Written Exam Economics Winter 2019-20

Corporate Finance Theory

Date: from 16 December 2019 at 10 AM to 6 January 2020 at 10 AM

This exam question consists of 4 pages in total

Answers only in English.

A take-home exam paper cannot exceed 10 pages – and one page is defined as 2400 keystrokes

The paper must be uploaded as <u>one PDF document</u>. The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Digital Exam.

Be careful not to cheat at exams!

Exam cheating is for example if you:

- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
- Reuse parts of a written paper that you have previously submitted and for which you have received a pass grade without making use of quotation marks or source references (self-plagiarism)
- Receive help from others in contrary to the rules laid down in part 4.12 of the Faculty of Social Science's common part of the curriculum on cooperation/sparring

You can read more about the rules on exam cheating on your Study Site and in part 4.12 of the Faculty of Social Science's common part of the curriculum.

Exam cheating is always sanctioned by a written warning and expulsion from the exam in question. In most cases, the student will also be expelled from the University for one semester.

Please answer all questions. Answers must be submitted in English.

You may discuss the questions with your fellow students, but you must write up your own individual answers to all questions.

Exam scripts may be checked for plagiarism. Note, in particular, that copy paste of each others' answers, or changing only a few words in sentences, etc. constitutes plagiarism.

Problem 1

Write 1 to 2 paragraphs for each of the following subquestions. For this problem you are encouraged to write your answers without the use of mathematical symbols. If you do include some mathematical symbols, then please keep their use to a minimum, and do not include any explicit calculations.

(a) Summarize what is meant by the IPO premium in Bayar and Chemmanur (2011). Informally describe why the size of this premium may depend on the entrepreneur's liquidity need in their theoretical setting.

(b) Consider the static model of DeMarzo et al. (2014). What is the main tradeoff the owner faces when deciding whether to induce the agent to implement the safe project or the risky project? Discuss in what kind of situations you expect the owner would find it more attractive to have the risky project implemented.

(c) In the framework of Povel and Singh (2010), explain how the bidders' ability to default after winning the takeover contest affects the seller's incentive to offer stapled finance. Now choose another academic article we have seen during the semester in which default plays a role. Comment on the main similarity, and the main difference, between the role played by default in that article and the role played by default in Povel and Singh (2010).

Problem 2

This problem extends the baseline framework of Banal-Estañol et al. (2013) with binary project returns: it introduces possible correlation between these returns, along with possible asymmetric information about whether returns are correlated or not. For this problem, you are expected to explicitly work with mathematical expressions, but are also encouraged to use words to briefly help describe the key expressions.

A firm is looking to start two identical projects. Each project requires an investment of 1. The firm has no assets, but has access to outside financing in the form of debt from competitive, risk-neutral creditors. Once started, each project can either succeed or fail. Success generates high cash flow r_H and failure generates low cash flow r_L, with $r_H > 1 > r_L > 0$.

The firm is characterized by type $\tau \in \{C, N\}$, where C stands for 'correlated' and N stands for 'not correlated'. For a C-firm (i.e. a firm of type C), the returns of the projects are perfectly correlated: with probability p both projects succeed, and with probability $1-p$ both projects fail. For an N-firm (i.e. a firm of type N), the returns of the projects are independent of one another, where p is the probability of success for each project. The firm knows its own type, i.e. it knows whether its project returns are correlated or not. We assume $pr_H + (1-p)r_L > 1$.

We will consider the firm's decision whether to use separate financing or joint financing. Under separate financing, creditors for a particular project only have a claim on the cash flow from that project. Under joint financing, all creditors have a claim on the cash flows from both projects. For joint financing we focus on coinsurance, so that a high cash flow from one project allows the firm to pay the promised return to all creditors, even if the cash flow from the other project is low.

Creditors are repaid as a function of the realized cash flows. Let r denote the gross interest rate promised to creditors. If the cash flow exceeds r, then creditors are paid in full, and the firm keeps any remaining amount as profit. If the cash flow is below r, then the firm defaults, creditors receive a fraction γ of the cash flow, and the remaining fraction $1-\gamma$ of the cash flow is lost to default/bankruptcy costs. We assume $0 < \gamma < 1$, where $\gamma < 1$ means there is a deadweight loss associated with default/bankruptcy. We also assume that creditors are willing to lend at the interest rate r for which they expect to break even on average.

Recall from Banal-Estañol et al. (2013) that $r^* = \left[\frac{1-\gamma(1-p)r_L}{p}\right]$ denotes the equilibrium interest rate under separate financing, and that $r_m^* = \left[\frac{1-\gamma(1-p)^2 r_L}{1-(1-p)^2}\right]$ denotes the equilibrium interest rate under joint financing with coinsurance (in the absence of correlation). Throughout this question, you can assume that $r^* \leq r_H$ and $r_m^* \leq (r_H + r_L)/2$ both hold. This will mean that both separate financing and joint financing with coinsurance are feasible.

For now, assume that creditors can observe the firm's type. That is, the creditors know whether the firm's project returns are independent or perfectly correlated.

(a) Consider an N-firm. Let π_S^N denote the firm's expected profits per project under separate financing, and let π_J^N denote expected profits per project under joint financing with coinsurance. Write down an expression for π_S^N and for π_J^N, and show that the coinsurance gains, $\pi_J^N - \pi_S^N$, are equal to $p(1-p)(1-\gamma)r_L$.

(b) Now consider a C-firm. Let π_S^C denote the firm's expected profits per project under separate financing, and let π_J^C denote expected profits per project under joint financing with coinsurance. Write down an expression for the coinsurance gains, $\pi_J^C - \pi_S^C$, and comment briefly on their magnitude. *Hint: it is fine to derive separate expressions for π_S^C and for π_J^C, and then take the difference between the two, but it is also possible to directly write an expression for the coinsurance gains.*

(c) For all remaining subquestions in Problem 2, you can assume the following: in order to use joint financing, the firm must pay an explicit cost $L > 0$ per project, over and above any payment it makes to creditors. For example, L might represent effort or administrative costs associated with merging the two projects.

What form of financing will an N-firm and a C-firm choose in equilibrium? Comment on whether your answer will change depending on whether one assumes L to be relatively large or relatively small.

From now on, assume that creditors cannot observe the firm's type. Creditors' prior beliefs are that the firm is an N-type with probability $\theta \in (0,1)$ and a C-type with probability $1-\theta$. Creditors update their beliefs about firm type after observing whether the firm chooses separate or joint financing. They do so using Bayes' rule, and taking into account the firm's equilibrium strategy. Creditors then lend to the firm at the interest rate for which, given their updated beliefs, they expect to break even on average.

(d) Show that there exists a separating equilibrium where an N-firm chooses joint financing and a C-firm chooses separate financing if and only if the following condition holds:

$$1 - [pr_m^* + (1-p)\gamma r_L] \leq L \leq p(1-p)r_L(1-\gamma). \tag{1}$$

Give an intuitive description of how this condition relates to the expected payoff of creditors if the firm deviates in its financing choice.

(e) Suppose that L is sufficiently small so that condition (1) is violated, and hence no separating equilibrium exists. Explain intuitively whether there may exist a partial pooling equilibrium where one firm type chooses joint financing for sure, and the other firm type randomizes between separate and joint financing (*Hint: look at the equilibrium in Bayar and Chemmanur (2011)*). Can you write down one equation, involving the interest rate under joint financing, which must hold in such a partial pooling equilibrium? You are not expected to explicitly derive the equilibrium strategies.

(f) Using your answers above, comment on how positive correlation between project returns will tend to affect a firm's choice between separate and joint financing, compared to a baseline where project returns are independent. Does your answer depend on whether creditors can observe whether project returns are correlated (as in parts (a) - (c)) or not (as in parts (d) - (e))?

Problem 3

Please seek out and find a news story, describing a case that relates to some of the ideas from the course. Discuss to what extent the main points from the news story relate to the different academic articles we have seen throughout the semester (approximately 2-3 pages). In particular, comment on **both** of the following:

- Which theoretical results from the academic articles can (or cannot) shed light on the news story?
- Which of the key modelling assumptions behind these theoretical results are realistic, when applied to this real-life situation?

Note: you are not expected to relate the news story to every single academic article we have seen. Rather, you should select a few articles from the course which you believe are most relevant for the news story you have chosen. Moreover, your answer should include a link to, or a copy of, the news story in question.