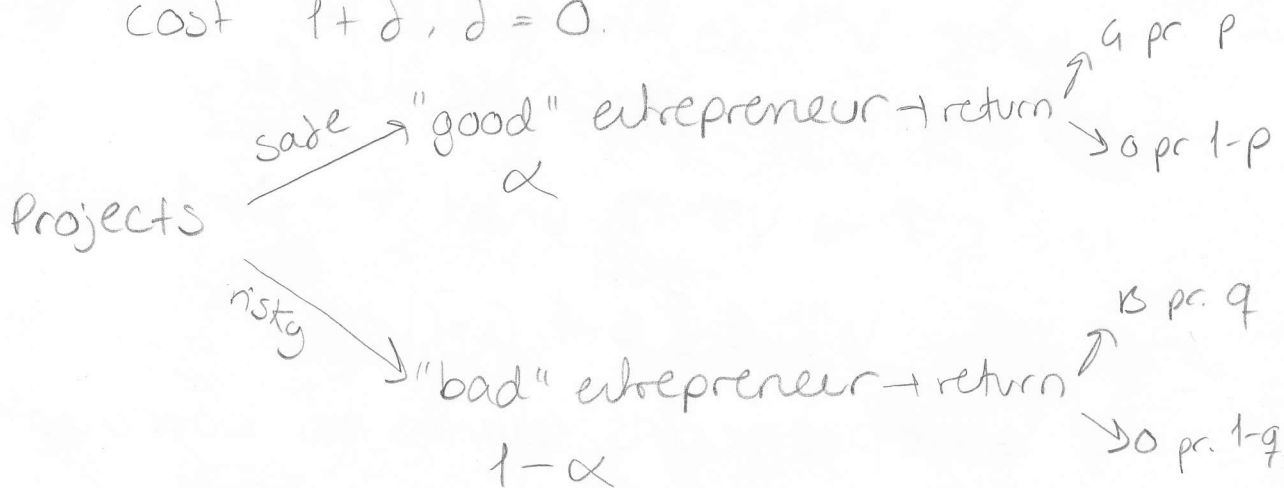# 2. Seminar 4335

(1)
- Risk neutral entrepreneurs
- Limited liability
- No initial wealth
- Project cost $I = 1$.
- Recieves financing from monopolistic and risk neutral bank which has lending cost $1 + d$, $d = 0$.

Projects
- safe → "good" entrepreneur → return $\nearrow$ G pr P $\searrow$ 0 pr $1-p$
  α
- risky → "bad" entrepreneur → return $\nearrow$ B pr. q $\searrow$ 0 pr. $1-q$
  $1 - \alpha$

$$1 > p > q > 0$$
$$B > G > 0$$
$$pG = qB = \mu$$

$$m := \alpha p + (1 - \alpha) q$$ — All agents know the probability distribution.

(a) Symmetric information
- We assume that both types are credit-worthy.
- In case of complete information the bank will offer $1 + r_{SI}^G = G$ to the "good" entrepreneur and $1 + r_{SI}^B = B$ to the bad entrepreneur, and so they are able to extract all profits.

b) Asymmetric information

$$V^{ML} = \alpha [p(1+r) - 1] + (1-\alpha)[q(1+r) - 1]$$

with $m = \alpha p + (1-\alpha) q$ $m \in [q, p]$

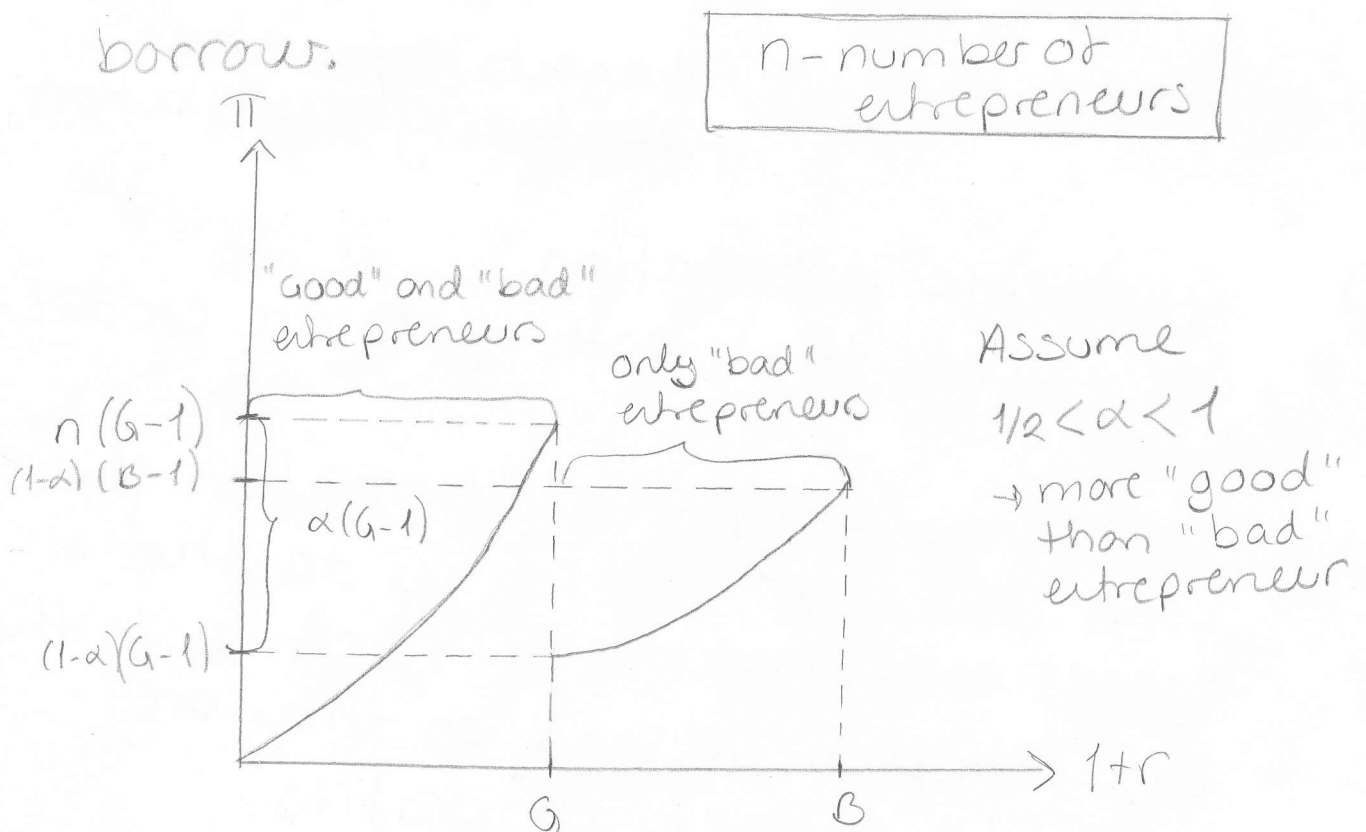$$V^{ML} = m(1+r) - 1$$

where V^{ML} is the value of the project for the monopolistic lender.

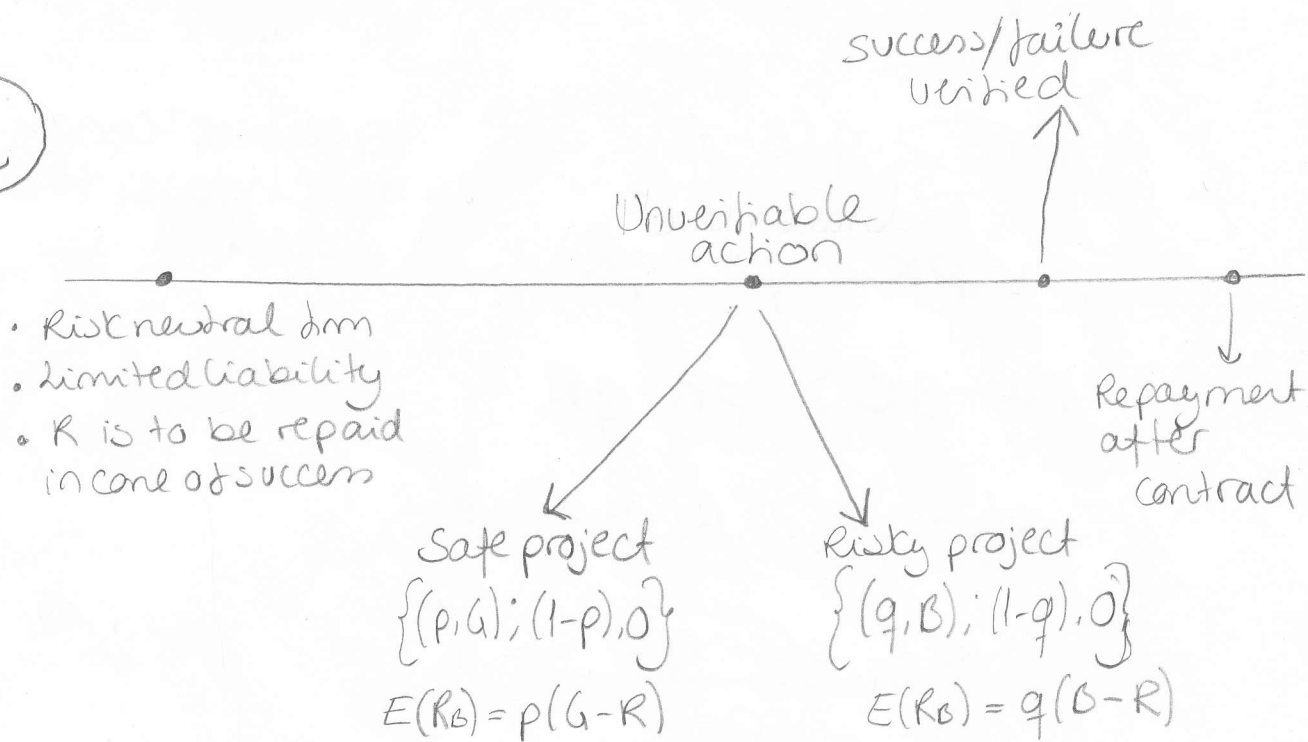If $r \uparrow \to V^{ML} \uparrow$ until $r = B-1$

$$V^{ML} \in [B-1, G-1]$$

All entrepreneurs wants to borrow as long as $1+r \leq G$. When $1+r > G$, only the bad entrepreneurs wants to borrow until $1+r \leq B$. If $1+r > B$, nobody wants to borrow.

| n - number of |
| entrepreneurs |

"Good" and "bad" entrepreneurs

only "bad" entrepreneurs

$n(G-1)$
$(1-\alpha)(B-1)$
$\alpha(G-1)$
$(1-\alpha)(G-1)$

Assume
$1/2 < \alpha < 1$
$\to$ more "good" than "bad" entrepreneur

Π $1+r$ G B

②

© With $a > 1/2$, the bank will choose
$1+r \approx G$ to include the "good" entrepreneur.
If $a < 1/2$ then the bank will choose
$1+r \approx B$. They will then have only
"bad" borrowers and would then like
to extract the highest possible
profit.

②

success/failure
verified ↑

Unverifiable
action

- Risk neutral firm
- limited liability
- R is to be repaid
  in case of success

Repayment
after
contract ↓

Safe project
$\{(p,G); (1-p),0\}$
$E(R_B) = p(G-R)$

Risky project
$\{(q,B); (1-q),0\}$
$E(R_B) = q(B-R)$

- $B > G$
- $p > q$
- $pG > 1+i > qB$, $i = 0$

1) The firm has to pay back R to the
bank in case of success independent
of wether it is the safe or risky
project that succeeds.

Gross income
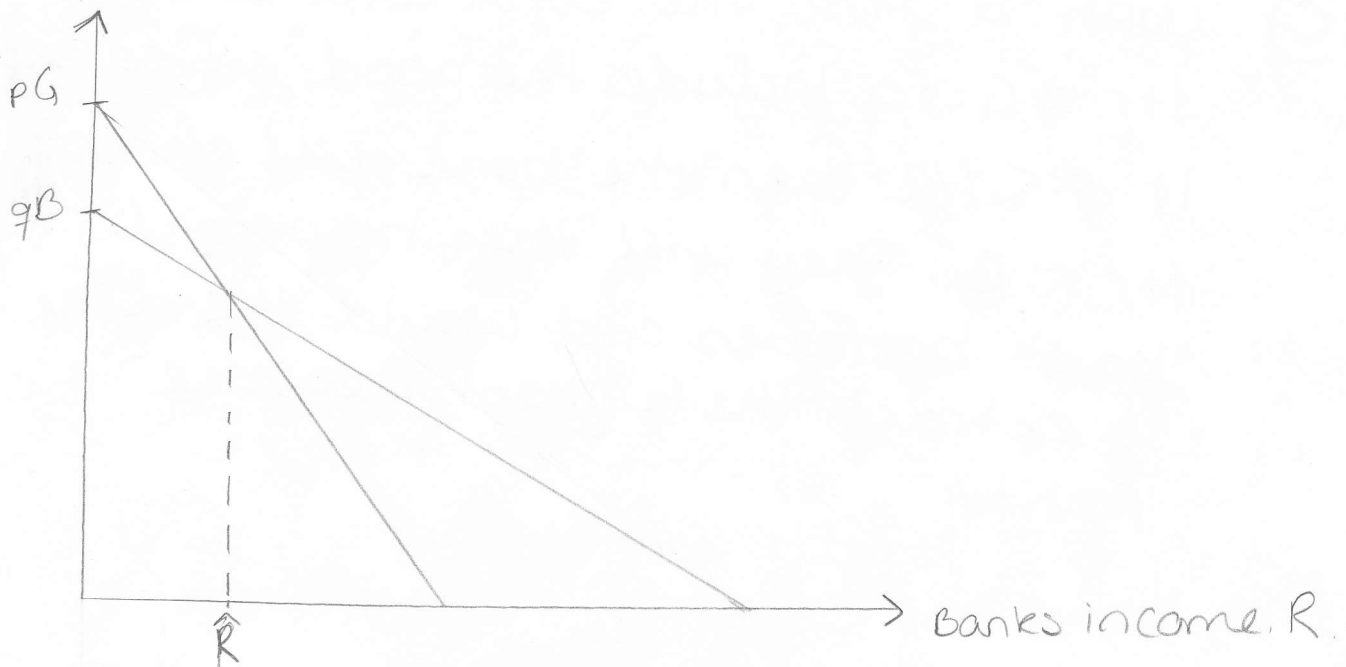
$$P(G-R) > q(B-R)$$

$$pG - pR > qB - qR$$

$$pG - qB > pR - qR$$

$$pG - qB > R(p-q)$$

$$R < \frac{pG - qB}{p-q} = \hat{R}$$

Incentive condition to choose the safe project.

where $\hat{R}$ is the critical value. If $R < \hat{R}$, the firm will choose the safe project. If $R > \hat{R}$ the firm will choose the risky project.

④

2) Since $1+i > qB$, the risky project will not be undertaken by any investor. We only have to consider the good projects.

$\therefore R < \hat{R}$

• We need to have:

$$pR + (1+i) > 0$$

$$i = 0$$

$$pR + 1 > 0$$

$$R_{DF} > \frac{1}{p}$$

3) Banks can monitor at cost c: only the safe project is undertaken, if NPV > 0.

$$pR - 1 - c > 0$$

$$R_B > \frac{1+c}{p} > R_{DF}.$$

The banks wants a higher return because they have to undertake monitoring costs.

(5)

4) We have from 2) that:

$$R = \frac{1}{P} \iff P = \frac{1}{R}$$

▹ If $P > \frac{1}{R}$ - will we have only direct financing.

For bank lending we need:

• $PR = 1 + C$

$$R = \frac{1+C}{P}$$

✦ $P(G - R) > 0$

$$P\left(G - \frac{1+C}{P}\right) > 0$$

$$PG - 1 + C > 0$$

$$P > \frac{1+C}{G}$$

▹ If $P < \frac{1+C}{G}$ there is no lending

(see figure)

No
lending

Bank lending

$\dfrac{1+c}{G}$

$\dfrac{1}{R}$

Direct
finance