

::Solutions::

Exam 1

- You have 75 minutes to complete this exam.
- You may use a calculator; you may **not** use any other device (cell phone, etc.)
- You may consult one page of notes (both sides); you may not use books, notebooks, etc.
- Show your work.

I understand that the honor code applies: I will not lie, cheat, or steal to gain an academic advantage, nor tolerate those who do.

Signature

Printed Name

1. [5 pts] What is a forward contract? What theory provides a formula for the forward rate of the home (H) currency per unit of foreign (F) currency? Provide the formula and define all of its variables.

A forward contract is an agreement to buy/sell a currency in the future at a predetermined price. The price is called the forward rate. Covered interest parity allows us to price this contract:

$$F_{H/F} = \frac{1 + i_H}{1 + i_F} E_{H/F}$$

$F_{H/F}$ is the forward rate

$E_{H/F}$ is the spot exchange rate

i_H is the return on home-currency denominated assets

i_F is the return on foreign-currency denominated assets

2. [5 pts] An Xbox One costs \$300 in the United States and 5,000 pesos in Mexico. The spot exchange rate is 0.05 dollars per peso. According to the law of one price, is the dollar overvalued or undervalued with respect to the peso? By how much?

LOP says

$$\$300 = E_{\$/peso}^{lop} 5000 pesos$$

So that $E_{\$/peso}^{lop} = 0.06$. The dollar is **overvalued** relative to the lop fx rate. It is overvalued by either 0.01 dollars, $0.01/0.06 \cdot 100 = 16.7\%$

3. [5 pts] Consider the quantity theory of money with interest-sensitive liquidity demand: $L(i)$. What does the theory predict should happen to the nominal interest rate if real income increases? Assume that the central bank does not change the money supply and that prices are fixed. Explain your answer.

When Y increases, it shifts the real demand for money up. This increases the nominal interest rate. See the figures at the end.

4. [5 pts] Denmark fixes its exchange with the euro at about 7.5 Danish kroner per euro. If the European Central Bank raises its interest rate to 3% why does Denmark's National Bank (DNB) have to raise its interest rate to 3%? Explain your answer.

UIP says that

$$i_{DK} = i_{\epsilon} + \frac{E_{DK/\epsilon}^e}{E_{DK/\epsilon}} - 1$$

If the exchange rate must stay unchanged, a change in i_{ϵ} must be matched one-for-one with a change in i_{DK} .

Consider a world with two countries, home and foreign. For the questions below, use the quantity theory of money with interest-sensitive liquidity demand. **Assume that prices are perfectly flexible.**

5. The home country was holding money supply growth at 5% per year. At time T , the home country announces that it is permanently changing the money supply growth rate to 3% per year. Assume that nothing in the foreign economy changes and nothing else in the home economy changes.
- (a) [10 pts] By how much does the home interest rate change at time T ? Explain your answer.

Prices are perfectly flexible, so we know that real interest parity holds and that the nominal interest rate is

$$i = \pi^e + r^*.$$

Again, with flexible prices, we know that

$$\pi^e = \mu^e - g^e.$$

Since μ^e has decreased by 2%, π^e decreased by 2% and i decreases by 2%.

- (b) [10 pts] Plot the time paths of M_H , $E_{H/F}$, M_H/P_H , and P_H . These figures should have “time” on the x-axis.

See figures at the end.

- (c) [10 pts] (Continued from the previous page.) Why is the exchange rate more volatile than the money supply?

The exchange is more volatile than the money supply because **expectations** of lower future deflation make interest rates change immediately. The change in interest rates makes prices jump at T which makes the exchange rate jump at T . But, at time T the money supply has barely changed.

So the price level and the exchange rate jump at T but the money supply grows smoothly. Thus, the exchange rate is more volatile than the money supply.

6. [5 pts] *Challenging*. Suppose that there are fees associated with foreign exchange. Each time a currency trade is made, the currency broker takes 1% of the transaction as a fee.

Derive an equation for uncovered interest parity in this environment. For concreteness, use the dollar yen exchange rate, $E_{\$/\yen}$.

When selling dollars for yen lose 1% so you have

$$\frac{\$1}{E_{\$/\yen}} \times 0.99$$

yen. Then earn interest on those yen and sell back for dollars, losing 1% again. The return is

$$\text{return} = \frac{\$1}{E_{\$/\yen}} \times 0.99(1 + i_{\yen}) \times E_{\$/\yen}^e \times 0.99$$

and UIP is

$$1 + i_{\$} = \frac{E_{\$/\yen}^e}{E_{\$/\yen}} \times 0.99 \times 0.99$$

Consider a world with two countries, home and foreign. **Assume that prices are sticky in the short run but perfectly flexible in the long run.**

At time T , there is a **permanent increase in the home money supply**. Assume that nothing in the foreign economy changes and nothing else in the home economy changes.

7. [15 pts] What happens to $E_{H/F}$, the home-foreign spot exchange rate, in both the short- and long- run? Explain your answer using whatever figures and equations you find suitable.

Begin with the long-run outcome. When the money supply rises (but Y_H and L_H don't change) the price level adjusts to exactly offset it: M/P is unchanged and so is the interest rate. Since P_H has increased, PPP says that the expected exchange rate depreciates shifting the FR curve up. The new long-run exchange rate is $E_{H/F}^4$ falls, **depreciating the home currency in the short-run**. (See the figures in the extra space at the end.)

In the short run, two things happen: 1) the FR curve shifts as it did in the long-run figures and 2) M_H/P_H rises, decreasing the home interest rate. The short-run exchange rate is at the intersection of the new FR curve and the DR curve, $E_{H/F}^2$. **The home currency depreciates in the short-run**. (See the figures in the extra space at the end.)

8. [15 pts] Is the short-run exchange rate $E_{H/F}$ above or below the expected long-run exchange rate? Will it stay this way forever? Explain your answer.

The short-run exchange rate is above the long-run rate. This is because, in addition to the shift in FR , in the short-run, the interest rate decreases.

Things will not stay this way. As the price level adjusts, the interest rate will return to its initial level and the exchange rate will converge to its long-run level.

Central banks around the world use some kind of nominal anchor. The next few questions explore these concepts.

9. [5 pts] What is a central bank hoping to achieve by using a nominal anchor?

The central bank is hoping to pin down expectations about the long-run inflation rate.

10. [5 pts] How does an exchange rate target help a central bank with a history of high and unpredictable inflation rates (e.g., the central bank of Argentina)?

By PPP we have

$$\pi_{AR} = d_{peso/\$} + \pi_{US}$$

By setting the deflation rate of the peso to a constant it ties the Argentine inflation rate to the U.S. inflation rate. In the case where $d_{peso/\$} = 0$ the two inflation rates are identical.

As long as the exchange rate target holds, Argentine inflation is determined by U.S. inflation.

11. [5 pts] Why is unpredictable inflation bad for borrowing and lending markets?

Fisher tells us

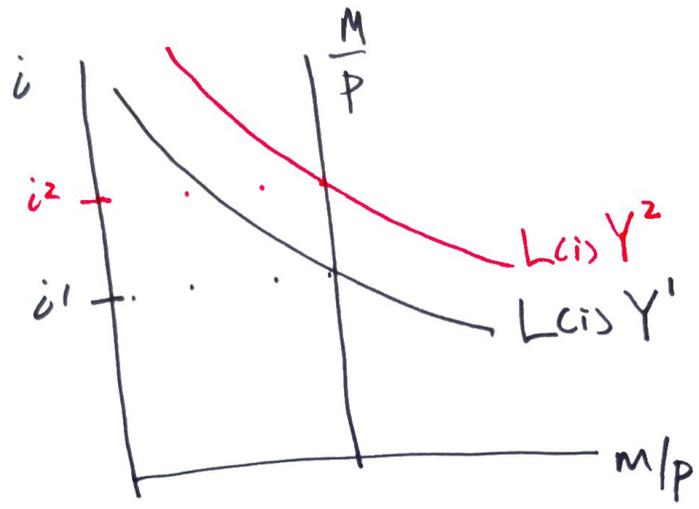
$$i - \pi^e = r$$

so that real return (what borrowers and lenders care about) will change as inflation changes. If it is difficult to predict inflation, then it will be difficult to predict the real return. This makes borrowing and lending risky, creating a disincentive for borrowing and lending.

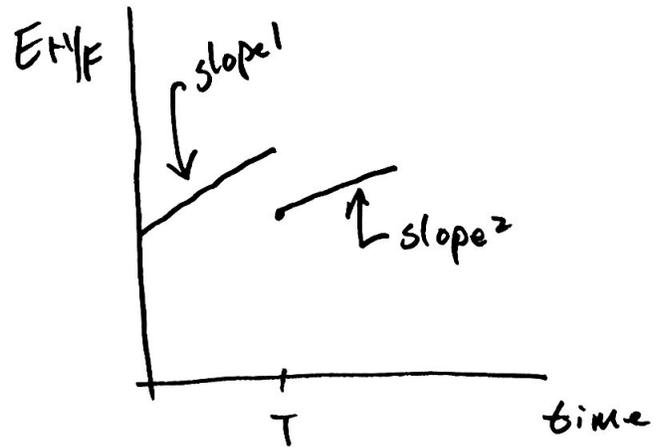
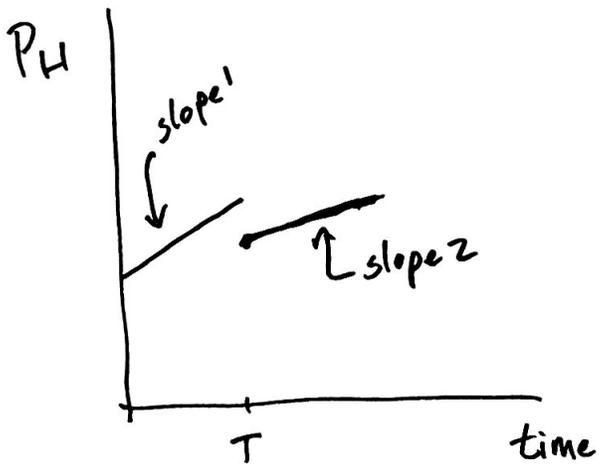
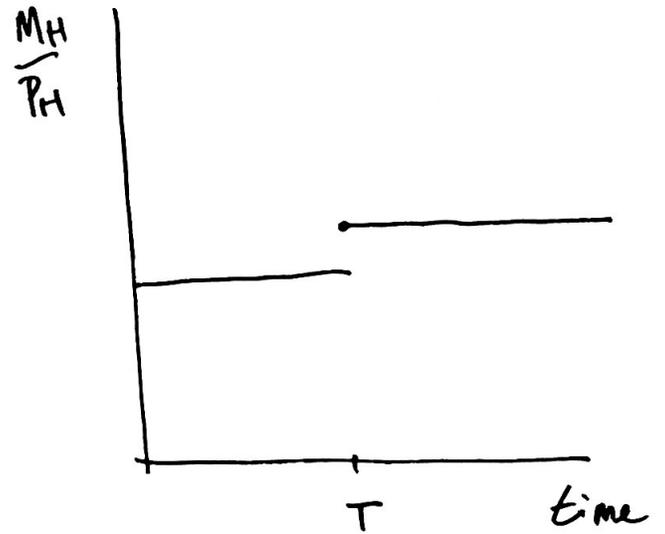
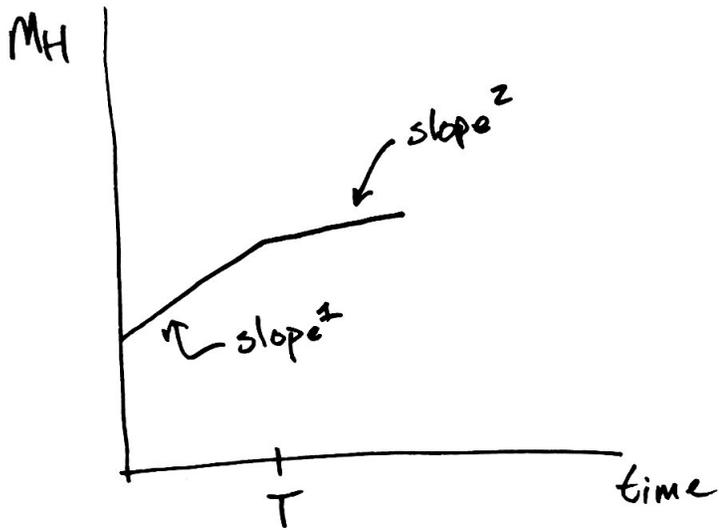
Extra Space

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Q3

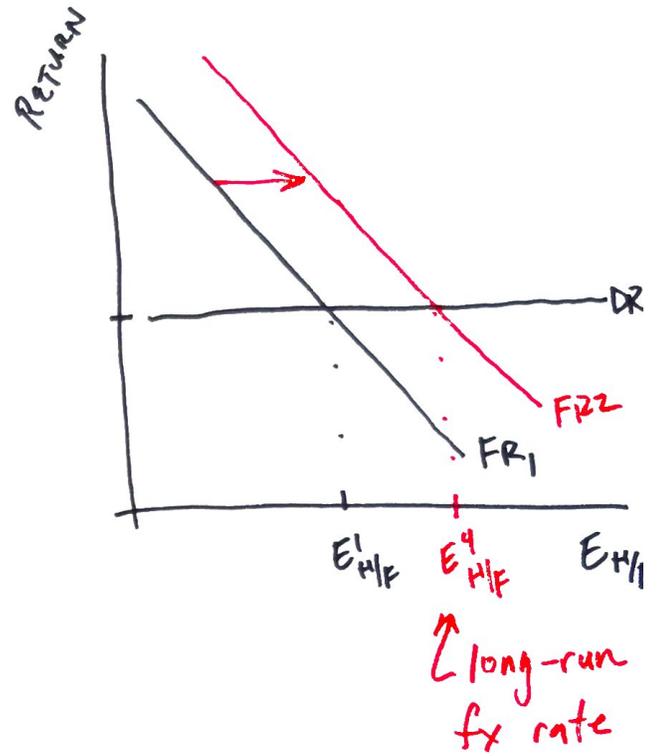
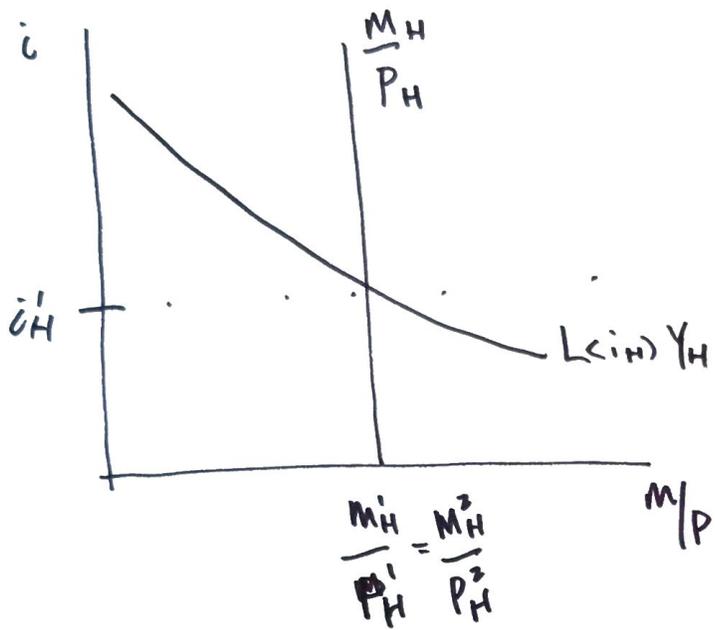


Q 5(b)



Q 7

Long Run



Short Run

