

name: _____

ECON 329
International Finance
Professor Ron Cronovich

Exam 1

Monday March 9, 2009

Instructions:

1. Do not open this exam booklet until told you may begin.
2. Turn off your cell phones and any other electronic devices (except pacemakers).
3. This is a closed book, closed notes exam. You may use a calculator.
4. Answer all questions within the context of material covered in this course.
5. Write legibly and on only one side of each page. If I can't read it, it's wrong.
6. Before you start writing, think about what you want to say. Including irrelevant information may reduce your score.
7. Please avoid using more than the available space for each question.
8. Show your work and/or explain your answer for questions that request it. This helps me determine the appropriate amount of partial credit to award if the answer is not perfect.

GOOD LUCK!

Part 1. Definitions

Give a concise, accurate definition of each of the following.

1. endogenous variable

2. Fisher effect

3. capital controls

4. effective exchange rate

5. sticky prices

Part 2. Short Answer Questions and Problems

1a. What is real interest parity?

1b. What conditions are necessary for real interest parity to hold?

2a. What is an exchange rate crisis?

2b. List and briefly explain two of The Economist's three indicators that suggest a country is at risk of an exchange rate crisis.

3a. What monetary policy change should the European central bank implement if it wants to reduce interest rates in the short run? (no graphs or explanation required)

3b. If the ECB implements this policy, what will happen to the U.S. exchange rate with Europe (dollars per euro)? Briefly explain. (no graphs required)

4. Real exchange rates and growth rates

The price of a basket of goods in the U.S. is \$300 in 2008 and 4% higher in 2009.

The price of a basket of goods in Mexico is 2000 pesos in 2008 and 6% higher in 2009.

The spot exchange rate is $E_{\$/\text{peso}} = 0.120$ dollars per peso in 2008 and will be 2% lower in 2009.

a. Determine the 2008 U.S. real exchange rate with Mexico. Show your work, draw a around your answer, and don't forget to tell me what units your answer is in.

b. Determine the growth rate of the real exchange rate from 2008 to 2009. Show your work and draw a around your answer.

c. Does relative PPP hold? circle *yes* or *no* Does absolute PPP hold? circle *yes* or *no*

Part 3. Problems and Applications

1. Comparing returns on foreign and domestic assets

For this problem, use these values: i = U.S. interest rate = 0.050 i_E = U.K. interest rate = 0.090
 $E_{\$/\pounds}$ = spot exchange rate (\$per pound) = 2.00, $F_{\$/\pounds}$ = forward exchange rate (in one year) = 1.90

- a. Calculate the forward premium. Show your work and draw a around your final answer.
- b. You have \$5000 to invest for one year. Calculate your rate of return (in dollars) if you convert your \$5000 to pounds, invest the pounds for one year and earn the U.K. interest rate, and then convert the pounds back into dollars in one year at the forward rate shown. Show your work and draw a around your final answer.
- c. Does covered interest parity hold? circle one: *yes* *no*
- d. Will the spot exchange rate (\$ per pound) rise, fall, or remain the same, and why?

2. An income shock in the Asset Approach

In this problem, the U.S. is the home country. Assume the growth rates of the nominal money supply and real GDP are zero. Focus on the short run.

- a. On the axes below, draw the diagrams of the money market (left) and foreign exchange market (right) assuming the U.S. is the “home country.” Label the axes and all curves. Show the initial equilibrium as point “A” in both diagrams.

Money Market



Foreign Exchange Market



- b. In the foreign exchange market diagram, is the FR curve positively sloped, negatively sloped, horizontal, or vertical? Explain the intuition (economic logic) for this slope.

- c. In both diagrams, show the short-run effects of a temporary decrease in U.S. real GDP. Show the new equilibrium as point “B” in both diagrams.

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- d. What happens to the U.S. nominal interest rate? Explain.
- e. What happens to the exchange rate (dollars per foreign currency unit)? Explain.
- f. Suppose the decrease in U.S. real GDP is permanent rather than temporary. Briefly, what can you tell me about how your analysis would be different?
3. The long run average annual growth rate of real GDP is 5% in India and 3% in China.
The average annual inflation rate in China is 7%.
- a. What is the money growth rate in China? Show your work, draw a around your answer.
- b. If India wants to maintain a fixed exchange rate with China over the long run, what rate of money growth must India choose? Show your work, your answer.

4. An income shock in the Monetary Approach

Again, assume the U.S. is the home country. Answer this question using the monetary approach (use the general model in which money demand depends negatively on the nominal interest rate).

Assume the world real interest rate, r^* , is exogenous. Also, use these values:

g = annual growth rate of U.S. real GDP = 2

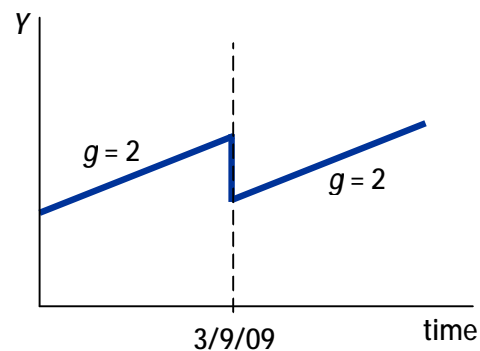
μ = growth rate of U.S. nominal money supply = 5

r^* = world real interest rate = 2.5

π = U.S. inflation rate = 3, π_ϵ = Eurozone inflation rate = 1

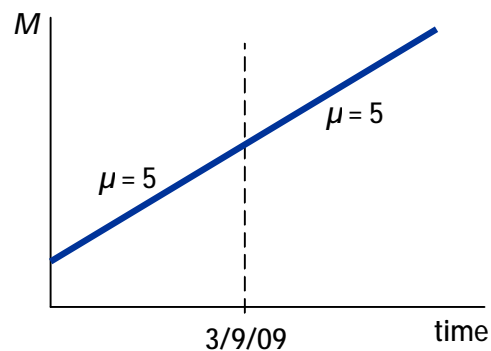
- a. Determine the U.S. nominal interest rate, i , and the rate of depreciation of the dollar relative to the Euro, $\frac{\Delta E_{\$/\epsilon}}{E_{\$/\epsilon}}$. Show your work and draw a box around your final answer for each variable.

For the rest of this problem (which continues on the next page), suppose U.S. real GDP falls on March 9, 2009. Note that the growth rate of U.S. real GDP equals 2 before March 9 and 2 after March 9, but the level of U.S. real GDP drops on March 9.



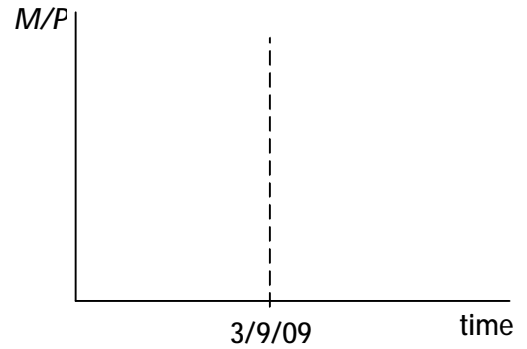
Assume that the Federal Reserve does not change the level or growth rate of the nominal money supply. The time series diagrams depict the behavior of U.S. real GDP and nominal money supply.

- d. After March 9, the U.S. inflation rate equals: _____ .
(no work or explanation needed)
- e. After March 9, the U.S. nominal interest rate equals: _____ .
(no work or explanation needed)

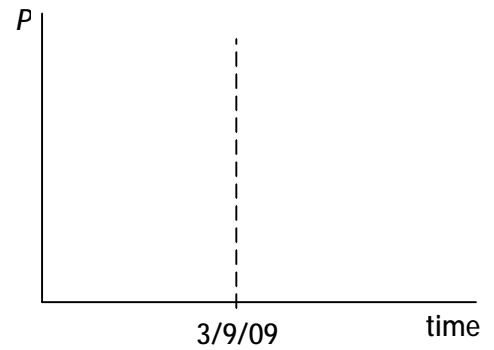


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- f. What happens to the demand for real money balances in the U.S. on March 9? Briefly explain, and draw a time series graph showing the behavior of real money balances in the U.S. before, on, and after March 9.



- g. What happens to the U.S. price level on March 9? Briefly explain, and draw a time series graph showing the behavior of the U.S. price level before, on, and after March 9.



- h. What happens to the exchange rate $E_{\$/\text{€}}$ on March 9? Briefly explain, and draw a time series graph showing the behavior of the exchange rate before, on, and after March 9.



Answers to Exam 1

(93 possible points on Exam 1)

Part 1. Definitions

(15 points total, 3 points each)

1. endogenous variable
A variable in an economic model whose value is determined by the model (e.g., equilibrium price in the supply & demand model).
2. Fisher effect
The one-for-one relation between changes in the inflation rate and changes in the nominal interest rate. See “The Fisher Effect” on Chapter 3/14.
3. capital controls
Restrictions on international financial transactions, such as restrictions of currency trading or limits on foreign ownership of domestic financial assets. See “Government Actions” in Chapter 2/13.
4. effective exchange rate
A weighted average of bilateral exchange rates, using trade shares as weights. Also called trade-weighted exchange rate. See “Multilateral Exchange Rates” in Chapter 2/13.
5. sticky prices
A modeling assumption that prices cannot respond to changes in supply or demand in the short run, but rather move sluggishly over time. See “Money Market Equilibrium in the Short Run: How Nominal Interest Rates are Determined” in Chapter 4/15.

Part 2. Short Answer Questions and Problems

1a. What is real interest parity? (2 points)

The condition in which real interest rates are equalized across countries.

1b. What conditions are necessary for real interest parity to hold? (3 points)

Purchasing Power Parity and Uncovered Interest Parity.

2a. What is an exchange rate crisis? (3 points)

A sudden, steep depreciation of a country's currency occurring after a period during which the exchange rate had been fixed or relatively stable. Occurs when investors lose confidence in the country's assets or economy and pull their financial capital out of the country (hence, "capital flight" is another common term for exchange rate crisis).

2b. List and briefly explain two of The Economist's three indicators that suggest a country is at risk of an exchange rate crisis. (4 points)

i. current account (as a % of GDP)

A current account deficit must be financed by foreign capital inflows. The bigger the deficit, the more the country depends on foreign capital to finance it, and thus the greater the vulnerability to a rapid withdrawal of foreign capital.

ii. short-term debt (as a % of foreign currency reserves)

As short-term debt comes due, foreign lenders may either leave their funds in the country (allowing the country to roll over its debt) or they will pull their funds out of the country. The latter option would cause a depreciation of the country's currency, which the country can prevent only if its central bank has adequate foreign currency reserves. The central bank would use its reserves of foreign currency to purchase its own currency in the foreign exchange market to prop up the value of its currency. Without such reserves, there would be nothing to stop the currency from depreciating, which would cause a snowball effect as other foreign lenders pull their capital out to avoid further losses.

iii. total bank loans (as a % of total bank deposits)

Banks use funds from deposits to make loans. If loans > deposits, then banks must be borrowing the difference from abroad. The more in debt banks are to foreign investors, the more vulnerable the country is to a crisis if foreign investors decide to pull their funds out.

For more information, see The Economist article discussed in class on March 2, available at the ECON 329 home page.

- 3a. What monetary policy change should the European Central Bank implement if it wants to reduce interest rates in the short run? (2 points)

The ECB (European Central Bank) should increase the money supply in Europe.
(To see why, draw a diagram of the money market. If the supply curve shifts right, the equilibrium interest rate must fall.)

- 3b. If the ECB implements this policy, what will happen to the U.S. exchange rate with Europe (dollars per euro)? Briefly explain. (3 points)

Other things equal, a fall in Europe's interest rates will make European bonds and bank deposits less attractive in the eyes of investors, relative to U.S. bonds and bank deposits. To obtain the now more attractive U.S. bonds, traders will sell Euros and buy dollars, causing $E_{\$/\text{€}}$ to fall (meaning the U.S. dollar appreciates in value).

4. Real exchange rates and growth rates (8 points: 3 for a & b, 2 for c)

The price of a basket of goods in the U.S. is \$300 in 2008 and 4% higher in 2009.

The price of a basket of goods in Mexico is 2000 pesos in 2008 and 6% higher in 2009.

The spot exchange rate is $E_{\$/\text{peso}} = 0.120$ dollars per peso in 2008 and will be 2% lower in 2009.

- a. Determine the 2008 U.S. real exchange rate with Mexico. Show your work, draw a around your answer, and don't forget to tell me what units your answer is in.

$$q = \frac{\text{price in \$ of a Mex basket}}{\text{price in \$ of a U.S. basket}} = \frac{E_{\$/\text{peso}} \times P_{\text{Mex}}}{P_{\text{US}}} = \frac{0.12 \times 2000}{300} = 0.8 \text{ U.S. baskets per Mexican basket}$$

- b. Determine the growth rate of the real exchange rate from 2008 to 2009. Show your work and draw a around your answer.

Using the growth rate rules from class, express $q = \frac{E_{\$/\text{peso}} \times P_{\text{Mex}}}{P_{\text{US}}}$ in growth rates:

$$\frac{\Delta q}{q} = \frac{\Delta E}{E} + \frac{\Delta P_{\text{Mex}}}{P_{\text{Mex}}} - \frac{\Delta P_{\text{US}}}{P_{\text{US}}} = \frac{\Delta E}{E} + p_{\text{Mex}} - p_{\text{US}} = -2 + 6 - 4 = \boxed{0}$$

- c. Does relative PPP hold? circle or no Does absolute PPP hold? circle yes or

Relative PPP holds because the depreciation rate equals the inflation differential.

Absolute PPP does not hold because the real exchange rate is not equal to 1.

Part 3. Problems and Applications

1. Comparing returns on foreign and domestic assets

(10 points: 2 for a, 4 for b, 1 for c, 3 for d)

For this problem, use these values: $i =$ U.S. interest rate = 0.050 $i_E =$ U.K. interest rate = 0.090

$E_{\$/\pounds} =$ spot exchange rate (\$per pound) = 2.00, $F_{\$/\pounds} =$ forward exchange rate (in one year) = 1.90

- a. Calculate the forward premium. Show your work and draw a around your final answer.

$$\text{Forward premium} = \frac{F - E}{E} = \frac{1.90 - 2.00}{2.00} = \boxed{-0.05}$$

- b. You have \$5000 to invest for one year. Calculate your rate of return (in dollars) if you convert your \$5000 to pounds, invest the pounds for one year and earn the U.K. interest rate, and then convert the pounds back into dollars in one year at the forward rate shown. Show your work and draw a around your final answer.

First, convert your dollars to pounds: $\$5000/2.0 = 2500\pounds$.

In one year, you'll have $(1 + 0.09) \times 2500 = 2,725\pounds$.

Which, using the forward rate, is worth $2,725 \times 1.9 = \$5,177.50$ in one year.

Calculate the rate of return: $\frac{5177.5 - 5000}{5000} = \boxed{0.036}$

- c. Does covered interest parity hold? circle one: yes no

In order for CIP to hold, the return (in dollars) on investments in the U.K. must equal the U.S. interest rate, which is not true here (0.036 does not equal 0.05).

- d. Will the spot exchange rate (\$ per pound) rise, fall, or remain the same, and why?

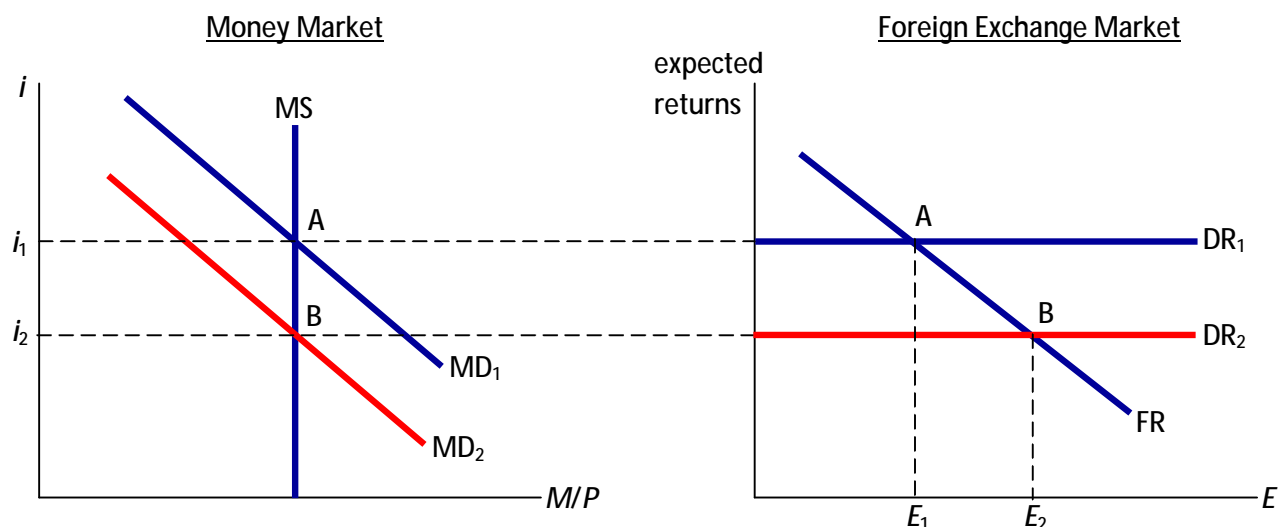
There is an arbitrage opportunity: since the U.S. return is higher than the U.K. return, traders will sell pounds and buy dollars, causing $E_{\$/\pounds}$ to fall (meaning, the dollar appreciates against the pound).

2. An income shock in the Asset Approach

(19 points: 6 for a, 3 for b, 4 for c, 3 for d, 3 for e; up to 2 extra credit points for f)

In this problem, the U.S. is the home country. Assume the growth rates of the nominal money supply and real GDP are zero. Focus on the short run.

- a. On the axes below, draw the diagrams of the money market (left) and foreign exchange market (right) assuming the U.S. is the “home country.” Label the axes and all curves. Show the initial equilibrium as point “A” in both diagrams.



- b. In the foreign exchange market diagram, is the FR curve positively sloped, negatively sloped, horizontal, or vertical? Explain the intuition (economic logic) for this slope.

FR is negatively sloped. To understand the slope, remember two things: First, the expected foreign return has two components – the foreign interest rate and the expected rate of dollar depreciation. The more the dollar depreciates while you’re holding foreign currency, then the more dollars you’ll get in the future when you cash in your foreign asset and change your foreign currency back into dollars. Second, remember that as you move along the FR curve, E is changing but the expected future exchange rate E^e and foreign interest rate are not changing.

For a given value of E^e , an increase in E reduces the expected rate of dollar depreciation and therefore reduces the expected foreign return, hence the negative slope.

- c. In both diagrams, show the short-run effects of a temporary decrease in U.S. real GDP. Show the new equilibrium as point “B” in both diagrams.

(this question continues on the next page)

- d. What happens to the U.S. nominal interest rate? Explain.

In the money market diagram, the money demand curve shifts left and the nominal interest rate falls. Explanation: with less income, households will be spending less, so they won't need as much money, so they attempt to convert some of their money into bonds. This drives up the demand for bonds, drives up bond prices, and reduces the interest rate.

- e. What happens to the exchange rate (dollars per foreign currency unit)? Explain.

The decrease in the U.S. interest rate makes U.S. bonds less attractive and foreign bonds more attractive. To get a better return on their portfolios, traders respond by selling dollars and buying foreign currency, which depreciates the dollar and drives up E .

- f. Suppose the decrease in U.S. real GDP is permanent rather than temporary. Briefly, what can you tell me about how your analysis would be different?

If the income shock is temporary, endogenous variables will return to their initial values fairly soon, so the long run won't be affected. If the shock is permanent, then E will be higher in the long run, and people today will adjust their expectations of the future exchange rate to incorporate this information: i.e., E^e will rise, which would shift up the FR curve, which would raise E even more in the short run: the increase in E^e raises the expected return on foreign bonds and creates even more selling of dollars and buying of foreign currency.

3. The long run average annual growth rate of real GDP is 5% in India and 3% in China.

The average annual inflation rate in China is 7%.

(6 points: 3 for a, 3 for b)

- a. What is the money growth rate in China? Show your work, draw a box around your answer.

$$\text{Solve } p_c = m_c - g_c: 7 = m_c - 3 \quad \text{so} \quad m_c = \boxed{10}.$$

- b. If India wants to maintain a fixed exchange rate with China over the long run, what rate of money growth must India choose? Show your work, box your answer.

According to relative purchasing power parity, in the long run: $\frac{\Delta E_{I/C}}{E_{I/C}} = p_I - p_C$

A fixed exchange rate means $\frac{\Delta E_{I/C}}{E_{I/C}} = 0$, which requires $p_I = p_C$.

Since $p_C = 7$, India must set its money growth rate to achieve a 7 percent inflation rate.

$$\text{Solve } p_I = m_I - g_I: 7 = m_I - 5 \quad \text{so} \quad m_I = \boxed{12}.$$

4. An income shock in the Monetary Approach
(18 points: 4 for a, 2 for d, 2 for e, 4 for f, 3 for g, 3 for h)

Again, assume the U.S. is the home country. Answer this question using the monetary approach (use the general model in which money demand depends negatively on the nominal interest rate).

Assume the world real interest rate, r^* , is exogenous. Also, use these values:

g = annual growth rate of U.S. real GDP = 2

μ = growth rate of U.S. nominal money supply = 5

r^* = world real interest rate = 2.5

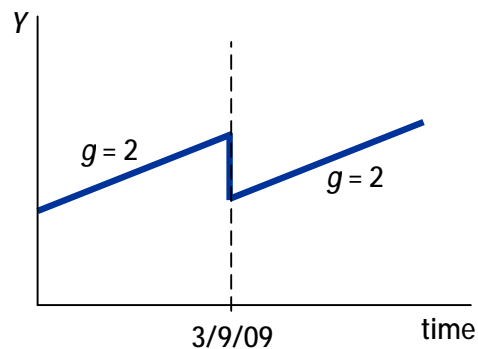
π = U.S. inflation rate = 3, π_ϵ = Eurozone inflation rate = 1

- a. Determine the U.S. nominal interest rate, i , and the rate of depreciation of the dollar relative to the Euro, $\frac{\Delta E_{\$/\epsilon}}{E_{\$/\epsilon}}$. Show your work and draw a box around your final answer for each variable.

$$i = \pi + r^* = 3 + 2.5 = \boxed{5.5}$$

$$\frac{\Delta E}{E} = \pi - \pi_\epsilon = 3 - 1 = \boxed{2}$$

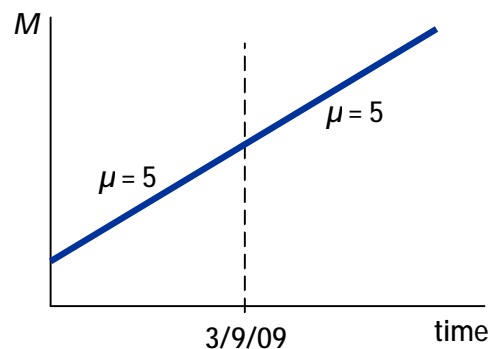
For the rest of this problem (which continues on the next page), suppose U.S. real GDP falls on March 9, 2009. Note that the growth rate of U.S. real GDP equals 2 before March 9 and 2 after March 9, but the level of U.S. real GDP drops on March 9.



Assume that the Federal Reserve does not change the level or growth rate of the nominal money supply. The time series diagrams depict the behavior of U.S. real GDP and nominal money supply.

- d. After March 9, the U.S. inflation rate equals: 3.

Same as before March 9, because $\pi = g - \mu$, and neither g nor μ have changed.



- e. After March 9, the U.S. nominal interest rate equals: 5.5.

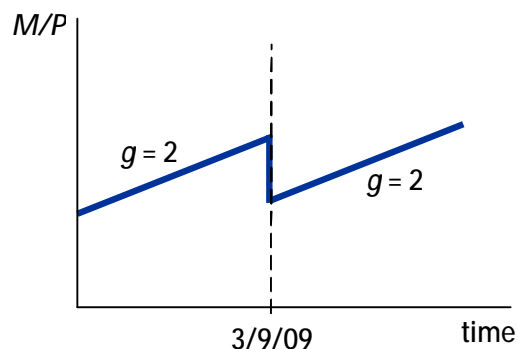
Same as before March 9, because $i = \pi + r^*$ and neither π nor r^* have changed.

(this problem continues on the next page)

- f. What happens to the demand for real money balances in the U.S. on March 9? Briefly explain, and draw a time series graph showing the behavior of real money balances in the U.S. before, on, and after March 9.

The fall in Y on March 9 causes a fall in real money demand (with less income, people don't spend as much and won't need as much money).

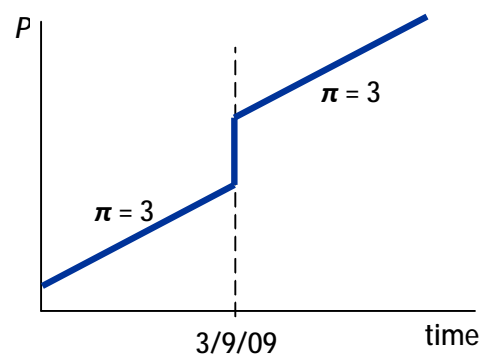
Before and after March 9, M/P grows at rate g (because $\pi = g - \mu$).



- g. What happens to the U.S. price level on March 9? Briefly explain, and draw a time series graph showing the behavior of the U.S. price level before, on, and after March 9.

Real money demand falls on March 9. To maintain equilibrium in the money market, M/P must fall. M does not change – it's exogenous and the instructions state it does not change. Therefore, P must rise on March 9 to make M/P fall as much as real money demand falls.

Before and after March 9, P grows at rate $\pi = 3$.



- h. What happens to the exchange rate $E_{\$/\epsilon}$ on March 9? Briefly explain, and draw a time series graph showing the behavior of the exchange rate before, on, and after March 9.

The monetary approach assumes PPP, so $E_{\$/\epsilon} = P_{US} / P_{Europe}$. Since P_{US} increases on March 9, $E_{\$/\epsilon}$ must also increase on March 9.

Before and after March 9, $E_{\$/\epsilon}$ rises at rate 2, the difference between U.S. and European inflation (see part a).

