

**FINAL EXAM** (December 13, 2020)

This is a **closed book** examination. No notes, electronic devices or external help are allowed.

Please **always explain** how you obtained your answers – no credit will be given for answers without explanation even if correct.

There are **120 POINTS** in total. You have **TWO HOURS**.

By moving to the next page you acknowledge that you have read and are familiar with the **SFU Academic Integrity Policy** regarding what constitutes plagiarism and academic dishonesty in examinations ('cheating').

SFU Academic Integrity Policy

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**I. TRUE or FALSE (5 pts each) – no points will be given for correct answers without explanation**

1. The data show that most of the recent poverty reduction around the world has been achieved because of economic growth and not because of tax and transfer policies within countries.

2. Requiring a borrower to post collateral can mitigate adverse selection and moral hazard problems.

3. Perfect insurance from idiosyncratic income shocks can only be achieved if a competitive insurance market exists.

4. Extractive political and economic institutions are main reason for lack of development in many countries.

5. Large farms which use paid workers are likely to be less productive than small farms using family labour only.

6. Adverse selection is an outcome of unobserved actions by economic agents.

**II. Concepts (5 pts each). Give an example or explain in your own words the following concepts. You do not need to provide a formal definition.**

1. fixed rent tenancy contract

2. multiple equilibria

3. lack of commitment

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### III. Quantitative Problem (45 pts)

An entrepreneur requires a loan of size  $L$  to start a business. The entrepreneur can post collateral worth  $C$ . The lender who provides the loan charges interest rate  $r$ . The business succeeds with probability  $p$  and yields sales  $Y > 0$  or fails, with probability  $1 - p$ , and yields sales zero. There is *limited liability* – the entrepreneur can only repay the loan, i.e., pay back principal plus interest  $(1 + r)L$  if the business succeeds. If the business fails, then the entrepreneur loses their collateral  $C$  which is obtained by the lender.

(a) Explain that the entrepreneur's (borrower's) expected payoff from running the business is

$$\Pi^E = p(Y - (1 + r)L) - (1 - p)C$$

How does  $\Pi^E$  depend on the collateral  $C$ , the probability of success  $p$ , the sales given success,  $Y$ , and the interest rate,  $r$  [increases, decreases, independent]? Explain the intuition.

(b) Write down an expression for the *lender's* expected payoff,  $\Pi^L$  of making the loan  $L$  to the entrepreneur. *Hint: think what the lender receives in case of success, with probability  $p$ , or failure.* How does  $\Pi^L$  depend on  $C, p, Y$  and  $r$ ? [increases, decreases, independent]. Explain the intuition.

(c) Assume that the lender wants to break even (zero profits) so he chooses the interest rate  $r$  so that  $\Pi^L = L$  (the opportunity cost of making the loan of size  $L$  is simply  $L$ ). Solve for the interest rate  $r^*$  at which the lender breaks even (i.e., the  $r$  value which solves the equation  $\Pi^L = L$ ). How does  $r^*$  depend on  $C, p$  and  $Y$ ? [increases, decreases, independent].

(d) Suppose that  $C = 0$  (no collateral),  $L = 1$  and  $p = 0.5$ . Find the value of  $r^*$  as defined in part (c). Explain how this value would change if the borrower could post collateral  $C = 1$  (keep  $L = 1$  and  $p = 0.5$ ). Relate your results to the class discussion on limited enforcement and imperfect credit markets.

*[The following text applies to parts (e) and (f) below.] Now suppose that the probability of success  $p$  is a function  $p(e)$  of the entrepreneur's effort,  $e$ . For simplicity let  $p(e) = e$  and suppose the cost of effort is  $c(e) = \frac{e^2}{2}$ . The rest of the problem remains as before.*

(e) Write down an expression, similar to that in part (a), for the entrepreneur's expected payoff in this case, call it  $\tilde{\Pi}^E(e)$

(f) Suppose the entrepreneur chooses her effort level  $e^*$  to maximize her expected payoff from part (e) minus the cost of effort, that is,  $e^*$  maximizes  $\tilde{\Pi}^E(e) - c(e)$ . Solve for  $e^*$ . How does  $e^*$  depend on  $Y, C$  and  $r$ ? [increases, decreases, independent]. Explain the economic intuition.

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#### **IV. Long answer – please answer in NO MORE THAN ONE page (30 pts)**

Suppose that you are an economic advisor to the Prime Minister in a developing country. You are asked to write a short **one-page** report on what you believe would be the main implications of COVID-19 for your country's economy. Be clear upfront on what you are assuming about your country (e.g., main sectors of the economy, demographic characteristics, etc.) and defend your arguments by referring to relevant facts or economic research discussed in the lectures, discussion articles or class presentations.