

Written Exam for the M.Sc. in Economics - Fall 2015

Financial Frictions, Liquidity, and the Business Cycle Final Exam

December 17, 2015

3-hour closed book exam

Please note that the language for this exam is English.

The points for each question should guide you in allocating time to answering them (they add up to 180, thus proportional to the total time you have for the exam).

1 (20 points) Answer true, false, or uncertain. Justify your answer.

According to the Bernanke and Gertler (1990) model, when there are binding borrowing constraints, a negative shock to entrepreneurs' wealth reduces aggregate investment and output.

2 (20 points) Answer true, false, or uncertain. Justify your answer.

It is welfare improving if central banks do not commit to providing liquidity assistance to all banks when there is a systemic liquidity shock, since this imposes some market discipline on banks.

3 (20 points) Answer true, false, or uncertain. Justify your answer.

In the Geanakoplos (2009) model of heterogeneous investors, a relaxation of borrowing constraints always leads to an increase in asset prices.

4 (60 points) Consider the following version of the Stiglitz and Weiss (1981) model seen in class. There is a continuum of risk neutral entrepreneurs that have initial wealth $W < 1$ and have access to a production technology that requires an initial investment $I = 1$ producing Y with probability p and 0 with probability $1 - p$. Entrepreneurs differ in the quality of their projects as measured by p , and $F(p)$ is the cumulative probability distribution for p (and $f(p)$ the corresponding probability density), that has support on $[0, 1]$.

Entrepreneurs need to borrow $B = 1 - W$ to undertake their projects. For this they face an infinitely elastic supply of funds from international capital markets at the risk free interest rate, r^* , which captures the opportunity cost for foreign lenders. Funding is done through debt contracts, such that investors receive a repayment only when the project is successful. If entrepreneurs decide to save their wealth they would do so in the same markets and get return r^* .

Consider first that the quality of projects is observable.

a) Write the entrepreneurs' individual rationality constraint (i.e. characterize when they would borrow to undertake the project and when they would save their wealth).

b) Characterize the marginal entrepreneur that is indifferent between investing in her project or saving her wealth. What is the repayment that foreign investors get from projects they finance when these are successful, and how does it relate to p ? Characterize investment and output in this economy.

c) Is the equilibrium optimal? Explain.

Now assume that only each entrepreneur observes the quality of her project. Foreign lenders only know the distribution function $F(p)$.

d) Characterize the repayment that foreign investors get from projects they finance when these are successful, and the probability of success of the marginal investor that borrows to finance her project. Is there underinvestment or overinvestment relative to your result in b)? Is output higher or lower than in b)? Explain.

Now assume that instead of facing an international capital market, entrepreneurs borrow from the domestic market that offers loanable funds according to the supply function $S(r)$, increasing in the domestic risk free rate, r (e.g. think there are banks that take deposits and offer loans, and that to increase loan supply they need to raise the interest rate to attract more deposits). Now, if entrepreneurs decide to save their wealth they would do so in domestic markets and get return r . Assume that parameters are such that in the equilibrium with perfect information $r = r^*$.

e) Is the problem of underinvestment or overinvestment in d) amplified or attenuated? Explain.

f) Considering your answer to e), is there any financial regulation that would improve welfare?

5 (60 points) Consider an economy that lasts for three periods, $t = 0, 1, 2$, and has one consumption good. To transfer wealth from $t = 0$ to later periods there are two technologies. One is a storage technology with unitary gross return, such that a unit of the good invested in t gives a unit of the good in $t + 1$. The other technology is a long term investment project that gives $R > 1$ units of the good in date 2 per unit of the good invested in date 0. If liquidated at date 1, the return is $L < 1$.

There is a continuum of agents endowed with a unit of the good at date 0. Of these, a fraction π will be "impatient", and prefer to consume in $t = 1$, while the rest will be

“patient” and prefer to consume in $t = 2$. Their preferences are given by

$$\begin{array}{ll} \sqrt{c_1} & \text{for impatient consumers,} \\ \rho\sqrt{c_2} & \text{for patient consumers.} \end{array}$$

Where c_i represents consumption in date i . Thus, the ex ante expected utility is $\pi\sqrt{c_1} + (1 - \pi)\rho\sqrt{c_2}$. Assume first that $\rho R > 1$.

a) Find the first order condition that characterizes the optimal allocation. Compare to the market allocation given by $c_1^M = 1$ and $c_2^M = R$.

b) Can a financial intermediary implement the optimal allocation? Is it possible to have bank runs? If so, for what parameter values? Explain why runs are inefficient.

For the remainder of the exercise assume that $\rho R < 1$.

c) Characterize the optimal allocation. Compare to the market allocation given by $c_1^M = 1$ and $c_2^M = R$.

d) Explain why an intermediary cannot implement the optimal allocation. Find the constrained optimal deposit contract (Hint: it must satisfy an incentive constraint such that patient consumers do not want to withdraw funds in date 1). Is it possible to have bank runs? If so, for what parameter values?

Now assume that the central bank would face a bank run by suspending the convertibility of bank deposits.

e) Explain why if the bank could commit to implement this policy the equilibrium with a bank run is eliminated.

f) Characterize the optimal ex post policy when the central bank has no commitment power, but can choose a threshold $\pi^S \geq \pi$ of deposits that get paid in date 1. Does this policy prevent runs? Explain.