

Entrepreneur/Venture capitalist Financial Contracting and Performance

Seminar exercise

A wealthless entrepreneur (E) has an idea for an innovative start-up venture, and approaches a venture capitalist (VC) for the required investment funds. At date 1, the VC makes a take-it-or-leave-it offer of equity shares to E. Denote the E's share as $\alpha \in [0,1]$, and the VC's share as $1 - \alpha$. If E accepts the offer, E and VC then proceed, at date 2, to exert respective effort levels e_E and e_{VC} into developing the business towards an IPO. The cost of effort is βe_E^2 and βe_{VC}^2 for E and VC respectively.

At date 3, the IPO succeeds with probability $p = \gamma_E e_E + \gamma_{VC} e_{VC}$ and fails with probability $1 - p$. Note that γ_E and γ_{VC} represents E's and VC's ability levels. In the case of success, the project provides income R, while in the case of failure, it provides zero income. E and VC receive their share of the income according to the equity shares agreed at date 0, and the game ends. Both VC and E are risk-neutral, and the discount rate is zero.

Required:

- a) Provide expressions for E's and VC's expected payoffs at the start of the game.
- b) Derive E's and VC's optimal date 2 effort levels, given the equity shares agreed at date 1.
- c) Derive VC's optimal equity offer.
- d) Using your answers to part a), b) and c), obtain the VC's and E's equilibrium payoff, and the expected venture value, as a function of abilities.
- e) What is the VC's optimal equity offer, the players' expected payoffs, and the expected value of the venture, when $\gamma_{VC} = 0$? What does this tell us about the trade-offs involved for the VC when choosing an optimal equity offer to the E?
- f) Briefly outline a method (without solving) for analysing the game whereby VC and E are not totally self-interested, but have 'empathy' for each other. What would you expect to happen to effort levels, success probability and venture value as empathy increases?