

Economics 102
 Fall 2007
 Answers to Homework #3

Problem 1.

In 2014, Bill wants to borrow \$1000 from Steve (who owns Orange Inc.) to found his company Macrosoft. Bill offers to pay Steve back principal and interest in 2015. They both expect the inflation to be 5% for the year. Steve is willing to make the loan provided he earns a real interest rate of 10% on this loan (he doesn't believe Macrosoft could make much money).

(a) How much will Bill need to pay Steve back in a year in order for Steve to be willing to lend him the money?

$$\text{Nominal } i \approx \text{Real } i + \text{Exp Inflation Rate} = 10\% + 5\% = 15\%$$

$$1000 * (1 + 15\%) = \$1150$$

$$(1 + \text{Nominal } i) = (1 + \text{Real } i) + (1 + \text{Exp Inflation Rate}) = \$1155$$

(b) After their agreement, suppose the actual inflation rate in 2015 is only 3%. Who is the winner given the loan agreement outlined in part (a)? (Hint: the winner is that individual who gets more than they expected when they made the loan agreement.) What is the gain equal to in real terms using 2014 as the base year?

$$\text{The real value of the money Steve receives in 2015 is } \$1150 / 1.03 = \$1117$$

$$> \$1150 / 1.05 = \$1095 = \text{what he expected to receive. So Steve wins.}$$

$$\text{Difference of real value of payment: } \$1117 - \$1095 = \$22$$

(c) Suppose the actual inflation rate in 2015 is 7%. Who is the winner given the loan agreement outlined in part (a)? What is the gain equal to in real terms using 2014 as the base year?

$$\text{The real value of the money Steve receive in 2015 is } \$1150 / 1.07 = \$1075$$

$$< \$1150 / 1.05 = \$1095 = \text{what he expected to receive. So Bill wins.}$$

$$\text{Difference of real value of payment: } \$1095 - \$1075 = \$20$$

(d) Suppose that back in 2014, Bill offered to pay Steve \$1140 in 2015 if Steve would lend Bill \$1000 in 2014. Furthermore, suppose both Bill and Steve expect inflation to be 5% for the year and that Steve wants to receive a real interest rate of 10%. Given this information, will Steve agree to lend money to Bill in 2014?

$$\text{Nominal } i = [(\$1140 - \$1000) / \$1000] * 100 = 14\%$$

Expected Real $i = \text{Nominal } i - \text{Exp Inflation Rate} = 14\% - 5\% = 9\% < 10\%$. Since Steve wants to receive a real interest rate of 10% he will not agree to this loan contract.

Problem 2.

This question focuses on the growth rate of GDP per capita. (Hint: use textbook provides a simple estimation rule for these types of calculations.)

(a) If U.S. real GDP per capita continues to grow at the rate of 2.8% per year, how many years will it take for real GDP per capita in the U.S. to double?

70/2.8=25 years

(b) If U.S. real GDP per capita continues to grow at the rate of 2%, how many years will it take for real GDP per capita in the U.S. to double?

70/2=35 years

(c) If Angola's real GDP per capita continues to grow at the rate of 10%, how many years will it take for real GDP per capita in Angola to double?

70/10=7 years

Problem 3.

What three factors are usually used to explain growth in productivity in an economy?

Physical capital, human capital, and changes in technology

Problem 4.

What factors could be used to explain difference in the growth rates in real GDP per capita among different countries? Pick one factor and briefly explain (use at least two sentences to explain) why it matters.

Saving and Investment Spending; Foreign Investment; Education; Infrastructure; Research and Development; Political Stability, Property rights, and Excessive Gov Intervention

Problem 5.

In 2007 the aggregate price level in Tropicia is 1, and real GDP is \$8000. Furthermore, suppose the money supply available in the market is \$5000.

(a) What is the velocity of money in Tropicia?

$$V = (P \cdot Y) / M = (1 \cdot 8000) / 5000 = 1.6$$

(b) In 2008 suppose the aggregate price level increases by 60% (in other words, the aggregate price level in Tropicia is now equal to 1.6) and real GDP has increased by \$800. Given that the velocity of money is the same as in 2007, what is the new level of the money supply in Tropicia in 2008? What is the growth rate of the money supply from 2007 to 2008?

$$M = (P \cdot Y) / V = [1.6 \cdot (8000 + 800)] / 1.6 = 8800$$

$$(8800 - 5000) / 5000 \cdot 100\% = 76\%$$