

METU Department of Economics

ECON202 Macroeconomic Theory I (Sec. 2)

Fall 2025

Instructor: Şirin Saraçoğlu

TA: Zeki Oğulcan Şengül

PROBLEM SET 6 (Chapters 18 and 19)

PART A: TRUE/FALSE

- 1) In theory, a financial account deficit necessarily implies a current account deficit.

False. By definition, the capital account (financial account) is equal to the negative current account. Thus, a capital account deficit implies a current account surplus.

- 2) If the trade deficit is equal to zero, then the domestic demand for goods and the demand for domestic goods are equal.

True. This is the explaining exports and imports as a mean for domestic demand and foreign demand for domestic goods.

- 3) A real depreciation leads to an immediate improvement in the trade balance.

False. Econometric evidence suggests that a real depreciation does not lead to an immediate improvement in the trade balance. Typically, the trade balance improves six to twelve months after a real depreciation. (J curve)

- 4) According to Uncovered Interest Parity, an increase in the foreign interest rate causes appreciation of domestic currency.

False. According to UIP, increase in foreign interest rate causes increase in demand for foreign currency, thereby, depreciation of domestic currency.

- 5) Uncovered interest parity implies that real interest rates must be the same across countries

False. The UIP is a relation between the nominal interest rates and the nominal exchange rate, and not the real interest rates and exchange rates. You are concerned about whether buying domestic bonds or foreign bonds, and in the case of bonds, it is the nominal interest rate rather than the real interest rate which matter, because bonds are claims to dollars rather than goods.

- 6) Real depreciation occurs when the price of foreign goods in terms of domestic goods increases.

True. Since domestic currency loses value, the foreign good become more expensive

- 7) Opening the economy to trade tends to increase the multiplier because an increase in expenditure leads to more exports.
False. It decreases the size of multiplier since increase in income causes increase in imports as well.
- 8) The real depreciation of domestic currency causes deterioration of trade balance, if Marshall-Lerner Condition holds.
False. If ML condition holds, it causes improvement in trade balance.
- 9) In an open economy, an increase in foreign output leads to increase in domestic output as well.
True. Increase in foreign output increases foreign imports, which is domestic exports. Increase in domestic exports leads to increase in domestic output.
- 10) J curve states that, under certain assumptions, a country's trade deficit will initially worsen after the depreciation of its currency—mainly because higher prices on imports will be greater than the reduced volume of imports.
True.

PART B: LONG QUESTIONS

- 1) After working so hard in your Macroeconomics course, you decide this year to spend your Summer Break in Japan.
- a) You leave home with 3000 TL, and convert it into 6000 Yen when you arrive in Tokyo. What is E (the value of one unit of foreign (Yen) currency in terms of domestic (TL) currency)?

$$E = 3000 / 6000 = 0.5$$

Note: Note that, here we find the exchange rate as the value of one unit of foreign currency in terms of domestic currency. 3000 TL = 6000 Yen, so Yen = 3000/6000 TL => 1 Yen = 0.5 TL. You can also do the other way around where exchange rate is the value of one unit of domestic currency in terms of foreign currency, so that 3000 TL = 6000 Yen => TL = 6000/3000 Yen => 1 TL = 2 Yen. Both ways are correct as long as you specify how you calculate the exchange rate

- b) After spending a week in Tokyo, you have 4500 Yen left, which you convert at the airport into 2245.5 TL. What is the new value of E? So does this mean the Turkish currency has appreciated or depreciated against the Japanese currency during your holiday?

E = 2245.5 / 4500 = 0.499. Since E has fallen, this means the TL has appreciated and Yen has depreciated during your holiday: Price of Yens in YTLs decreases or equivalently price of TLs in Yens increases.

Note: Using 1 TL = x Yen version, the new exchange rate can be found as: 2245,5 TL = 4500 Yen => TL = 4500/2245.5 Yen => 1 TL = 2.004 Yen. So you can buy more yens with

same amount of TL (2.004 Yen instead of 2 Yen) which means that TL has appreciated and Yen has depreciated vis a vis TL.

- c) Assume you expect the trend in the movement of the exchange rate that took place during your week in Japan to continue for at least a year (i.e. E continues to move by the same amount each week as it did during your holiday). What is the expected annual percentage change in E? (In other words, calculate the expected change in E over the year as a percentage of the E you calculated in part (a)). For the 3 purposes of this calculation, use the approximation that there are 50 weeks in a year.

If the trend continues, this means that E will be $0.5 - 0.001 \times 50 = 0.45$ in a year's time. The percentage change in E is $[(0.45 - 0.5) / 0.5] \times 100 = -10\%$.

- d) Say the inflation rate in Turkey is 2 per cent, and in Japan it is 7 percent. Based on the expected rate of change in E you calculated in part (c), what do you expect to be the percentage change in the real exchange rate over the next year?

Recall that $\epsilon = E \frac{P^*}{P}$ With a bit of algebra, we can write:

$$(1 + \Delta\epsilon) = \frac{(1 + \Delta E)(1 + \Delta P^*)}{(1 + \Delta P)}$$

Where Δx means percentage change in x. We can write this by approximation:

$$\Delta\epsilon = \Delta E + \Delta P^* - \Delta P$$

as long as the percentage changes are not too large (Remember that we really do not need to go through all this algebra because we know that if $z = x \times y$ then $gz = gx + gy$ or if $z = x/y$ then $gz = gx - gy$). So if $\%E = -0.10$, $\%P^* = 0.07$ and $\%P = 0.02$, then $\%\epsilon = -0.05$: the real exchange rate is expected to appreciate by 5 percent over the coming year so that price of Japanese goods in terms of Turkish goods decreases (or equivalently price of Turkish goods in terms of Japanese goods increases).

Note: If you use 1 TL = x Yen version, then the real exchange rate formula should be:

$\epsilon = E \frac{P}{P^*}$ which implies $\%\epsilon \approx \%E - \%P^* + \%P$ You should make your calculations accordingly. You also need to reconsider the change in E, now a decrease of 10% with the first version now translates into an increase of 11.11% in the second version.

- 2) Suppose that Turkey has a large current account deficit. For each of the following (i) – (vi) state whether the event will lead to a larger, a smaller, or no change in the current account deficit:

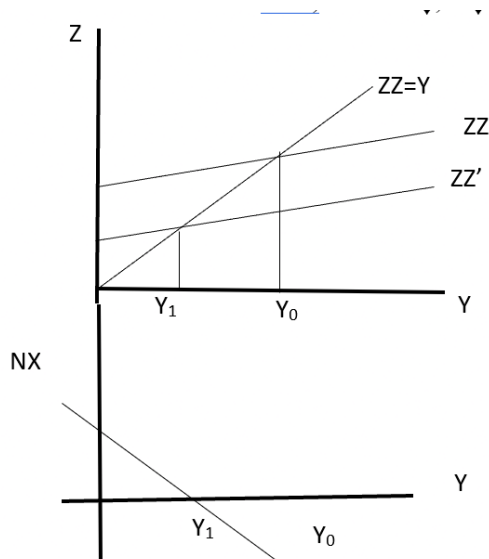
- i) People in Turkey start buying more domestically – made cars and less foreign – made cars.
 - ii) Turkey increases the amount of aid it gives to foreign countries.
 - iii) More overseas students start coming to study in Turkey.
 - iv) The Turkish people start to finance a greater share of their current account deficit selling foreign assets, rather than borrowing from overseas.
 - v) Foreign investors are paid 10 million TL in dividends from their holdings of Turkish public companies.
 - vi) With the conclusion of the war in Syria, Turkish people start to travel abroad more often
- i) **Smaller (current account deficit) CAD since imports fall.**
 - ii) **Larger CAD, since net transfers to overseas increases.**
 - iii) **Smaller CAD since exports increase (domestic goods and services consumed by foreigners increase)**
 - iv) **No impact on CAD. This is about reallocation between different parts of the capital account.**
 - v) **Larger CAD, since net investment income falls.**
 - vi) **Larger CAD since imports increase.**

3) Suppose a country is experiencing large trade deficit ($NX < 0$). Government officials now decide to eliminate this deficit. Against this background, answer the following questions

- a) What type of (domestic) fiscal policy (expansionary or contractionary) could be pursued? What effect would this policy have on (domestic) output?

Since imports are function of domestic income, government should conduct contractionary fiscal policy to eliminate trade deficit. As a result of the policy, equilibrium level of output declines in any level.

$Y = C + I + G + NX$, when $G \downarrow$, $Y \downarrow$ as well. Z curve shift down



- b) What type of exchange rate policy (nominal appreciation or nominal depreciation) could be pursued to eliminate the trade deficit? What effect would this policy have on (domestic output)?

Depreciation of a domestic currency will solve the problem. When the depreciation occurs, the imported goods become more expensive and goods that are subject of export become cheaper. Competitiveness of domestic goods in international markets helps to eliminate the trade deficit.

- c) What type of exchange rate – fiscal policy combination could be implemented to eliminate the trade deficit?

Depreciation and contractionary fiscal policy. Decline in the national income has downward pressure on imports and depreciation improves the net exports.

- d) Suppose domestic policy makers can influence foreign fiscal policy. What type of foreign policy (expansionary or contractionary) could be implemented to eliminate the trade deficit? What effect will this have on domestic and foreign output?

If domestic country can influence the foreign fiscal policy, to increase the exports, foreign country should implement the expansionary fiscal policy.

$Y^* = C^* + I^* + G^* + NX^*$, $G^* \uparrow \rightarrow Y^*$ which causes $M^* \uparrow$ which is domestic country's exports. $M^*(X) \uparrow \rightarrow NX \uparrow$

- 4) Consider an open economy in which the real exchange rate is fixed and equal to one. Consumption, investment, government spending, and taxes are given by

$$C = 10 + 0.8(Y - T), I = 10, G = 10, \text{ and } T = 10$$

Imports and exports are given by

$$IM = 0.3Y \text{ and } X = 0.3Y^*$$

Where Y^* denotes foreign output.

- a) Solve for equilibrium output in the domestic economy, given Y^* . What is the multiplier in this economy? If we were to close the economy – so exports and imports were identically equal to zero – what would the multiplier be? Why would the multiplier be different in a closed economy?

$$Y = C + I + G + NX \rightarrow 10 + 0.8Y - 8 + 10 + 10 + 0.3Y^* - 0.3Y$$

$Y = 22 + 0.5Y + 0.3Y^*$, if the foreign output is fixed, open economy multiplier is

$\frac{1}{1-0.5} = 2$. If the economy is would be closed, since we would not consider the marginal import rate, it would be $\frac{1}{1-0.2} = 5$. Since in this setup, the increase in autonomous expenditure causes decline in output because of the imports, the multiplier open economy is smaller than closed economy. (The equilibrium equation is $Y^{eq} = 44 + 0.6Y^*$)

- b) Assume that the foreign economy is characterized by the same equations as the domestic economy (with asterisks reversed). Use the two sets of equations to solve for the equilibrium output of each country. (Hint: Use the equations for the foreign economy to solve for Y^* as a function of Y and substitute this solution for Y^* in part (a).) What is the multiplier for each country now? Why is it different from the open economy multiplier in part (a).

Like the domestic economy's equation, the equilibrium equation of foreign economy is

$Y^{*eq} = 44 + 0.6Y$. Since we are looking for the value of multiplier, we plug this equation into the Y .

$$Y = 22 + 0.5Y + 0.3(44 + 0.6Y) \rightarrow 35.2 + 0.68Y = Y, Y^{eq} = 110, Y^{*eq} = 110$$

The multiplier is $\frac{1}{1-0.68} = 3.125$. The multiplier is larger than the previous one since it takes into account the fact that an increase in domestic income leads to an increase in foreign income due to increase in domestic imports which is exports of foreign country. The increase in foreign income causes

increase in foreign imports which is domestic exports. The foreign repercussions cause this situation.

- c) Assume that the domestic government, G, has a target level of output of 125. Assuming that the foreign government does not change G^* , what is the increase in G necessary to achieve the target output in the domestic economy? Solve for net exports and the budget deficit in each country.

If domestic income equals 125, the foreign income is $Y^* = 44 + 0.6(125) = 119$

From a), we have the national income identity, $Y = 12 + G + 0.5Y + 0.3Y^*$

$$Y = 24 + 2G + 0.6(119) \rightarrow G = 14.8$$

Net exports in domestic country, $X - M = 0.3(119) - 0.3(125) = -1.8$. As a result of expansionary fiscal policy, domestic country has trade deficit.

Budget deficit in domestic country, $T - G = 10 - 14.8 = -4.8$, budget deficit.

Net exports in foreign country, similarly, $0.3(125) - 0.3(119) = 1.8$ trade surplus.

The budget deficit does not change in foreign country.

- d) Suppose each government has a target level of output of 125 and that each government increases government spending by the same amount. What is the common increase in G and G^* necessary to achieve target output in both countries? Solve for net exports and the budget deficit in each country.

Both Y and $Y^* = 125$

$$125 = 24 + 2G + 0.6(125) \rightarrow 26 = 2G, G = 13 \text{ and also } G^* = 13$$

Since national incomes are same, there is no trade deficit in these two countries. Both of them have budget deficit.

- e) Why is fiscal coordination, such as the common increase in G and G^* in part (d), difficult to achieve in practice?

Fiscal coordination is difficult to achieve since it causes budget and trade deficit and waiting for another economy's expansionary policy to offset it.

- 5) The following quote is from a paper written by the former governor of Central Bank of Republic of Turkey, Erdem Başçı:

“Apart from its conventional impact on aggregate demand via foreign trade, the exchange rate has the fastest channel of transmission owing to its effects on key variables such as expectations, the risk premium, firms' balance sheets, production costs, and prices in Turkey. The existence of supply side effects – operating mainly through cost and balance sheet channels – may give

rise to non-conventional relationships. A historical glance at the relationship between the real exchange rate and business cycles in Turkey clearly shows that appreciation periods coincide with solid expansion phases whereas strong depreciation episodes are associated with recessions.”

How does Başçı’s argument relate to “Marshall-Lerner condition” that you have seen in class and also in your textbook? Can you think of any economic reason leading to such non-conventional results especially in the context of a developing country such as Turkey?

The above argument is compatible with Marshall-Lerner condition since Başçı admits the conventional impact of exchange rate changes on aggregate demand via foreign trade. However, Başçı also argues that there are other channels at work, through which currency depreciation can decrease output rather than increase.

In the textbook it is shown that currency depreciation leads to higher output through the shift of the ZZ curve (as a result of the increase in net exports). However, in describing the goods market equilibrium, the textbook uses some assumptions. In particular, consumption and investment are treated to have no direct relation with exchange rate so that any exchange rate change does not have an impact on domestic demand for goods and the only impact is via net exports. But, if there is such relation through various channels as we mentioned in recitation (cost channel & balance sheet channel), then it is possible to have complex results.

Using the language of the textbook, if investment and consumption decisions are not independent of exchange rate and instead are negatively related with depreciation, then it is possible that the equilibrium output is lower after depreciation.

6) (Blanchard & Johnson, p.440, Q.7)

- a)** Suppose there is an increase in foreign output. Show the effect on the domestic economy. What is the effect on domestic output? On domestic net exports?

The ZZ and NX lines shift up. Domestic output and net exports increase

- b)** If the interest rate remains constant, what will happen to domestic investment? If taxes are fixed, what will happen to the domestic budget deficit? (assume that there is positive relationship between income and investment)

Investment increases, since there is no change in taxes, budget deficit will not change.

7) Suppose that the economy is described by the following model:

$$C = c_0 + c_1(Y - T)$$

$$I = b_1 Y - b_2 i$$

$$G = \bar{G}$$

$$M = \frac{Y}{m_1}$$

$$X = x_1 Y^*$$

Assume that the Marshall – Lerner condition is satisfied (that is following a depreciation of the exchange rate, the trade balance improves) and exchange rate is fixed at one.

- a) Find the expression for equilibrium income.

$$ZZ = C + I + G + X - M$$

$$= c_0 + c_1 Y - c_1 T + b_1 Y - b_2 i + \bar{G} + x_1 Y^* - \frac{Y}{m_1}$$

At equilibrium, $ZZ = Y$

$$Y = \frac{1}{1 - c_1 - b_1 + \frac{1}{m_1}} [c_0 - c_1 T - b_2 i + \bar{G} + x_1 Y^*]$$

- b) Calculate the change in output, net exports, and the domestic interest rate if taxes increase by ΔT .

$$\Delta Y = \frac{-1}{1 - c_1 - b_1 + \frac{1}{m_1}} c_1 \Delta T \quad = \frac{\Delta Y}{\Delta T} = \frac{-c_1}{1 - c_1 - b_1 + \frac{1}{m_1}} < 0$$

$$NX = X - E^*M = X - M \quad (\text{since exchange rate is fixed at 1})$$

$$\frac{\Delta NX}{\Delta T} = \frac{\Delta X - \Delta M}{\Delta T} = \frac{\Delta X}{\Delta T} - \frac{\Delta Y}{m_1 \Delta T}$$

$$\frac{\Delta NX}{\Delta T} = \frac{c_1}{m_1(1 - c_1 - b_1 + \frac{1}{m_1})} > 0$$

Note that under the fixed exchange rate regime, if UIP holds, the interest rate cannot change. If there is a tax increase, which will cause IS curve to shift to left, and there will be a downward pressure on interest rate. Then, monetary policy has to accommodate in order to keep i constant (by conducting contractionary monetary policy, LM also shifts to left, and i stays constant).

- c) Calculate the effect of a change in foreign output on domestic output and net exports. (Assume that $c_1 + b_1 < 1$).

$$Y = \frac{1}{1 - c_1 - b_1 + \frac{1}{m_1}} [c_0 - c_1 T - b_2 i + \bar{G} + x_1 Y^*]$$

$$\Delta Y = \frac{1}{1 - c_1 - b_1 + \frac{1}{m_1}} [x_1 \Delta Y^*]$$

$$\frac{\Delta Y}{\Delta Y^*} = \frac{x_1}{1 - c_1 - b_1 + \frac{1}{m_1}} > 0$$

Throughout the mechanism, we have to opposite effects:

$$Y^* \uparrow, M^* \uparrow (X \uparrow), Y \uparrow$$

$$Y \uparrow, M \uparrow, Y \downarrow$$

However, by assuming Marshall-Lerner condition holds, we can say that the first dominates the second one and overall, Y increases.

$$NX = X - E^*M = X - M \quad (\text{since exchange rate is fixed at 1})$$

$$NX = x_1 Y^* - \frac{1}{m_1} Y$$

$$\frac{\Delta NX}{\Delta Y^*} = \frac{x_1 \Delta Y^* - \Delta \frac{1}{m_1} Y}{\Delta Y^*} = x_1 - \frac{\Delta Y}{\Delta Y^*} \frac{1}{m_1}$$

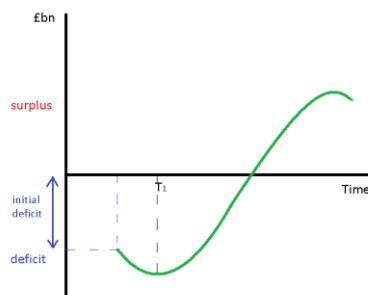
From the previous section, we know that $\frac{\Delta Y}{\Delta Y^*} = \frac{x_1}{1 - c_1 - b_1 + \frac{1}{m_1}}$, then plug this into equation,

$$\frac{\Delta NX}{\Delta Y^*} = x_1 \left(1 - \frac{1}{m_1} \left(\frac{1}{(1 - c_1 - b_1 + \frac{1}{m_1})} \right) \right) > 0$$

Again, export effect dominates.

8) Explain the following in detail

a) J curve



We use J curve to explain the relation between a country's currency and its trade balance. The real depreciation produces opposite effects:

- i) **Price Effect :** Imported Goods' price (↑), the expenditure on imported goods (↑) (Because quantity is same at initial point)
- ii) **Income Effect:** Trade Deficit (↓), Price of exports (↓), competitiveness (↑)

If M-L condition holds, although the price effect takes place initially, income effect dominates it and overall, the trade balance improves.

b) Derivation of Marshall-Lerner Condition

Net exports are $NX = X - E * M$

Exports must rise enough and imports must fall enough to compensate for the rise in price of imports

$$\Delta NX = \Delta X - [\Delta E * M + \Delta M * E]$$

$$= \Delta X - \Delta E * M - \Delta M * E$$

Divide both sides by X

$$\frac{\Delta NX}{X} = \frac{\Delta X}{X} - \Delta E \frac{M}{X} - E \frac{\Delta M}{X}$$

Assume that at the beginning, the exports and imports are equal, which is $X=E*M$. Substitute these in the equation;

$$\begin{aligned}\frac{\Delta NX}{X} &= \frac{\Delta X}{X} - \Delta E \frac{M}{E * M} - E \frac{\Delta M}{E * M} \\ &= \frac{\Delta X}{X} - \frac{\Delta E}{E} - \frac{\Delta M}{M} > 0\end{aligned}$$

Which states that the change in trade balance as a percentage of exports equals to proportional change in exports minus change in domestic currency and proportional change in imports. This implies that depreciation causes improvement in trade balance if percentage increase in exports and declining imports are enough to cover the change in exchange rate. (Note that this condition is regarding the elasticity of demand for export and imports. If, sum of demand for imports and exports are inelastic, which means, they do not reflect the change in prices much, ML condition does not hold and depreciation cause trade deficit.)

- 9) Suppose that both the supply curve of imports to country A and the supply curve of exports from country A are horizontal. Assume that at a pre-depreciation value of A's currency, country A sells 975 units of exports and purchases 810 units of imports and trade is initially balanced. Suppose now that there is a 10 percent depreciation of A's currency against foreign currencies and that because of the depreciation exports rise to 1025 units and imports fall to 790 units.

- a) What is the initial situation of country's trade balance?

At the beginning, if we assume that $P=1$, Value of total exports are $975*1=975$ and value of imports are $810*1=810$. Country has $975-810=165$ trade surplus.

- b) What is the result of depreciation on country's trade balance ?

When the country's domestic currency depreciates 10%, let say, $E=1.1$ and the foreign good's price will appreciate 10 percent and become 1.1, the value of imports is $790*1.1=869$. The value of exports is 1025. Trade balance is $1025-869=156$, which is less than the initial situation.

- c) Would the simple Marshall-Lerner condition suggest that country A's current account balance has improved or deteriorated because of this depreciation of its currency?

After the depreciation, the current account balance worsens. This country does not hold Marshall-Lerner condition.

Note: This question can be solved by using the elasticity of demand for import and exports. According to the Marshall-Lerner condition, the current account

balance will improve because of currency depreciation if the sum of the absolute values of the elasticities of demand for imports and exports is greater than 1.0. In this problem the elasticity of demand for imports is equal to $\{(790 - 810)/[(790 + 810)/2]\}/0.10 = -0.25$. The elasticity of demand for exports is equal to $\{(1025 - 975)/[(1025 + 975)/2]\}/(0.10) = 0.50$. The sum of the absolute values of these two elasticities is thus 0.75, which is strictly less than 1.0. One would therefore conclude that a depreciation of the home currency would cause the current account balance to worsen