

Macro in Matlab

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Session contents

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1 Sessions 1 to 3: Introduction to Matlab

- Starting matlab and first commands
- Introductory topic 1: Utility maximization
Consider the utility function $u(C_X, C_Y)$ and a budget constraint $p_X C_X + p_Y C_Y = w$ with obvious notation. Plot a figure with the budget constraint, with indifference curves and the optimal consumption point (C_X^*, C_Y^*) .
- Introductory topic 2: Demand and supply on the labour market

1. Consider a consumption-leisure choice that follows the utility function

$$U(c, l) = [\gamma c^\theta + (1 - \gamma)l^\theta]^{\frac{1}{\theta}}, \quad \theta < 1$$

and a budget constraint $pc = (\bar{l} - l)w^{\text{nominal}}$. The optimal leisure choice is given by (compare Makro I, Bachelor Wiwi JGU)

$$l(w) = \frac{1}{1 + \left(\frac{\gamma}{1-\gamma}\right)^{\frac{1}{1-\theta}} w^{\frac{\theta}{1-\theta}}} \bar{l}, \quad \text{with } w = \frac{w^{\text{nominal}}}{p}.$$

2. Plot isoquants for the above utility function.
3. Plot a budget constraint
4. Plot the labour supply function.
5. Assume a Cobb-Douglas production function. Let the demand function for labour be given by (again, see Makro I)

$$L^D = \left(\frac{(1-a)A}{w} \right)^{1/a} K$$

6. Plot the labour demand function.
7. Combine both the labour supply function and labour demand function in one plot and visualize the equilibrium of the labour market. Highlight the equilibrium wage.

2 Session 4: Assignment of topics

2.1 Topics

1. Compute the equilibrium price and quantity on the labour market analytically and numerically (fzero).
2. Plot a phase diagram for the Solow growth model (solving ODEs).
3. Plot a phase diagram for the neoclassical growth model with optimal saving (solving ODEs).
4. Replicate the figure on business cycles from Advanced Macro.
5. Plot a phase diagram for the Pissarides matching model in Advanced Macro.
6. Compute stress dynamics in the stress model.
7. Compute indifference surfaces and budget constraints for a three-period utility maximization problem (compare time-inconsistency in Advanced Macro).
8. more to come (Grossman-Helpman growth model, your own suggestions, social groups and social cohesion ...)

3 Sessions 5 to 11: Q&A

4 Last session: Presentations