Problem Set 7

Thursday, 2 November 2017 08:02

1. Baseline, "first-best": if there's no asymmetric info.

→ lending to good projects, funding is scarce,

⇒ $r_D^{I,FB} = y$. first-best interest charged by investors, investors take all

$$p_G y > R > p_B y + B$$

→ moral hazard, r_D^I such that enterpreneurs are induced to choose good project

$$\underbrace{p_G(y - r_D^I)}_{\text{return from good}} \geq \underbrace{p_B(y - r_D^I) + B}_{\text{return from bad}} \quad (IC\text{-}D)$$

incentive comp. constraint of entre.

$$\Rightarrow \quad r_D^I \leq y - \frac{B}{\underbrace{p_G - p_B}_{\Delta p}} = y - \underbrace{\frac{B}{\Delta p}}_{\text{inf. rent}} < r_D^{I,FB}$$

Participation constraint (PC - I)

$$p_G r_D^I \geq R L_D^I$$

L_D^I: volume of lending to the entrepreneur

$$\rightarrow \quad L_D^I \leq \frac{p_G r_D^I}{R}$$

$$y = r_D^I + \underbrace{\frac{B}{\Delta p}}_{r_D^E} \leftarrow \text{inf. rent.}$$

split between entre. and investors

2.

$$\left.\begin{array}{l} L_D^I \leq \dfrac{p_G r_D^I}{R} \\ (IC\text{-}D) \end{array}\right\} = \frac{p_G}{R}\left(y - \frac{B}{\Delta p}\right)$$

For entrepreneurs starting with A

$$A + L_D^I \geq I$$

$$\rightarrow \quad A \geq I - L_D^I = \underbrace{I - \frac{p_G}{R}\left(y - \frac{B}{\Delta p}\right)}_{\equiv \bar{A}(R)}$$

Only "well-capitalized" entr. can directly borrow.

3.

entre. < Banks / investors

$$y = \underbrace{r_B^B}_{\text{for banks}} + \underbrace{r_B^I}_{\text{for investors}} + \underbrace{r_B^E}_{\text{inf. rent. for entre}}$$

(r_B ~ banking solution)

Bank — monitor

$$B \rightarrow b$$

IC.- E. incentive comp. constraint for entre.

$$\left.\begin{array}{l} \underbrace{p_G r_B^E}_{\text{return from good proj.}} \geq \underbrace{p_B r_B^E + b}_{\text{return from bad}} \\ r_B^E = y - r_B^B - r_B^I \end{array}\right\}$$

$$\Rightarrow \quad r_B^B + r_B^I \leq y - \underbrace{\frac{b}{\Delta p}}_{\text{inf. rent}}$$

Bank — moral hazard

monitor (not observed by investors) — cost C (if bank "shirks", it will save the cost C. moral hazard!)

IC - Bank incentive comp. constraint for bank

$$\underbrace{p_G r_B^B - C}_{\text{return from mon.}} \geq \underbrace{p_B r_B^B}_{\text{return from no-mon.}}$$

$$\Rightarrow \quad r_B^B \geq \frac{C}{p_G - p_B} = \frac{C}{\Delta p}$$

Participation constraints: PC - Inv.

$$p_G r_B^I \geq R L_B^I \Rightarrow L_B^I \leq \frac{p_G r_B^I}{R}$$

(L_B^I — lending provided by investors)

PC - Bank

$$\left.\begin{array}{l} p_G r_B^B \geq \beta L_B^B \Rightarrow L_B^B \leq \dfrac{p_G r_B^B}{\beta} \\ IC\text{ - Bank} \end{array}\right\} \Rightarrow$$

(L_B^B — lending provided by bank)

$$L_B^B \leq \frac{p_G C}{\beta \Delta p}$$

4.

$$\left.\begin{array}{l} IC\text{ - E} \\ IC\text{ - Bank} \\ PC\text{ - Inv.} \\ PC\text{ - Bank} \end{array}\right\} \Rightarrow L_B^I \leq \frac{p_G}{R}\left(y - \frac{b + C}{\Delta p}\right)$$

For entr. with initial wealth A

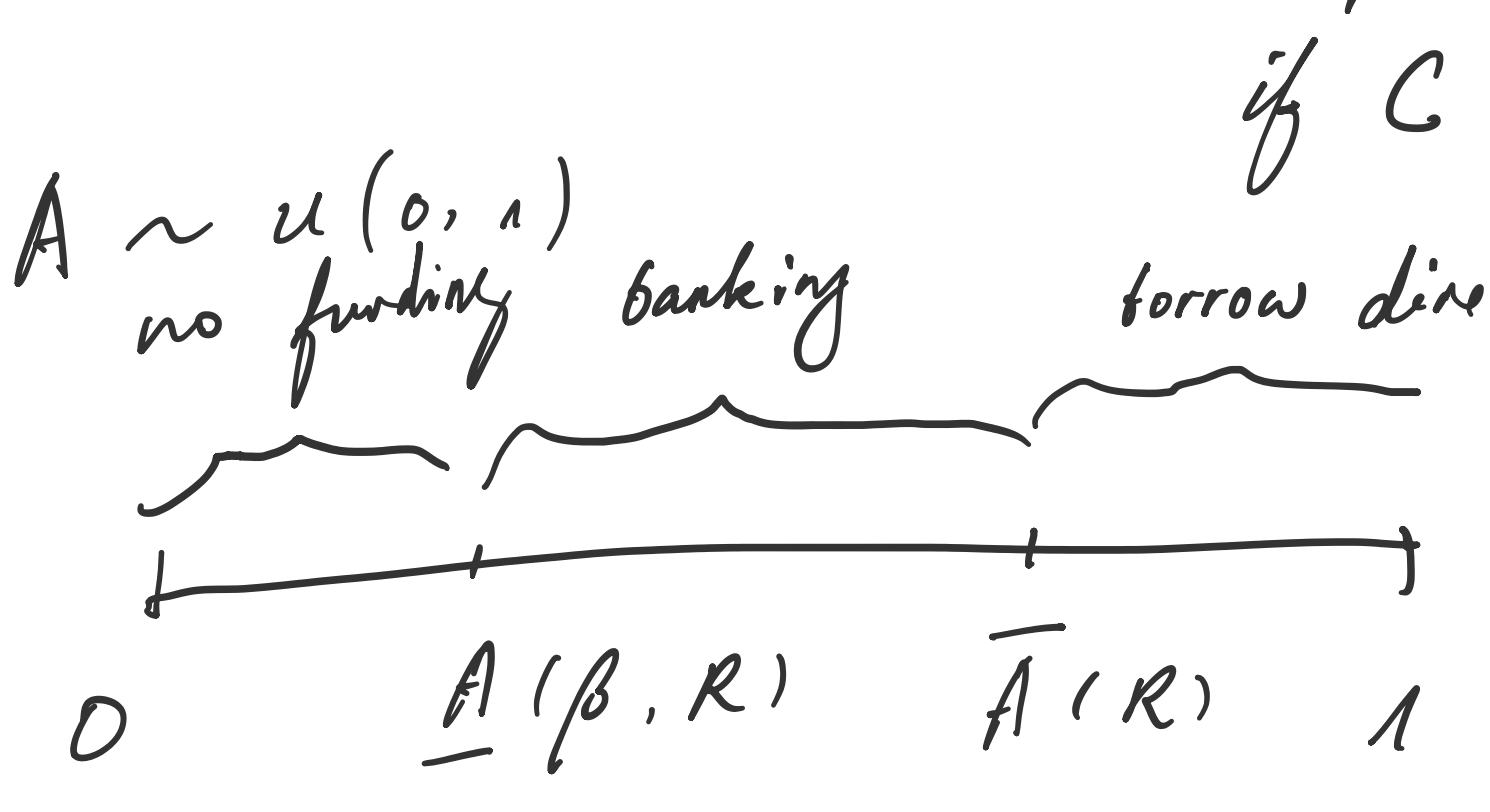
$$A + L_B^I + L_B^B \geq I$$

$$A \geq I - L_B^B - L_B^I = \underbrace{I - L_B^B - \frac{p_G}{R}\left(y - \frac{b+C}{\Delta p}\right)}_{\equiv \underline{A}(\beta, R)}$$

$$< \bar{A}(R)$$

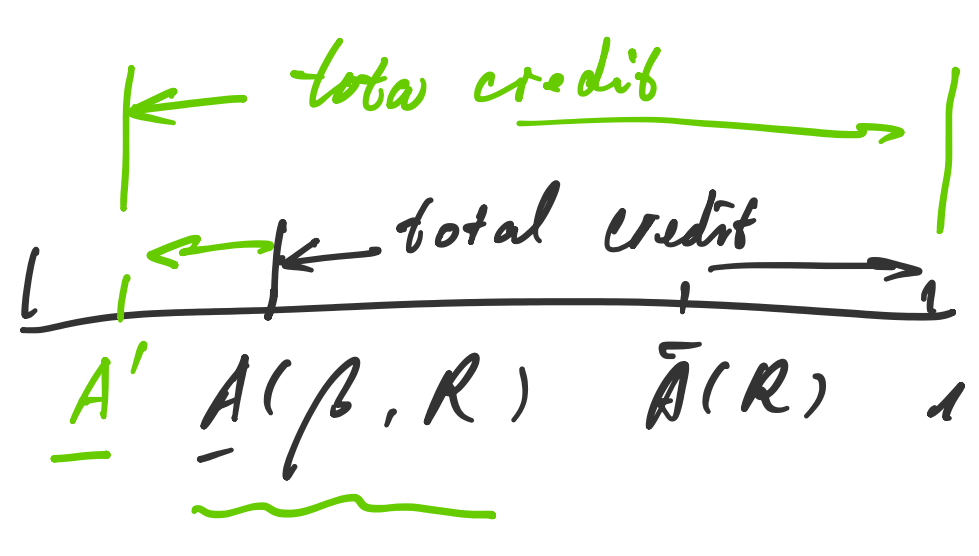
↑ if C is not ~~too~~ big

$A \sim U(0, 1)$



Credit supply

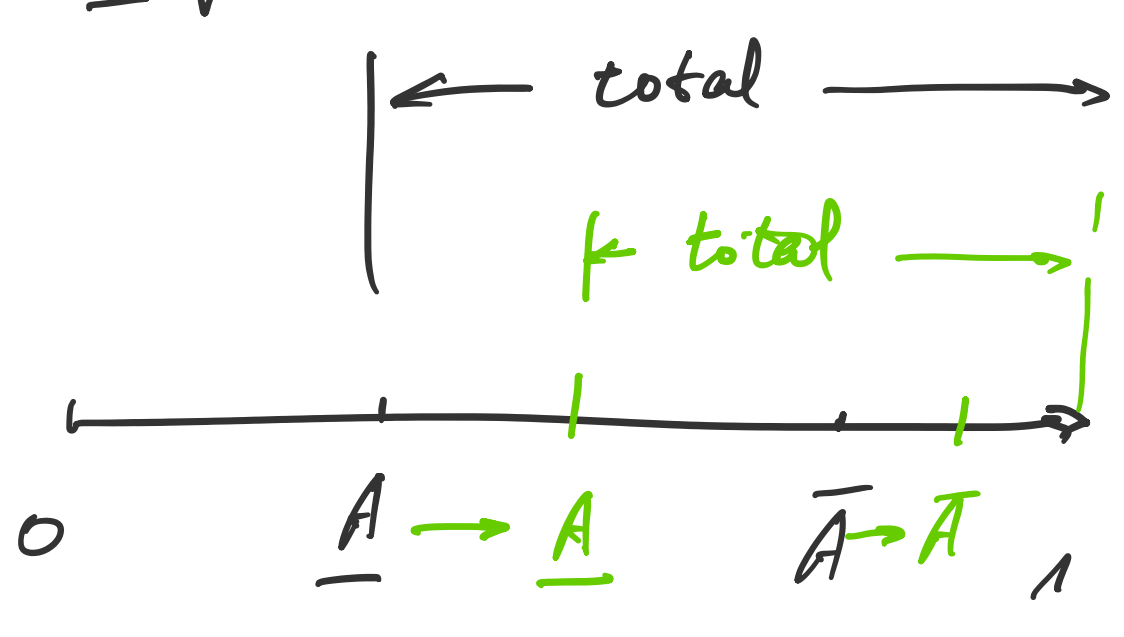
1. $\beta \downarrow$



$$\frac{\partial \underline{A}(\beta, R)}{\partial \beta} = -\frac{\partial L_B^B}{\partial \beta} = \frac{p_G C}{\beta^2 \Delta p} > 0$$

$$\Rightarrow \quad \beta \downarrow \rightarrow \underline{A} \downarrow$$

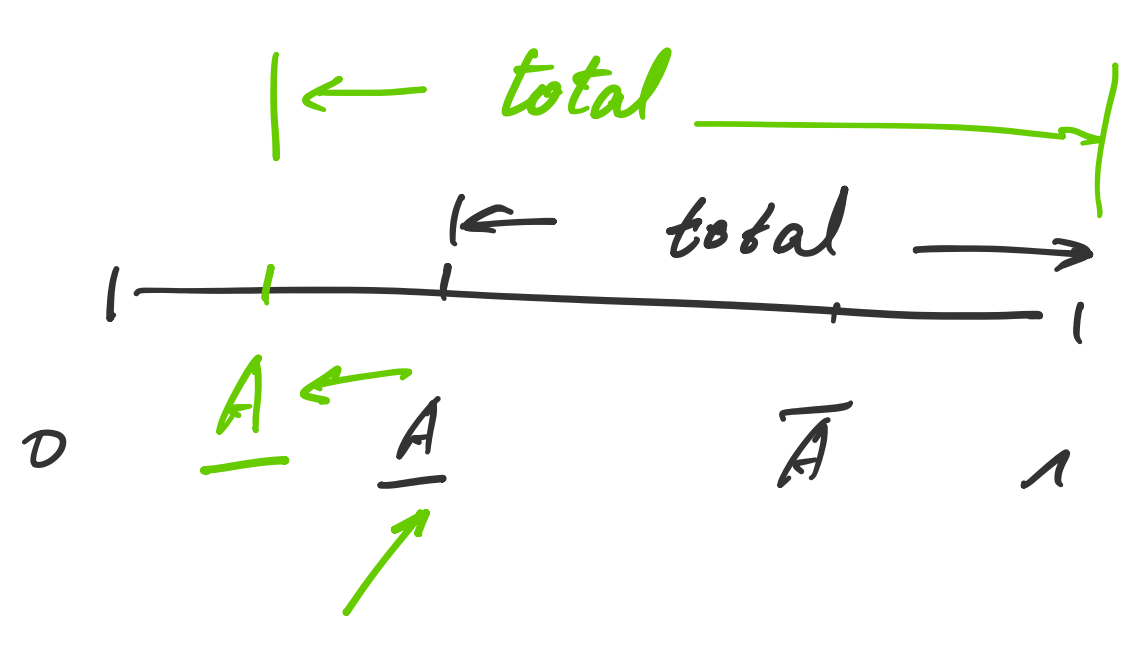
2. $p_G \downarrow$



$$\left.\frac{\partial \underline{A}}{\partial p_G} = -\frac{C}{\beta \Delta p} - \frac{1}{R}\left(y - \frac{b + C}{\Delta p}\right) < 0 \quad p_G \downarrow \right\} \Rightarrow \underline{A} \uparrow$$

$$\left.\frac{\partial \bar{A}}{\partial p_G} = -\frac{1}{R}\left(y - \frac{B}{\Delta p}\right) < 0 \quad p_G \downarrow \right\} \Rightarrow \bar{A} \uparrow$$

3. $C \downarrow$ $b \downarrow$

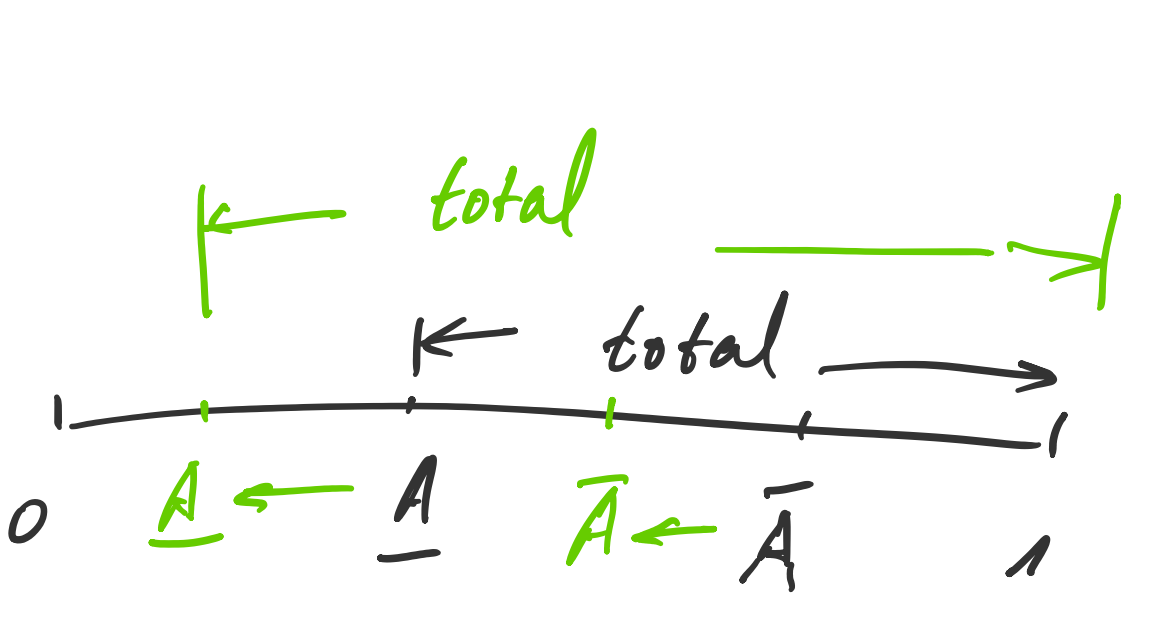


$$\frac{\partial \underline{A}}{\partial b} = \frac{p_G}{R \Delta p} > 0$$

$$\left.\frac{\partial \underline{A}}{\partial C} = -\frac{p_G}{\beta \Delta p} + \frac{p_G}{R \Delta p} \quad \beta >> R \right\} \Rightarrow \frac{\partial \underline{A}}{\partial C} > 0$$

$C \downarrow$ $b \downarrow$ $\Rightarrow \underline{A} \downarrow$

4. $R \downarrow$



$$\left.\frac{\partial \underline{A}}{\partial R} = \frac{p_G}{R^2}\left(y - \frac{b+c}{\Delta p}\right) > 0 \quad R \downarrow \right\} \Rightarrow \underline{A} \downarrow$$

$$\left.\frac{\partial \bar{A}}{\partial R} = \frac{p_G}{R^2}\left(y - \frac{B}{\Delta p}\right) > 0 \quad R \downarrow \right\} \Rightarrow \bar{A} \downarrow$$