# 111-112 Section 11 manuscript

Tuesday, September 29, 2020 8:37 PM

111: https://berkeley.zoom.us/rec/share/pqu7jJ90xIlaSLpPB7fiLXHsVGrpb7A8tTY3omSAOqXZCwIlI1oTFTQ_TvbBc5H5.aJXOfPKozG3C9Ahy Passcode: 839E%?dh
112: https://berkeley.zoom.us/rec/share/kb9vWGry4O52_783-MIQQSuT7TkhtIQ_2hQdqEdKRdO9as5qCNiBN8bbbMxy1hlf.oa3Ztdv_L25PgLsg Passcode: 9O6X?Kn$

Today
- Course pack p.13, 15
- 4.3 Problems Q7
- 5.3 Problems Q5

7. Income today $m_1 = 100$ interest rate $r$ 10%
tomorrow $m_2 = 200$ inflation $\pi$ 5%

$U = c_1 c_2$

(a) Intertemporal budget constraint: Good 1 : consumption today
Good 2 : consumption tomorrow

from today's point of view

tomorrow's income, leftover from today, interest

inflation: tomorrow, \$100 can only buy a good of \$95 value from today's prospective

$$c_2 \ (\leq) = \left[ m_2 + (m_1 - c_1)(1+r) \right] \frac{1}{1+\pi}$$

$$\Rightarrow (1+\pi) c_2 = m_2 + (m_1 - c_1)(1+r) \quad \leftarrow \text{multiply } (1+\pi) \text{ on both sides}$$

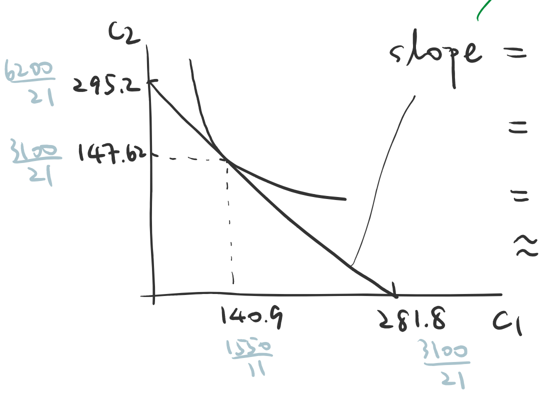
$$\Rightarrow \frac{1+\pi}{1+r} c_2 = \frac{m_2}{1+r} + m_1 - c_1 \quad \leftarrow \text{divide } (1+r) \text{ on both sides}$$

$$\Rightarrow \boxed{c_1 + \frac{1+\pi}{1+r} c_2 = m_1 + \frac{m_2}{1+r}} \quad \leftarrow \text{rearrange terms}$$

$$\Rightarrow c_1 + \frac{1.05}{1.1} c_2 = 100 + 200 \frac{1}{1.1} \quad \leftarrow \text{plug in numbers}$$

$$\Rightarrow c_1 + \frac{21}{22} c_2 = \frac{3100}{11}$$

"Price ratio": spend \$1 today v.s. save \$1 for tomorrow




$$\text{slope} = -\frac{1+r}{1+\pi} \quad \begin{matrix}\text{— interest} \\ \text{— depreciation}\end{matrix}$$

$$= -\frac{1.1}{1.05}$$

$$= -\frac{22}{21}$$

$$\approx -1.048$$

(b) $MRS = \frac{MU_1}{MU_2} = \frac{c_2}{c_1}$ Let $\frac{c_2}{c_1} = \frac{22}{21}$ $\Rightarrow$ $c_2^* = \frac{22}{21} c_1^*$

Intertemporal budget constraint: $c_1^* + \frac{21}{22} \cdot \underbrace{\frac{22}{21} c_1^*}_{= c_2^*} = \frac{3100}{11}$

$$c_1^* = \frac{1550}{11} \approx 140.9$$

Saver or borrower?

Recall: $m_1 = 100$
$m_2 = 200$

$c_1^* > m_1$

$$C_1^* = \frac{1550}{11} \approx 140.9$$

$$C_2^* \approx \frac{1550}{11} \cdot \frac{22}{21} = \frac{3100}{21} \approx 147.62$$

$m_2 = 200$

$C_1^* > m_1$

$\Rightarrow$ borrower

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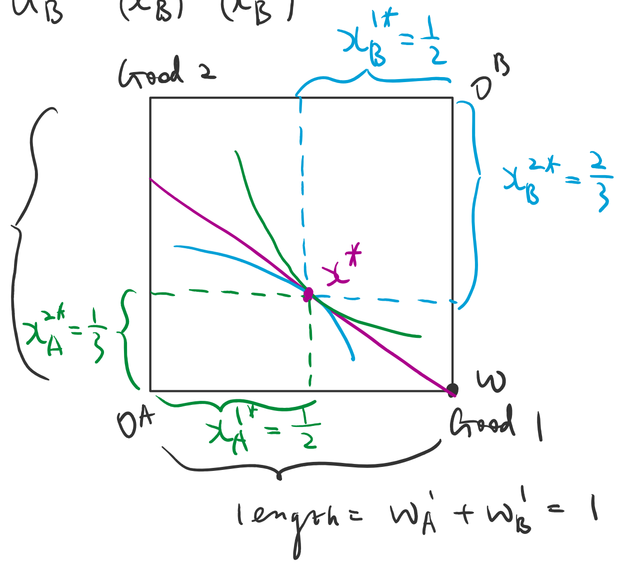
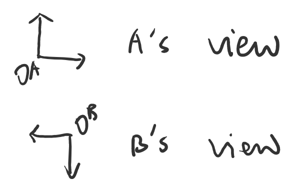
5. Exchange economy: consumers meet in market $\to$ price $\to$ trade
(no production yet)

$$w_A = (1, 0) \qquad u_A = (x_A^1)^{\frac{1}{2}} (x_A^2)^{\frac{1}{2}}$$

$$w_B = (0, 1) \qquad u_B = (x_B^1)^{\frac{1}{3}} (x_B^2)^{\frac{2}{3}}$$

Edgeworth box:




Competitive equilibrium (Walrasian):

"invisible hand"

① Consumers behave optimally (utility maximizers)

② Market clearance ($\sum$ consumption $= \sum$ endowment for all goods)

} market will come up w/ $\frac{p_1}{p_2}$ to enable trade

$\to$ general equilibrium

outcome: bundles + prices

① Utility max

$$u_A = (x_A^1)^{\frac{1}{2}} (x_A^2)^{\frac{1}{2}} \qquad p_1 \underset{1}{w_A^1} + p_2 \underset{0}{w_A^2} = p_1$$

$$\Rightarrow (x_A^1)^* = \frac{m_A}{2} \cdot \frac{1}{p_1} = \frac{1}{2}$$

$$(x_A^2)^* = \frac{m_A}{2} \cdot \frac{1}{p_2} = \frac{p_1}{2p_2}$$

$$u_B = (x_B^1)^{\frac{1}{3}} (x_B^2)^{\frac{2}{3}} \qquad p_1 \underset{0}{w_B^1} + p_2 \underset{1}{w_B^2} = p_2$$

$$\Rightarrow (x_B^1)^* = \frac{m_B}{3} \cdot \frac{1}{p_1} = \frac{p_2}{3p_1}$$

$$(x_B^2)^* = \frac{2}{3} m_B \cdot \frac{1}{p_2} = \frac{2}{3}$$

② Market clear:

$$(x_A^1)^* + (x_B^1)^* = w_A^1 + w_B^1 \Rightarrow \frac{1}{2} + \frac{p_2}{3p_1} = 1 \Rightarrow \frac{p_1}{p_2} = \frac{2}{3}$$

$$(x_A^1)^* + (x_B^1)^* = w_A^1 + w_B^1 \Rightarrow \frac{1}{2} + \frac{1}{3p_1} = 1 \Rightarrow \frac{1}{p_2} = \frac{2}{3}$$

$$(x_A^2)^* + (x_B^2)^* = w_A^2 + w_B^2 \Rightarrow \frac{p_1}{2p_2} + \frac{2}{3} = 1 \Rightarrow \frac{p_1}{p_2} = \frac{2}{3}$$

By Walras' Law:

there are n markets, n−1 markets clear ⇒ the $n^{th}$ market must also clear

$$\Rightarrow (x_A^2)^* = \frac{1}{2}\frac{p_1}{p_2} = \frac{1}{3}$$

$$(x_B^1)^* = \frac{1}{3}\frac{p_2}{p_1} = \frac{1}{2}$$

Competitive eqm:

$$\boxed{\begin{array}{l} x_A^* = \left(\frac{1}{2}, \frac{1}{3}\right) \\ x_B^* = \left(\frac{1}{2}, \frac{2}{3}\right) \\ \frac{p_1}{p_2} = \frac{2}{3} \end{array}}$$

} bundles

→ prices

Q1: Why the budget line has to go through $w$ point?

A: Because endowment point is always feasible

Q2: Are consumers better off after trade?

A: Yes, because if trade is harmful, consumers can always opt out and stick to the endowment.

Q3: Is the Competitive outcome (Pareto) efficient?

Yes! (First fundamental theorem of welfare economics)