

EE312 Macroeconomics, 2/2013 (Sec. 046402)
 Chapter 5. Two Period Model
 Consumption-Savings Decision and The Credit Market

1 Consumers

- Current budget constraint : $c + s = y - t$; $s > 0$, lender , $s < 0$, borrower.
- Consumer saves by buying bonds and lend by selling bonds. Lending rate = borrowing rate = r
- The relative price of future consumption in terms of current consumption is $\frac{1}{(1+r)}$.
- Future budget constraint : $c' = y' - t' + (1+r)s$. $s > 0$ get interest (and principal) , $s < 0$ pays interest and principal

- Life time budget constraint :

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

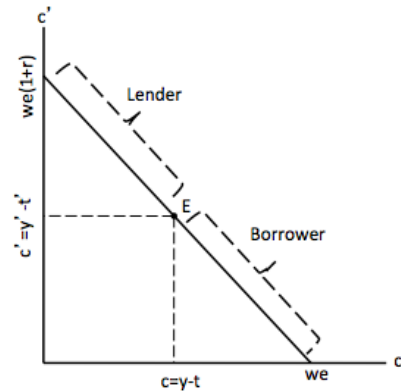
The PV of lifetime consumption = PV of lifetime income minus PV of lifetime taxes.

$$= we$$

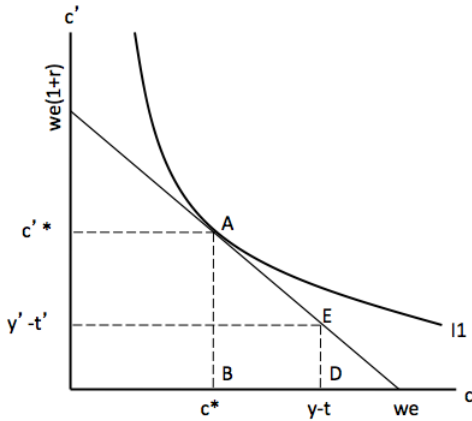
life time wealth

- $c' = -(1+r)c + we(1+r)$

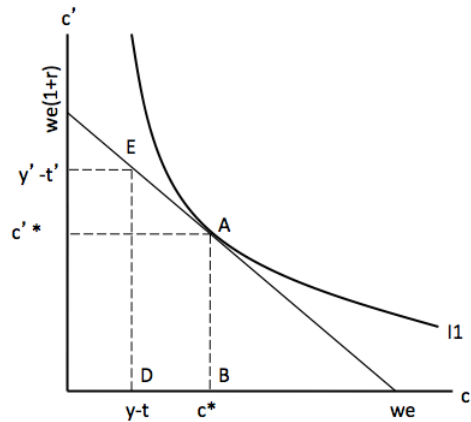
- Consumer optimization : $\frac{MU_c}{MU_{c'}} = MRS_{c,c'} = (1+r)$.



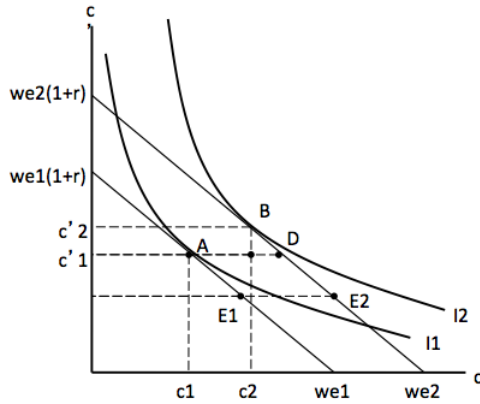
Lender



Borrower



- An increase in **current income** (y)



- $y \uparrow \Rightarrow we \uparrow$ pure income effect $\Rightarrow$ smooth consumption $\Rightarrow s \uparrow \Rightarrow c \uparrow$ and $c' \uparrow$

• Temporary versus Permanent Δy

• A temporary increase in $y = HL$:

- HJ = effect of temporary rise in y .
- Current consumption rises $<$ current income; saving $\uparrow$

• A permanent increase in $y = y_2 - y_1 = HL = y'_2 - y'_1 = LM$.

- HK = effect of permanent rise in y .
- Larger effect on current consumption: $c1c3$

• Effect of a tax cut?

- If **temporary**, the increase in consumption will be small; most of the increased income is saved.
- If **permanent**, the increase in consumption will be large.

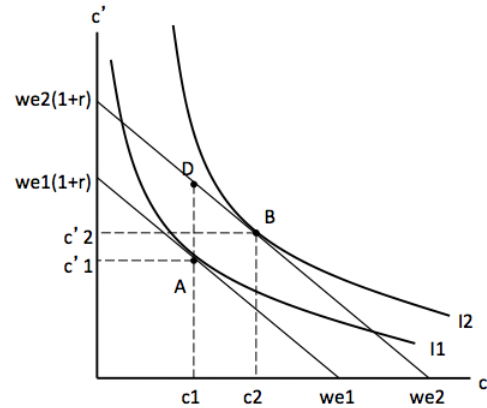
• An increase in the real interest rate

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

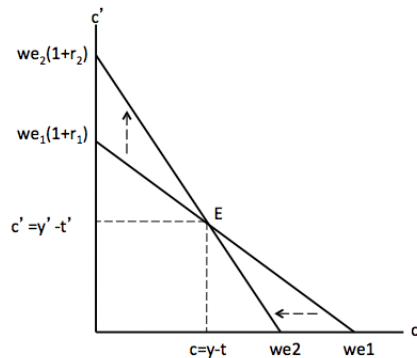
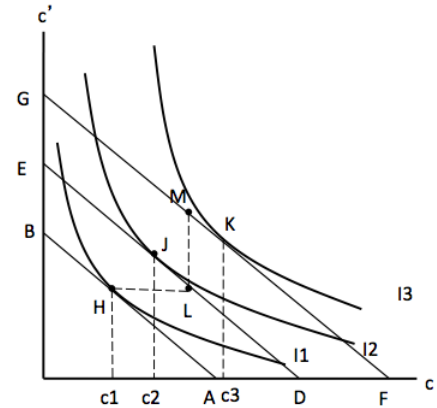
$$we(1+r) = y(1+r) + y' - t(1+r) - t'$$

- **Future consumption** becomes cheaper; **current consumption** becomes more expensive.

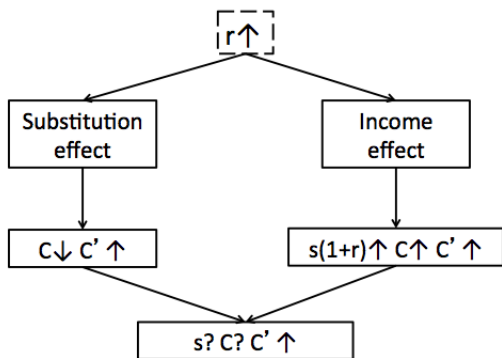
- an increase in **future income** (y')



- $y' \uparrow \Rightarrow we \uparrow$ pure income effect $\Rightarrow$ smooth consumption $\Rightarrow s \downarrow \Rightarrow c \uparrow$ and $c' \uparrow$

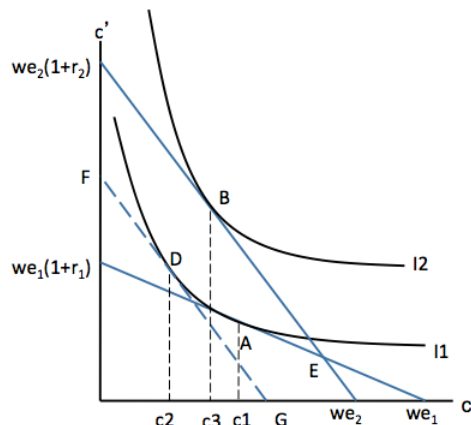


Lender



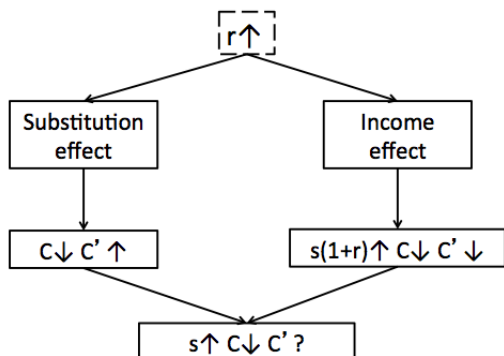
- **The substitution effect:** more future consumption for less current consumption.
- **The income effect:** given savings yield more future income — higher current and future consumptions.
Positive income effect for lenders

Lender: stronger substitution effect



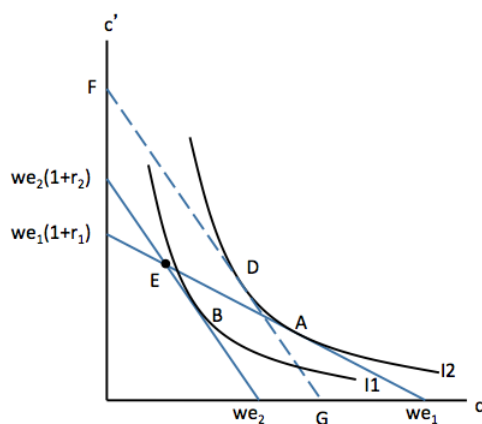
- AD = substitution effect; lower c.
- DB = income effect; higher c.
- AD > DB; lower c at c3, assuming a lender.

Borrower



- **The substitution effect:** more future consumption and less current consumption.
- **The income effect:** loans for future consumption become more expensive — reduced current and future consumptions. **Negative income effect for borrowers.**

Lender: stronger substitution effect



- AD = substitution effect; lower c and higher c'.
- DB = income effect; lower c and c'.
- Net effect: lower c; unclear c'.

2 The government sector

- Government's **current budget constraint**: $G = T + B$ or $G - T = B$, $B > 0$ = lender, $B < 0$ = borrower
- Government's **future budget constraint**: $G' + (1 + r)B = T'$
- Government's **life-time budget constraint**: $G + \frac{G'}{1 + r} = T + \frac{T'}{1 + r}$.
- **Equilibrium**
 1. The credit market clears. $S^p = B$, $S = S^p + S^g = B - B = 0$.
 2. The income-expenditure identity.

$$\begin{aligned}
Y &= C + G \\
S^P &= Y - C - T \\
B &= G - T \\
Y - C - T &= G - T \\
Y &= C + G
\end{aligned}$$

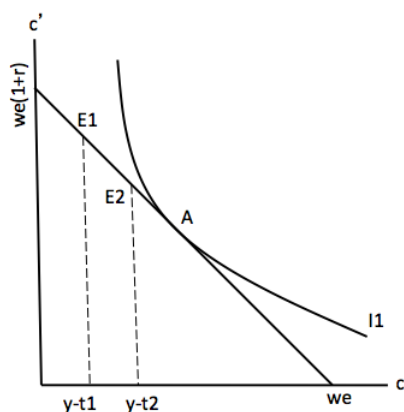
3 The Ricardian Equivalence

- **A change in current taxes** with an equal and opposite change in the present value of future taxes has **no effect on the real interest rate and the consumption of individual consumers.**

$$\begin{aligned}
G + \frac{G'}{1+r} &= Nt + \frac{Nt'}{1+r} \\
t + \frac{t'}{1+r} &= \frac{1}{N} \left[G + \frac{G'}{1+r} \right] \quad \dots(\text{eq.9.25})
\end{aligned}$$

$$\begin{aligned}
\text{From } c + \frac{c'}{1+r} &= y + \frac{y'}{1+r} - \left[t + \frac{t'}{1+r} \right] \\
c + \frac{c'}{1+r} &= y + \frac{y'}{1+r} - \frac{1}{N} \left[G + \frac{G'}{1+r} \right] \quad \dots(\text{eq.9.26})
\end{aligned}$$

- But private and government savings do change due to the different timings of taxes.
- A decrease in current taxes increases private saving and reduces government saving by the same amount ($S^p = Y - C - T$ and $S^g = T - G$).
- Consumers respond to a tax cut by increasing private saving by the same amount.
 - * Private saving increases to pay for higher future taxes.
 - * The consumption bundle remains the same.
 - * $\Delta S^p = \Delta B = \Delta T$ so the credit market equilibrium remains.
- The change in current taxes (Δt) is matched by $-\Delta t(1+r)$ so that equation 9.25 holds.
- Equation 9.26 remains unchanged, given r (as y, y', G, G' and N are the same).
- And $Y = C + G$; the credit market clears.
- No welfare change for consumers.
- **A current tax cut for a borrower**
 - A current tax cut equals a future tax increase.



Unchanged credit market

