

MACROECONOMICS I

Homework Assignment #1

Deadline: March 21st, before the class (12:00). No late submissions will be accepted.

Submission: a hard (printed) copy; no electronic versions will be accepted.

The setup contains 4 problems. You are asked to provide answers to all problems. You may work in groups (maximum 3 people per group).

Problem 1. (15 points). GDP Accounting

- (5 points)** If a woman marries her butler, and after the marriage her husband continues to wait on her as before, and she continues to support him as before (but as a husband rather than as an employee). How does the marriage affect GDP? How do you think it should affect GDP?
- 5 points)** Which of the following transactions will be included into GDP? Explain.
 - A seafood restaurant buys \$100 worth of fish from a fisherman
 - A family spends \$100 on a fish dinner at the seafood restaurant
 - Czech Airlines buys a new jet from Boeing for \$300 million
 - Airbus sells one of its jets to Denzel Washington for \$100 million
- (5 points)** Which variation of GDP will you use in every case and why:
 - You want to compare the economic growth in a set of countries over past 20 years;
 - You want to assess the short-run fluctuations of the Czech economy within a year;
 - You want to compare the standards of living of Czech population in 1990s and in 2000s;
 - You want to assess the size of the shadow economy in a country;
 - You want to compare income in year 2013 across 10 countries;

Hint: We have the following set of GDP measure: GDP, per capita, real, seasonally adjusted, purchasing power parity (PPP) adjusted.

4. (Problem 2. (25 points). Real GDP

Consider the economy of Czech Republic which produces only two goods: beer and Skoda cars. The table below summarized the output and prices for the period 2010-2013.

Goods	2010		2011		2012		2013	
	Q	P(\$)	Q	P(\$)	Q	P(\$)	Q	P(\$)
Beer (bottles)	5	1	5	1	10	2	8	4
Skoda cars (thousands)	10	2	15	3	20	3	35	10

Calculate the following quantities

1. **Nominal GDP** and its **growth rate**
2. **Real GDP** (100=2011) and its **growth rates**
3. **The GDP deflator** (100=2011) and **inflation rates**
4. **Real GDP growth rates** using the chain-weight measure
5. **Real GDP** using the chain-weight measure (take 2011 as a starting year)
6. **GDP deflator** using the chain-weight method (take 2011 as a starting year)
7. Compare **levels** and **growth rates** of real GDP from **two** approaches (base year approach and chain-weighted approach). Do you observe any differences in the results? Explain.
8. Explain your own understanding of the following phrase: “Updating the base year leads to re-writing of the history of economic growth.”

Problem 3. (35 points). Solow-Swan Economic Growth Model

Assume yourself being a policy maker in charge of a small country. Your country is producing only pizza using the following technology:

$$Y = F(K, L) = K^{0.4} L^{0.6},$$

where Y – number of pizzas produced, K – capital and L – labor inputs. We assume that each person in the economy is employed and supplies 1 unit of labor. So, the population is equal to the labor force which in turn is equal to L. The economy is closed, so no interaction with abroad are allowed.

1. **(20 points)** Assume there is no population growth. The **depreciation rate of the capital (δ)** is 10 % per year.
 - Derive the **per-capita** production function? What is the source of growth in GDP per capita in such economy?
 - Suppose a country starts with a **capital stock per worker** equal to 2. Make a table showing **steady-state** capital per worker, output per worker, and consumption per worker for saving rates of 0 %, 10 %, 20 %, 30 %, up to 100 %.
 - What savings rate maximizes per-capita output?
 - What savings rate maximizes per-capita consumption?
 - As a social planner, who places priority on the welfare of a current generation, what savings rate would you choose? Now, suppose you change your priority and become more interested in the

standards of living of the future generations. What savings rate policy would you adopt in this case?

2. **(15 points)** Now, add the population growth into your model, by assuming population growth rate $n = 3\%$ per year. Derive the **steady-state** capital per worker, output per worker, and consumption per worker for the savings rate 30 %. What effect does the population growth has on the GDP per capita? What can you do about that as a policy maker?

Problem 4. (25 points). Economic Growth

Discuss the potential role of each of the factors listed below for the **steady-state level** of GDP per capita. In each case, indicate whether the effect is through A (technological progress), through K (physical capital accumulation), through H (human capital accumulation), or through some combination of A, K, and H:

- ✓ Geographical location
- ✓ Education
- ✓ Protection of property rights
- ✓ Openness to trade
- ✓ Low tax rates
- ✓ Good public infrastructure
- ✓ Low population growth

Good luck!