

Problem set 2 · Exercises

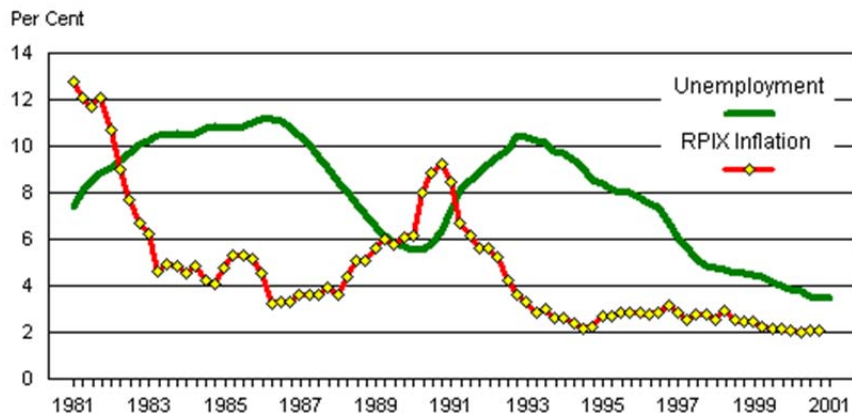
1. Unemployment. (i) Is it possible that, at the same time, the participation rate rises and the unemployment rate falls? If so, why? (ii) Explain the differences between frictional unemployment and structural unemployment. Suggest examples of both. (iii) Is there any relationship between Moravec's paradox and structural unemployment?

2. Unemployment. (i) Explain if it is possible that, at the same time, unemployment increases and the unemployment rate decreases. (ii) Explain if it is possible that employment increases and, simultaneously, the unemployment rate also increases.

3. Phillips curve. Consider the Phillips curve $\pi = \alpha - \beta \cdot u$, where α and β are positive constants. (i) Make a graph of the Phillips curve. (ii) Let α include the inflation rate π^e expected by people. Show graphically the effect on the Phillips curve of an increase in π^e .

4. Inflation and unemployment. The chart below shows the unemployment rate u and the inflation rate π in the UK (RPIX = retail price index excluding mortgage interest payments \approx underlying inflation). Identify periods during which u and π are consistent with a stable Phillips curve and periods in which they are not.

UNEMPLOYMENT AND RPIX INFLATION 1981-2000



http://www.tutor2u.net/economics/content/topics/inflation/philips_curve.htm

5. Orthodox labour market model. Consider the following orthodox labour market. Letting ω designate the real wage rate, the supply of labour function is given by $N^S = \omega - 2$ if $\omega \geq 2$ and $N^S = 0$ otherwise. There are 99 identical firms that use labour to produce the same commodity using the production function $q = \ln n$, where q is the amount of the commodity produced with the amount n of labour. The price p of the commodity is determined in a competitive market and assumed given. [For simplicity, suppose that workers used price p to calculate the real wage rate ω in the supply function.]

- (i) Find the market equilibrium and identify this equilibrium in a graphical representation of the market.
- (ii) What is the amount of involuntary unemployment created by a minimum (real) wage rate set at $\omega = 5$?
- (iii) Answer (ii) if $\omega = 15$.

6. E-PIS model. In the E-PIS model, for every function of the model, identify the shift in the function that could reduce involuntary unemployment and suggest an event that could cause that shift.

7. Segmented competitive labour market model. Firms classify workers in two types, I and II. Letting ω designate the real wage rate, the supply of labour function of type I workers is $N^S = \omega$. The supply function of type II workers is $N^S = \omega/4$. The firms preferring to hire type I workers have collectively a demand for labour function given by $N^d = 40 - \omega$ if $\omega \leq 40$ and $N^d = 0$ otherwise. The firms preferring to hire type II workers have exactly the same demand function.

- (i) Find the market equilibrium in each segment and identify the equilibria in a graphical representation of the segments.
- (ii) Compute the average real wage rate (weighted by the weight of each type of workers in total employment).
- (iii) What is the amount of involuntary unemployment when workers take into account the average real wage rate to decide whether they supply labour or not?
- (iv) Indicate in a graphical representation how to reduce involuntary unemployment by shifting the supply or demand functions from the type I segment.
- (v) Determine the change in involuntary unemployment when the demand for type II workers shifts to the right and becomes $N^d = 60 - \omega$ if $\omega \leq 60$ and $N^d = 0$ otherwise.

8. Phillips curve and Okun's law. Indicate some feature than Okun's law and the Phillips curve have in common and some other that differentiates them.

9. Unemployment. Suggest three explanations for the existence of involuntary unemployment.

10. Okun's law and AS function. Suppose Okun's law takes the following form: $\Delta u = 12 - \Delta y$, where $\Delta u = u - u_{-1}$ and $\Delta y = y - y_{-1}$. Let the Phillips curve be given by $\pi = 5 - u$. (i) Graph each of the two relationships. (ii) Combine the two equations to obtain an AS function and plot the function.

11. Okun's law and Phillips curve. Suppose Okun's law is defined as in Exercise 3. Explain how a Phillips curve can be obtained in the AS-AD model when the AD function is allowed to shift but the AS function is not. That is, show that, with a fixed AS function, a reduction in the unemployment rate must be accompanied by a rise in the inflation rate.

12. Balance identity. Fill out the following table using the balance identity.

Case	Private balance	Government balance	Foreign balance
1	positive	positive	
2		negative	positive
3	negative		positive
4			zero
5	zero	negative	
6		zero	

13. Balance identity. Explain which of the following cases are possible according to the sectoral balance identity.

Case	Private balance	Government balance	Foreign balance
1	rises	rises	rises
2	rises	falls	does not change
3	falls	does not change	rises
4	falls	rises	falls
5	falls	rises	does not change
6	does not change	rises	falls

14. Savings identity. Government purchases equal imports. Exports equal savings. Taxes equal investment. If possible, find, using the savings macroeconomic identity, the value of transfers.

15. Savings identity. Find savings S if the other six variables in the savings identity take the same value $x > 0$.

16. Savings identity. (i) Define net private saving as $S - I$ and the government budget as $G + TR - T$. If both magnitudes double, what happens to the trade balance NX ? (ii) If net private saving is positive and the trade balance negative, is there a budget deficit or a budget surplus?

17. Savings identity. Find net exports if the government budget (spending minus revenue) is equal to net exports, savings are three times investment, and investment is 10.

18. Savings identity. Ascertain if investment I increases, decreases, or does not change if the trade balance rises, the government budget (spending minus receipts) falls and private savings S is always zero.

19. Savings identity. Fill out the following table (where government budget is defined as spending minus receipts).

Case	Net private saving	Government budget	Trade balance
1	positive	positive	
2		negative	positive
3	negative		positive
4			zero
5	zero	negative	
6		zero	

20. Savings identity. Show how to obtain the savings identity $I \equiv S + (T - TR - G) + (IM - EX)$ from the identity $Y \equiv C + I + G + NX$.

21. Savings identity. Defining net private saving as $S - I$ and government budget as spending minus receipts, identify which cases are possible.

Case	Net private saving	Government budget	Trade balance
1	rises	rises	rises
2	rises	falls	does not change
3	falls	does not change	rises
4	falls	rises	falls
5	falls	rises	does not change
6	does not change	rises	falls

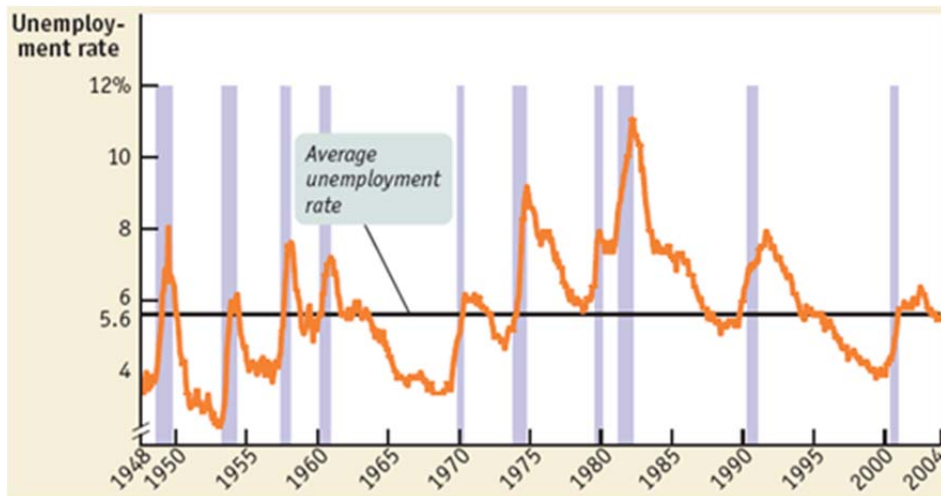
22. **Savings identity.** Find net exports if $S = 50$, $G = 20$, $TR = 5$, and $T = 30$.

23. **Savings identity.** (i) Using the savings identity, ascertain whether exports are higher than, smaller than, or equal to investment if: imports equal government expenditure; transfers equal taxes; and investment is half savings. (ii) Government purchases equal imports. Exports equal savings. Taxes equal investment. Find the value of transfers.

24. **Savings identity.** Net exports are -50 . Investment is equal to savings. Determine the value of the government budget.

25. **Savings identity.** If possible, find imports if (private) savings are 10, the trade balance is zero, consumption is 20, the government deficit is zero, the inflation rate is negative, the unemployment rate is 24%, exports equal government spending, and government spending equals (private) savings.

26. **Business cycle and unemployment.** The chart below shows the US unemployment rate u (shaded areas identify recessions). (i) On inspection, what is the relationship between u and the business cycle that the chart suggests? (ii) Does u appear to be a procyclical or a counter-cyclical variable?



<http://www.worthpublishers.com/krugmanwellsnew/main.htm>

27. **Deflation theories.** (i) Indicate two features that Fisher's debt deflation theory and Koo's balance sheet recession theory have in common and two features that differentiates them. (ii) Why the effectiveness of monetary policy may differ between the *yin* and *yang* phases of an economy?

28. **AS-AD model.** Using the AS-AD model, and assuming that the economy is initially at its macroeconomic equilibrium, determine the effect on the macroeconomic equilibrium of the following events. In each case, explain the difference between assuming that the economy is on the non-inflationary region of the AS function and assuming that it is on the inflationary region.

- (1) A significant number of immigrants come to 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) The economy experiences a technological revolution
- (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 severely cuts spending on public services
- (19) The government simultaneously 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

29. Proccyclical/coincident variables. Explain the difference between a proccyclical variable and a coincident variable.

30. 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.

31. 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) Compute the macroeconomic equilibrium.
- (iii) Compute 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) Determine the macroeconomic equilibrium if the AS function is as in (iii) and the AS function is $AD = 16/\pi$.
- (vi) What event could explain the change from $AD = 1/\pi$ to $AD = 16/\pi$? Indicate some event that could not.

32. AS-AD model. The government decrees that even days are no longer working days, so workers are forbidden to be at work any such day 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 functions that cause the effect determined. (ii) Assuming that the economy is big enough, how would that measure affect the macroeconomic equilibrium, the aggregate supply function, and the aggregate demand function of the rest of the world? Explain your answer.

33. Hyperinflation. (i) Suggest some event that may lead the economy to enter the hyperinflationary region of the AS function. (ii) Calculate the annual inflation rate if prices double every day.

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

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 independently of the rest of causes).

35. 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					

36. Wage-led and profit-led economic regimes. Explain why the distinction between wage-led and profit-led economic regime is relevant to ascertain the effects on the economy of labour market reforms that increase the share of profits (and reduces the share of wages) in aggregate income.

37. 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?

38. AS-AD model. The economy is initially at its macroeconomic equilibrium. Analyze graphically and explain the separate and joint effect of the following measures on the macroeconomic equilibrium: (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).

39. AS-AD model. “The chart shows the failure of Italy to grow. It is Italy's real gross domestic product on a semi-log scale. The slope matters here, and the slope is ugly. The level is back to around the year 2000 (red circle). Essentially, the economy has gone nowhere for a decade and a half. The extrapolation of the trend shows a huge gap between what could've-should've been and where Italy is now.”



<http://www.bloomberg.com/news/articles/2015-06-16/i-knew-italy-s-economy-was-bad-but-the-truth-may-be-even-grimmer>

(i) In the AS-AD model, what shift in AS function could explain the evolution of Italy's GDP? (ii) And what shift in the AD function? (iii) Which scenario is more likely?

40. AS-AD model. In the aggregate supply and aggregate demand model, identify 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.

41. 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.

42. AS-AD model. “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...”
http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week_us_5720bb05e4b01a5ebde403ce

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.

43. 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.”
http://www.huffingtonpost.com/entry/venezuela-energy-2-day-work-week_us_5720bb05e4b01a5ebde403ce

(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?

44. AS-AD model. “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.” <http://www.bbc.com/news/business-36319420>

(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.