Problem Set # 3

Answer Key

Answer the following questions. Show your work. As mentioned in class, you are encouraged to work in groups but must write your own answers.

1. **(Continued question from PS1)** Fixed Exchange Rate Regime: China (Mainland)

   Consider the USD/CNY FX market, where CNY is the Chinese currency, Yuan. Assume that China is operating a fixed exchange rate system. Suppose that there is an increase in Chinese exports to the U.S.A.

   (a) If the People's Bank of China (PBC), the Chinese central bank, wants the exchange rate to stay at its target level, how should it intervene in the FX market? (Indicate which currency PBC buys and which it sells.)

> To maintain the exchange rate at its target rate, PBC should buy USD (and sell RMB). You answered this part in the problem set 1.

   (b) What are the Chinese balance of payments entries for PBC's FX market intervention? Assume that PBC is providing US importers with the necessary CNY and that, in the same period, US importers use the CNY to buy Chinese goods. What's the credit, what's the debit, and in which accounts do they go?

> Credit: Current Account - Exports (exports to the US)
>
> Debit: Financial Account - Imports of Reserve Assets by Central Bank (also called official reserve assets by the book)

   (c) Does the FX market intervention increase or decrease the following?

   (i) Chinese holdings of official reserve assets; (ii) Chinese money supply:

> Chinese holdings of official reserve assets: **increase**
>
> Chinese money supply: **increase**

   (d) Assume that China continues to operate a fixed exchange rate system. Which of the following are part of an adjustment mechanism that might follow the repeated FX market interventions by the Chinese central bank and might ultimately bring CA+FA, i.e., the sum of current and capital account balances, back to zero? Circle all that apply

- Chinese price level rises
- Chinese price level falls
- Chinese (real) interest rates rise
- Chinese (real) interest rates fall

"Chinese price level rises" and "Chinese (real) interest rates fall"

(e) How could the Chinese state (i.e., PBC, other regulators, or state owned enterprises (SOEs)) accommodate the export-related demand for CNY at the fixed exchange rate without changing the money supply (i.e., the amount of CNY in circulation)? [Hints: Make a guess based on other policy regulations]

Remember the Trilemma, we can play around with other policy tools so that China does not have to use the monetary supply increases:

China could increase demand for USD, by, for example, encouraging SOEs to increase imports from the US, or by lowering barriers for capital outflows, i.e., allowing and encouraging Chinese firms or households to acquire U.S. assets.

China could decrease the amount of foreign/US investments in China that also create demand for CNY. That is, China could restrict the movement of capital flows entering their economy.

2. **External Wealth with three periods** Consider a world with three periods, $t = 0, 1, 2$. A country has initial wealth W_{-1}, the interest rate is r^* for all periods, and the country can have a non-zero trade balance in each period. At the end of the third period, the country's wealth must be equal to zero.

(a) Write out the country's budget constraint for each period

$$W_0 = TB_0 + (1 + r^*)W_{-1}$$
$$W_1 = TB_1 + (1 + r^*)W_0$$
$$W_2 = TB_2 + (1 + r^*)W_1$$

(b) Combine the three budget constraints from (a) to create the long-run budget constraint. Write out the long-run budget constraint in present-value form.

$$-(1 + r^*)W_{-1} = TB_0 + \frac{TB_1}{1 + r^*} + \frac{TB_2}{(1 + r^*)^2}$$

(c) Suppose $W_{-1} = 100$, $r^* = 0.1$. Can all three trade balances ($TB_0,\ TB_1,\ TB_2$) be positive? Explain your answer.

No, the terminal wealth should be 0, this is only possible if some periods this economy runs a trade balance deficit.

The intuition behind is that there's no reason for this economy not to spend its wealth by the end of its duration (final period), given a positive wealth this can only be done by importing more than exported in at least one period.

(d) Suppose $W_{-1} = -50$, $r^* = 0.1$, and $TB_0 = 10$: Give values for TB_1 and TB_2 such that the long-run budget constraint holds. [There are many correct answers, just provide one]

$TB_1 = 22$, $TB_2 = 30.25$

(e) List the values of W_0, W_1; and W_2 associated with your answers in part (d).

$$W_0 = 10 + (1.1)(-50) = -45$$
$$W_1 = 22 + (1.1)(-45) = -27.5$$
$$W_2 = 30.25 + (1.1)(-27.5) = 0$$

3. **(Based on FT 15.4)** In 2021 the country of Ikonomia has a current account deficit of \$1 billion and a non-reserve financial account surplus of \$700 million. Ikonomia's capital account is in a \$150 million surplus. In addition, Ikonomian factories located in foreign countries earn \$700 million. Ikonomia has a trade deficit of \$600 million. Assume Ikonomia neither gives nor receives unilateral transfers. Ikonomia's GDP is \$9.4 billion.

(a) What happened to Ikonomia's net foreign assets during 2021? Did it acquire or lose foreign assets during the year?

The NFA decreased since the $FA > 0$, meaning Ikonomia exported more assets than those it acquired (imported).

$$CA + FA + KA = 0$$
$$-1000 + FA + 150 = 0$$

Then $FA = 850$

(b) Compute the official settlements balance (OSB). Based on this number, what happened to the central bank's (foreign) reserves? [Hint: the FA can be split into transactions conducted by the central bank (OSB) and those conducted by everyone else, the non-reserves FA]

We have that $FA = FA^{\text{non-reserve}} + FA^{\text{OSB}}$, we also were given $FA^{\text{non-reserve}} = 700$ and just computed the $FA = 850$, plugging into the equation and solving for FA^{OSB}:

$$FA = FA^{\text{non-reserve}} + FA^{\text{OSB}} = 700 + FA^{\text{OSB}} = 850 \implies FA^{\text{OSB}} = 150$$

There is an inflow of money for 150 that foreigners paid the central bank. If these are paid in foreign currency the bank reserves increased.

The interpretation here is tricky. If the number is negative (as in table 16-2 in the FT book) it means the central bank spent money buying foreign assets that also increased the reserves. That's why I had to assume they were paid in foreign currency. If that inflow would have resulted from a foreign country buying back their currency (or bonds denominated in their currency) then the US would decrease their reserve of foreign currency assets by selling those.

(c) How much income did foreign factors of production earn in Ikonomia during 2021?

We have all components of the CA but the NFIA. We can plug the values in the formula and solve for it:

$$CA = TB + NFIA + NUT \longrightarrow -1000 = -600 + NFIA + 0 \implies NFIA = -400$$

This is the net income. That is, the income revenue minus the payments (income of foreigners). To find the income of foreign factors, i.e., the payments we have to consider the formula for the NFIA and replace what we know:

$$NFIA = EX_{FS} - IM_{FS} \longrightarrow -400 = 700 - IM_{FS} \implies IM_{FS} = 1100$$

That is, by knowing that home factors abroad got 700 as income and that NFIA is -400 we get that foreign factors at home (at Ikonomia) earned \$1100 million.

(d) Compute Ikonomia's gross national expenditure (GNE), gross national income (GNI), and gross national disposable income (GNDI).

$$GNE = GDP - TB = 9400 - (-600) = 10000$$

$$GNI = GDP + NFIA = 9400 + (-400) = 9000$$

$$GNDI = GNI + NUT = 9000 + 0 = 9000$$

4. **(BEA BOP release)** Go to the Balance of Payments report published by the BEA for any of the last two releases (go to bea.gov → data → data by topic → international trade and investment →

international transactions (BOP) → current release - US international transactions, 2nd quarter 2022). Read the summary report and answer:

(a) Is the Current Account (CA) in surplus of deficit? did this account decreased or increased with respect to the previous quarter?

> The CA is in deficit as it has been usual for the US in the last years. However, the CA is less negative than last quarter, meaning the CA deficit shrank.

(b) Have the trade balance subaccounts (exports and imports) recovered the peak levels they had in (the first half of) 2019 before the COVID shock? Which subaccount recovered faster? Can you guess why?

> Yes, they have recovered and surpassed the peak values registered in the first half of 2019. The imports recovered faster than the exports, the former recovered in early 2021 while the later in the second half of 2021. It's possible that the imports recovered faster because the economic recovery (and surge in consumption) was faster in the US relative to the economies to which the exports are sold.

(c) The primary income is what we denoted as Factor Income (labor and capital income). Is this subaccount larger or smaller than in 2017? What does it mean for the level of debt of the US given that the CA is more negative (on average) over time?

> The NFIA is smaller in magnitude but remains positive. A positive NFIA in the context of a CA deficit means that the income payments are partially offsetting the greater indebtedness of the US. However, the compensation has become weaker since 2017 given that this subaccount is smaller than before.