

Econ 0200 University of Pennsylvania

First Midterm

Instructions

1. This quiz is 120 minutes long, from 17:30 to 19:30.
2. This exam is closed note and book.
3. You may use a calculator. The use of cellphone or laptop calculators is not allowed.
4. This quiz has a total of 100 points and eight pages (including this one), please check that you are not missing any page.
5. In all the numerical questions, in order to get full credit you must show your work.
6. This exam has two sections (Short Answer Questions and Numerical Answer Questions). Please read the instructions at the beginning of each section.
7. Please answer each question in the space provided below the question (you can also use the back of each sheet to answer the question). In case you need extra space, there are two additional blank sheets at the end of the exam. If you need to use them just indicate to me that you will be answering in a blank sheet.

Name: _____

Penn ID: _____

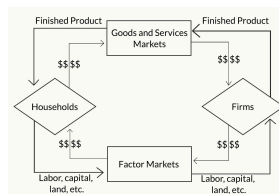
My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.

Please sign here _____ Date _____

Short Answer Questions (5 Points Each)

Briefly answer FIVE out of the following seven questions. Each answer is worth five points. If you answer more than five questions, I will deduct ten points off your grade.

1. What is the Gini coefficient and what is it used for?
It is a measurement of inequality within an economy during a particular period of time. It is computed by measuring the area between an economy's Lorenz curve and the Lorenz curve of a perfect equality economy. A higher Gini coefficient implies that an economy is more unequal.
2. How can we be sure if a particular country is going through a recession?
By observing the stage of the business cycle that the economy is currently on. If it is the case that the short-run measurement of GDP is below the long-run trend, then we can be certain that the economy is currently in a recession.
3. What is the difference between natural and cyclical unemployment?
Cyclical unemployment is the one caused by the fluctuations of the economy during the business cycle. Cyclical Unemployment is counter-cyclical, meaning that during an economic boom, cyclical unemployment goes down (and vice-versa). On the other hand, natural unemployment is related to the structural conditions of the economy as well as job search related reasons.
4. Write down the Circular Flow diagram and briefly explain it.



The circular flow diagram basically establishes that, at the aggregate level, expenditures of households (and government) are the same as the labor and capital payments that firms pay workers and capitalists, and these are equal to income. This flow then establishes that we can measure production using either the income or expenditure approach.

5. When talking about mobility between generations, we can use either a relative or absolute measurement. Explain both (you can give an example to illustrate the definitions, if you want).
A person has relative mobility with respect to their parents if the income that they earn places them in a higher quantile than the ones their parents are positioned in, while it has absolute mobility when the income of the person is higher than the income of their parents.
6. What is the real interest rate and why is it relevant?
The real interest rate r is equal to the nominal interest rate i minus inflation π , $r = i - \pi$. It measures the actual benefit/loss of investing your money in a bond/asset that pays i by taking into account the increase in prices in goods and services. So, in other words, it measures the benefit/loss in terms of purchasing power of an investment.
7. What is the GNP? In your answer, explain the main difference between the GNP and GDP.
The Gross National Product (GNP) measures the production (market value of final goods) of the citizens of a particular economy, regardless of their location, during a particular period of time. The main difference with the GDP is that it considers the production of all citizens of the economy who live outside the territory of this particular economy, and subtracts the production of all the foreigners that live in the economy.

Numerical Answer Questions

1. (20 Points) Suppose that in Springfield, there are five inhabitants (Marge, Homer, Lisa, Bart, and Maggie). The following table describes the income these people earned during 2005 and 2012:

	2005	2012
Marge	700	600
Homer	300	200
Lisa	1000	900
Bart	500	400
Maggie	200	100

Notice that the difference between the incomes these people had between 2005 and 2012 is 100 dollars, meaning EVERYONE is earning 100 dollars less in 2012 than what they earned in 2005.

Professor Frink claims that the Gini coefficient in Springfield is the same in 2005 and 2012.

Is Professor Frink correct? Is this a desirable property of the Gini coefficient? In order to answer this question and get full credit, you must compute the income distribution for each year and plot the Lorenz curve (preferably in the same graph). DO NOT try to compute the Gini coefficient.

Solution:

The first thing we must do is to sort out the income of each individual during 2005, then compute the total income, then compute the percentage that each individual's income represent over the total, and finally compute the cumulative distribution of income:

	2005 Income	% Total Income	Cumulative Distribution
Maggie	200	7.4 %	7.4%
Homer	300	11.11 %	18.5 %
Bart	500	18.5 %	37%
Marge	700	25.9%	62.9%
Lisa	1000	37.1%	100 %

We now do the same for 2012:

	2012 Income	% Total Income	Cumulative Distribution
Maggie	100	4.5 %	4.5 %
Homer	200	9.1 %	13.6 %
Bart	400	18.2 %	31.8 %
Marge	600	27.3%	59.1 %
Lisa	900	40.1%	100 %

So, the Lorenz curve of 2012 is going to be below the Lorenz curve of 2005, meaning that according to the Gini coefficient, the income distribution is more unequal on 2012 than on 2005. This means Professor Frink is wrong. However, at an intuitive level, since everyone is earning 100 dollars less, one would think that the income distribution should be the same. This is not captured by the Gini coefficient, and this is not a desirable characteristic of this inequality measurement.

2. (20 Points) Suppose that in Genovia, during 2001, taxes were equal to 7000 while transfers were equal to zero. Also, the Genovian government spent 6400. Let us suppose that Genovia is a closed economy, and therefore net exports are equal to zero. Finally, suppose that the following describe the relationship between investment, savings, and the real interest rate:

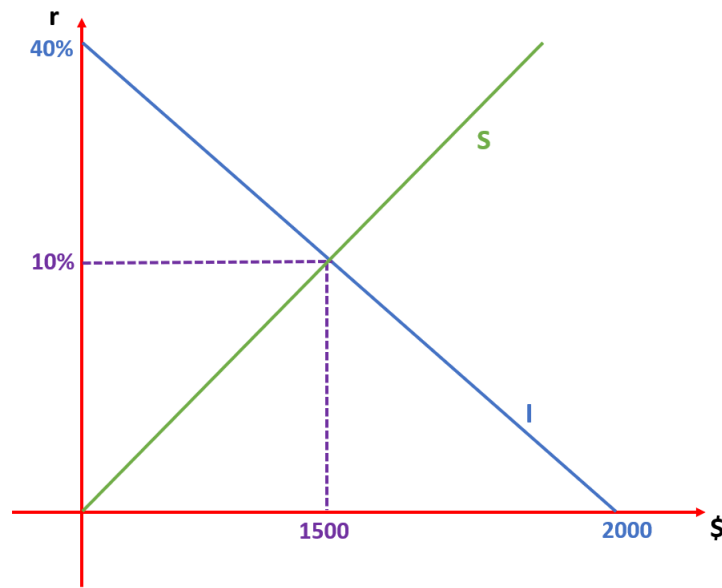
$$I = 2000 - 5000r, \quad S = 15000r.$$

With this information answer the following questions:

- (a) (3 Points) Find the value of Public Savings in Genovia during 2001.

$$S_{Pub} = T - (Tr + G) = 7000 - 6400 = 600.$$

- (b) (8 Points) Find the equilibrium value of the real interest rate as well as investment. Make sure to graph the market for investment as well as the equilibrium using dollars on the X-axis and the real interest rate on the Y-axis.



- (c) (4 Points) What is the value of Private Savings?

We know that $S_{Total} = S_P + S_{Pub}$. Since this is a closed economy, investment is equal to savings, which means that total savings are \$1500. Using this information, we get that $S_P = 900$.

- (d) (5 Points) If in addition we know that household consumption was equal to 16000, find the GDP of Genovia during 2001.

First, we know that $S_P = Y_D - C$, which implies that disposable income must be \$16,900. Also, we know that $Y_D = Y - T + Tr$, and using the information provided by the question, we can conclude that $Y = \$23,900$.

3. (20 Points) Suppose the following information about prices and quantity of all the goods produced in Duloc (Goods 1, 2, and 3):

Year	P_1	Q_1	P_2	Q_2	P_3	Q_3
2006	10	100	3	10	20	10
2007	15	100	3	X	15	20
2008	20	120	5	20	20	30

Suppose that the base year is 2008. With this information answer the following questions:

- (a) (5 Points) Find the value of X such that the Real GDP of 2007 is equal to 2500.
The real GDP of 2007 for this economy is given by:

$$R_{07} = 20(100) + 5X + 20(20) = 2400 + 5X = 2500.$$

This implies that $X = 20$.

- (b) (8 Points) Find the GDP deflator in Duloc during these three years.
The real GDP in Duloc during this years is:

$$R_{06} = 20(100) + 5(10) + 20(10) = 2250,$$

$$R_{08} = 20(120) + 5(20) + 20(30) = 3100.$$

On the other hand, nominal GDP is:

$$N_{06} = 10(100) + 3(10) + 20(10) = 1230,$$

$$N_{07} = 15(100) + 3(20) + 15(20) = 1860,$$

$$N_{08} = R_{08} = 2250.$$

Finally, this implies:

$$D_{06} = 100 \left[\frac{1230}{2250} \right] = 54.67,$$

$$D_{07} = 100 \left[\frac{1860}{2500} \right] = 74.40,$$

$$D_{08} = 100.$$

- (c) (4 Points) Find the growth rate of Nominal GDP between 2006 and 2007. Also find the growth rate of Real GDP during these years.

$$\Delta N_{06-07} = 100 \left[\frac{1860 - 1230}{1230} \right] = 51.2\%,$$

$$\Delta R_{06-07} = 100 \left[\frac{2500 - 2250}{2250} \right] = 11.11\%.$$

- (d) (3 Points) Find the inflation rate (using the GDP deflator) in Duloc between 2006 and 2007.

$$\pi_{06-07} = 100 \left[\frac{74.40 - 54.67}{54.67} \right] = 36.09\%.$$

4. (15 Points) Suppose that in Florin the marginal product (or benefit) of capital is given by:

$$MPK = \frac{2}{K^{1/3}}.$$

Suppose that today (period t) Florin has a capital stock of $K_t = 750,000$ and that between today and tomorrow (period $t+1$) the real interest rate is $r = 0.02$. Finally, suppose that depreciation in this country is $\delta = 0.25$. How much investment must Florin make today (I_t) for it to have the optimal amount of capital tomorrow?

First of all, let us remember that the capital stock of tomorrow (K_{t+1}) is determined by how much investment the economy decides today (I_t). The optimal amount of capital for tomorrow is determined by equating the marginal product of capital to the real interest rate. This means:

$$\frac{2}{K_{t+1}^{1/3}} = 0.02,$$

which implies that $K_{t+1} = 1000000$. Finally, using the law of capital accumulation:

$$1000000 = I_t + (1 - 0.25)(750000).$$

Solving for investment, we get that $I_t = 437500$.