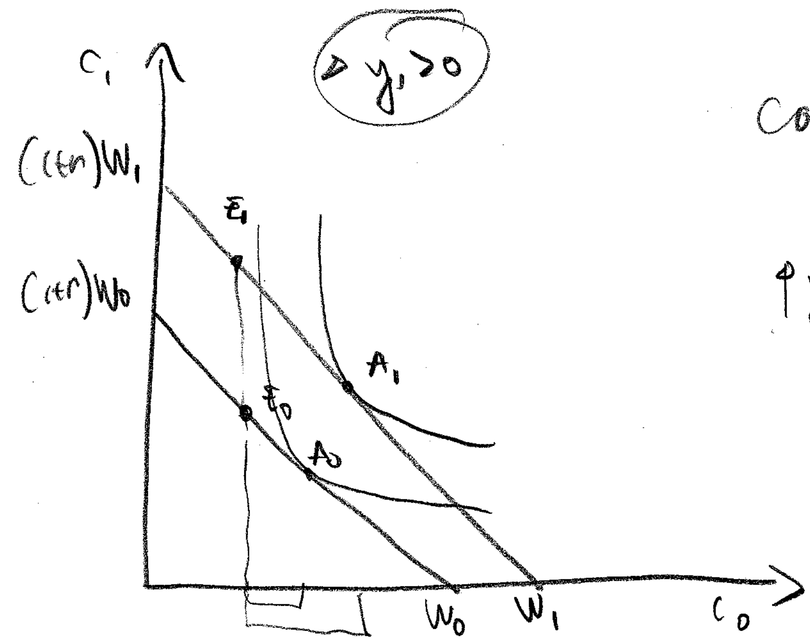
$\rightarrow W_1 - W_0 = \frac{\Delta y_1}{1+r}$

$\therefore \Delta W = \frac{\Delta y_1}{1+r}$ $\rightarrow$ similar to Δy_0

$\Rightarrow$ pure income effect

$\downarrow$

consumption smoothing



$\uparrow y_1 \rightarrow \underbrace{\uparrow C_0 \uparrow C_1}_{\text{consumption smoothing}}$ $(\downarrow S_0)$

increase in borrowing (to $\uparrow C_0$)

3) permanent change in income [Δy that is expected to last]

ie $\Delta y_1^e = \Delta y_0$

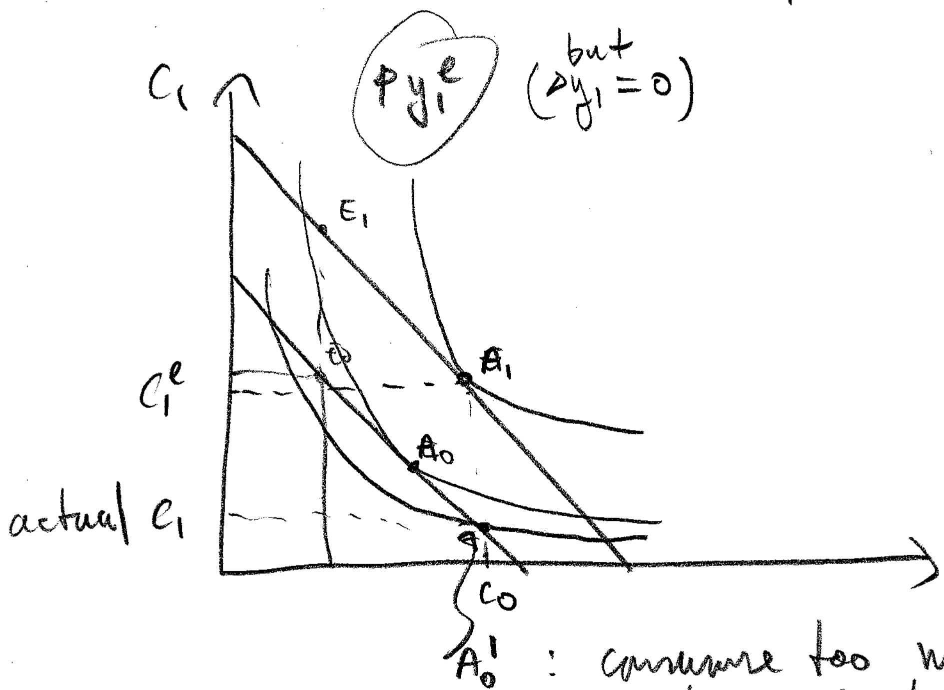
$$W_1 = y_0 + \Delta y_0 - t_0 + \frac{1}{1+r}(y_1 + \Delta y_1 - t_1]$$

$\Rightarrow \Delta W = \Delta y_0 + \frac{1}{1+r}\Delta y_1$ $\Rightarrow$ pure income effect again [but of higher magnitude]

4) Forecast error

ie: $\underbrace{\Delta y_1^e \neq 0}_{\text{expected}}$ but $\underbrace{\Delta y_1 = 0}_{\text{actual}}$

$\longrightarrow$ forecast error



A_0' : consume too much at time 0 [not enough at time 1)

↳ loss in welfare [sub optimal decision] due to improper forecast.

5) Δr

$\hookrightarrow \Delta r \rightarrow \Delta \frac{1}{1+r} \rightarrow \Delta \frac{p_{c0}}{p_{c1}}$

∴ a change in "r" will not only have income effects. It will also have substitution effects

Say $\uparrow r$

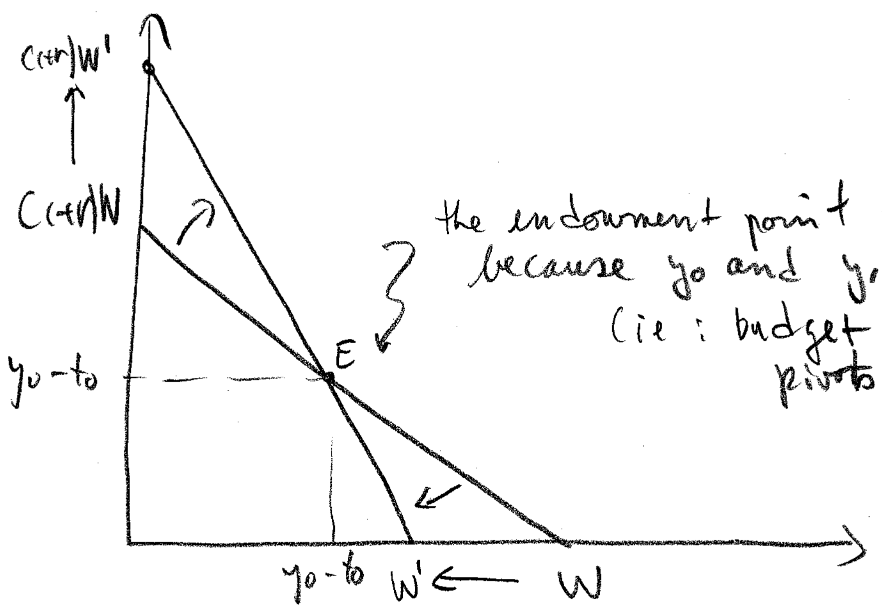
1) $W = y_0 - t_0 + \frac{1}{1+r}[y_1 - t_1]$

$\frac{1}{1+r} \downarrow$ ⤻ more expensive to buy c_0

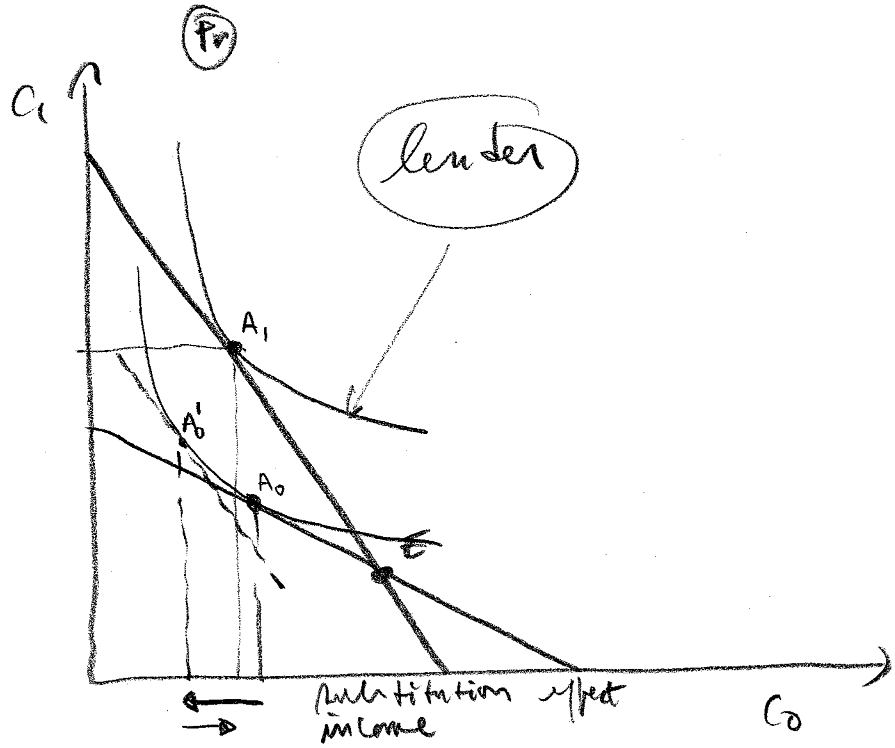
$\therefore W \downarrow$ (ie $\frac{p_{c_1}}{p_{c_0}} \downarrow \therefore$ present value of income $\downarrow$)

2) $(1+r)W = (1+r)[y_0 - t_0] + y_1 - t_1$

$(1+r) \uparrow \quad \therefore (1+r)W \uparrow$ (ie: $\frac{p_{c_0}}{p_{c_1}} \uparrow \therefore$ future value of income $\uparrow$)



the endowment point does not change because y_0 and y_1 do not change (ie: budget constraint pivots on E)



i.e. $\uparrow r \rightarrow \uparrow c_1$ (for sure)

$\rightarrow \uparrow\downarrow c_0$ (depending on relative strength of substitution and income effect)

ΔS_0 is also uncertain ←

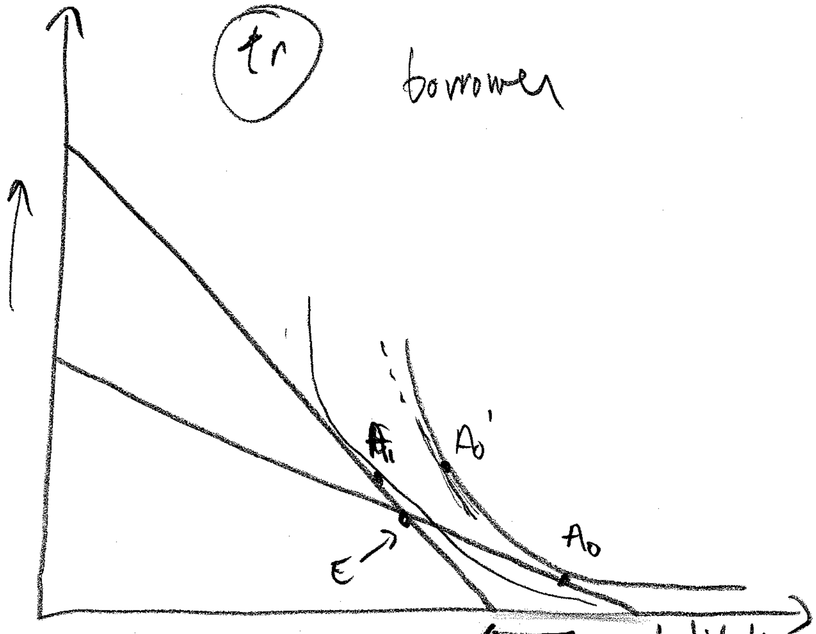
- income effect: can attain same c_1 with lower s_0 (because $\uparrow r$)
  ↳ incentive to $\uparrow c_0$
- substitution effect: $\uparrow r \rightarrow \uparrow \frac{P_{c_0}}{P_{c_1}} \rightarrow$ more expensive to consume at time 0 than at time 1
  ↳ incentive to $\downarrow c_0$

note: for a lender, $\uparrow r \rightarrow \uparrow$ utility

↳ not the case for a borrower:

↑r

borrower



← substitution effect (↑ $\frac{P_{C_0}}{P_{C_1}}$ → ↓C_0)

← income effect

↳ ↑r → more expensive to borrow ∴ ↓C_0

here: ↑r → ↓C_0 (for sure)

→ ↑↓C_1 depends on

→ S_0 ↑ for sure (to get ↓C_0)

→ ↓u

note: in macro, we look at aggregate effects

↳ ie what happens to C_0 when r changes

[belief is that ↑r → ↓C_0]

but there are no guarantee that this will happen according to our model

(ie for lenders ↑r → ↑C_0)