Martin Luther University Halle-Wittenberg
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2nd Exam - Parts I, II, III
Advanced Macroeconomics
Winter 2024/25

General Remarks:

- Please read the document **info_exam.pdf** from StudIP again carefully. You find there information on the **due date for exam acceptance/ withdrawal**, other examination rules, the grading scheme, formal requirements and general comments on the exam format.
- The due date of these three problem sets will be **August 5, 2025**.
- This document contains all problem sets for the three parts of the second exam in winter 2024/25.
- Please read the exercises carefully.
- Depending on your DigiMops, you have to work on the respective problem sets.
- Questions about the exercises can be sent by Email to makro@wiwi.uni-halle.de until **July 1, 2025, 12:00** (in German or in English). The questions will be answered by Email to all participants.

Good luck!

Part I - Problem Set #n

digiMOPS	n	country in task 1	variable x in task 2
rwCrT3	1	BE	p
EW48q7	2	CZ	ω

1. Visit the database of Eurostat. Download a dataset from namq_10_fcs by choosing the following filter options:

   - na_item: P311_S14, P312N_S14
   - unit: CLV10_I20
   - s_adj: SCA
   - geo: assigned to you according to your digiMOPS
   - time: 2010-Q1 to latest

   Add a data section where you describe shortly how you accessed the data and if/ how you cleaned them before loading them into Matlab/ Octave. Explain the variables you downloaded. Plot consumption expenditures for both groups of goods and explain the behavior of both time series.

2. Imagine the One-Period-Model from lecture 4 with an adjusted utility function

   $$u = (1 - \omega) \ln c_1 + \omega \ln c_2$$

   and price p for good c_2 while the price for good c_1 is normalized to 1.

   - Derive analytically a formula for optimal c_i, $i = 1, 2$.
   - Solve for equilibrium values c_i and display the values. Assume $r = 0.2$, $w = 0.7$, $p = 1$ and $\omega = 0.5$.
   - Solve for equilibrium values c_i for a reasonable range of the variable or parameter x assigned to you according to your digiMOPS in steps which are small enough to plot the consumption levels as continuous functions $c_i(x)$ of the varying factors. Plot and interprete the functions.

Part II - Problem Set #n

digiMOPS	n	country in task 1
rwCrT3	1	AUS
EW48q7	2	IND

1. Conduct the following task for the country that has been allocated to you according to your digiMOPS. Using the Penn World Tables (PWT, Version 10.01), provide a time-series plot of real GDP ($rgdpe$) and the investment share (csh_i). Start with the first available observation and add also the average of the investment share to the plot. Explain the behavior of the time series and refer to economic theory of long-run growth.

2. Consider the Extended Ramsey Growth Model with endogenous labor supply from chapter 9. Explain how the steady-state investment share (I/Y) depends on the time preference rate. Do this by extending the Dynare code by an additional variable $ishare$ (investment share) and solving for the steady state for different numerical values of the time preference rate. Summarize your results in a graph that shows the relation between the time preference rate and the steady-state investment share as continuous function $ishare(\rho)$. Show also output as function $y(\rho)$. Interpret the results economically and compare your findings to the data.
   Hint - Check the Dynare manual *for learning about loops in Dynare.*

Part III - Problem Set #n

digiMOPS	n	Std. Dev. in task 2	Range for h in task 2
rwCrT3	1	$\sigma_a = 0.007$	$h = [0, 0.5, 0.8]$
EW48q7	2	$\sigma_a = 0.008$	$h = [0, 0.4, 0.7]$

1. Consider the model with monopolistic competition in lecture 11 with an adjusted utility function
$$U(C_t, N_t) = \frac{(C_t - hC_{t-1})^{1-\theta}}{1-\theta},$$
where h is a parameter for consumption habit persistence. Assume that these habits are taken exogenously by the household, i. e. when optimizing, the decision variable is still C_t only and hC_{t-1} is treated like a constant parameter when deriving the first-order-conditions. You must not derive the whole maximization problem, but can work directly with the formulas on the lecture slides. Formulate equations (3), (7) and the Euler equation on slide 11-9 with these specific preferences depending on the real interest rate. Be aware of complete documentation of your derivations.
Hint - Do not change any other equations that are relevant for the implementation of the model in the next task.

2. Adjust the respective equations in the model code from lecture 11. Run stochastic simulations of a TFP shock of the size σ_a and for values of h assigned to you according to your digiMOPS. Extract the impulse responses of variables c, n, y, w, i, a and plot them for all three cases, per variable into one window, so that you can compare them directly (3 lines for every h per plot). Explain the effects of a positive TFP shock on the variables and also the differences in effects depending on the persistence of consumption habits.