Econ 4382 - International Finance Spring 2024
Granados

Problem Set # 2

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. **(FT 14.7; Cross-country differentials)** Consider two countries: Japan and Korea. Real output growth in Japan is 1% while in Korea is 6%. Suppose the bank of Japan allowed money supply to grow by 2% and the bank of Korea implemented an even higher growth rate of 12% (growth per year).

   For the following questions treat Korea as the home country and Japan as the foreign one. Also, assume the prices are flexible and use the quantity theory model in which L is constant.

   (a) What is the inflation rate in Korea? in Japan?

   Here we use the monetary model (in growth rates) that tells us that inflation is equal to the growth of money minus the growth in the real income:

   $$\pi_{kr} = \mu_{kr} - g_{kr} = 12\% - 6\% = 6\%$$
   $$\pi_{jp} = \mu_{jp} - g_{jp} = 2\% - 1\% = 1\%$$

   (b) What is the expected rate of depreciation of the Korean won relative to the Japanese yen?

   Now we keep using the same model but for two locations at the same time and equal it to the PPP in growth rates:

   $$d_{w/¥} = \pi_{kr} - \pi_{jp} = 6\% - 1\% = 5\%$$

   The yen is expected to appreciate 5% against the won (or the won is expected to depreciate about as much).

   (c) When would this calculation be valid? when it would not? and Why? [Hint: think about what theory is used to get the depreciation and when it holds]

   This calculation is valid for the long-run, it would be invalid for the short-run. The reason is that it is based on the PPP equation that is satisfied only for longer horizons.

   (d) Suppose that the Bank of Korea increases the money growth rate from 12% to 15%. If nothing in Japan changes, what is the new inflation rate in Korea?

The new inflation rate in korea is 9%: $\pi_{kr} = \mu_{kr} - g_{kr} = 15\% - 6\% = 9\%$

(e) Suppose the Bank of Korea wants to fix their exchange rate against the Japanese Yen (i.e. to maintain a peg). What is the money growth that the bank would have to implement in such case? [Hint: a fixed exchange rate is constant]

In that case depreciation is zero, that is, the won does not gain, nor lose value relative to the Japanese yen, they are equally vauable after all.

Thus, the money growth to implement would be the one consistent with zero depreciation:

$$d_{w/¥} = 0 = \pi_{kr} - \pi_{jp} = \pi_{kr} - 1\%$$

Which at the same time, is the money growth consistent with a 1% inflation rate:

$$\pi_{kr} = \mu_{kr} - g_{kr} = \mu_{kr} - 6\% = 1\% \quad \Longrightarrow \quad \mu_{kr} = 7\%$$

Korea would have to implement a 7% money supply growth to keep the value of the won against the yen fixed.

(f) Using time series diagrams, illustrate how an increase in money growth rate (e.g., the one assumed in (d)) affects the money supply, M_k; Korea's interest rate i_k; prices P_k; real money supply M_k/P_k; and $E_{w,¥}$ over time (plot reach variable on the vertical axis and time on the horizontal). [Hint: See figure 14-6 in the textbook —FT— or check the lecture's slides]

See plots at the end

2. **(FT 14.8) Cross-country differentials with liquidity** Now answer based on the quantity theory model where the liquidity is no longer constant ($L(i)$) and money demand is inversely related to the nominal interest rate. Consider the same scenario described at the start of the previous question. In addition, the bank deposits in Japan pay a 3% interest rate ($i_{¥} = 3\%$)

(a) What is the interest rate paid on Korean deposits (i_w)? [Hint: UIP]

From before we have the (expected) depreciation is 5%. We plug that, and the Japanese rate in the approximate UIP:

$$i_w = i_{¥} + d_{w/¥} = 3\% + 5\% = 8\%$$

Here $d_{w/¥}$ is the expected depreciation rate also equivalent to: $d_{w/¥} = \frac{\Delta E^e_{w/¥}}{E_{w/¥}}$ and E refers to the levels of the exchange rates.

(b) Using the definition of the real interest rate (nominal interest rate adjusted for inflation), show that the real interest rate in Korea is equal to the real interest rate in Japan.

$$r_k = 8\% - 6\% = 2\%$$
$$r_j = 3\% - 1\% = 2\%$$

(c) Now suppose the Bank of Korea increases the money growth rate from 12% to 15%. Using time series diagrams, illustrate how this increase in money growth rate affects the money supply, M_k; Korea's interest rate; prices P_k; real money supply; and $E_{w,¥}$ over time (plot reach variable on the vertical axis and time on the horizontal). [Hint: See figure 14-14 in the textbook -FT- or check the lecture's slides, also notice this is the same as 1.d but with $L(i)$ rather than $\bar{L}$]

See plots at the end

3. **(Real interest rate parity)** Answer the following based on the real interest rates parity result:

(a) Briefly, what is the real interest parity? Is this a long-run or short-run results?

The real interest rate parity states that the expected real interest rates of different locations will converge to the same value. Such value is the world interest rate. In other words, inflation and interest rates will be able to differ between locations, but they still will take values such that the real interest rates they imply are the same (over the long run) for different countries.

This is a long-run result requiring prices to adjust to movements in the nominal interest rates in a way that brings the real rate to the convergence value.

(b) Real interest parity is the outcome of two other "parity conditions". Name them and provide a formula for each. Use dollars and euros in your equations

The real interest rate parity is an implication of both conditions holding:

1. UIP: $d^e_{h/f} = i_h - i_f$

2. PPP in expectations: $d^e_{h/f} = \pi^e_h - \pi^e_f$

where h denotes the home country, f the foreign country and e that the variable is an expectation (guess of the future value the variable takes).

(c) Derive the real interest parity from the two equations you listed before.

See plots at the end Since the left hand side of both equations is the same (the expected depreciation) we can just equal what is in the right hand side:

$$i_h + i_f = \pi_h^e + \pi_f^e$$

Now we rearrange the terms by country and remember that the real rate is defined as the nominal one minus the inflation:

$$\begin{aligned} i_h + i_f &= \pi_h^e + \pi_f^e \\ i_h - \pi_h^e &= i_f - \pi_f^e \\ r_h &= r_f \end{aligned}$$

4. **(Integrated Short-run and Long-run approaches)** Use money market and FX diagrams [an example is figure 15-7 in the textbook] to answer the following questions about the dollar-pound exchange rate $E_{\$/£}$. How does a change in money supply affect interest rates and exchange rates? On all graphs, label the initial equilibrium point "A".

   (a) Illustrate how a **temporary** decrease in the U.S. money supply affects the money and FX markets. Label the short-run equilibrium point "B". [Hint: Just focus on the short-run here as expected depreciation won't change, also prices are sticky in this case]

See plots at the end

   (b) Now illustrate how a **permanent** decrease in the U.S. money supply affects the money and FX markets. Label the **long-run equilibrium** point "B". [Hint: in the long-run prices are flexible]

See plots at the end

Figure 1: Plots for 1F and 2C

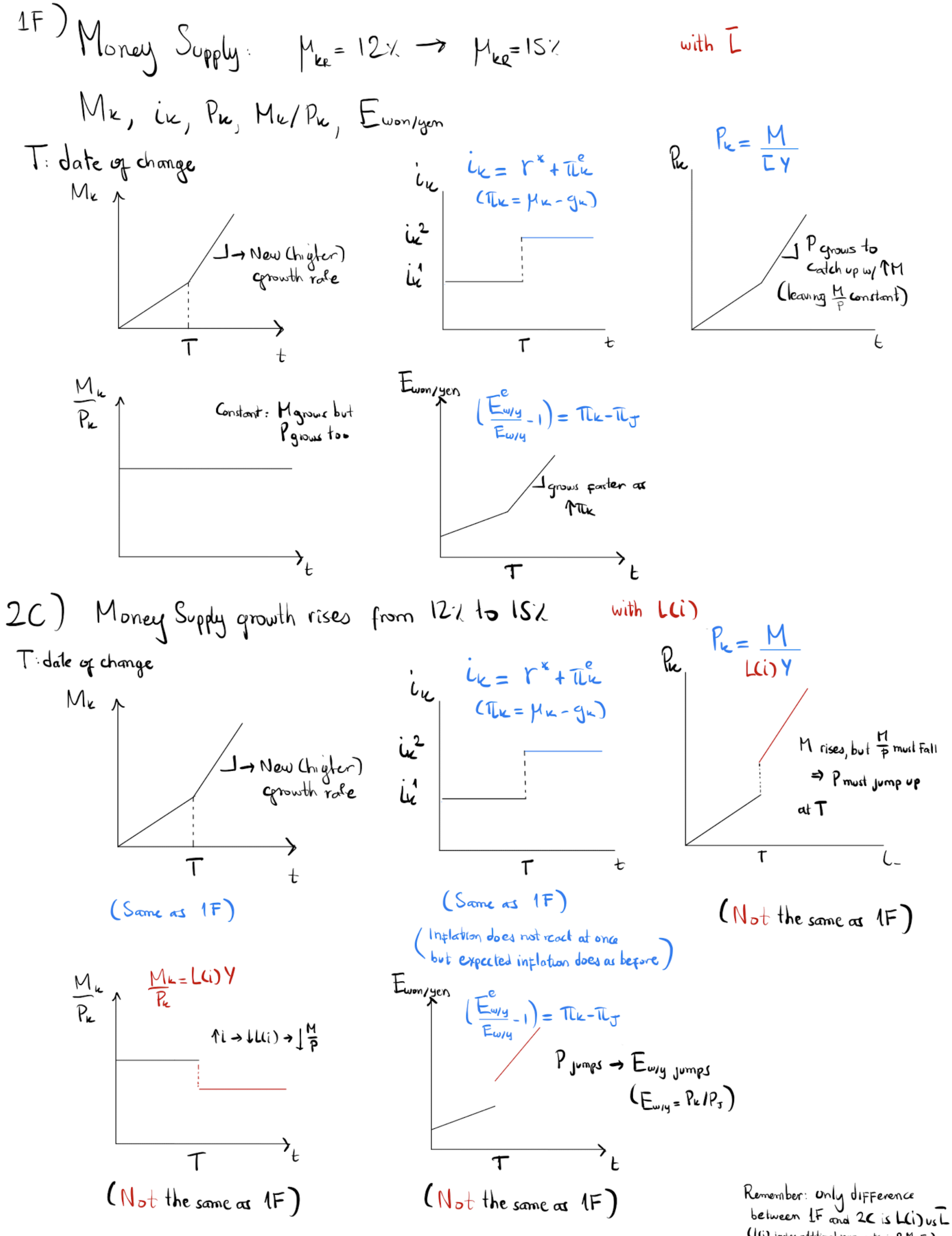

Figure 2: Plots for 4A and 4B