

# ECON747 - Assignment 4

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- Work in groups of around 3 people; work with different people on each assignment
- Please hand in by Sunday, April 6, 2025 via email to drechsel@umd.edu
- Solutions (including model output) should be presented in one single pdf file, with the corresponding Matlab/Dynare codes in one single zip file per group

## Question 1

Consider the model of Bernanke and Gertler (1989 AER). Specify functional forms for  $x(\omega)$ ,  $f(k)$  and  $u(z^y)$  that satisfy the assumptions made by the authors.

(a) List the set of equations that describes:

- (i) The full information equilibrium
- (ii) The asymmetric information equilibrium

In both cases, the equilibrium should be characterized for the variables  $q, k, z^y, z^o, z^{o,e}, w, y$ . Note that I have denoted the entrepreneur's consumption (when old) as  $z^{o,e}$ . You may want to go back to the original paper and go through the description of the model, in order to be sure you correctly describe the relevant optimality and market clearing conditions for all of these variables. Important: not all of these conditions are actually stated in the paper explicitly, and this is part of what you learn from this exercise.

(b) Choose sensible parameter values and solve both versions of the model in Dynare. For the calibration of the parameters, make sure that the assumption indicated with \*\*\* in Lecture 10 is satisfied. Generate impulse response functions to a TFP shock for the variables listed in part (a). Make sure you maintain the timing assumption made by the authors about  $\theta$ . Do your impulse response functions generate the dynamics emphasized in the original paper?

## Question 2

Derive and characterize the optimal contract of Bernanke and Gertler (1989 AER) for the case  $n = 3$ .

## Question 3

Derive equation (4.8) in Bernanke, Gertler and Gilchrist (1999). You can take everything up to Section 3.3 as given (so you do not need to explain any of the equations/derivations until Section 3.3). Interpret equation (4.8). Why is it an important equation? Does a similar equation exist in Bernanke and Gertler (1989)? Why/why not?

## Question 4

Consider the paper by Christiano, Motto and Rostagno (2014 AER): “Risk shocks”

(a) Describe the idea of this paper using no more than five sentences. You can assume you are explaining the idea to someone who has taken the lectures of ECON747.

(b) Dynare codes for this paper can be found on the AER website. Using the material you find online, put together a mod file that runs on your computer without any errors and replicates the main results of the paper. You do not need to replicate every single result, but make sure you have the code running for some key output, for example Table 5 of the paper. You can take any estimation settings and priors as given.

(For this question you need to familiarize yourself with how estimation works in Dynare. This is not that difficult given what you already know about solving models in Dynare.)

(c) The authors of this paper use US data. Collect corresponding data from another country of your choice, and re-estimate the model. You may choose whichever country you like, but you will need to check whether the necessary data series are available for this country (for example, credit spreads are not easy to find for some countries). You

also need to make sure you correctly transform the data before inputting them in Dynare (e.g. growth rates vs. levels). Generally, try to follow as closely as possible what is done in the original data for the US. Present your key findings and contrast them with your replication in part (a). Do you find that risk shocks are as important in the country that you focused on?