

Written Exam Economics Summer School 2018

## Financial Frictions, Liquidity and the Business Cycle

From August 18, 10:00 to August 20, 10:00

This exam question consists of two 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 one PDF document. 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.**

Consider the following variant of Kurlat (2013). The only difference is that we make workers live for two periods (we keep the assumption of constant population), and have them be risk neutral. While they work when young, they only derive utility from consumption when old. Thus, they need to find a way to save their labor income into retirement consumption. Using Kurlat (2013)'s characterization of equilibrium as a benchmark (in particular how supply and demand for projects are determined), assuming Assumption 1 holds and that equilibrium features positive prices, answer the following:

a) If workers can only save by purchasing projects in the market, what is the effect this has on project prices, the market return, and on capital accumulation?

b) Would the response of an economy to a productivity shock be larger, smaller or the same as in Kurlat (2013)? Explain.

c) If a pay-as-you-go social security system is introduced in this economy such that workers contribute fraction  $\tau$  ( $0 < \tau < 1$ ) of their labor income when young in exchange of benefits when old (benefits are determined from the system being balanced, i.e. each period total contributions equal total benefits), how does this affect project prices, market return, and capital accumulation relative to what you found in a)? Explain.

d) Suppose now that workers have the option of also saving through deposits in foreign banks that pay return  $R$ . Show that now the equilibrium market return is a function of both  $p$  (market price of projects) and  $R$ . Show that there exists  $\underline{R}$  such that for  $R < \underline{R}$  workers do not invest in foreign banks. Characterize  $\underline{R}$ . Show that there exists  $\bar{R}$  such that for  $R > \bar{R}$  workers do not purchase projects. Characterize  $\bar{R}$ .

e) Assume that parameters are such that in steady state workers are indifferent between using either technology to save (i.e.  $\underline{R} < R < \bar{R}$ ). Would the response of the economy to a productivity shock be larger, smaller, or the same as you found in b)? Explain.