

Problem Set I

Section I: Chapter 1 - 2

Question 1

Decide whether each of the following transactions is included in the GDP. If the transaction is included, determine which component of final expenditure it represents. If the transaction is excluded for GDP, explain why.

- a. Your local ice cream maker buys peaches to make peach ice cream.
- b. Your local ice cream maker buys a new and improved ice cream machine.
- c. You buy peach ice cream from your local ice cream maker.
- d. Your local ice cream maker sells peach ice cream to a local restaurant that serves peach smoothies.
- e. Your cousin from Germany buys peach ice cream from your local ice cream maker while she visits you from Germany.
- f. You buy a used book to learn how to make ice cream.
- g. You buy peaches to make peach ice cream for yourself.
- h. You buy a new ice cream machine to make peach ice cream for yourself.
- i. You give some of your peach ice cream to your cousin when she visits from Germany.

Question 2

Suppose in an economy only three goods X, Y and Z are produced and the only factor of production is labor. The wage rate is 2 TL for each sector. The input requirements of those goods are as follows:

One unit of X: 1 unit of labor

One unit of Y: 1,5 units of labor + 0, 5 units of X + 1 unit of Z

One unit of Z: 1 unit of labor + 1 unit of X

Further suppose that in a given period 26 units of X, 12 units of Y and 20 units of Z are produced while the prices of X, Y, and Z are 2 TL, 8 TL and 4 TL, respectively.

- a. Identify the intermediate and final goods.
- b. Calculate GDP from expenditure approach.
- c. Calculate the value added generated in the production of each good and total value added.
- d. Calculate GDP from income approach.

Question 3

From the following table, calculate:

- a. gross private domestic investment
- b. net exports
- c. gross domestic product
- d. gross national product
- e. net national product
- f. national income
- g. personal income
- h. disposable income

Category	Value (Billion TL)
Transfer payments	15
Subsidies	5
Social insurance payments	35
Depreciation	50
Receipts of factor income from the rest of the world	4
Government consumption and investment	75
Imports	50
Payments of factor income to the rest of the world	5
Indirect taxes	20
Exports	60
Net private domestic investment	100
Personal taxes	60
Corporate profits	45
Personal consumption expenditures	250
Dividends	4

Question 4

Assume an economy with a coal producer, a steel producer, and some consumers (there is no government). In a given year, the coal producer produces 15 million tons of coal and sells it for \$5 per ton. The coal producer pays \$50 million in wages to consumers. The steel producer uses 25 million tons of coal as an input into steel production, all purchased at \$5 per ton. Of this, 15 million tons of coal comes from the domestic coal producer and 10 million tons is imported. The steel producer produces 10 million tons of steel and sells it for \$20 per ton. Domestic consumers buy 8 million tons of steel, and 2 million tons are exported. The steel producer pays consumers \$40 million in wages. All profits made by domestic producers are distributed to domestic consumers.

- Determine GDP using (i) the product approach, (ii) the expenditure approach, and (iii) the income approach.
- Determine the current account surplus.
- What is GNP in this economy? Determine GNP and GDP in the case where the coal producer is owned by foreigners, so that the profits of the domestic coal producer go to foreigners and are not distributed to domestic consumers.

Question 5

In year 1 and year 2, there are two products produced in a given economy, computers and bread. Suppose that there are no intermediate goods. In year 1, 20 computers are produced and sold at \$1,000 each, and in year 2, 25 computers are sold at \$1,500 each. In year 1, 10,000 loaves of bread are sold for \$1.00 each, and in year 2, 12,000 loaves of bread are sold for \$1.10 each.

- a. Calculate nominal GDP in each year.
- b. Calculate real GDP in each year, and the percentage increase in real GDP from year 1 to year 2 using year 1 as the base year. Next, do the same calculations using the chain-weighting method.
- c. Calculate the implicit GDP price deflator and the percentage inflation rate from year 1 to year 2 using year 1 as the base year. Next, do the same calculations using the chain-weighting method.
- d. Suppose that computers in year 2 are twice as productive as computers in year 1. That is, computers are of higher quality in year 2 in the sense that one computer in year 2 is equivalent to two computers in year 1. How does this change your calculations in parts (a) to (c)? Explain any differences.

Question 6

Consider the identity $S^p - I = CA + D$, where S^p is private sector saving, I is investment, CA is the current account surplus, and D is the government deficit.

- a. Show that the above identity holds.
- b. Explain what the above identity means.

Section II: Chapter 3

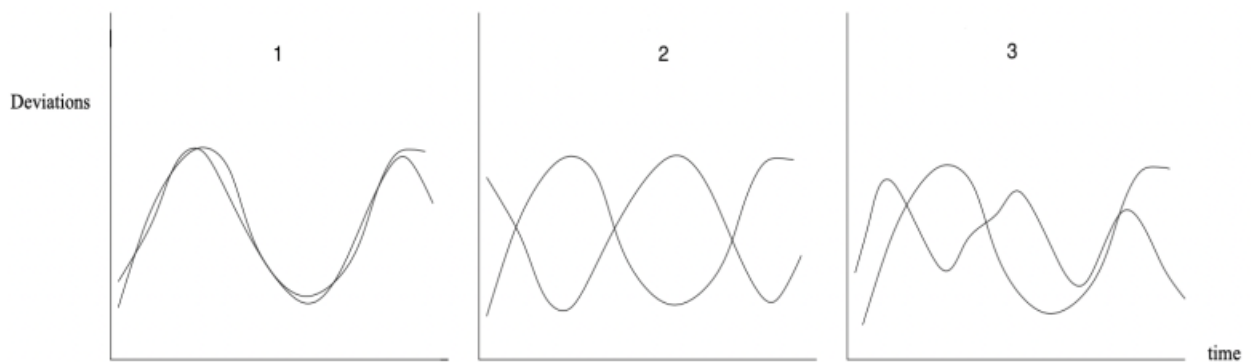
Question 7

- a. What is the primary defining feature of business cycles?
- b. Besides persistence, what are three important features of the deviations from trend in GDP?
- c. Explain why forecasting GDP over the long term is difficult.
- d. Why are the co-movements in aggregate economic variables important?
- e. Give a non-economic example of two variables that are positively correlated and an example of two variables that are negatively correlated.

- f. What are the three features of co-movement that macro-economists are interested in?
- g. Describe the key business cycle regularities in consumption and investment expenditures.
- h. What are the key business cycle regularities with respect to the price level and the money supply?
- i. What are the key business cycle regularities in the labor market?

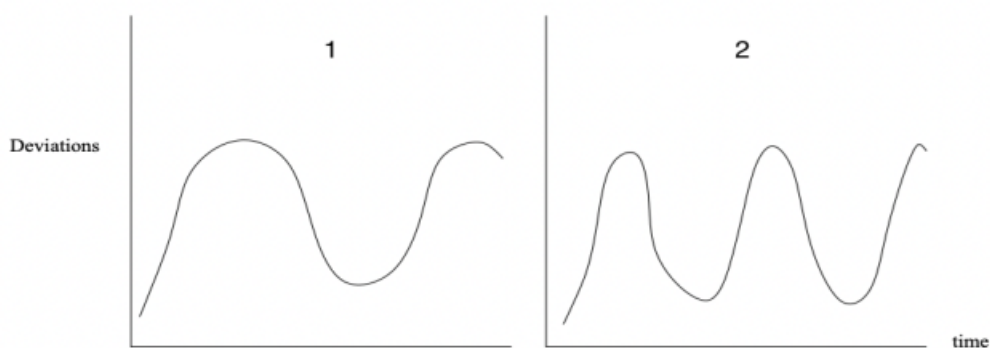
Question 8

Within the realm of business cycles, we do not just look at GDP. Since several other series have some peculiar properties in relation with GDP, we also look at their cyclical components which tend to move in a particular fashion, loosely synchronized with GDP. These properties are called co-movements. Now consider the figure below. Classify co-movement in graphs 1, 2, 3.



Question 9

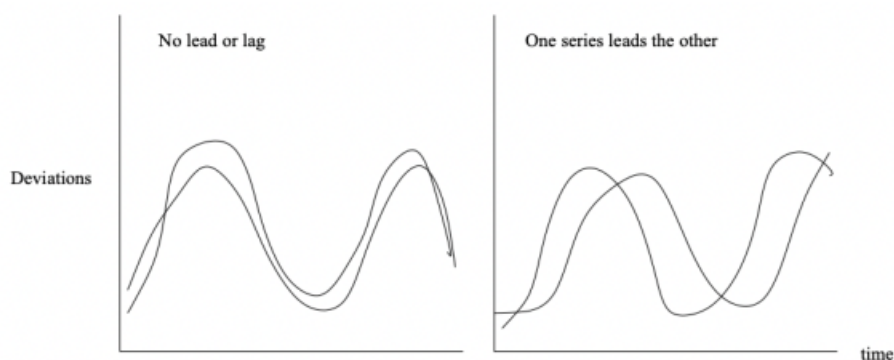
We define the length of business cycle to be between two and eight years. They can on average be close to two years or to eight years. Now, what is "frequency" and "persistence" in the context of the business cycle. Look at the graphs below, determine which one seems to have high frequency (low persistence).



Business cycle frequencies

Question 10

Consider the graphs below. Explain what having a series leading or lagging behind one other means within the realm of the business cycle (With example of macroeconomic variables).



Lags and Leads

Question 11

Table below reports a large number of statistics for the United States. From all these numbers, we will be trying to crystallize the most apparent characteristics, which we will call the stylized facts of the business cycle. Note that we use GNP, not GDP. Their business cycle behavior is equivalently important.

First off examine standard deviations (the SD% column.). Compare GNP's standard deviation of 1.72% to the standard deviation of other aggregates. Among aggregates, which component is the least volatile? The standard deviation of durables is a multiple of that of GNP. Why is this so? Look at the components of Investment, are they more or less volatile than the GNP itself?

Secondly, turn to labor. What can be said about the volatility of total ours compared to that of GNP? Compare the volatiles of labor earnings and labor productivity (as measured by GNP over total hours) to that of GNP. Lastly, look at prices and monetary aggregates, what can be said about their volatiles compared to that of GNP.

Thirdly, look at the correlations, in particular concentrate on the middle column (x_t). Classify each components of GNP (whether they are acyclical, pro-cyclical, countercyclical). Are labor aggregates a cyclical? Determine whether prices and monetary aggregates are pro-cyclical or not. Consider the remaining columns of the table. Determine any aggregate leads or lags the business cycle.

Variable	SD%	Correlation of GNP with										
		x_{t-5}	x_{t-4}	x_{t-3}	x_{t-2}	x_{t-1}	x_t	x_{t+1}	x_{t+2}	x_{t+3}	x_{t+4}	x_{t+5}
GNP	1.72	.02	.16	.38	.63	.85	1.0	.85	.63	.38	.16	.02
Consumption:												
- total	1.27	.25	.42	.57	.72	.82	.83	.67	.46	.22	-.01	-.20
- non dur., serv.	0.86	.22	.40	.55	.68	.78	.77	.64	.47	.27	.06	-.11
- durables	4.96	.24	.37	.49	.65	.75	.78	.61	.38	.11	-.13	-.31
Investment												
- total	8.24	.04	.19	.38	.59	.79	.91	.76	.50	.22	-.04	-.24
- fixed	5.34	.08	.25	.43	.63	.82	.90	.81	.60	.35	.09	-.12
- non residential	5.11	-.26	-.12	.05	.30	.57	.79	.88	.83	.60	.46	.24
- residential	10.7	.42	.55	.65	.72	.74	.63	.39	.11	-.14	-.33	-.43
- ch. inventories	17.3	-.03	.07	.22	.38	.53	.67	.51	.27	.04	-.15	-.30
Govt expenses	2.04	.03	-.01	-.03	-.01	-.01	.04	.08	.11	.16	.25	.32
Exports	5.53	-.48	-.42	-.29	-.10	.15	.37	.50	.54	.54	.52	.44
Imports	4.88	.11	.19	.31	.45	.62	.72	.71	.52	.28	.04	-.18
Labor (household survey)												
- total hours	1.59	-.06	.09	.30	.53	.74	.86	.82	.69	.52	.32	.11
- average hours	0.63	.04	.16	.34	.48	.63	.62	.52	.37	.23	.09	-.05
- employment	1.14	-.10	.04	.23	.46	.69	.85	.86	.76	.59	.40	.18
- GNP/tot. hours	0.90	.06	.14	.20	.30	.33	.41	.19	.00	-.18	-.25	-.24
Labor (establishment survey)												
- total hours	1.69	-.12	.07	.38	.54	.78	.92	.90	.78	.63	.42	.21
- average hours	0.48	.14	.26	.42	.58	.68	.62	.45	.22	.05	-.15	-.30
- employment	1.41	-.19	-.01	.22	.47	.72	.89	.92	.86	.73	.55	.34
- GNP/tot. hours	0.73	.35	.44	.44	.45	.34	.34	.10	-.09	-.30	-.38	-.42
- hourly earnings	0.76	.20	.35	.47	.58	.66	.68	.59	.46	.29	.12	-.03
Hourly compens.	0.55	.24	.25	.21	.14	.09	.03	-.07	-.09	-.09	-.09	-.10
Prices												
- GNP deflator	0.88	-.52	-.63	-.69	-.70	-.65	-.57	-.44	-.31	-.17	-.04	.08
- CPI	1.43	-.57	-.66	-.71	-.72	-.65	-.52	-.35	-.17	.02	.19	.34
Money												
- M0	0.84	.22	.33	.39	.42	.37	.30	.21	.15	.07	.03	.02
- M1	1.52	.16	.24	.33	.41	.39	.33	.21	.12	.05	.03	.02
- M2	1.46	.51	.58	.62	.62	.50	.33	.10	-.08	-.21	-.29	-.37

Economic Fluctuations in the US, 1954:I-1991:II

Now, in the light of your answers please state the stylized facts:

1. Consumption is (more/less/as) volatile than/as output.
2. All other components of GNP are (more/less) volatile.
3. The labor input is(more/less/as) volatile ... (than/as) output.
4. Average hours uctuate (more/less) than employment.

5. All components of GNP are (acyclical/procyclical/countercyclical)- except government expenses.
6. All labor aggregates are (acyclical/procyclical/countercyclical).
7. Labor productivity is (weakly/strongly) (acyclical/procyclical/coun-
tercyclical).
8. Labor earnings are (acyclical/procyclical/countercyclical).
9. Prices are (acyclical/procyclical/countercyclical).
10. Money is (weakly/strongly) (acyclical/procyclical/countercyclical).

Section III: Chapter 4

Question 12

Suppose, alternatively, that leisure and consumption goods are perfect substitutes. In this case, an indifference curve is described by the equation

$$u = al + bC$$

where a and b are positive constants, and u is the level of utility. That is, a given indifference curve has a particular value for u , with higher indifference curves having higher values for u .

- a. Show what the consumer's indifference curves look like when consumption and leisure are perfect substitutes, and determine graphically and algebraically what consumption bundle the consumer chooses. Show that the consumption bundle the consumer chooses depends on the relationship between a/b and w , and explain why.
- b. Do you think it likely that any consumer would treat consumption goods and leisure as perfect substitutes?
- c. Given perfect substitutes, is more preferred to less? Do preferences satisfy the diminishing marginal rate of substitution property?

Question 13

Suppose that the government imposes a proportional income tax on the representative consumer's wage income. That is, the consumer's wage income is $w(1 - t)(h - l)$ where t is the tax rate. What effect does the income tax have on consumption and labor supply? Explain your results in terms of income and substitution effects.

Question 14

Suppose that the representative consumer's dividend income increases, and his or her wage rate falls at the same time. Determine the effects on consumption and labor supply, and explain your results in terms of income and substitution effects.

Question 15

Suppose that the government imposes a producer tax. That is, the firm pays t units of consumption goods to the government for each unit of output it produces. Determine the effect of this tax on the firm's demand for labor.

Question 16

Suppose that the government subsidizes employment. That is, the government pays the firm s units of consumption goods for each unit of labor that the firm hires. Determine the effect of the subsidy on the firm's demand for labor.