

MIDTERM 2 (16th May 2025, 17:40)

(120 min)

SHOW ALL CALCULATIONS CLEARLY. MARKS WILL BE DEDUCTED OTHERWISE

Question 1. (24p) True / False / Uncertain? Explain.

- a. In the credit market model with limited commitment, suppose that a consumer's collateral constraint does not bind. Then, suppose that the value of collateral falls. Then, current consumption falls and saving increases.

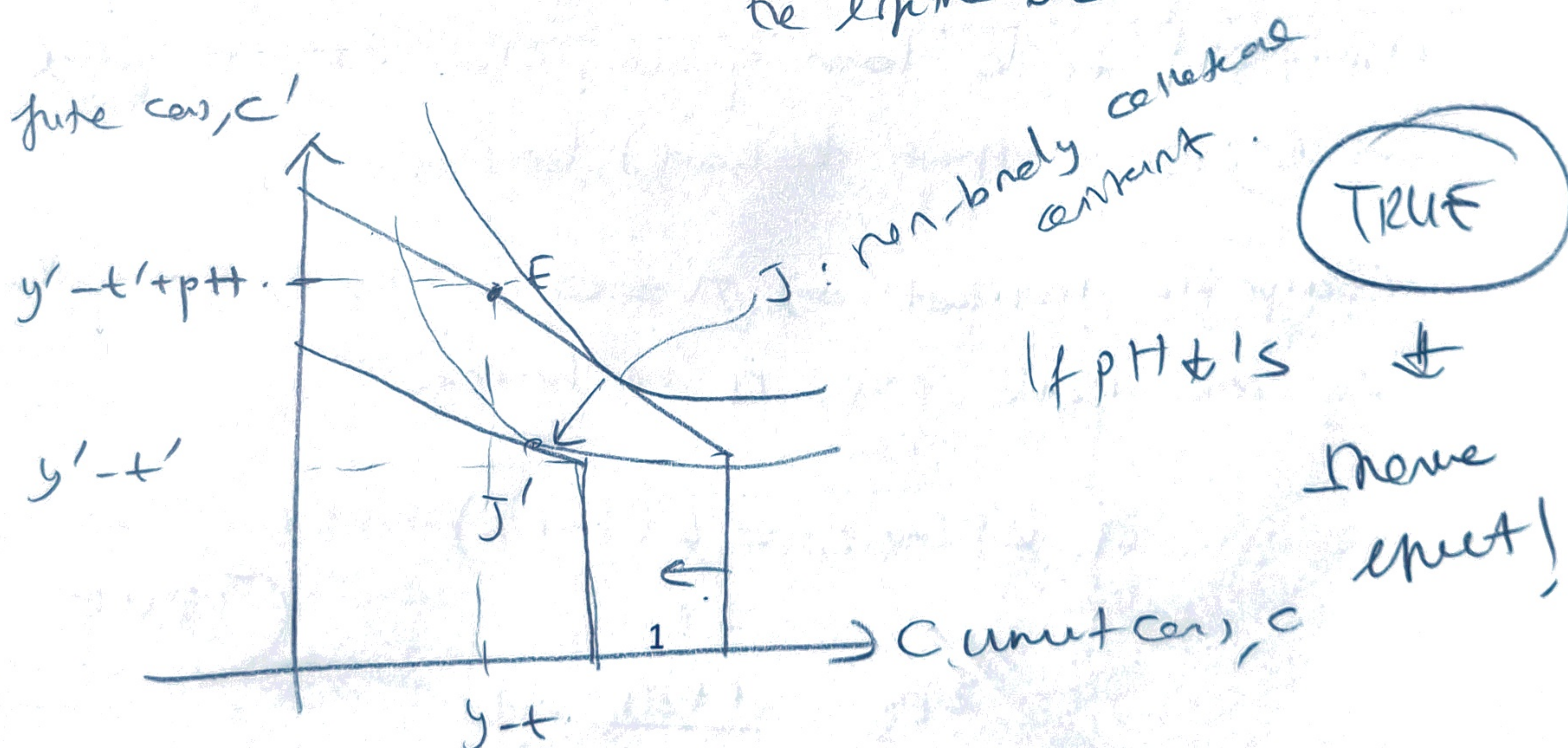
In the credit mkt. model with limited commitment, the consumer's lifetime wealth becomes:

$$W_t = y - t + \frac{y' - t' + p_H}{(1+r)}$$

where p_H is the asset value of the consumer (when he can be liquidated in the future period).

With the constraint on the collateral:

$$c \leq y - t + \frac{p_H}{(1+r)} \quad \text{setting the limit to be the b.c.}$$



The consumer will ↓ both current cons & future cons, $c \downarrow$, $c' \downarrow$!

- b. It is irrelevant whether an increase in government expenditures is financed by an increase in current taxes or by the issue of government bonds.

TRUE, As long as the government's spending at t and t' are the same, $G, G' - G \uparrow$ by $\Delta G = X$

Then the BCO of the representative agent:

$$C + \frac{C'}{1+r} = Y + \frac{Y'}{1+r} + \frac{1}{N} \left[G + \frac{G'}{1+r} \right]$$

will increase by X
but not for $\frac{1}{N} B$
on the budget constraint
of the rep. h.h.'s.

- c. In the credit market model with asymmetric information, an increase in the number of bad borrowers increases the interest rate spread.

Asymmetric information in credit markets causes $r_2 > r_1$, with r_2 the borrowing rate & r_1 the lending rate. Therefore, if "a" represents the fraction of good borrowers, the profit of the bank is:

$$\pi = aL \cdot (1+r_2) - L(1+r_1)$$

assuming that the loan quantity chosen by good (and by strictly expected bad) borrowers.

Competitive market $\Rightarrow \pi = 0$, Therefore, given the lending rate bank pays, r_1 we have

$$a \cdot L(1+r_2) = L(1+r_1)$$

$$r_2 = \frac{1+r_1}{a} - 1$$

Now if the number of bad borrowers $\uparrow$, $a \downarrow \Rightarrow r_2 \uparrow$

Question 2. (28p) Suppose that the government decides to subsidize savings. The subsidy works in the following way: If someone saves s in current period then in the future period this person receives $(1+r+a)s$. Each person receives a in addition to the current interest rate r . The subsidy is financed only in the future period t' . In period t' , each agent pays a lump sum tax t' to cover the subsidy. Suppose for the sake of simplicity, G and G , Government expenditures are equal to zero. Suppose further that $y' = 0$.

- a. (4p) Given the information above, write down the consumer's budget constraint in the current period.

$$C + S = Y - t$$

$$C + S = Y$$

{ Actually you may have $t = 0$ since $G = 0$ }

- b. (4p) Given the information above, write down the consumer's budget constraint in the future period

As $y' = 0$, there is no future income and $t' > 0$ will cover for the subsidy, then for $C, C' > 0$ it has to be $s > 0$. Therefore,

$$C' = (1+r+a)s - t' \quad \text{with } t' = as.$$

- c. (4p) From a and b, derive the intertemporal (lifetime) budget constraint of the rep. consumer.

$$C' = (1+r+a)s - as.$$

$$C' = (1+r)s \Rightarrow s = \frac{C'}{(1+r)}$$

$$\Rightarrow C + \frac{C'}{(1+r)} = Y - t$$

{ OR just have $s = \frac{C' + t'}{(1+r+a)}$ with $t' = as$ }

- d. (4p) Write down the consumer's optimization problem.

$$\max u(c, c')$$

st.

$$c + \frac{c'}{1+r} = y$$

$$c, c' > 0$$

- e. (4p) Write down the budget constraint of the government. Suppose that all expenditures of the government are equal to zero, and that the government does not issue bonds.

The gov. in each period consumes $G, G' = 0$.
 & doesn't issue bonds. Therefore, it has to
 collect taxes s.t. it finances its budget.

Therefore at $t = t$

$$= t' \downarrow$$

$$T' = Nt' = \underbrace{N}_{(as)}$$

$$T = 0$$

(or alternatively if you have some
 for some time,

$$T = \frac{N}{1+n} (as)$$

If you have had $t > 0$ in
 part a)

(8p) Discuss the effects of the subsidy: Will savings increase? Will welfare increase?

From the viewpoint of the consumer as with the subsidy the consumer's lifetime budget constraint doesn't change:

$$c + \frac{c'}{(1+r)} = y - t \quad \left\{ c + \frac{c'}{(1+r)} = y \right\}$$

Regardless of whether the subsidy is or not. Hence, the effects of the subsidy will be null.

Question 3. (22p) Suppose you are analyzing an economy where the consumers' utility is provided by: $u(c, c') = \log c + \log c'$ (which satisfies all the properties of smooth and convex indifference curves), where c and c' refer to consumption in current and future periods. Let y, y' be the level of current and future incomes and t and t' be the levels of current and future (lump-sum) taxes.

- a. (3p) Given the information above, write down the consumer's budget constraint in the current period.

$$c + s = y - t$$

- b. (3p) Given the information above, write down the consumer's budget constraint in the future period.

$$c' = y' - t' + (1+r)s$$

- c. (3p) From a and b, derive the intertemporal (lifetime) budget constraint of the rep. consumer.

From b) $(1+r)s = c' - (y' - t')$

$$s = \frac{c' - (y' - t')}{(1+r)}$$

From a) $s = y - t - c$

$$(1+r)(y - t - c) = c' - (y' - t')$$

$$\Rightarrow c + \frac{c'}{(1+r)} = (y - t) + \frac{(y' - t')}{(1+r)}$$

d. (3p) Write down the consumer's optimization problem.

$$\max U(C, C')$$

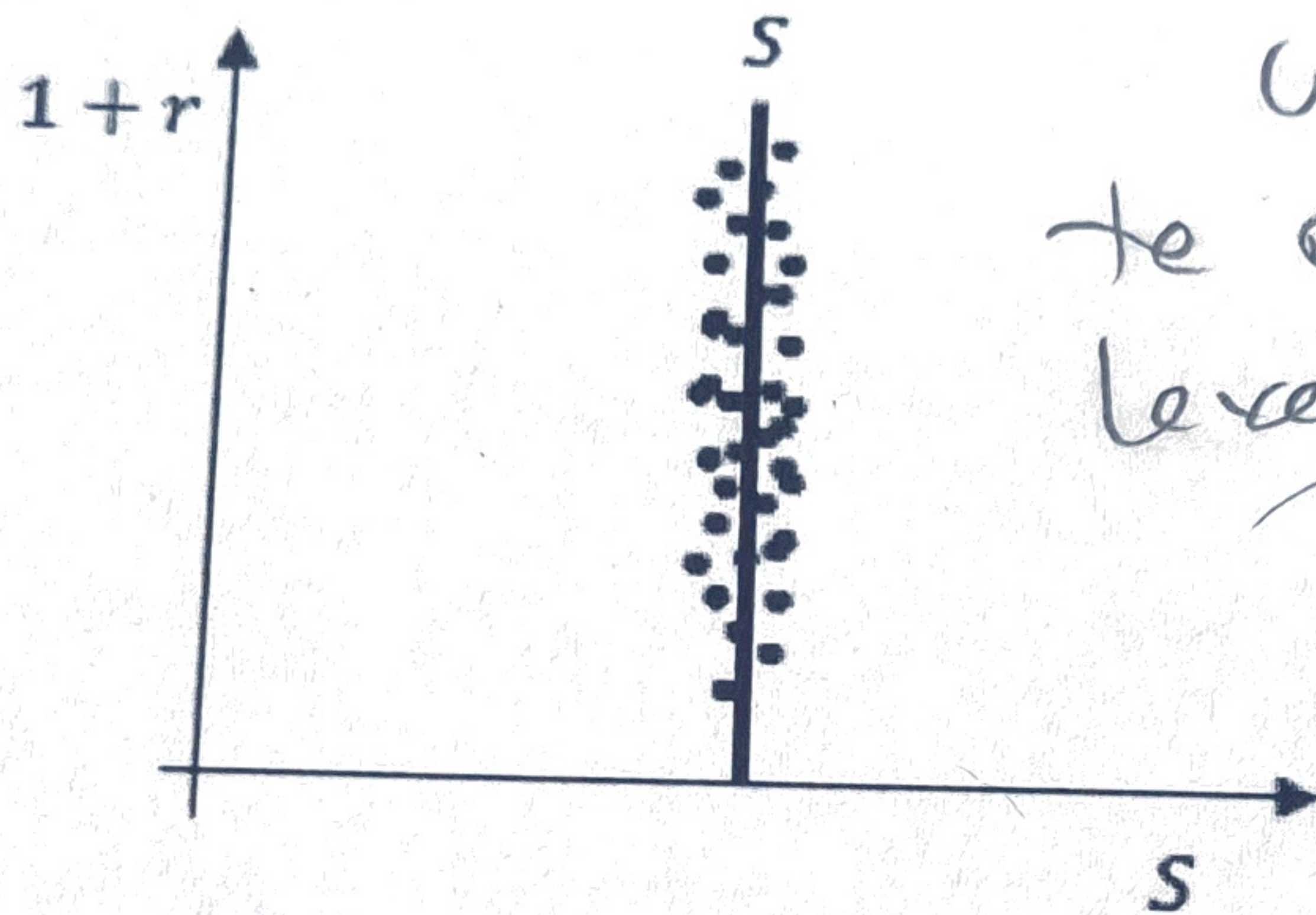
s.t.

$$C + \frac{C'}{1+r} = y - t + \frac{y' - t'}{1+r}$$

$$C, C' \geq 0$$

$$\text{Let } y - t + \frac{y' - t'}{1+r} = w_e$$

e. (10p) Now suppose you have a database of past-periods' saving decisions of the consumers and the graph that you get for the relationship between r and **national private savings** (S) is as follows:

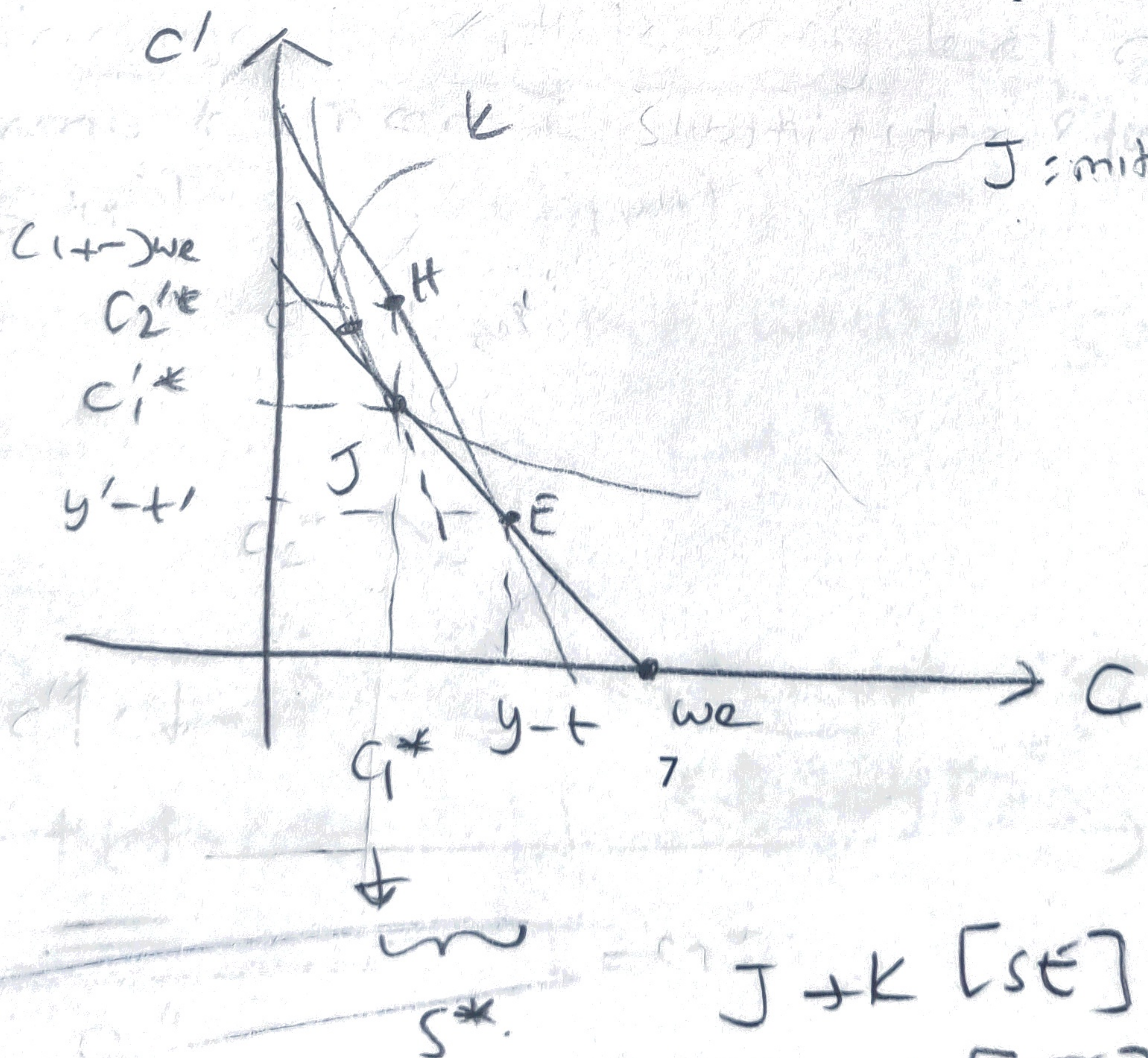


With changes in " r ",
the interest rate, saving
level doesn't change!

- income effect
- substitution effect

Cancel!

Suppose the current value of the interest rate, r_1 increases to $r_2 > r_1$. Utilizing the information summarized in the **Figure above, draw on (a) graph(s), the effect of the increase in interest rate on current and future consumption values. Make sure you label the axes, the relevant points/slopes/lines clearly. Explain.**



J: initial optimum
bundle with

$$C = C_1^* \\ C' = C_1'^*$$

H: new bundle
with

$$C = C_2^* = C_1^* \\ C' = C_2'^* > C_1'^*$$

J + K [substitution effect]

K → H [income effect]

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+ There maybe other answers to this
question with lenders

& Borrowers

} saving behavior
keeps rate

savings is response
to & unchanged!

Question 4 (10p) In the context of
in Ch. 5, what does the first welfare

The first welfare

9 There are no
5

Question 4. (10p) In the context of the one agent, one period model with leisure, which we have studied in Ch. 5, what does the first welfare theorem tell us about what should policy do? Explain.

The first welfare Thm. states that if

- 1 there are no externalities
- 2 " " " distorting taxes
- 3 " " " public goods
- 4 " " " price setters

then, competitive eqm-allocation is also the Pareto optimal allocation.

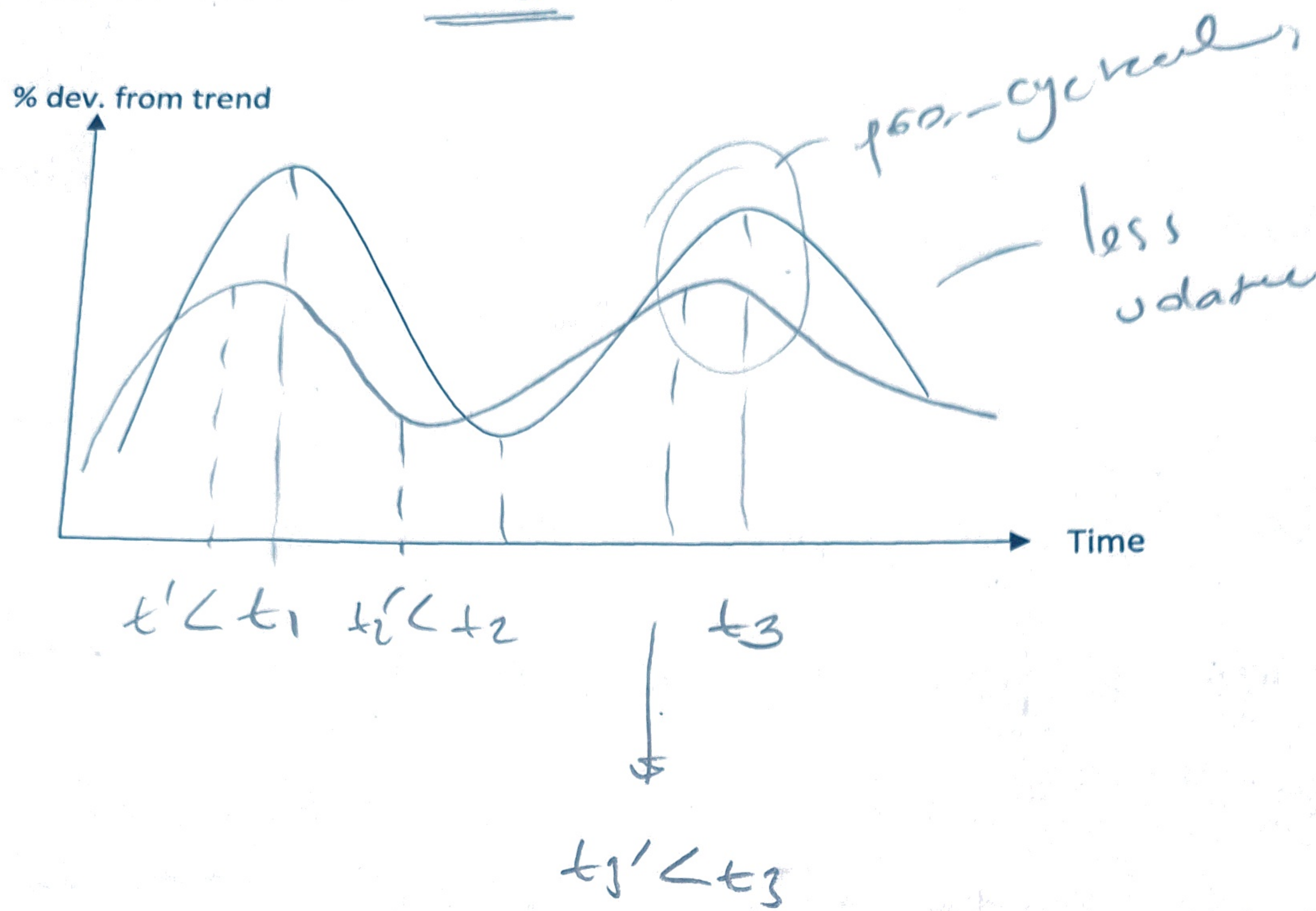
An implication of this thm. for policy is that for markets to be the best for the society (PO) are (CE) should look for policies to implement the conditions above.

For example: Have a competition authority to avoid (inefficient) market power & implement policies that would guarantee perfect competition. (d)

OR

Finance public schools (state economic enterprises?) to guarantee that CE $\Rightarrow$ PO. (c)

Question 5. (8p) Using the graph below, which represents the cyclical components of GDP through a HP filter. Draw a series x that is leading, less volatile and procyclical. **Explain.**



Question 6. (8p) Explain the following: "Increase national saving".

We should slow down the assumption that RE would allow G/G' change.

Question 6. (8p) Explain the following in the context of two-period setting with government. "Tax cuts decrease national saving".

We should show the impact of a tax cut under the assumption that RE wouldn't hold (that is, you may allow G, G' changing. It is easier to assume G' changing for this question)

A tax cut (+ t) would cause the rep-agent's budget constraint.

$$C + \frac{C'}{(1+r)} = y - \underbrace{t}_{\downarrow \text{ by } \Delta t} + \frac{y' - t'}{(1+r)}$$

This causes $\Delta C > 0$

$\Delta S > 0$ but $\Delta S < \Delta(y - t) < \Delta t$ (why?)

Therefore, $\Delta SP = N - \Delta S < \underbrace{N \Delta t}_{\Delta T}$

Would cause national saving to $\downarrow$ $SP + SG < 0$
 $\Delta T = \Delta T$
 $(+) \quad (-)$

[* The assumption that the gov. satisfies the B.C. would not change T' but G' is changing here]