INTERTEMPORAL CHOICE (OR INTERTEMPORAL CONSUMPTION)

BASIC IDEA

- PERSONS OFTEN RECEIVE INCOME IN "LUMPS"; e.g. monthly salary.
- HOW IS A LUMP OF INCOME SPREAD OVER THE FOLLOWING MONTH (SAVING NOW FOR CONSUMPTION LATER)
- OR HOW IS CONSUMPTION FINANCED BY BORROWING NOW AGAINST INCOME TO BE RECEIVED AT THE END OF THE MONTH?

FUTURE VALUE:

EX; IF $r = 0.1$ (10%) THEN 100 BAHT SAVED AT THE START OF PERIOD 1 BECOMES 110 BAHT AT THE START OF PERIOD 2.

- $FV = 1 + r \Rightarrow$ FUTURE VALUE ONE PERIOD FROM NOW OF 1 BAHT
- IF YOU HAVE m BAHT AND WITH INTEREST RATE OF r,

FUTURE VALUE ONE PERIOD FROM NOW OF m BAHT IS

$$FV = m(1 + r)$$

PRESENT VALUE:

PRESENT VALUE:

- SUPPOSE YOU CAN PAY NOW TO OBTAIN 1 BAHT AT THE START OF NEXT PERIOD.

- WHAT IS THE MUST YOU SHOULD PAY

- 1 BAHT ?

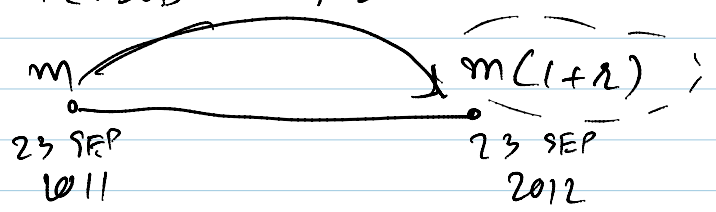
- NO. IF YOU KEPT YOUR 1 BAHT NOW AND SAVE IT, YOU WOULD HAVE $1+r$ AT THE START OF NEXT PERIOD

IN MIDEM $(1+r)$ BAHT $>$ 1 BAHT,

SO PAYING 1 BAHT NOW FOR 1 BAHT NEXT PERIOD IS A BAD DEAL.

Q: HOW MUCH MONEY WOULD HAVE TO BE SAVED NOW TO OBTAIN 1 BAHT AT THE START OF THE NEXT PERIOD ?

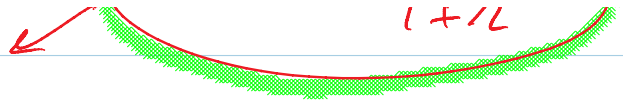
A: m BAHT SAVED NOW WILL BECOME $m(1+r)$ BAHT AT THE START OF NEXT PERIOD FV



SO WE WANT THE VALUE OF m FOR WHICH

$$m(1+r) = 1$$

THAT IS $$m = \frac{1}{1+r}$$



THE PRESENT-VALUE OF 1 BAHT OBTAINED AT THE START OF NEXT PERIOD!!!

EX: IF $r = 0.1$, THE MOST YOU SHOULD PAY NOW FOR 1 BAHT AVAILABLE NEXT PERIOD IS

$$PV = \frac{1}{1+0.1} = 0.91 \text{ BAHT !!!}$$

IF $r = 0.2$, $PV = \frac{1}{1+0.2} = 0.83$ BAHT !!!

SUMMARY

- THE PRESENT VALUE OF 1 BAHT AVAILABLE AT THE START OF THE NEXT PERIOD IS

$$\boxed{PV = \frac{1}{1+r}}$$

- THE PRESENT VALUE OF m BAHT AVAILABLE AT THE START OF THE NEXT PERIOD IS

$$\boxed{PV = \frac{m}{1+r}}$$

LET'S START THE FULL ANALYSES ON INTERTEMPORAL CONSUMPTION.

- LET m_1 AND m_2 BE INCOMES RECEIVED IN PERIOD 1 AND 2
- LET c_1 AND c_2 BE CONSUMPTIONS IN PERIOD 1 AND 2

PERIOD 1	PERIOD 2
TODAY	TOMORROW
THIS YEAR	NEXT YEAR

CONSUMPTIONS IN PERIOD 1 AND 2 YEAR | YEAR

- LET P_1 AND P_2 BE THE PRICES OF CONSUMPTION IN PERIOD 1 AND 2

THE INTERTEMPORAL CHOICE PROBLEM:
GIVEN INCOME m_1 AND m_2, AND GIVEN CONSUMPTION PRICES P_1 AND P_2, WHAT IS THE MOST PREFERRED INTERTEMPORAL CONSUMPTION BUNDLE (C_1, C_2)?

TO START, LET'S IGNORE PRICE EFFECTS BY SUPPOSING THAT $P_1 = P_2 = 1$ BAHT

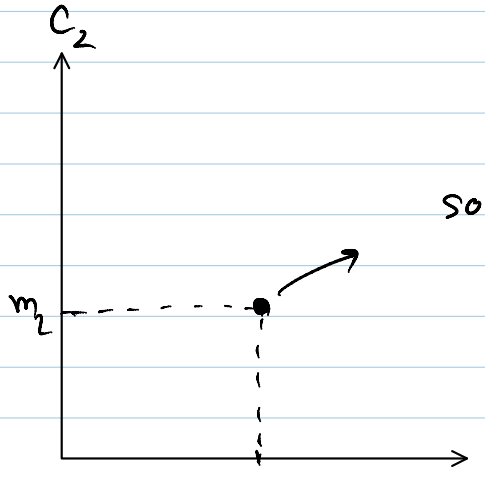
- SUPPOSE THAT THE GUY CHOOSES NOT SAVE OR TO BORROW

Q: WHAT WILL BE CONSUMED IN PERIOD 1?

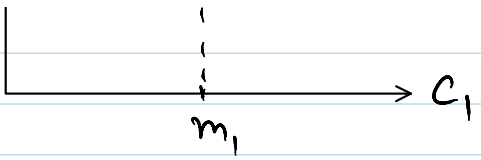
A: $C_1 = m_1$

Q: WHAT WILL BE CONSUMED IN PERIOD 2?

A: $C_2 = m_2$



SO $(C_1, C_2) = (m_1, m_2)$ IS THE CONSUMPTION BUNDLE IF HE CHOOSES NEITHER TO SAVE NOR TO BORROW.



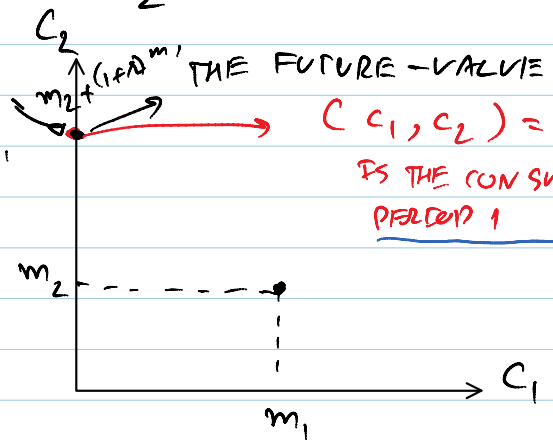
SAVE NOR TO BORROW.

- NOW SUPPOSE THAT THIS GUY SPENDS NOTHING ON CONSUMPTION IN PERIOD 1, THAT IS $c_1 = 0$ AND THEN HE SAVES

$$S_1 = m_1$$

- W/ INTEREST RATE OF r, WHAT NOW WILL BE THE PERIOD 2 'S CONSUMPTION LEVEL ?

$$c_2 = m_2 + m_1(1+r) .$$



- NOW SUPPOSE THAT THE CONSUMER SPENDS EVERYTHING POSSIBLE ON CONSUMPTION IN PERIOD 1, SO $c_2 = 0$.

- WHAT IS THE MOST THAT HE CAN BORROW IN PERIOD 1 AGAINST THE PERIOD 2 INCOME OF m_2 BAHT ?

- LET b_1 DENOTE THE AMOUNT BORROWED IN PERIOD 1.

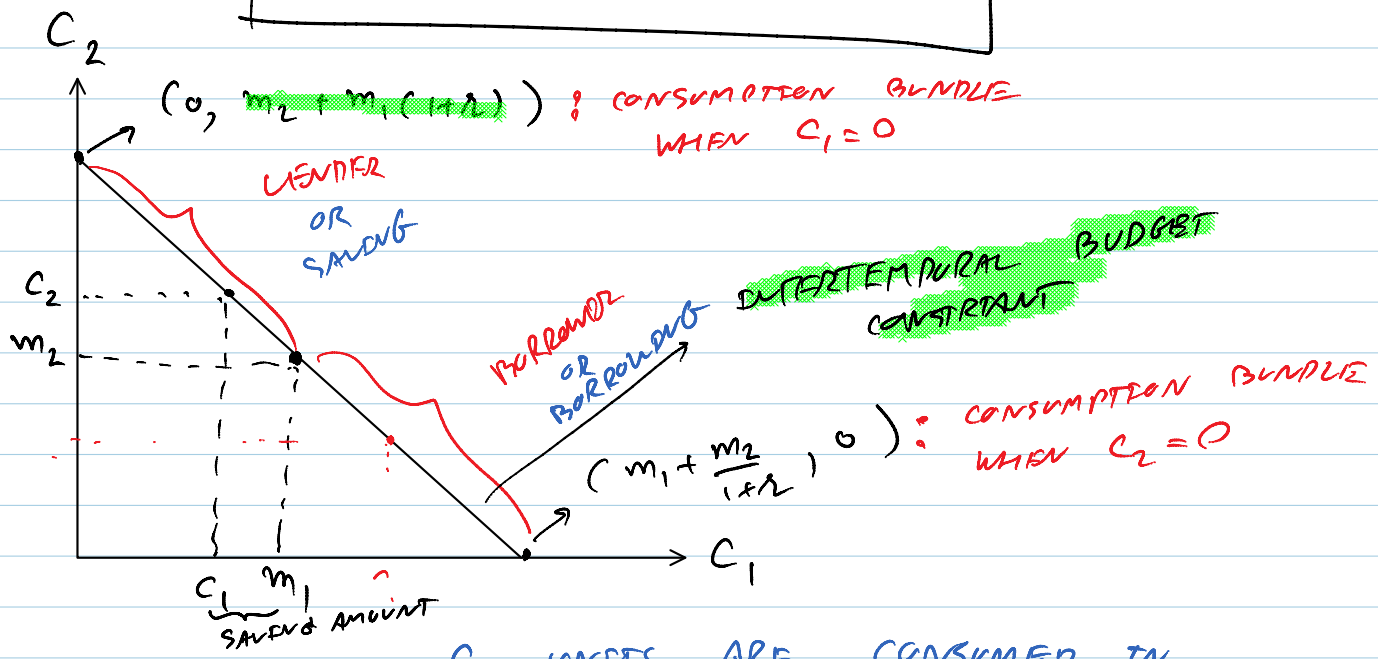
- ONLY m_2 BAHT WILL BE AVAILABLE IN PERIOD 2 TO PAY BACK b_1 BAHT

- SO $b_1(1+r) \leq m_2$

$$\therefore \quad b_1 = \frac{m_2}{(1+r)}$$

- SO THE LARGEST POSSIBLE PERIOD 1 CONSUMPTION LEVEL IS,

$$C_1 = m_1 + \frac{m_2}{1+r}$$



SUPPOSE THAT C_1 UNITS ARE CONSUMED IN PERIOD 1. THEN $m_1 - C_1$ WILL BE SAVED.

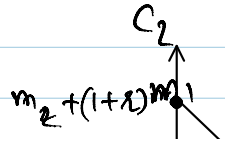
- PERIOD 2 CONSUMPTION WILL BE THEN

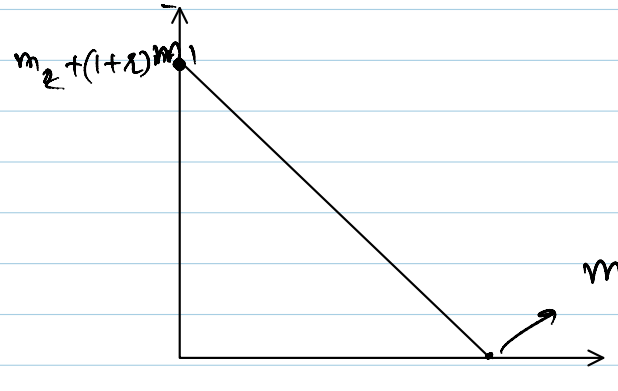
$$C_2 = m_2 + (m_1 - C_1)(1+r),$$

WHICH IS

$$C_2 = m_2 + m_1(1+r) - C_1(1+r)$$

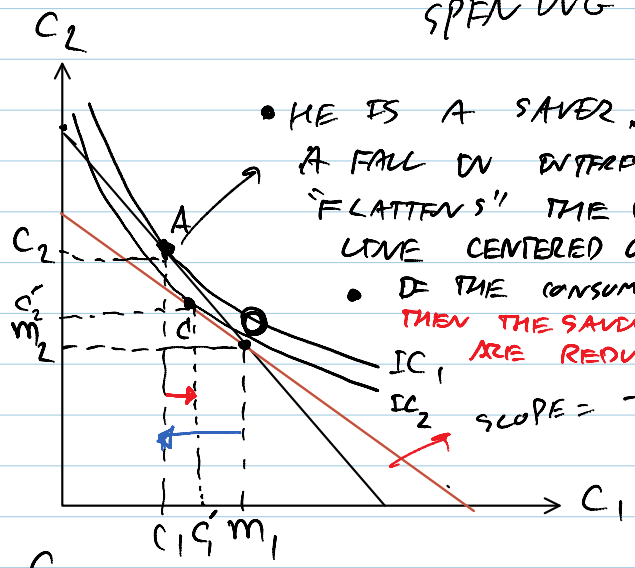
$$C_2 = \underbrace{m_2 + m_1(1+r)}_{\text{INTERCEPT}} \underbrace{- (1+r) C_1}_{\text{SLOPE}}.$$





SLOPE = $-\dfrac{m_2 + (1+r)m_1}{m_1 + \dfrac{m_2}{(1+r)}} = -(1+r)$ = TODAY'S CONSUMPTION PRICE / TOMORROW'S CONSUMPTION PRICE

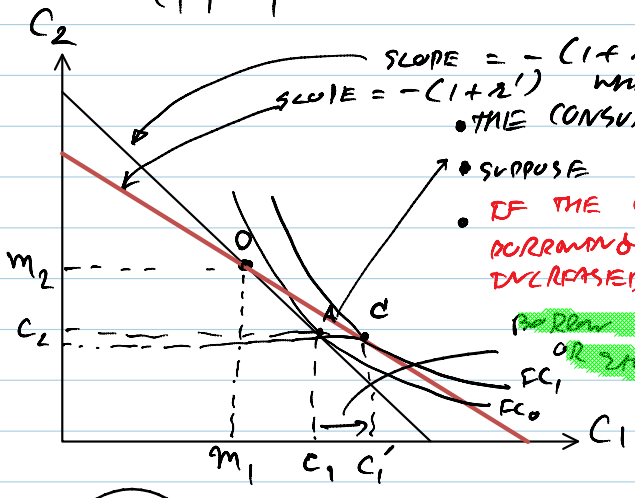
OPPORTUNITY COST OF SPENDING 1 BAHT IN THE PERIOD 1



- HE IS A SAVER.
- A FALL IN INTEREST RATE "FLATTENS" THE BUDGET LINE CENTERED ON POINT O.
- IF THE CONSUMER SAVES, THEN THE SAVING AND WELFARE ARE REDUCED BY A LOWER INTEREST RATE.

SUPPOSE INTEREST RATE FALLS.

BOTH SAVING RATE AND LENDING RATE



- THE CONSUMER BORROWS.
- SUPPOSE r FALLS
- IF THE CONSUMER BORROWS, THEN BORROWING AND WELFARE ARE INCREASED BY A LOWER INTEREST RATE

BORROW MORE OR SAVE LESS

$\downarrow r$ → BORROW MORE OR SAVE LESS (WHEN HE IS A BORROWER)

THE INTEREST RATE ↓

SE ↑ CURRENT CONSUMPTION BECOME LESS EXPENSIVE RELATIVE TO FUTURE CONSUMPTION, C_1 ↑, C_2 ↓, S_1 ↓

IE ↑ WHEN r FALLS, YOU CAN AFFORD LESS OF CURRENT AND FUTURE CONSUMPTION, SO SAVING RISES (S_1)

SINCE SE > IE → SAVING ↓