BEEM117

UNIVERSITY OF EXETER

BUSINESS SCHOOL

May 2022

Economics of Corporate Finance

Module Convenor: Simone Meraglia

Duration: TWO HOURS + 30 minutes upload time

No word count specified

Answer any 3 questions out of 4.
All questions are worth equal marks.

Materials to be supplied on request: None.

Approved calculators are permitted.
This is an open book exam.

Question 1

Suppose you are an investor seeking to find new opportunities to invest. You have identified two firms: *L1 Corporation* and *BT Enterprises*. *L1 Corporation* is debt free, while *BT Enterprises* is highly leveraged. Each firm is run by an entrepreneur who can exert two levels of effort: high or low. The project undertaken by the entrepreneur of each firm yields either a high return $R^S > 0$ or a low return $R^F \geq 0$, with $R^F < R^S$. High effort by the entrepreneur increases the probability that the firm realizes a high return.

(a) Suppose there are perfect capital markets, no taxes, and no bankruptcy. Suppose also that you (and other outside investors) can perfectly observe the effort exerted by the entrepreneurs of the two firms, and you can write a contract specifying the effort you want the entrepreneurs to exert. Does the amount of leverage of each firm affect its market value? Explain your answer. **(30% of the marks)**

(b) Suppose now you and other outside investors cannot observe the effort exerted by the entrepreneurs of the two firms. In case of a low return, the project undertaken by the entrepreneur of each firm yields $R^F > 0$. Does the amount of leverage of each firm affect its market value? If yes, is there an optimal amount of debt to be issued? Explain. **(40% of the marks)**

(c) Let us continue with the framework described in point **(b)** above. Unlike point (b), suppose now that, in case of a low return, the project undertaken by the entrepreneur of each firm yields $R^F = 0$. Does the amount of leverage of each firm affect its market value? If yes, is there an optimal amount of debt to be issued? Explain. **(30% of the marks)**

Question 2

An entrepreneur has to finance a project of fixed size I. The entrepreneur has "cash-on-hand" A, where $A < I$. To implement the project, the entrepreneur (that is, the borrower) must borrow $I - A$ from lenders. If undertaken, the project either succeeds, in which case it yields a return $R > 0$, or fails, in which case it delivers a zero return. The probability of success depends on the effort exerted by the entrepreneur: if the entrepreneur exerts high effort, the probability of success is equal to p_H; if the entrepreneur exerts low effort, the probability of success is equal to p_L, where $\Delta p = p_H - p_L > 0$. If the entrepreneur exerts low effort, she also obtains a private benefit $B > 0$, while there is no private benefit when the entrepreneur exerts high effort. Define as R_b the amount of profit going to the entrepreneur, and as R_l the amount of profit going to the lenders in case of success, where $R = R_b + R_l$. We assume both players obtain zero in case the project fails. All the players are risk neutral and there is limited liability for the entrepreneur. Lenders behave competitively, and both entrepreneur and lenders receive zero if the project fails.

(a) Write down the "breakeven constraint" for the lenders assuming that the entrepreneur exerts high effort. **(10% of the marks)**

(b) Write down the entrepreneur's "Incentive Compatibility Constraint" (IC_b) and derive the minimum level of R_b such that the entrepreneur exerts high effort. **(10% of the marks)**

(c) Compute the minimum level of cash-on-hand the entrepreneur must have to be financed. **(10% of the marks)**

(d) Suppose there is a second entrepreneur who has the possibility of investing in a separate project that also costs I. The project yields a return $R > 0$ in case of success, and a return equal to zero in case of failure. The probability of success is p_H (p_L, respectively) if the second entrepreneur exerts high effort (low effort, respectively). The projects of the two entrepreneurs are independent; that is, the return of each project is independent of the return of the other project. Like the initial entrepreneur, the second entrepreneur has "cash-in-hand" A, and obtains a private benefit $B > 0$ if he exerts low effort.

Suppose $A < \overline{A}$ (for both entrepreneurs). Suppose also each entrepreneur puts weight $a \in [0, 1]$ on the other entrepreneur's income (relative to her own income). Consider the case of "group lending": each entrepreneur receives a payment R_b if both entrepreneurs succeed, and receives zero otherwise.

Write down the entrepreneur's "Incentive Compatibility Constraint" (IC_b) and derive the minimum level of R_b such that the entrepreneur exerts high effort when he/she believes the other entrepreneur exerts high effort too. **(20% of the marks)**

(e) Determine the highest income that each entrepreneur can pledge to lenders, and write down the "break-even constraint" for the lenders (IR_l) assuming both entrepreneurs exert high effort. Does group lending *always* enable financing when $A < \overline{A}$? Explain. **(20% of the marks)**

(f) Let us continue with the framework introduced in parts (d) and (e). We keep assuming that $A < \overline{A}$ (for both entrepreneurs). Also, each entrepreneur puts weight $a \in [0,1]$ on the other entrepreneur's income (relative to her own income). If each entrepreneur receives R_b when her project succeeds, independently of whether the other project succeeds or fails, can entrepreneurs receive financing from outside investors? Explain. **(30% of the marks)**

Question 3

An entrepreneur has to finance a project of fixed size I. The entrepreneur has no cash-on-hand ($A = 0$). To implement the project, the entrepreneur must borrow I from lenders. If undertaken, the project either succeeds, in which case it yields a return $R > 0$, or fails, in which case it delivers a zero return. The entrepreneur (borrower) can be one of two types. A "good" borrower has a probability of success equal to p. A "bad" borrower has a probability of success equal to q, where $p > q$. Define as R_b the borrower's level of compensation when the project is financed and succeeds. All the players are risk neutral and there is limited liability for the borrower. Lenders behave competitively, and both borrower and lenders receive zero if the project fails.

Assume $pR > I > qR$.

(a) Suppose first that lenders have complete knowledge of the borrower's type. Write down the lenders' break-even constraint when the borrower is (i) "good" or (ii) "bad". **(10% of the marks)**

(b) What is the highest level of compensation each type of borrower can obtain? **(10% of the marks)**

(c) Suppose now that lenders cannot observe the borrower's type. Lenders believe the borrower is "good" with probability α, and "bad" with probability $1 - \alpha$. Comment on the effect of asymmetric information on **(i)** the availability of credit to both types of borrower, and **(ii)** if a loan is granted, on the compensation the two types of borrower obtain from undertaking the project. **(20% of the marks)**

(d) Consider now the case in which $A > 0$, where $pR > I - A > qR$. Suppose the good borrower is interested in *separating* herself from the bad one. How much of her wealth A is the "good" borrower willing to invest? Show your work and explain. **(40% of the marks)**

(e) In a *separating* equilibrium, when the project is financed, what is the lowest amount that the outside investors obtain in case of success? Show your work. **(20% of the marks)**

Question 4

Consider a firm run by an "incumbent" manager. Suppose the incumbent manager has the opportunity to invest in one of two different projects, Project 1 or Project 2. The incumbent manager has a higher ability in managing Project 1 rather than Project 2. Also, if the incumbent is fired by shareholders, she is replaced by an "alternative" manager whose ability to manage Project 1 is lower than the incumbent's ability.

Suppose the investment in a project is irreversible, and the shareholders' choice of the incumbent manager salary (as well as their decision on whether to fire her) is taken after the investment is made. Also, assume the incumbent manager has a stake in the firm she runs, but she does not fully control it.

(a) Suppose none of the projects gives the manager a direct utility. According to Shleifer and Vishny (1989), which of the two projects should the incumbent manager choose? What is the economic rationale behind this choice? Explain. **(20% of the marks)**

(b) Suppose the incumbent manager chooses the size of the investment in her preferred project. Do you expect the manager to select the investment size that maximizes the firm's market value? If not, does the manager over-invest or under-invest with respect to the efficient investment size? Explain your answer. **(30% of the marks)**

(c) Suppose now that the incumbent manager and the "alternative" manager have the same ability in managing Project 1. We consider the case in which the manager owns a positive fraction $\theta \in (0,1)$ of the shares of the company, but she does not fully control it (that is, $\theta < 1$). Does the incumbent manager select the investment size that maximizes the firm's market value? If not, does the manager over-invest or under-invest with respect to the efficient investment size? Show your work and explain your answer. **(50% of the marks)**