

# Entrepreneurial Optimism, Self-Financing, and Capital-Market Efficiency

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# Motivation

- ▶ Leland and Pyle (1977) show that when entrepreneurs have private information about project quality, the amount of own funds invested will be interpreted as a signal of quality.
- ▶ In equilibrium, the higher the project's quality, the greater the amount of equity retained by the entrepreneur, and the higher the market valuation of the firm.
- ▶ Signaling is costly because entrepreneurs are risk-averse and those with high quality projects do not obtain full-insurance.
- ▶ Thus, signalling reduces the inefficiencies caused by asymmetric information in capital markets but at a cost.

# Motivation

- ▶ Entrepreneurs' accurate beliefs about the quality of projects are the cornerstone of the signaling mechanism.
- ▶ Yet, scholarly work shows that entrepreneurs typically overestimate the chances that their projects will succeed.
- ▶ Landier and Thesmar (2009) compare French entrepreneurs' expectations of sales to data on sales growth from tax files.
- ▶ For businesses started in 1997, the realizations of 27%, 53% and 20% of entrepreneurs exceeded, matched and were below their expectations, respectively.

# Motivation

## Research Question

- ▶ What is the impact of entrepreneurial optimism on self-financing and capital market efficiency?

# Main Findings

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- ▶ Increases aggregate self-finance when the ratio of optimistic to pessimistic entrepreneurs is not too low.
- ▶ Improves capital market efficiency when (i) risk aversion is sufficiently high and (ii) the ratio of optimistic to pessimistic entrepreneurs is not too high.



# Main Findings

## Entrepreneurial optimism:

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- ▶ Increases aggregate self-finance when the ratio of optimistic to pessimistic entrepreneurs is not too low.
- ▶ Improves capital market efficiency when (i) risk aversion is sufficiently high and (ii) the ratio of optimistic to pessimistic entrepreneurs is not too high.
- ▶ Weakens Leland and Pyle's (1977) main qualitative prediction that the level of self-finance increases with project quality.

# Model

## Entrepreneurs:

- ▶ Each has a risky project which requires an investment of 1.
- ▶ Project generates a random (gross) return of  $\tilde{R} = 1 + \tilde{r}(\theta)$ .
- ▶ Net returns  $\tilde{r}(\theta) \sim N(\theta, \sigma^2)$ ,  $\theta \in \{\theta_1, \theta_2\}$ ,  $0 < \theta_1 < \theta_2$  known by entrepreneur only.
- ▶ Entrepreneurs are risk averse with  $u(W) = -e^{-\rho W}$ ,  $\rho > 0$ , have initial wealth  $W_0 > 1$ , and final wealth  $W$ .
- ▶ Entrepreneurs can self-finance a fraction  $\gamma$  of the project.

# Model

There are four types of entrepreneurs:

- ▶ Realistic entrepreneurs with bad projects have projects with quality  $\theta_1$  and know it.
- ▶ Realistic entrepreneurs with good projects have projects with quality  $\theta_2$  and know it.
- ▶ Pessimistic entrepreneurs believe to have a bad project  $\theta_1$  when, in fact, they have a good project  $\theta_2$ .
- ▶ Optimistic entrepreneurs believe to have a good project  $\theta_2$  when, in fact, they have a bad project  $\theta_1$ .

# Model

Let

- ▶  $\pi \in (0, 1)$  be the fraction of good projects.
- ▶  $\nu \in [0, \pi]$  be the fraction of pessimistic entrepreneurs.
- ▶  $\kappa \in [0, 1 - \pi]$  be the fraction of optimistic entrepreneurs.

Investors:

- ▶ Risk neutral.
- ▶ Cannot observe project's quality, but know  $\pi$ ,  $\nu$ , and  $\kappa$ .
- ▶ Observe  $\gamma$  and infer the expected returns of the project.
- ▶ Compete in the capital market  $\Rightarrow$  market price for project  $P(\theta) = E[\tilde{r}(\theta)]$ .

# Model

In a separating equilibrium:

- ▶ Entrepreneurs who believe they have a good project set  $\gamma > 0$ .
- ▶ Entrepreneurs who believe they have a bad project set  $\gamma = 0$ .
- ▶ Among entrepreneurs with  $\gamma = 0$ , investors know that fraction  $\alpha = \frac{v}{1-\pi-\kappa+v}$  has a good project and  $1 - \alpha$  has a bad project.
- ▶ Among entrepreneurs with  $\gamma > 0$ , investors know that fraction  $\beta = \frac{\kappa}{\pi+\kappa-v}$  has a bad project and  $1 - \beta$  has a good project.

# Model

Investors' posterior belief that an entrepreneur has a good project

$$\mu(\theta_2|\gamma) = \begin{cases} \alpha & \text{for } \gamma = 0 \\ 1 - \beta & \text{for } \gamma > 0 \end{cases}$$

Market price for projects

$$P(\gamma) = E[\tilde{r}(\gamma)] = \begin{cases} \alpha\theta_2 + (1 - \alpha)\theta_1 = \theta_1 + \alpha\Delta\theta & \text{for } \gamma = 0 \\ \beta\theta_1 + (1 - \beta)\theta_2 = \theta_2 - \beta\Delta\theta & \text{for } \gamma > 0 \end{cases}$$

with  $\Delta\theta \equiv \theta_2 - \theta_1$ .

# Partial Self-Finance

## Proposition 1

*The fraction of partial self-finance with biased entrepreneurs is lower than that with rational entrepreneurs, i.e.,  $\gamma_B < \gamma_R$ .*

## Partial Self-Finance

In the least cost separating equilibrium:

$$W_0 + \theta_1 + \alpha\Delta\theta = W_0 + (1 - \gamma)(\theta_2 - \beta\Delta\theta) + \gamma\theta_1 - \gamma^2\frac{\rho\sigma^2}{2}$$

The level of partial self-finance with biased entrepreneurs is:

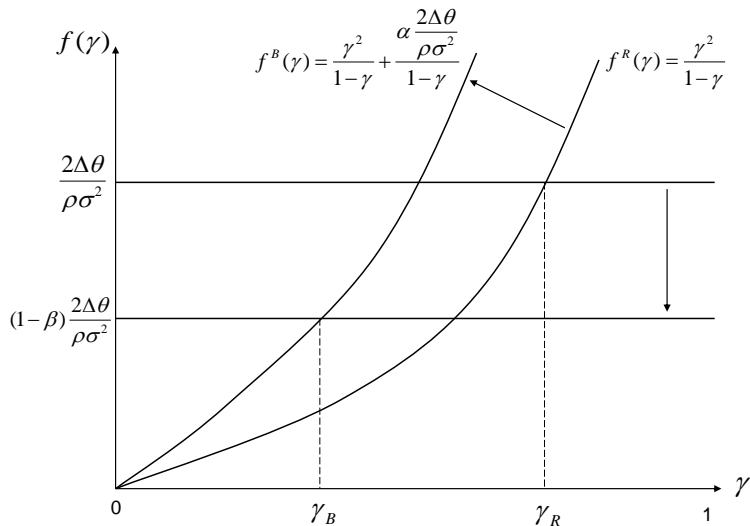
$$\frac{\gamma_B^2}{1 - \gamma_B} + \frac{\alpha\frac{2\Delta\theta}{\rho\sigma^2}}{1 - \gamma_B} = \frac{2\Delta\theta}{\rho\sigma^2}(1 - \beta)$$

If all entrepreneurs are rational,  $\alpha = \beta = 0$ , then

$$\frac{\gamma_R^2}{1 - \gamma_R} = \frac{2\Delta\theta}{\rho\sigma^2}$$



# Partial Self-Finance



# Aggregate self-finance

Aggregate self-finance with biased entrepreneurs is:

$$S_B = (\pi - \nu + \kappa)\gamma_B$$

Aggregate self-finance with rational entrepreneurs is:

$$S_R = \pi\gamma_R.$$

The change in aggregate self-finance is:

$$\begin{aligned} S_B - S_R &= (\pi - \nu + \kappa)\gamma_B - \pi\gamma_R \\ &= -(\pi - \nu)(\gamma_R - \gamma_B) - \nu\gamma_R + \kappa\gamma_B. \end{aligned}$$

# Aggregate Self-Finance

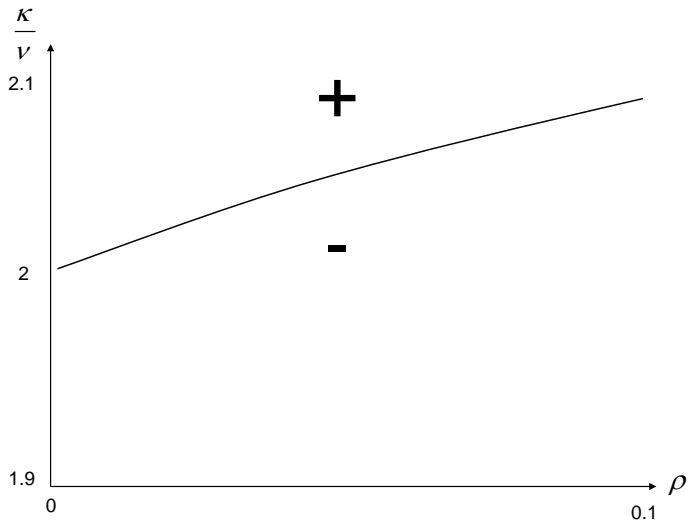
## Proposition 2

*Aggregate self-finance with biased entrepreneurs is higher than with rational entrepreneurs when either (i) some entrepreneurs are optimistic and no entrepreneur is pessimistic or (ii) some entrepreneurs are optimistic, some are pessimistic, and the ratio of optimistic to pessimistic entrepreneurs satisfies*

$$\frac{\kappa}{v} > \frac{\Delta\theta}{\rho\sigma^2} \left( 1 + 2\frac{\rho\sigma^2}{\Delta\theta} - \sqrt{1 + 2\frac{\rho\sigma^2}{\Delta\theta}} + \frac{\rho\sigma^2}{\Delta\theta} \frac{\pi}{1 - \pi} \right).$$

# Aggregate Self-Finance

$$\pi = 0.5, \Delta\theta = 40, \sigma^2 = 80.$$



# Capital Market Efficiency

- ▶ Market efficiency is the weighted average of the utilities of each group of entrepreneurs since investors break-even.

$$W_B = (1 - \pi - \kappa)E[u(\theta_1|\theta_1)] + \kappa E[u(\theta_2|\theta_1)] \\ + \nu E[u(\theta_1|\theta_2)] + (\pi - \nu)E[u(\theta_2|\theta_2)]$$

$$W_R = (1 - \pi)E[u(\theta_1)] + (\pi)E[u(\theta_2)]$$

- ▶ To evaluate the expected utility of biased entrepreneurs we take the perspective of an outside observer who knows the actual projects' qualities.

# Capital Market Efficiency

## Proposition 5

*If some entrepreneurs are optimistic, some are pessimistic, the coefficient of absolute risk aversion satisfies*

$$\rho > \frac{1}{\Delta\theta},$$

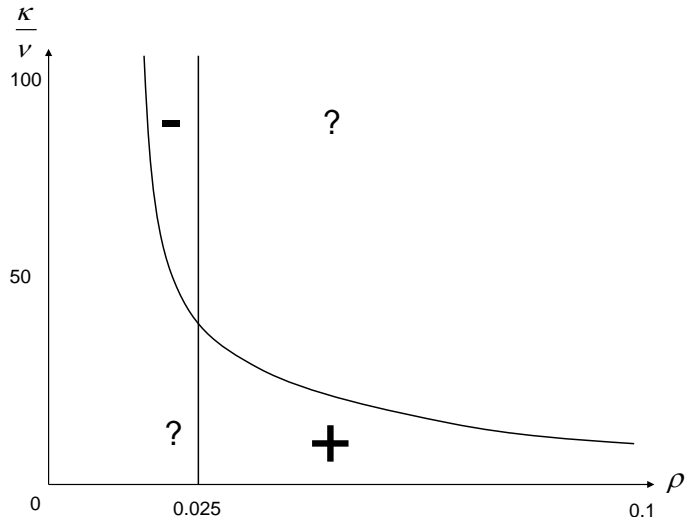
*and the ratio of optimistic to pessimistic entrepreneurs satisfies*

$$\frac{\kappa}{\nu} < \frac{1}{\rho^2\sigma^2} \left[ \left( 1 + \sqrt{1 + \frac{2\rho\sigma^2}{\Delta\theta}} \right) \left( \rho^2\sigma^2 \frac{\pi}{1-\pi} + \frac{\rho\sigma^2}{\Delta\theta} + 1 \right) + \frac{\rho\sigma^2}{\Delta\theta} \right],$$

*then capital market efficiency is higher than when all entrepreneurs are rational.*

# Capital Market Efficiency

$$\pi = 0.5, \Delta\theta = 40, \sigma^2 = 80.$$



# Conclusion

The paper analyzes the impact of entrepreneurial optimism on self-finance and capital market efficiency.

We find that:

- ▶ The existence of biased entrepreneurs weakens the main qualitative prediction of Leland and Pyle's (1977) model.
- ▶ The presence of optimistic entrepreneurs can improve capital market efficiency.
- ▶ This last result stands in contrast with previous literature like de Meza & Southey (1996) and Manove & Padilla (1999).



# Extensions

- ▶ Entrepreneurs' limited initial wealth.
- ▶ High quality projects  $\Rightarrow$  higher risk.
- ▶ Negative net returns of low quality projects.
- ▶ Endogenous entrepreneurs' effort.

## Model: details of the derivation

In a separating equilibrium

$$\begin{cases} Eu[W_0 + (1 - \gamma)(\theta_2 - \beta\Delta\theta) + \gamma\tilde{r}(\theta_2)] \geq u(W_0 + \theta_1 + \alpha\Delta\theta) \\ u(W_0 + \theta_1 + \alpha\Delta\theta) \geq Eu[W_0 + (1 - \gamma)(\theta_2 - \beta\Delta\theta) + \gamma\tilde{r}(\theta_1)] \end{cases}$$

Using that if  $u(\tilde{x}) = -\exp(-a\tilde{x})$  with  $\tilde{x} \sim N(\mu, \sigma^2)$ , then

$$Eu(\tilde{x}) = -\exp(-a\mu + \frac{a^2}{2}\sigma^2) = u(a\mu - \frac{a^2}{2}\sigma^2)$$

$$\begin{cases} u[W_0 + (1 - \gamma)(\theta_2 - \beta\Delta\theta) + \gamma\theta_2 - \gamma^2\frac{\rho\sigma^2}{2}] \geq u(W_0 + \theta_1 + \alpha\Delta\theta) \\ u(W_0 + \theta_1 + \alpha\Delta\theta) \geq u[W_0 + (1 - \gamma)(\theta_2 - \beta\Delta\theta) + \gamma\theta_1 - \gamma^2\frac{\rho\sigma^2}{2}] \end{cases}$$

## Proposition 3

### Proposition 3

*In the least cost separating equilibria of the models with biased and rational entrepreneurs:*

(i) *If  $\alpha \geq 0$ , then  $E[u(\theta_1|\theta_1)] \geq E[u(\theta_1)]$ ;*

(ii) *If  $\alpha \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} \gamma_R$  then  $E[u(\theta_1|\theta_2)] \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} E[u(\theta_2)]$ ;*

(iii) *If  $\alpha \geq 0$ , then  $E[u(\theta_2|\theta_1)] \geq E[u(\theta_1)]$ ;*

(iv) *If  $\alpha \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} \gamma_R - \gamma_B$ , then  $E[u(\theta_2|\theta_2)] \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} E[u(\theta_2)]$ .*

## Proposition 4

### Proposition 4

*If some entrepreneurs are optimistic and no entrepreneur is pessimistic, then capital market efficiency is lower than when all entrepreneurs are rational.*

## Proposition 6

### Proposition 6

*If the net mean returns of low-quality projects satisfy  $\theta_1 \leq -\frac{\alpha\theta_2}{1-\alpha}$ , then capital market efficiency is lower with biased entrepreneurs than with rational entrepreneurs.*