

# Introduction to Macroeconomics · 2017-18

## Problem Set 4 · Multiple choice questions

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- Which sentence is not false?
  - GDP at constant prices is also called real GDP.
  - Real GDP minus nominal GDP equals CPI.
  - Real GDP may be smaller than nominal GDP.
  - The CPI inflation rate minus the GDP deflator plus the population multiplied by the rate of change of real GDP per capita divided by the base period is twice the base period minus the rate of change of nominal GDP per capita minus the GDP deflator inflation rate plus the CPI.
- If the GDP deflator goes up and nominal GDP goes down, then
  - real GDP goes down.
  - real GDP goes up.
  - real GDP remains constant.
  - nominal GDP goes up.
- Which variables are related by definition?
  - Nominal GDP and population growth rate
  - Real GDP and GDP deflator
  - GDP deflator inflation rate and CPI
  - None of the above
- It is not possible to have, simultaneously,
  - disinflation and hyperinflation.
  - hyperinflation and deflation.
  - reflation and inflation.
  - None of the above
- If nominal GDP is 600 and CPI is 20, then real GDP
  - is  $600/20 = 30$ .
  - is  $600 \cdot 20 = 12,000$ .
  - is necessarily 600 if the period considered is different from the base period.
  - cannot be determined.
- Which of the following variables measures the general price level of an economy?
  - The rate of growth of real GDP
  - The nominal GDP divided by the real GDP
  - The nominal GDP per capita
  - None of the above
- The base period CPI is 100, it is 110 in period 2, and it is 100 in period 3. From period 2 to 3, the CPI inflation rate
  - cannot be calculated.
  - is 0%.
  - is 10%.
  - is negative.
- Which sentence is not true?
  - The rate of growth of real GDP may be smaller than the rate of growth of nominal GDP.
  - The rate of growth of nominal GDP may be higher than the inflation rate.
  - The rate of growth of real GDP per capita cannot be negative.
  - The CPI inflation rate may be different from the GDP deflator inflation rate.
- Real GDP necessarily rises if
  - nominal GDP rises.
  - the GDP deflator falls.
  - nominal GDP falls and the GDP deflator increases.
  - None of the above
- In which case does a rise in the first variable necessarily cause a fall in the second variable?
  - CPI inflation rate and potential GDP
  - GDP deflator and nominal GDP per capita
  - Real GDP and nominal GDP
  - None of the above
- Real GDP and real GDP per capita have in common that both are
  - estimates of the underground economy.
  - variables without units.
  - price indices.
  - None of the above
- Which variable is a relatively good measure of aggregate production in an economy?
  - The GDP deflator minus the CPI
  - Nominal GDP divided by real GDP
  - The inflation rate or real GDP per capita
  - None of the above
- By definition of CPI-based inflation rate, that the CPI-based inflation rate rises means that
  - the general price level diminishes.
  - aggregate production increases.
  - the GDP deflator necessarily goes up.
  - None of the above
- Which sentence is not true?
  - GDP at constant prices may fall and, at the same time, GDP at current prices may rise.
  - Real GDP is always smaller than nominal GDP.
  - If nominal GDP rises and the GDP deflator diminishes, then real GDP increases.
  - Real GDP and nominal GDP may be equal.

15. Which variable cannot be negative?
- The inflation rate
  - The change in the inflation rate
  - The nominal GDP growth rate
  - None of the above
16. Which pair of variables cannot both simultaneously grow?
- The CPI and the GDP deflator
  - Population and real GDP per capita
  - Nominal GDP and real GDP
  - None of the above
17. Which sentence is not false?
- The real GDP per capita growth rate is smaller than the nominal GDP growth rate.
  - The GDP deflator inflation rate is the nominal GDP per capita growth rate minus the CPI inflation rate.
  - The CPI inflation rate can never be equal to the GDP deflator inflation rate.
  - Disinflation does not necessarily imply deflation.
18. Which matching between a macroeconomic variable and the property it could be used to measure is logically invalid?
- Real GDP and size of an economy
  - Inflation rate and purchasing power of money
  - Real GDP per capita and standard of living
  - None of the above
19. Let the GDP deflator inflation rate be positive.
- If the initial period for the calculation of the inflation rate is the base period, then nominal GDP is higher than real GDP.
  - The CPI inflation rate is necessarily negative.
  - Neither nominal GDP nor real GDP have changed.
  - None of the above
20. Which sentence is logically impossible?
- Simultaneously, GDP deflator goes up, nominal GDP goes down, and real GDP goes up.
  - At the same time, population increases, the inflation rate falls and GDP at current prices goes up.
  - Real GDP per capita and population both rise.
  - None of the above
21. Real GDP went up by 10%, whereas the CPI inflation rate went down by 5%. As a consequence,
- a fall in the GDP deflator inflation rate necessarily took place.
  - an approximately 5% increase in nominal GDP occurred.
  - nominal GDP may not have changed.
  - None of the above
22. Real GDP has increased. Which other variable must necessarily have also increased?
- The CPI or the GDP deflator
  - Nominal GDP
  - Real GDP per capita
  - None of the above
23. In a given period, the CPI is 100 and the GDP deflator is 200. Therefore,
- the inflation rate in that period is positive.
  - the inflation rate in that period is negative.
  - the above values for CPI and GDP deflator are impossible.
  - None of the above
24. Knowing the GDP deflator from 2017 and nominal GDP from 2017, it is possible to calculate
- some inflation rate of 2017.
  - the CPI of 2017.
  - real GDP of 2017.
  - None of the above
25. The ratio real GDP/nominal GDP for period  $t$
- is the GDP deflator of period  $t$ .
  - is greater than 1 if the GDP deflator is positive.
  - is smaller than 1 if the GDP deflator is also smaller than 1.
  - None of the above
26. Which variable cannot, at the same time, be negative and increase?
- The growth rate of nominal GDP per capita.
  - The difference between the growth rate of real GDP and the growth rate of nominal GDP.
  - The rate of return of a financial asset.
  - None of the above
27. Which sentence is not true?
- Certain changes in nominal GDP and population could leave nominal GDP per capita unchanged.
  - The CPI basket of goods is larger than the GDP deflator basket of goods.
  - Deflation does not mean that the CPI is smaller than the GDP deflator.
  - It is false that every change in nominal GDP also causes a change in the CPI inflation rate.
28. Which option is not possible?
- Real GDP grows, nominal GDP falls and GDP deflator goes up.
  - Real GDP grows, nominal GDP also grows and GDP deflator remains constant.
  - Real GDP remains constant, nominal GDP falls and GDP deflator does not increase.
  - None of the above

29. In which case is the first sentence not true and the second one not false?

- (a) Real GDP is never larger than nominal GDP. The GDP deflator is also known as real GDP at current prices.
- (b) Real GDP is nominal GDP divided by the GDP deflator. Nominal GDP is real GDP multiplied by the GDP deflator.
- (c) The GDP deflator is not a price index. Real GDP is not equal to the GDP deflator multiplied by nominal GDP.
- (d) Real GDP per capita is a measure of the general price level of an economy. Real GDP can never be equal to nominal GDP.

30. Real GDP is 120, nominal GDP is 100, the CPI is 150. In which case is the first sentence not false and the second one not true?

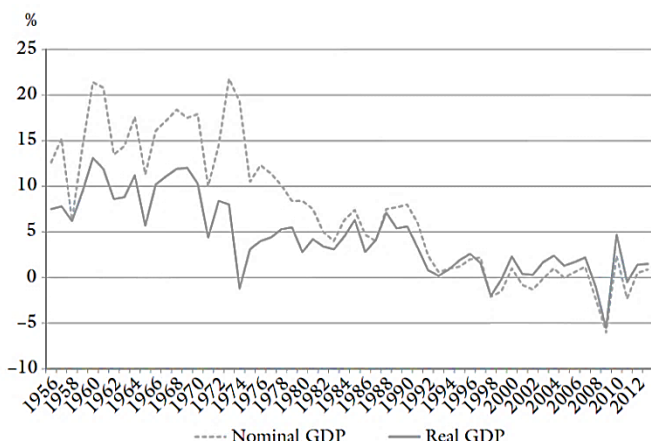
- (a) The GDP deflator is larger than the GDP deflator corresponding to the base period with respect to which real GDP has been calculated. It is possible to ascertain the CPI inflation rate.
- (b) The GDP deflator inflation rate coincides with the CPI inflation rate. Real GDP has grown by 20%.
- (c) The CPI inflation rate cannot be calculated. The base period to which the figures refer is the base period chosen to compute real GDP.
- (d) Real GDP per capita could have not changed. The rate of growth of real GDP could be negative.

31. Which variable cannot be take negative values?

- (a) An inflation rate
- (b) The change in an inflation rate
- (c) The rate of growth of nominal GDP
- (d) None of the above

32. What assertion is true about the chart below, taken from Masazumi Wakatabe (2015), *Japan's Great Stagnation and Abenomics*, p. 4?

- (a) Shows an episode of hyperinflation
- (b) Indicates that deflation occurred in the 1970s
- (c) Suggests that 2000-2008 was not an inflationary period
- (d) None of the above



33. Which pair of variables cannot both simultaneously grow?

- (a) The CPI and the GDP deflator
- (b) The CPI inflation rate and the GDP deflator inflation rate
- (c) Nominal GDP and real GDP
- (d) None of the above

34. Which sentence is not false?

- (a) Real GDP cannot be larger than the CPI inflation rate.
- (b) The rate of change of nominal GDP minus the rate of change of real GDP is always approximately equal to the CPI inflation rate minus the GDP deflator inflation rate
- (c) Disinflation means that nominal GDP decreases but less than the CPI inflation rate.
- (d) None of the above is true.

35. The nominal GDP of economy 1 is larger than nominal GDP of economy 2. The GDP deflator of economy 2 is smaller than GDP deflator of economy 1. Then, necessarily,

- (a) the real GDP of economy 1 is larger than the real GDP of economy 2.
- (b) the real GDP of economy 1 must be equal to the real GDP of economy 2.
- (c) nominal GDP of economy 1 is growing faster than nominal GDP of economy 2.
- (d) None of the above

36. If real GDP does not change, then

- (a) the GDP deflator inflation rate is higher than the rate of change of nominal GDP.
- (b) the GDP deflator inflation rate plus the rate of change of nominal GDP is approximately equal to zero.
- (c) the GDP deflator inflation rate is approximately equal to the rate of change of nominal GDP.
- (d) None of the above

37. Real GDP is 500. Nominal GDP is 450. Then the GDP deflator is (expressed in base 1)

- (a) 450/500.
- (b) 500/450.
- (c) 500 - 450.
- (d) (500 - 450)/450.

38. Which claim is true?

- (a) The CPI inflation rate can never coincide with the GDP deflator inflation rate.
- (b) An economy cannot experience at the same time inflation and deflation.
- (c) The difference between CPI inflation rate and the rate of growth of real GDP cannot be positive.
- (d) The above three claims are not true.

39. Aggregate planned expenditure is more likely to rise if
- the interest rate and the exchange rate rise.
  - the interest rate rises and the exchange rate falls.
  - the interest rate falls and the exchange rate rises.
  - the interest rate and the exchange rate fall.
40. The macroeconomic equilibrium lies on the inflationary region of the AS function. Starting from this point, an increase in the number of firms together with an increase in the number of consumers cannot lead to
- an increase in the aggregate production.
  - an increase in the inflation rate .
  - a reduction in the inflation rate.
  - a reduction in the aggregate production.
41. Which sentence is not true?
- In the AS-AD model, each change in the AD function always changes the inflation rate.
  - Negative shocks to the AS function tend to cause stagflation.
  - In the AS-AD model, any change in the inflation rate caused by a shift of the AS function could be neutralized by some shift of the AD function.
  - Neither (b) nor (c) are false.
42. In the AS-AD model, both the AS function and the AD function shift to the right. As a result,
- the inflation rate necessarily rises.
  - the economy will experience a recession.
  - it is likely that real GDP will rise.
  - it is economically impossible that disinflation occurs.
43. If people feel poorer because of a fall in the price of financial assets,
- the AD function will shift to the left because people will be induced to consume more.
  - the AD function will shift to the right as people will be induced to consume more.
  - the AD function will shift to the left because people will be induced to consume less.
  - the AD function will shift to the right as people will be induced to consume less.
44. In the AS-AD model, aggregate production has increased while the inflation rate remained unchanged. A possible explanation is that
- consumers have lost part of their wealth.
  - the oil prices are on the rise.
  - there has been a cut in the taxes consumers pay while the economy remains on the non-inflationary region of the AS function.
  - None of the above
45. By itself alone, the AS-AD model can be used to predict the changes in the
- rate of growth of the monetary base.
  - interest rate.
  - inflation rate.
  - real exchange rate.
46. In the AS-AD model, a devaluation of the domestic currency is likely to
- fuel inflation.
  - reduce the nominal exchange rate.
  - increase the interest rate.
  - raise the reserve ratio.
47. A shift of the AD function to the left cannot be explained by
- the general belief that the economy is entering a recession.
  - a tax reduction combined with a cut in the government purchases of goods.
  - the price level goes down faster at the rest of the world than at home.
  - None of the above.
48. What would not shift the AD function to the right?
- Consumption rises, investment falls.
  - Net exports fall, government spending rises.
  - Consumption falls, net exports fall.
  - None of the above.
49. The macroeconomic equilibrium is given by
- the inflation rate and the unemployment rate.
  - real GDP and **M1**.
  - real GDP and the inflation rate.
  - the real interest rate and the real exchange rate.
50. In the AS-AD model, a positive shock to consumption combined with a negative shock to the AS function tends to generate
- necessarily, a fall in the unemployment rate.
  - always, an uncertain effect on the inflation rate.
  - a rise in the inflation rate.
  - necessarily, a fall in GDP.
51. By the expenditure multiplier effect,
- an increase in the inflation forces the central bank to raise the interest rate, so the money stock falls.
  - an increase in the government budget deficit financed by bond issue induces people to save for the payment of additional future taxes, so they cut consumption and aggregate demand falls.
  - an increase in transfers raises aggregate demand, which raises income, which raises consumption, which raises aggregate demand, which raises income...
  - None of the above

52. A negative shock to the AS function on the inflationary region generates a
- rise in the inflation rate and a fall in real GDP.
  - fall in the inflation rate and a fall in real GDP.
  - rise in the inflation rate and a rise in real GDP.
  - fall in the inflation rate and a rise in real GDP.
53. A rise in production together with a fall in the inflation rate has been observed. What could explain that result?
- Only the AD function has been modified.
  - Both the AD function and the AS function may have changed.
  - Necessarily, only the AS function has changed.
  - None of the above
54. Real GDP has increased and the inflation rate decreased. A possible explanation is that
- public expenditure has expanded.
  - a contractionary OMO has been implemented.
  - supply policies have been adopted.
  - None of the above
55. The expenditure multiplier effect means that
- an initial exogenous rise in the inflation rate leads to a rise in the interest rate that further raises the inflation rate, that further raises the interest rate, that further raises the inflation rate...
  - the tax revenue is always a multiple of the money stock.
  - when the economy is booming, the inflation rate coincides with the money multiplier.
  - an initial exogenous increase in aggregate demand leads to an increase in income that further increases aggregate demand, that further increases income, that further increases aggregate demand...
56. What is likely to shift the aggregate demand function to the right?
- An increase in net exports
  - A decline in the firms' production costs
  - An increase in the unemployment rate
  - A decline in aggregate income
57. Which argument does not justify a negatively sloped AD function?
- A decline in the inflation rate increases purchasing power, which in its turn stimulates consumption.
  - A surge in the inflation rate erodes competitiveness and reduces net exports.
  - When the inflation rate rises, the central bank increases the interest rate, which tends to reduce expenditure.
  - None of the above
58. What tends to shift the AD function to the right?
- An increase in imports
  - A reduction in the firms' production costs
  - A fall in the proportion of income that is saved
  - A decline in aggregate income
59. Characteristically, in a booming economy
- GDP does not decline.
  - the inflation rate falls.
  - the AS function shifts to the left.
  - the money multiplier becomes smaller than the inflation rate and, occasionally, even negative.
60. A positive shock to the AD function on the non-inflationary region of the aggregate AS causes
- a rise in the inflation rate and a fall in real GDP.
  - a fall in the inflation rate and a fall in real GDP.
  - a significant rise in the inflation rate and a rise in real GDP.
  - essentially, only an increase in real GDP.
61. The expenditure multiplier effect means that
- an exogenous rise in the inflation rate causes an increase in the interest rate  $i$ , which in turn causes an increase in the inflation rate, which causes an increase in  $i$ ...
  - an exogenous increase in aggregate demand AD causes an income rise, which raises AD, which raises income...
  - an increase in the monetary base **M0** causes an increase in the money stock **M1**, which causes an increase in **M0**, which causes an increase in **M1**...
  - aggregate demand is always and necessarily a multiple of the government expenditure.
62. What is likely to shift the AS function to the left?
- An increase in the government spending
  - An increase in the firms' production costs
  - A productivity rise
  - A tax cut
63. Which formula does not include a price index?
- The formula that defines real GDP in relation to nominal GDP
  - In the formula defining the real exchange rate
  - In the formula defining the PPP exchange rate
  - None of the above
64. In the AS-AD model the inflation rate may fall if
- the price of imported energy (like oil) rises and real GDP in the rest of the world also rises.
  - there is a surge in the arrival of immigrants and 50% of all the firms close down.
  - unemployment goes up and the taxes paid by firms are increased.
  - None of the above

65. In which case all the events indicated tend to modify the AD function in the same direction?
- The nominal interest rate falls (with the expectation that the inflation rate will remain constant) and the number of firms rise.
  - The foreign inflation rate rises and domestic financial wealth falls.
  - The nominal exchange rate increases and businessmen expect an increase in aggregate demand in the near future.
  - None of the above
66. The expenditure multiplier effect
- states that inflationary expectations multiply the inflation rate so that the economy moves faster from the inflationary region to the non-inflationary region than vice versa.
  - captures the idea that increases in income lead to increases in consumption which, in turn, lead to increases in aggregate demand and further increases in income.
  - is exactly the same effect as the money multiplier effect: more money generates more expenditure and more expenditure creates more money.
  - cannot take place if the economy reacts to an increase in aggregate expenditure by altering both the inflation rate and real GDP.
67. Which sentence is not true?
- Stagflation does not mean that the inflation rate remains stagnant.
  - It is likely that changes in the inflationary expectations will alter the macroeconomic equilibrium.
  - The above two sentences are true.
  - A macroeconomic equilibrium is solely a value for the inflation rate such that aggregate supply and aggregate demand coincide at that value of the inflation rate.
68. In the AS-AD model, both the AS function and the AD function shift to the right. As a result,
- the inflation rate necessarily rises.
  - the economy enters into a recession.
  - it is likely that real GDP will go up.
  - it is impossible that a disinflation occurs.
69. In the AS-AD model, domestic GDP tends to grow
- if foreign real GDP and foreign inflation rate both grow.
  - if foreign real GDP falls and the domestic currency appreciates.
  - if the economy moves from the AS inflationary (but not hyperinflationary) region to the non-inflationary one.
  - None of the above
70. In the AS-AD model, a favourable shock on consumption, that occurs when AS function is impacted by a negative shock, tends to cause
- necessarily, a reduction in the CPI.
  - always an uncertain effect on the inflation rate.
  - a rise in the inflation rate.
  - necessarily a contraction in GDP.
71. In the AS-AD model, GDP has increased but the inflation rate has remained approximately constant. A possible explanation is
- that consumers have lost wealth.
  - that the international price of oil went up.
  - that the tax rate paid by consumers has been lowered, with the economy remaining on the non-inflationary region of the AS function.
  - None of the above
72. What could shift the AD function to the right?
- The belief that the economy enters a recession
  - A cut on taxes paid by consumers that occurs while the government expands its spending
  - Prices abroad going up at a faster rate than domestic prices
  - None of the above
73. Which two events do not modify the domestic AD function in the same direction?
- The domestic interest and exchange rates go up
  - The number of consumers and the taxes consumers pay both rise
  - The foreign GDP grows and the domestic inflation rate declines
  - None of the above
74. In the AS-AD model,
- a shift in the AD function could lower the inflation rate.
  - no shift in the AS function could lower GDP.
  - the euro could appreciate against the dollar if the demand for liquidity function shifts to the left.
  - None of the above
75. What policy mix produces a non-ambiguous effect on GDP?
- The government conducts an expansionary fiscal policy (specifically, government expenditure is increased) and the central bank conducts a contractionary open market operation.
  - The government implements supply-side policies (those intended to expand the economy's production capacity) and the central bank conducts an expansionary open market operation.
  - The government applies supply-side policies and, at the same time, cuts public expenditure.
  - None of the above



## Problem Set 4 · Exercises

**76. Nominal GDP, real GDP, GDP deflator.** There are only two goods. Fill out the following table, as much as possible, justifying each answer.

period	1	2	3
price $p_1$ of good 1	8	3	
amount $q_1$ produced of good 1	5		2
price $p_2$ of good 2		5	
amount $q_2$ produced of good 2		8	2
nominal GDP	100		60
real GDP (base period $t = 1$ )		80	
GDP deflator (base = 100)			300
GDP deflator inflation rate			

**77. Real GDP.** There are only two goods. The table on the right shows the price, and amount produced, of each good in each period.

$t$	$p_1$	$q_1$	$p_2$	$q_2$
1	4	6	2	8
2	9	$x$	3	$y$

- (i) With  $y = 5$ , find out the value of  $x$  (that is, the amount of production of good 1 in period 2) ensuring that GDP at constant prices of period 1 remains unchanged from  $t = 1$  to  $t = 2$ .
- (ii) Answer (i) again if the aim is to keep GDP at constant prices of period 2 unaltered.
- (iii) If  $x = 5$ , calculate the value of  $y$  (the amount of production of good 2 in period 2) guaranteeing that GDP at constant prices of period 1 remains unchanged from  $t = 1$  to  $t = 2$ .
- (iv) Letting  $x = y$ , which is the smallest value of  $x$  under which GDP at constant prices of period 1 increases from  $t = 1$  to  $t = 2$ ?

**78. Real GDP.** Can real GDP increase from  $t$  to  $t + 1$  if the production of all the goods remains constant from  $t$  to  $t + 1$ ?

**79. Manipulating real GDP?** There are only two goods. The table below shows the price, and amount produced, of each good in each period. Find some value of  $x$  such that a change in the base period modifies the period with the largest real GDP.

$t$	$p_1$	$q_1$	$p_2$	$q_2$
1	4	6	2	8
2	$x$	9	3	5

**80. Real and nominal GDP.** (i) Can real and nominal GDP be equal in a period  $t$  different from the base period? (ii) If so: (a) what would it mean?; (b) could the real GDP from that period  $t$  be larger than real GDP from the base period?; (c) could nominal GDP?

**81. Another real GDP.** There are only two goods. The table on the right shows the price, and amount produced, of each good in each period.

$t$	$p_1$	$q_1$	$p_2$	$q_2$
1	4	7	2	8
2	3	9	3	5

Real GDP with base period  $t = 1$  values production of every period by means of the price vector  $(p_1^1, p_2^1) = (4, 2)$  from  $t = 1$ . Real GDP with base period  $t = 2$  values production of every period by means of the price vector  $(p_1^2, p_2^2) = (3, 3)$  from  $t = 2$ . Consider a new definition of real GDP in which the price vector that values production is the combination  $\lambda \cdot (4, 2) + (1 - \lambda) \cdot (3, 3)$  of the two price vectors. The parameter  $\lambda$  represents the weight of the prices from period  $t = 1$  and satisfies the constraint  $0 \leq \lambda \leq 1$ .

- (i) What does the case  $\lambda = 0$  represent? And the case  $\lambda = 1$ ?
- (ii) Calculating real GDP with price vector  $\lambda \cdot (4, 2) + (1 - \lambda) \cdot (3, 3)$ , find the value  $\lambda'$  of  $\lambda$  that equates real GDP from  $t = 1$  with real GDP from  $t = 2$ .
- (iii) Being  $\lambda'$  the value computed in (ii), which period has the largest real GDP if  $\lambda < \lambda'$ ?
- (iv) In view of the preceding results, is it defensible the existence of a 'correct' value for real GDP?

**82. GDP growth.** The GDP of economy E1 is 1000. The GDP of economy E2 is 20.

- (i) The GDP of economy E1 grows at an annual rate of 2%. The GDP of E2 grows at 12%. How many years are roughly necessary for the GDP of E2 to catch up with the GDP of E1?
- (ii) If the GDP of E1 grows at 5% per year, what is the smallest growth rate that allows E2 to catch up with E1 in 10 years?

**83. GDP and GDP deflator.** For every period  $t$ , calculate: (i) nominal GDP; (ii) real GDP at constant prices of period  $t = 2$ ; (iii) the corresponding GDP deflator; (iv) the rates of growth of both nominal GDP and real GDP; and (v) the GDP deflator inflation rate.

$t$	$p_1$	$q_1$	$p_2$	$q_2$	$p_3$	$q_3$
1	5	1	6	4	0	0
2	6	2	3	3	1	2
3	5	3	5	2	2	4
4	3	4	9	1	3	6

**84. CPI and GDP deflator.** (i) Explain the differences between the GDP deflator and the CPI. (ii) Identify two differences between real GDP and CPI. (iii) Can the CPI inflation rate be positive and, simultaneously, the GDP deflator inflation rate be negative? (iv) What is the effect of a change in the price of imported goods on: (a) CPI; (b) GDP deflator?

**85. GDP, GDP deflator, CPI.** (i) If nominal GDP and real GDP both fall at the same rate, what is the GDP deflator? (ii) And the GDP deflator inflation rate? (iii) And the CPI inflation rate?

**86. Rule of 70 (Rule of 72).** If a variable grows at a rate of  $g$  per cent per year, it doubles approximately every  $70/g$  ( $72/g$ ) years. Compute how many years are roughly necessary for a variable growing at the following rates to double using each of the two rules.

rate (%)	years	rate (%)	years	rate (%)	years
1/10		3		7	
1/5		4		10	
1		5		50	
2		6		100	

**87. CPI.** Imagine an economy where only two goods are produced, good 1 and good 2. The basket of goods of the CPI consists of one unit of good 2 and two units of good 3, which is an imported good. Given the table below, find: (i) for each period, the GDP deflator with base level 100; (ii) for each period, and also with base level 100, the CPI; (iii) the inflation rates based on the GDP deflator; and (iv) the inflation rates corresponding to the CPI.

period	$p_1$	$q_1$	$p_2$	$q_2$	$p_3$	$q_3$
1	5	100	1	400	6	100
2	4	100	2	300	7	200
3	3	100	3	200	6	150
4	2	100	2	100	8	300
5	1	100	1	300	7	250

**88. Real/nominal variable.** The table below displays the monthly minimum nominal wage in Spain, in euros, and the CPI (annual average, base 2011). Compute: (i) for each year, the monthly minimum real wage; (ii) the sequence of growth rates of the nominal wage; and (iii) the sequence of growth rates of the real wage. (iv) Optional: draw a chart with the results.

	2002	2003	2004	2005	2006
wage	442.20	451.20	460.50	513	540.90
CPI	78.552	80.939	83.399	86.208	89.239
	2007	2008	2009	2010	2011
wage	570.60	600	624	633.30	641.40
CPI	91.726	95.464	95.190	96.903	100
	2012	2013	2014	2015	2016
wage	641.40	645.30	645.30	648.60	655.20
CPI	102.446	103.889	103.732	103.213	103.004

<http://www.ine.es/jaxiT3/Tabla.htm?t=10305&L=01>

<http://www.salariominimo.es/>

(2017: 707.60 EUR; 2018: 735.90 EUR)

**89. Real and nominal GDP.** Consider two periods of an economy with two goods. Find the prices and the quantities of the goods so that from period 1 to period 2 nominal GDP falls and real GDP rises.

**90. Rates of change.** For any given variable  $v$ , let  $\hat{v}$  designate the rate of change of  $v$ : absolute change  $v_1 - v_0$  in  $v$  divided by the initial value  $v_0$ . (i) In the table below find the relative error that arises when the correct rate of change of the variable  $z = x \cdot y$  is approximated by the rule  $\hat{z} \approx \hat{x} + \hat{y}$  [the correct value is given by  $1 + \hat{z} = (1 + \hat{x}) \cdot (1 + \hat{y})$ ]. (ii) Do the same when the correct rate of change of the variable  $z = x/y$  is approximated by the rule  $\hat{z} \approx \hat{x} - \hat{y}$ . (iii) Find the formula of the correct value in (ii).

time	$\hat{x}$	$\hat{y}$	value of $\hat{z}$ with rule	correct value of $\hat{z}$	relative error (%)
1	1%	1%			
2	1%	10%			
3	1%	100%			
4	10%	-20%			
5	10%	20%			
6	0%	100%			

**91. Real GDP growth.** Find the approximate value of real GDP growth if the GDP deflator inflation rate is 5% and nominal GDP growth is -5% (see §90).

**92. GDP, GDP deflator.** Identify which of the following cases are possible and which are not.

Case	Nominal GDP	Real GDP	GDP deflator
1	increases	increases	increases
2	increases	decreases	decreases
3	decreases	decreases	increases
4	decreases	increases	decreases
5	decreases	increases	does not change
6	does not change	increases	decreases

**93. GDP growth.** (i) Can it be that the nominal GDP of an economy grows faster than the nominal GDP of a second economy and, simultaneously, that the real GDP per capita of the second economy grows faster than the real GDP per capita of the first economy? (ii) What if 'nominal' were replaced by 'real'?

**94. GDP.** What happens to the GDP deflator if nominal GDP and real GDP are both increased twofold?

**95. Falling variables.** Show that a 40% fall is equivalent to a 20% fall followed by a 25% fall.

**96. GDP deflator.** Find the approximate value of the GDP deflator inflation rate if real GDP has increased by 10% and nominal GDP has fallen by 5% (see §90).



97. **CPI.** (i) Is a negative CPI possible? (ii) If so, what would a negative CPI mean?

98. **Inflation rate.** Find the approximate value of the inflation rate if real GDP has increased by 4% and nominal GDP has decreased by 2%.

99. **GDP, GDP deflator, GDP per capita.** Complete as much as possible of the following table.

Case	Nominal GDP growth rate	GDP deflator inflation rate	population growth rate	Real GDP per capita growth rate
1	positive	positive	positive	
2		negative	positive	zero
3	negative		negative	positive
4			zero	zero
5	zero	negative	positive	
6		zero	negative	negative
7	zero	positive	zero	
8		positive		positive

100. **GDP deflator.** Nominal GDP in period 3 is 100. Real GDP in period 3 is 120. (i) Compute the GDP deflator inflation rate from period 2 to period 3. (ii) If, in period 2, nominal GDP was higher than real GDP, was the GDP deflator inflation rate positive or negative? Explain the answer.

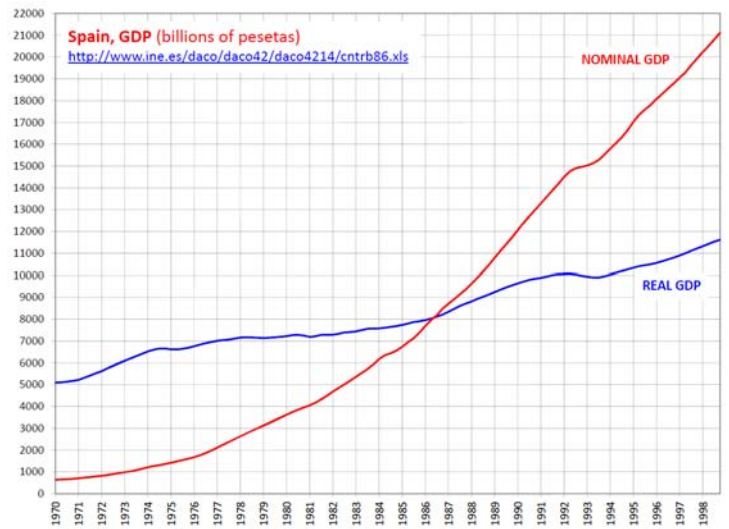
101. **GDP, CPI.** Fill out the next table in a justified way if the two goods are produced in the economy and the CPI basket is  $(q_1, q_2) = (1, 4)$ .

period	1	2	3
price $p_1$ of good 1		10	
amount $q_1$ produced of good 1	10		30
price $p_2$ of good 2			20
amount $q_2$ produced of good 2	20	40	
nominal GDP		2000	2000
real GDP (base period $t = 1$ )	1000	2000	
GDP deflator (base = 100)			
GDP deflator inflation rate			
value of the CPI basket	200		160
CPI (base period $t = 1 \cdot$ base level = 100)			

102. **Inflation rates.** If the GDP deflator inflation rate rises, what occurs for sure with the CPI inflation rate?

103. **GDP.** If the GDP deflator has fallen by 2%, by how much should approximately vary real GDP in order to keep nominal GDP constant? Justify the answer by means of the corresponding formula.

104. **Nominal/real GDP.** (i) In the chart below, nominal GDP is larger than real GDP in 1998 but real is larger than nominal in 1970. Has the GDP deflator increased or decreased from 1970 to 1998? (ii) Interpret the evolution of the GDP deflator between 1970 and 1986. (iii) Answer (ii) if the labels of nominal and real GDP were exchanged.



105. **GDP, CPI.** (i) Real GDP has increased by 5% while the CPI inflation rate has decreased by 3%. By how much has nominal GDP varied approximately? (ii) The GDP deflator has fallen a 3%. Real GDP has increased by 2%. Find out by how much nominal GDP has changed approximately.

106. **GDP per capita.** In 2016 Spain apparently surpassed Italy in GDP per capita for the first time. (i) Interpret this fact. Did that fact mean that the Spanish economy had become bigger than the Italian economy? (ii) Which changes in the variables that define GDP per capita explain an increase in GDP per capita?

<http://www.expansion.com/economia/2016/03/25/56e16ed922601d9c238b457e.html>

107. **Nominal GDP.** (i) CPI in period  $t + 1$  is 120. CPI in period  $t$  is 150. Between  $t$  and  $t + 1$  real GDP has fallen by 3%. The GDP deflator inflation rate between  $t$  and  $t + 1$  is half the CPI inflation rate between  $t$  and  $t + 1$ . If possible, find by how much nominal GDP has changed between  $t$  and  $t + 1$ .

108. **GDP deflator.** If possible, find the GDP deflator, and express it in base 100, if real GDP doubles nominal GDP. Interpret the result.

109. **GDP.** Can real GDP be larger than nominal GDP? Explain why or how.

110. **Inflation.** Explain if it possible to have a period of inflation, followed by a period of deflation, followed by a period of deflation.

**111. AS-AD model.** Using the AS-AD model find the effect on the macroeconomic equilibrium of the events below, differentiating the case with the economy on the inflationary region of the AS function from the case in which it is on the non-inflationary region.

1. A large number of immigrants enter the economy
2. Autonomous consumption (the consumption not depending on income) falls
3. The central bank buys government bonds
4. Tourists no longer want to visit the country
5. Oil prices surge
6. The rest of the world becomes more competitive
7. The rest of the world becomes richer
8. The foreign nominal interest rate rises
9. 20% of employed workers retires
10. The domestic stock market crashes
11. A drought devastates the country
12. A technological revolution unfolds
13. The government cuts taxes on the firms' profits
14. Trade unions go on strike for two-weeks
15. 50% of all the banks in the economy go bankrupt
16. 50% of all the firms in the economy close
17. The world wide web is closed
18. The government cuts spending on public services
19. The government reduces transfers and taxes
20. The government reduces the firms' contributions to social insurance
21. It becomes easier for firms to dismiss workers
22. One of the previous events and the following one in the list simultaneous occur
23. Businessmen expect a drop in consumption
24. The government offers subsidies to develop renewable sources of energy
25. Businessmen become extraordinarily optimistic about future business conditions
26. The government defaults on public debt payments
27. People expect a rise in the inflation rate
28. People expect a rise in the interest rate
29. Firms expect a rise in the government budget deficit
30. Alien intelligent life is discovered
31. The largest coronal mass ejection ever recorded strikes the Earth

**112. AS-AD model: Japó.** "Gross domestic product in the world's third-largest economy [Japan] grew at an annualised pace of 1.7%. The better-than-expected growth rate came after higher government spending helped to offset weakness in business investment and exports." (i) Represent in the AS-AD model the effect on the macroeconomic equilibrium of experiencing "weakness in business investment". (ii) Do the same if the weakness refers to exports.

<http://www.bbc.com/news/business-36319420>

**113. AS-AD model.** (i) During the world recession of the 1970s economies typically experienced a rise in the inflation rate and, at the same time, a reduction in real GDP. What changes in the functions of the AS-AD model could explain that outcome? (ii) During the world recession of the 1930s economies typically experienced a decrease in both the inflation rate and real GDP. What changes in the functions of the AS-AD model could explain that outcome? (iii) In terms of the evolution of the inflation rate and real GDP, to which of the two abovementioned crises is the crisis that started around 2008 more similar? Explain your answer.

**114. AS-AD model.** The AD function is given by  $AD = 1/\pi$ . The AS function is defined in two parts:  $Y = \pi/4$  if  $0 \leq \pi \leq 8$  and  $Y = 2$  if  $\pi > 8$ .

(i) Graph the two functions and indicate the maximum level of production.

(ii) Calculate the macroeconomic equilibrium.

(iii) Calculate again the macroeconomic equilibrium if the AS function changes to  $Y = \pi/4$  if  $0 \leq \pi \leq 12$  and  $Y = 2$  if  $\pi > 12$ .

(iv) Suggest three events that could have caused the shift in the AS function described in (iii).

(v) Find the macroeconomic equilibrium with AD function  $AD = 16/\pi$  and the AS function from (iii).

(vi) What event could explain the change from  $AD = 1/\pi$  to  $AD = 16/\pi$ ? Indicate some event that could not.

**115. Macroeconomic equilibrium.** Find out how each of the next events would alter the equilibrium in the AS-AD model. [Write "↑" if there is a rise or a shift to the right; "↓", if a fall or a shift to the left; "=", if no change; and "?" if the change is uncertain.]

Event	AS	AD	$\pi$	Y
Taxes paid by firms are cut				
Government expenditure is cut				
The cost to firms of dismissing workers goes up				
Oil prices rise and the central bank executes a monetary policy to keep the inflation rate constant				
Transfers and taxes both fall				
50% of all the banks go bankrupt				
50% of all the firms go bankrupt				
Expectations on the evolution of the economy turn pessimistic				
Foreign real GDP grows				
Foreign inflation rate falls				
The domestic currency appreciates				
A big asteroid is to hit the Earth				

**116. AS-AD model.** The government decrees that even days are no longer working days; that is, workers are forbidden to be at work and firms are legally obliged to close factories and facilities every such day. Using the AS-AD model, determine graphically the effect of that measure on the macroeconomic equilibrium when a whole year is considered and explain the changes in the aggregate supply and demand functions that this measure causes. (ii) Assuming that the economy is large enough, how would the decree affect the macroeconomic equilibrium, the aggregate supply function and the aggregate demand function of the rest of the world? Explain your answer in detail.

**117. AS-AD model.** There are two economies, A and B. In A the central bank conducts an expansionary open market operation (OMO). Analyze graphically by means of the AS-AD model: (i) how the OMO would affect both the inflation rate and the GDP of economy A; and (ii) how the changes found in (i) would affect both the inflation rate and the GDP of economy B.

**118. Spending.** How many years are necessary to spend Spain's GDP if one euro is spent every second? (GDP at current prices in 2017: €1,163,662 million)

[http://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica\\_C&cid=1254736164439&menu=resultados&idp=1254735576581](http://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736164439&menu=resultados&idp=1254735576581)

**119. AS-AD model: Inflation.** In his *Response to the Paradoxes of Malestroit* (1568), the French political philosopher Jean Bodin (1530-1596) states:

In my opinion, several causes lay behind the increase in prices that we have witnessed. The main and almost unique cause (one that nobody has referred to previously) is the abundance of gold and silver, which is greater in this kingdom than it has been in the last 400 years. The second cause is due in part to monopolies. The third cause is scarcity, which is caused both by the export trade and by waste. And there is also the luxurious consumption by the kings and the nobles, who raise the price of fashionable goods.

Analyze in the AS-AD model, or by means of equations presented in the course, the impact on the inflation rate of each the four causes listed by Bodin (analyze each cause separately).

**120. Price indices.** (i) Is it possible for the GDP deflator inflation rate to be positive and, simultaneously, for the CPI inflation rate to be negative? Justify the answer. (ii) List four concepts directly related to, or built from, a price index.

**121. AS-AD model.** On April 4, 2014, a new investment law was enacted in Bolivia: the *Ley de Promoción de Inversiones*. The goal of this law was to set the legal and institutional framework to promote investment in Bolivia and attract foreign capital in order to foster economic growth, stimulate the social and economic development of the country, and create jobs. (i) Analyze in the aggregate supply and aggregate demand model the effect on the macroeconomic equilibrium of the success in the application of the law and explain your graphical analysis. (ii) What if investors believe that the law will be ineffective because the government is not going to respect it?

**122. AS-AD model: Indonesia's tax amnesty.** "Indonesia's tax amnesty, which began in July 2016, ended on March 31st. More than 800,000 evaders declared 4,700trn rupiah (\$350bn) in assets previously hidden from the authorities. That is a staggering sum, equivalent to 40% of Indonesia's GDP and 90% of the money supply (...) At around 10% of GDP, Indonesia's tax ratio is one of the lowest in South-East Asia and compares with an average of 34% among OECD countries. The government hopes that the amnesty will add new names to the tax register and thus bring about a steady increase in the numbers paying the tax they owe."

Using the AS-AD model, analyze the effect of a tax amnesty on the macroeconomic equilibrium and justify the changes you claim that occur in the AS function and the AD function.

<http://www.economist.com/news/finance-and-economics/21719822-it-brought-windfall-has-been-criticised-letting-evaders?zid=306&ah=1b164dbd43b0cb27ba0d4c3b12a5e227>

**123. AS-AD model.** "Venezuela's socialist government ordered public workers on Tuesday to work a two-day week as an energy-saving measure in the crisis-hit South American OPEC country. President Nicolas Maduro had already given most of Venezuela's 2.8 million state employees Fridays off during April and May to cut down on electricity consumption. 'From tomorrow, for at least two weeks, we are going to have Wednesdays, Thursdays and Fridays as non-working days for the public sector,' Maduro said on his weekly television program. Full salaries will still be paid despite the two-day week." (i) Using the AS-AD model, explain and analyze graphically the effect on the macroeconomic equilibrium of passing a law declaring that firms must close down four days every week. (ii) Does it make any difference if firms must pay workers for the whole week or just for the three days they work for the firms?

[http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week\\_us\\_5720bb05e4b01a5ebde403ce](http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week_us_5720bb05e4b01a5ebde403ce)



**124. AS-AD model: Japan.** “In January [2016], the Bank of Japan introduced negative interest rates in an attempt to stimulate the economy. ‘One of the lessons over the past year is that monetary policy isn’t as effective as it was in the past and might have reached some limits,’ Martin Schulz from Fujitsu Research Institute told the BBC. ‘So what we will probably see this year is that the Bank of Japan will keep buying government bonds and the government will probably start to spend even more than it did before to support the economy.’”

<http://www.bbc.com/news/business-36319420>

(a) Explain how a negative interest rate is supposed to stimulate the economy.

(b) In what sense “monetary policy isn’t as effective as it was in the past”? Which policy targets is monetary policy not so effective to achieve? Interpret the claim that monetary policy might have reached some limits. Which are those limits?

(c) What kind of macroeconomic policy is “keep buying government bonds”? What kind of macroeconomic policy is that the government will “start to spend even more than it did before”? How does additional spending by the government manage to “support the economy”?

(d) Using the AS-AD model, explain and analyze graphically the effect on the macroeconomic equilibrium of: (1) the central bank buying more government bonds; and (2) the government spending more.

**125. AS-AD model: The European Commission 2016 country-specific recommendations.** “As external factors supporting Europe's moderate recovery are fading, domestic sources of growth are gaining in importance. Today's recommendations therefore focus on the Commission's three priority areas: Investment is still low compared to pre-crisis levels but is gaining traction, also helped by the Investment Plan for Europe. Faster progress on structural reforms is necessary to boost the recovery and raise the long-term growth potential of EU economies. All Member States need to pursue responsible fiscal policies and ensure growth-friendly composition of their budgets.” (i) Use the AS-AD model to analyze the impact on the macroeconomic equilibrium of each of the three recommendations: boosting investment, implementing structural reforms, and pursuing fiscal responsibility. (ii) Could any of these policies be considered a supply-side policy?

[http://europa.eu/rapid/press-release\\_IP-16-1724\\_en.htm](http://europa.eu/rapid/press-release_IP-16-1724_en.htm)

**126. AS-AD model: Brexit.** Using the AS-AD model, analyze the effect on Spain’s macroeconomic equilibrium of a reduction in the number of British tourists combined with a return of British firms, currently settled on Spanish soil, to UK.

**127. AS-AD model: Abenomics.** “Japanese Prime Minister Shinzo Abe’s economic policy, which quickly became known as ‘Abenomics’ is based on three arrows. (1) The monetary arrow: expansion of the money supply to combat deflation. (2) The fiscal arrow: increased government spending to stimulate demand in the economy. (3) The structural arrow: structural reforms to make the economy more productive and competitive.” Use the AS-AD model to explain how each arrow is supposed to produce the stated effects.

<http://www.bbc.com/news/business-36319420>

**128. AS-AD model: The Morawiecki Plan.** “Poland’s [...] government approved a long-term economic development plan [...]. The plan aims to boost industry, innovation and exports [...]. The program [...] is based on five pillars: reindustrialization, innovation, international expansion, sustainable social and regional development, and increased savings. It largely reflects the ruling party’s campaign pledge to generate a flood of new investment for enhanced growth. [...] Morawiecki says [...] that the country needs to change its growth pattern after years of relying on ‘an unsustainable level of debt, EU aid, CO2 cost exemptions, demographic conditions, low wages and low innovation.’ ‘We envisage a wise strengthening of industrialization [...by...] creating new competitive advantages for Polish businesses [...]. The government should create investment-friendly conditions to encourage businesses to invest.” Using the AS-AD model, explain and analyze graphically the effect on the macroeconomic equilibrium of the above plan, identifying clearly which measures would constitute supply-side, and which ones demand-side, policies.

<http://www.warsawvoice.pl/WVpage/pages/article.php/28445/article>

**129. AS-AD model: Drinking and blowing?** On the 31st of March, 2017, the Spanish minister of Economy, Industry, and Competitiveness, Luis de Guindos, seemed to implicitly invite Spanish firms to raise wages and salaries, since the Spanish economy was then no longer on the verge of economic disaster. [Yet, the Spanish government had strongly contributed to remove from workers the bargaining power necessary to press for wage increases, so that it was entirely up to the employers’ will to grant any pay rise.] Using the AS-AD model, analyze the effect of a wage increase on the macroeconomic equilibrium (provide a justification of the changes you claim that occur in the AS or AD functions).

[http://cincodias.elpais.com/cincodias/2017/03/31/mercados/1490972420\\_364646.html](http://cincodias.elpais.com/cincodias/2017/03/31/mercados/1490972420_364646.html)

**130. AS-AD model: Political uncertainty.** On the 31st of March, 2017, the Spanish Minister of Economy, Industry, and Competitiveness, Luis de Guindos, declared that political uncertainty in 2016 prevented the Spanish economy from having reached a growth rate of 3.5% in 2016, instead of the actual rate of 3%. [A new government failed to be elected in 2016 for lack of parliamentary support. For that reason, Spain was ruled in 2016 by an acting government, that is, a not fully functioning government devoted to carry out the bare essential governmental activity.]

Using the AS-AD model, analyze the effect of political domestic uncertainty on the macroeconomic equilibrium (provide a justification of the changes you claim that occur in the AS or AD functions).

[http://cincodias.elpais.com/cincodias/2017/03/31/mercados/1490972420\\_364646.html](http://cincodias.elpais.com/cincodias/2017/03/31/mercados/1490972420_364646.html)

**131. AS-AD model: Ecuador and Peru.** "...while both countries —like much of the rest of South America— in recent years benefited from the biggest boom in commodity prices in recent history, Peru did much better than Ecuador. (...) While Ecuador's economy grew by an annual average of 3.4 percent between the start of Correa's term in 2007 and 2014, Peru's economy grew by an annual average of 5.6 percent. Jose Hidalgo, director of Ecuador's CORDES economic research firm, says the biggest difference between the two countries is that while Peru has welcomed investments and saved for a rainy day, Correa's Ecuador went on a populist fiesta that left the country broke. Under Correa, Ecuador was the South American country that most increased public spending during the oil boom years (...) from 25% of GDP to 44% (...) Correa hit private businesses with hundreds of regulations and more than 20 tax reforms, sowing growing confusion and scaring away private investments." Using the AS-AD model and justifying all the changes made in the AS or AD functions: (i) represent how an economy can benefit from a boom in export prices; (ii) explain why attracting foreign investment could lead to a higher GDP growth than increasing public expenditure at the expense of domestic private investment.

<http://www.miamiherald.com/news/local/news-columns-blogs/andres-oppenheimer/article136054198.html>

**132. AS-AD model.** Analyze graphically and explain the separate and joint effect on the macroeconomic equilibrium of the following measures: (i) immediate (and unexpected by businessmen) reduction of the payments made by firms to the social security system; (ii) immediate (and unexpected by consumers) increase of the VAT (value-added tax).

**133. AS-AD model.** Explain how each event is likely to affect the macroeconomic equilibrium: (i) adoption of protectionist trading measures (like an increase in tariffs and other taxes on imports or, more radically, a ban on some imports); (ii) adoption of import restrictions on both consumption and capital goods.

**134. AS-AD model: Ecuador.** The richest 1% in Ecuador apparently controls the 64% of drinking water. A single mine could use in one day more water than a family in 22 years. Using the AS-AD model, and justifying all the changes made in the AS or AD functions, analyze the effect on the macroeconomic equilibrium of a more egalitarian distribution of water in an economy like Ecuador.

<https://www.theguardian.com/global-development-professionals-network/2017/mar/01/crece-la-inestabilidad-en-latinoamerica-por-la-falta-del-agua>

**135. AS-AD model: Argentina.** "The economy declined in the fourth quarter of 2015, and fell into recession in the first half of last year. Some of Macri's reforms aimed at cutting the deficit and encouraging investment, including letting the peso currency float and cutting subsidies, deepened the recession by gutting consumers' purchasing power. Popular frustration over these policies has grown in recent months, with a poll this weekend showing more Argentines disapprove of Macri than approve for the first time since he took office. The country's largest labor union has called a general strike for April 6 [2017]." Using the AS-AD model, and justifying all the changes made in the AS or AD functions, analyze the effect on the macroeconomic equilibrium of the measures and events described above

<http://www.reuters.com/article/argentina-economy-idUSL2N1GY1FV>

**136. AS-AD model: Indonesia.** "The Indonesian government under the leadership of Joko Widodo has implemented several structural reforms that aim at long-term growth but cause some short-term pain. For example, the majority of fuel subsidies have been scrapped successfully, a remarkable accomplishment (as fuel subsidy cuts have always caused outrage among the population) aided by the globe's low crude oil prices. Moreover, the government places high priority on infrastructure development (evidenced by the sharply rising government infrastructure budget) and on investment (evidenced by deregulation and fiscal incentives that are offered to private investors)." Using the AS-AD model, justify the claim that the above measures cause long-term growth and short-term pain.

<http://www.indonesia-investments.com/culture/economy/item177>

**137. AS-AD model: Trade.** “Italian Prime Minister Paolo Gentiloni has said major powers should reject ‘the temptation of protectionism’ at the meeting (...) Gentiloni told Italian business leaders and industrialists [March 2017] that free trade was ‘the biggest growth engine in history.’” Using the AS-AD model: (i) justify the claim that free trade between two economies is a growth engine; (ii) show the GDP losses occurring when two economies implement protectionist measures (an increase in tariffs or, more radically, a ban on imports).

<http://www.reuters.com/article/us-italy-usa-trade-idUSKBN172193>

**138. AS-AD model: Infrastructures.** “The so-called Mediterranean Railway Corridor, a long-awaited piece of infrastructure which is set to transport freight and passengers non-stop from Gibraltar to Central Europe along the Mediterranean coastline, is one of the most representative examples of Spain’s lack of investment in Catalonia. Despite being essential not only for the Spanish economy but for the entire European economy as well, its construction has been repeatedly delayed (...) The delays in the construction of the Corridor are affecting private investment, the Catalan Government has warned. According to Catalan Minister for Planning and Sustainability, Josep Rull, the pending business investments are worth €300 million...” (27 March 2017) Using the AS-AD model, analyze the effect on the equilibrium of building a transport infrastructure like the Railway Corridor. Compare this with the result when the infrastructure is not built.

<http://www.catalannewsagency.com/business/item/the-mediterranean-railway-corridor-a-key-long-awaited-infrastructure>

**139. AS-AD model: Venezuela.** “Drought has reduced water levels at Venezuela’s main dam and hydroelectric plant in Guri to near-critical levels. The dam provides for about two-thirds of the nation’s energy needs. Water shortages and electricity cuts have added to the hardships of Venezuela’s 30 million people...” (27 April 2016) Using the AS-AD model, explain and analyze graphically the effect on the macroeconomic equilibrium of the existence of a drought and the subsequent reduction in the activity of hydroelectric plants.

[http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week\\_us\\_5720bb05e4b01a5ebde403ce](http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week_us_5720bb05e4b01a5ebde403ce)

**140. AS-AD model.** In the AS-AD model, identify in each case an event that could simultaneously cause, in equilibrium: (i) an increase in GDP and a decrease in the inflation rate; (ii) an increase in the inflation rate and a decrease in GDP.

**141. AD expansion.** (i) Indicate two events, not appearing in the lecture notes, that may hit positively on aggregate consumption. (ii) Do the same for investment. (iii) Do the same for net exports.

**142. Variables.** Select two variables of the domestic economy that are affected by a rise in foreign income  $Y^*$  and explain how the change in  $Y^*$  affects them.

**143. AS-AD model: Money.** On 4th of April, 2017, the European Central Bank issued the new €50 banknote. Imagine that the European Central Bank dictates that, by the end of 2018, old €50 banknotes will cease to be legal tender (official money). Using the AS-AD model, analyze and explain how this measure is likely to affect the macroeconomic equilibrium.

**144. AS-AD model: Bolivia, 2016.** Using the AS-AD model, and justifying all the changes made in the AS or AD functions, analyze the effect on the macroeconomic equilibrium of a water emergency combined with deforestation in a country strongly dependent on the exploitation of natural resources.

**145. AS-AD model: Spain and Italy?** Let A and B be two eurozone economies. Suppose A is forced to reduce government spending and B is not. Use the AS-AD model to determine the effect of that measure on the macroeconomic equilibrium of A and B, identifying clearly in the case of B the variables that link the two economies.

**146. [Optional] Expenditure multiplier.** The AD function in period  $t$  is  $AD_t = C_t + I_t$ , where  $C_t = 4 + 0.6 \cdot Y_t + 0.5 \cdot W_t - \pi_t$  and  $I_t = 6 + 0.2 \cdot Y_t$ , where  $Y_t$  is income and  $W_t$  the financial wealth. (i) Fill out the following table assuming that  $Y_{t+1} = AD_t$  and that the inflation rate and financial wealth have constant values  $\pi = 1$  and  $W = 10$ . (ii) Calculate the value  $Y^*$  to which the sequence  $(Y_1, Y_2, Y_3, \dots)$  converges (that is, solve for  $Y_t$  the equation  $Y_{t+1} = AD_t = Y^*$  by making  $t = t + 1$ ). (iii) Find the formula that gives the equilibrium value  $Y^*$  as a function of  $W$  (do the same as in (ii) but leaving  $W$  as a parameter, without replacing  $W$  by 10). (iv) What is the change in financial wealth ensuring that  $Y^* = 95$ ? (v) Find the equilibrium value  $Y^*$  with  $W = 10$  and AS function  $Y_t = 2 \cdot \pi_t$ .

$t$	$AD_{t-1}$	$C_t$	$I_t$	$AD_t$	$Y_t$
1	50				
2					
3					
4					



147. In period  $t$ , real GDP is larger than nominal GDP. Explain if the GDP deflator has increased or decreased between the base period and period  $t$ .

148. The GDP deflator (in base 100) is 200 in period 1 and 190 in period 2. Find by how much real GDP has approximately changed if nominal GDP has fallen by 3%.



149. On 21 March 2018, the US Federal Reserve increased the interest rate, from 1.50% to 1.75%, the first rise under the new chairman, Jerome H. Powell (photo by Kevin Dietsch/UPI). “The Fed’s decision to raise rates by 25

basis points reflects a strengthening economy, reflected in extremely low unemployment rates and a growing gross domestic product that’s being stimulated by tax cuts and a budget deal that will raise federal spending by \$300 billion over the next two years”. Use the AS-AD model (justifying any shift in the AS or AD functions) to ascertain the effect on the macroeconomic equilibrium of a tax cut and an increase in government spending. Would a rise in the interest rate contribute to offset the effect of these two measures on the inflation rate?

<https://money.usnews.com/investing/stock-market-news/articles/2018-03-22/fed-interest-rate-hike>.

150. At the heart of all of Italy’s problems (March 2018) is ingrained corruption, nepotism, and discrimination against women that undermine meritocracy. The best and the brightest who lack connections or have the bad luck of being born female leave for countries such as Germany and the US where they are compensated for their talents. If the best jobs are obtained based on who you know and your gender, the business sector will be led by persons who lack talent and who are unable to exploit innovations that can maximize productivity. Low productivity, in turn, leads to economic stagnation, lower tax revenue, higher debt and economic crises that force the European Union to intervene”. Use the AS-AD model (justifying any shift in the AS or AD functions) to ascertain the effect on the macroeconomic equilibrium of removing from the administration of firms competent, talented and innovative people. Explain why low productivity leads to economic stagnation (GDP does not grow).

<http://www.jpost.com/Opinion/Italys-malaise-544378>

151. “Italy’s productivity crisis needs to be tackled by reforming the civil service, incentivising investment in human capital both in schools and in the workplace, and attracting foreign investors”. Use the AS-AD model (justifying any shift in the AS or AD functions) to ascertain the effect on the macroeconomic equilibrium of improving public services, professional training and education, and of attracting foreign business investors.

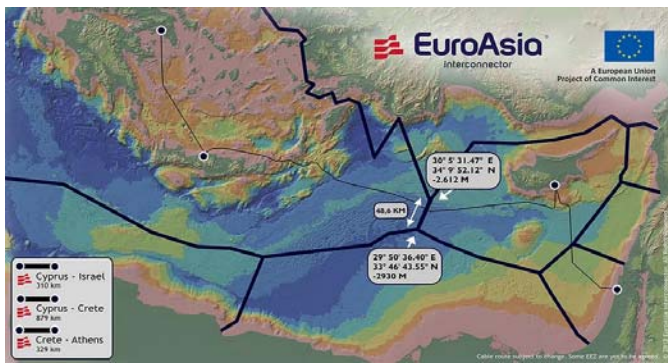
<http://theconversation.com/italys-new-govern-ment-has-a-huge-economic-challenge-ahead-92943>

152. “A key driver of Poland’s economic development is consumption, which makes up about 60% of GDP. To boost consumption (and reverse demographic trends), in April 2016 the country’s government introduced the ‘Family 500 plus’ social benefit programme, giving families an extra 500 zloty (about \$150) for every second and further child. The programme cost the state an estimated 0.9% of GDP in 2016, and 1.2% of GDP in both 2017 and 2018. But investment, especially from EU funds, is also crucial. Poland will receive some €105.8bn in EU funding from the 2014-2020 programme. However, the support the country will receive in the next EU budget is widely expected to be lower – in part due to the UK vote for Brexit but also due to Poland’s economic success”. Show in the AS-AD model the effect on the GDP of the benefit programme and the reduction in EU funding.

<http://www.thebanker.com/World/Will-EU-dispu-te-derail-Poland-s-economy?ct=true>.

153. “EuroAsia Inter-connector is a leading European Union Project of Common Interest, also labelled as an “electricity highway” by the European Commission, connecting the national grids of Israel, Cyprus and Crete-Attica in Greece and creating a reliable energy bridge between the continents of Asia and Europe allowing bi-directional transmission of electricity. The EuroAsia Inter-connector will provide to the partner countries significant socio-economic benefits worth 10 billion euros which will derive from the decrease of electricity cost by using more efficient methods in power generation (...) and from the reduced cost of replacing old power plants which will be avoided”. Show in the AS-AD model the effect on the GDP and the inflation rate of a infrastructure that lowers the electricity cost.

<http://www.balkaneu.com/greece-cyprus-israel-diplomacy-of-high-voltage/>



154. (March 2018) “In its latest Economic Survey of Poland the Organisation for Economic Co-operation and Development encouraged policy-makers to build on the country’s economic and social progress in order to ‘tackle major remaining challenges’. ‘To sustain rising living standards Poland has to develop its capacity to innovate and invest in skills and infrastructure, as is acknowledged in the government’s Strategy for Responsible Development’, the report said”. Show in the AS-AD model the effect on GDP of developing the capacity to innovate and invest in skills and infrastructure.

<http://thenews.pl/1/12/Artykul/354586,OECD-urges-Poland-to-build-on-economic-strength-and-innovate>

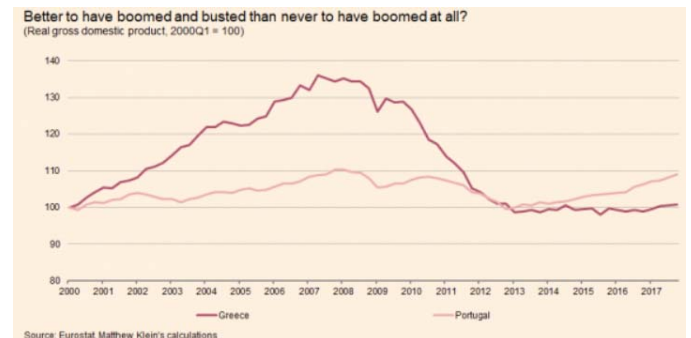
155. “Six out of ten unemployed Greeks aged 20 to 34 are ready to migrate or relocate to another part of Greece in order to find work, a Eurostat survey shows. However, the phenomenon is not limited to Greek youth, as 50 percent of European young people are also considering migration to solve their unemployment problem.” (i) Show in the AS-AD model the effect on the macroeconomic equilibrium of two countries, A and B, of having workers from A emigrate to B. (ii) Show the effect of the same event on the interest rate of each country. (iii) Show the effect on the exchange rate.

<http://greece.greekreporter.com/2018/03/28/most-young-unemployed-greeks-willing-to-move-for-work/>

156. Concerning the news “Iran and the US bring the price of oil to it maximum level in 3 years and a half: the Brent barrel exceeds \$80,” SANTI (on 17 May 2018, 12:36) made the following comment: “Expensive oil = less GDP, more unemployment, higher inflation”. Use a graphical representation of the AS-AD model to justify or contradict the above comment. Explain the reasons that justify or contradict the comment.

<http://www.eleconomista.es/materias-primas/noticias/9142035/05/18/El-petroleo-cotiza-en-maximos-de-tres-anos-y-medio-el-barril-de-Brent-roza-los-80-dolares.html>

157. The chart below shows Greece’s and Portugal’s GDP between 2000 and 2017. (i) Explain which is the most salient information that the chart conveys. (ii) If only shifts in the AD function are considered, in which periods the GDP dynamics could be explained by an AD expansion and in which ones by an AD contraction? (iii) In which country would the expansion or contraction be more intense?



<https://ftalphaville.ft.com/2018/04/04/2199417/whats-up-with-portugal/>

158. Explain if the following claim is true or false: if real GDP increases and the GDP deflator decreases, then nominal GDP necessarily rises.

159. What could cause a stagflation in the aggregate supply and demand model?

- (a) A contractionary fiscal policy that is combined with a supply-side policy.
- (b) An expansionary fiscal policy that is combined with a contractionary monetary policy.
- (c) A supply-side policy that is combined with an expansionary demand-side policy.
- (d) None of the above

160. If a deflation occurs,

- (a) its effect on the inflation rate could be neutralized, at least in the short run, by applying supply-side policies.
- (b) its effect on the inflation rate could be neutralized, at least in the short run, by applying a contractionary fiscal policy.
- (c) its effect on the inflation rate could be not be offset in the short run by applying an expansionary monetary policy.
- (d) it is almost always followed by either a hyperinflation or the failure of the savings identity.
- (e) and it is a cost-push deflation, then its effect on GDP could not be neutralized, in the short run, by conducting an expansionary fiscal policy.
- (f) None of the above