## Macro III: HW 1

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## 1 Instructions

## 2 Setup up

Consider the following economy (Hansen (1985) following Uhlig (1998), section 5). Next we present the Planner's problem.

$$\max \mathbb{E} \sum_{t=1}^{\infty} \beta^t \left( \frac{(C_t)^{1-\eta} - 1}{1-\eta} - AN_t \right)$$

subject to

$$C_t + I_t = Y_t$$

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$$K_t = I_t + (1 - \delta)K_{t-1}$$
$$Y_t = Z_t K_{t-1}^{\rho} N_t^{1-\rho}$$
$$\log(Z_t) = (1 - \psi)\log(Z) + \psi\log(Z_{t-1}) + \epsilon_t$$

Remember: for all the question, on top of doing the relevant algebra and coding, please discuss and provide economic interpretation of your findings.

- 1. Write the competitive equilibrium version of this economy. Assume there is a market for goods and labor.
- 2. Define the competitive equilibrium.
- 3. Use the Schmitt-Grohe and Uribe solution package and solve the model up to first order.Solve the model for the calibration in Uhlig (1998), section 5. Discuss, how good does it replicate the standard business cycle facts? Discuss using second order moments, cross-correlations
- 4. Produce and interpret the impulse response functions.
- 5. Introduce a demand shock (shock to  $\beta$ ) calibrate it for a persistence of 0.6 and volatility of the innovation of 0.01. Re-do the 2 previous questions and discuss.

## References

- HANSEN, G. D. (1985): "Indivisible labor and the business cycle," Journal of monetary Economics, 16(3), 309–327.
- UHLIG, H. (1998): "A toolkit for analyzing nonlinear dynamic stochastic models easily manuscript," University of Tilburg.