

# Exercise Pack

*PRACTICE QUESTIONS WITH ANSWERS*

**Global Economic Environment (53-854-08)**

**MBA HEC Montréal**

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***N.B.:***

- This exercise pack is a companion to the course Global Economic Environment (53-854-08).
- Questions are written in black, answers in red.
- The answers provided are suggestive and not necessarily exhaustive. Please do not hesitate to contact me if some answers appear erroneous or incomplete.
- The questions are not arranged by theme, as one question often covers many topics in an integrative effort on my part.

*This version: July 2011*

**SHORT QUESTIONS****QUESTION 1 - TRUE, FALSE OR UNCERTAIN**

Explain whether each of the following statements is true, false, or could go either way, depending on the circumstances.

- a) The Bank of Canada has the mandate to target inflation at 2%. If it did not have that mandate, it could achieve a permanently higher GDP growth and lower unemployment.

*FALSE. It could achieve higher GDP growth only temporarily, by surprising the private sector. If it continuously surprised the private sector this would generate ever increasing inflation. The potential growth rate of the economy and the natural unemployment rate would not be affected.*

- b) On April 20<sup>th</sup>, 2010, the Bank of Canada indicated that it may start reversing its expansionary policy of the last few years sooner than initially thought: “With recent improvements in the economic outlook, the need for such extraordinary policy is now passing, and it is appropriate to begin to lessen the degree of monetary stimulus”. Despite this improved outlook, it once again decided not to change its target for the overnight rate, keeping it at 0.25%. Yet, the Canadian dollar rose sharply following the Bank of Canada’s press release. This is in contrast to the predictions of the interest rate parity theory.

*FALSE. The fact that the BofC did not actually change its overnight rate is not what’s important. What matters for the interest rate parity theory is whether longer maturity rates increased, as they are the most relevant for investment purposes. Here, the statement of the Bank of Canada in fact did lift treasury yields. In turn, we would expect it to lead to a higher demand for the Canadian dollar as investors want to take advantage of the higher returns here. This then explains the rise of the loonie.*

- c) It is well known that the yield curve tends to steepen as a recession unfolds, and is the steepest at the beginning of a recovery. This is consistent with the view that central banks are very active in responding to economic developments.

*TRUE. Indeed, the yield curve tends to be at its steepest at the beginning of the recovery. This is consistent with markets knowing that the central bank sees that the economy is starting to recover, and hence that it will have to raise rates in the future. This means higher long term rates. Also, inflation expectations may be rising, also having an impact on longer rates.*

- d) In the classical view of the economy, prices are very flexible and hence business cycles must be the result of aggregate demand shocks.

*FALSE. Indeed, classical economists tend to believe more in flexible prices. But in this case, demand shocks will not affect output much, instead they will have an impact on prices. Classical economists tend to have more faith in supply shocks (which affect the FE curve, like productivity shocks) to lead to movements in Y.*

- e) In periods when the financial system is in disarray, monetary policy becomes impotent as commercial banks prefer to pile up reserves instead of extending new loans. The powerless central bank has then no choice but to wait that prices eventually adjust to bring back the economy to its potential.

*FALSE. We saw in class that the central bank has other tools available, such as quantitative easing. For example, it could lend directly to firms, state governments or non-bank financial institutions. It could also buy heavily long term treasuries in order to lower their yields.*

- f) The high real GDP growth, high capital spending (investment) by firms, high employment growth, and low inflation rates that the US experienced between 1995 and 2000 can all be explained by a series of positive productivity shocks.

*TRUE. In the context of the IS-LM-FE model, a series of productivity shocks shifts the FE curve to the right. Prices in the economy tend to decrease (or inflation to fall), as the economy converges to a higher output level (and therefore employment level).*

- g) The full employment level of output is the output level corresponding to an unemployment rate of zero.

*FALSE. At the full employment level of output, unemployment is at its natural level, which is greater than 0 (between 5 and 6 % for the US).*

**ESSAY QUESTIONS****QUESTION 2 – IS-LM-FE**

Make the assumption that prices are fixed in the short run, and the economy does not reach general equilibrium immediately following a shock. For each of the following, what will be the short run as well as medium run effects on the real interest rate and output?

- a) A fall in expected inflation ( $\pi^e$ ).

In the money market, the fall in expected inflation leads to a rise of money demand. For a given level of  $Y$ ,  $r$  is now higher, hence the LM curve shifts left/up. In the short run, the result is a recession and a rise in  $r$ . In the medium run, prices will fall so that the economy goes back to YFE.

- b) Consumers become more optimistic, which leads to more consumption at each level of the real interest rate.

The national saving curve shifts left. Since the interest rate is now higher for each level of  $Y$ , the IS curve shifts right/up. The result in the short run is a boom, with a rise in the interest rate. In the medium run, prices will rise in order to get the economy back to potential.

- c) Increase in government spending.

Same as b.

- d) Increase in income taxes.

The fall in disposable income will lead to a rise in saving. The national curve shifts right, which leads to a shift left/down of the IS curve. In the short run, output and the interest rate fall. In the medium run, prices fall so that the economy goes back to YFE.

- e) Non-money assets become more risky (think about what happens in the money market).

People switch to money. Hence the money demand will shift right, which results in a higher  $r$  for a given  $Y$ . In turn, this means a shift left/up of LM, with a fall in output in the short run (as well as higher  $r$ ). Prices eventually fall.

- f) The government implements investment subsidies for firms.

Investment rises, which leads to a shift right/up of the IS curve. Boom in the short run as well as higher interest rates. Prices rise in the medium run.

- g)** The economy is hit by an immigration wave (consider only its impact through changes on the labor market).

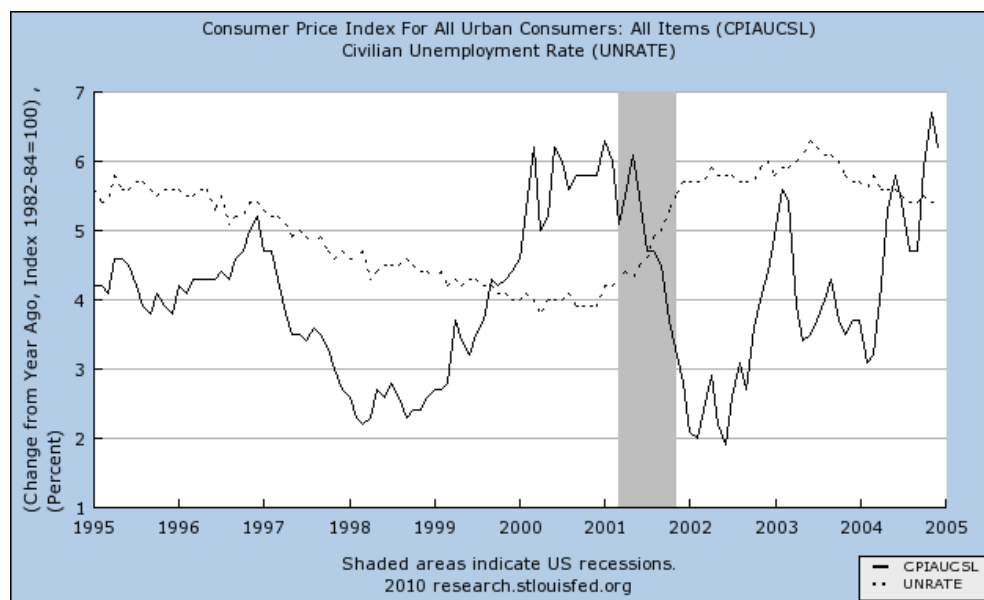
This is a positive supply shock. The labor supply shift right, leading to higher level of employment in eqbm. Hence, the FE curve shifts right. In the short run, the economy is still at its initial level of output and  $r$ , but as prices start falling output moves higher to its new potential level.

- h)** Banks decide to keep higher reserves, and the central bank does not react by injecting more liquidity.

The money multiplier falls. As a result, the money supply contracts, leading to a shift left/up of the LM curve. In the short run, there is a recession and  $r$  is higher. Eventually, prices fall and the LM curve goes back to its initial position.

## QUESTION 3 – THE LATE 1990s

In this question we will look back at the economic events of the second half of the 1990s and the early 2000s. The graph below shows you the evolution of CPI inflation (solid line; year-over-year rate of change of the CPI) and the unemployment rate (dotted line) in the United States during this period.



- a) In the context of the IS-LM-FE framework, what was the likely position of the US economy at the very end of the 1990s? Explain your position using a graph.

The unemployment rate is very low, likely below its natural rate. This seems to indicate that the economy should be above potential (i.e. IS and LM cross below FE). In addition, the rise in inflation is consistent with an economy overheating, as prices adjust to bring back the economy to general equilibrium.

For questions b. and c., assume that the economy was initially at its potential level.

- b) Some commentators at the time argued that the strong growth in output and job creation in the late 1990s was due to a significant increase in productivity (A) leading to a strong supply shock. Based only on the information contained in the graph above, do you think this is a plausible explanation? Use a graph to explain whether or not a supply shock could have been the main story back then.

A strong supply shock would represent a movement to the right of the FE curve. The economy would then be below potential. As it converges towards its new

potential level, prices need to fall such that LM moves to the right. This is not consistent with the rise in inflation we see in the graph.

- c) Other analysts instead focused on the sustained stock market boom of the late 1990s, saying it could have been behind the strong output growth numbers. Illustrate graphically how a rise in stock values would affect the short run equilibrium in the IS-LM-FE framework. Would it be consistent with the evolution of both unemployment and inflation at the time?

A rise in the stock market represents a positive wealth shock. As consumers become wealthier, they save less. In the savings/investment market, this means less saving. In turn, it means that the IS curve will shift to the right, pushing the economy above its potential level and lowering unemployment. Finally, prices should start rising. Hence, this is consistent with the info from the graph for the late 1990s.

- d) Given the situation the economy was in during the late 1990s (i.e. the one you described in question a.), what should the Fed have done if it wanted to bring back the economy to its long-run equilibrium? Explain briefly and show the expected result of this policy on the IS-LM-FE graph.

The Fed should have adopted a restrictive monetary policy, i.e. lower money supply. This would have led to a movement left of the LM curve, bringing the economy towards the FE curve. Note that this would mean that prices don't have to rise as much to bring back LM left.

- e) In the context of the expectations-augmented Phillips curve, how would you describe graphically the evolution of the economy during the second half of the 1990s? Would you say that inflation expectations must have risen significantly during that period?

So we know unemployment is going down, eventually falling below its natural level. At the same time, inflation rises but is not getting out of control. This looks like a movement along the short-run Phillips curve (SRAS). Given that inflation seemed relatively contained, it is unlikely that inflation expectations rose much during that period.

## QUESTION 4: INFLATION AND MONETARY POLICY IN CHILE

*“The consumer price index (CPI) rose by 1.2% month on month in May, more than doubling the consensus forecast of 0.5%. The rate of increase was even higher, at 1.5%, in June. This brought inflation for the 12-month period through June to 9.5%, the highest level since 1994. This is almost triple the 3.2% annual rate registered in June 2007, and more than double the upper figure of the central bank’s target range for inflation of 2%-4%.”* The Economist, July 11, 2008.

- a) Using the IS-LM-FE diagram, show the most likely situation of the Chilean economy in June 2008 (hint: use the fact that prices have started to rise strongly lately). Briefly explain your answer.

**It is likely the junction of the IS and LM curves is to the right of the FE curve. The economy, trying to go back to YFE, faces inflationary pressures.**

Chile, like many emerging economies, has been particularly vulnerable to the rise in commodity prices. *“The price of food in Chile jumped by 2.3% month on month in June. Transport costs have also escalated, rising by 3.6% in June after a 2.3% jump in May, because of record global oil prices.”*

- b) Imagine that a year ago, the Chilean economy was in a situation of general equilibrium (where all three markets are in equilibrium simultaneously). Based on the paragraph above, what shock do you believe is most likely to explain the evolution of the economy in the last year? In other words, why did the economy move from general equilibrium to the situation you described in (a)? Illustrate your answer graphically.

**The evolution of the Chilean economy over the last year can be well explained by a negative supply shock following the rise in oil prices. This leads to a shift to the left of the FE curve.**

*“The Central Bank’s failure to tighten policy earlier and more sharply appears to have contributed too, as this has allowed inflation to contaminate prices across the economy. Core inflation, which excludes volatile food and energy prices, is also very steep—at 8.7% for the year ending in June. This confirms that the country’s inflationary woes are [...] also coming from still-strong domestic demand. This has forced the Central Bank to embark on a renewed tightening cycle. This monetary tightening will probably result in an easing of inflation later this year.”*



- c) Why would a monetary tightening from the central bank lead to a lower rate of inflation relative to a “no action” policy? As part of your answer, illustrate the two scenarios (i.e. monetary tightening vs. no action from the central bank) using the IS-LM-FE framework.

If the central bank does not take action, prices will have to rise in order to bring the economy back to YFE. However, if the central bank decides to adopt a contractionary policy (i.e. reduce the money supply), the economy can reach YFE while suffering lower inflation.

(Also, it means that the slowdown in Y will likely be happening faster)

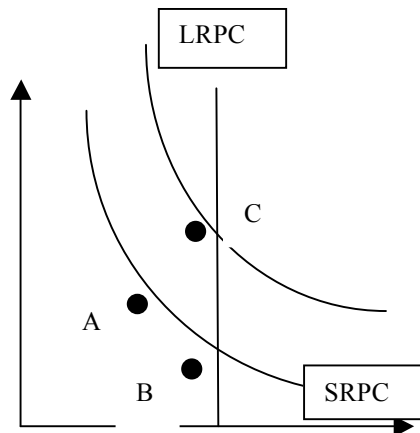
- d) Chile is expected to have a budget surplus equal to 8.9% of real GDP in 2008. Suppose that the Chilean government decides to take advantage of this situation by lowering income taxes. Assuming that the economy is in the situation described in (a), do you believe this policy would help contain inflationary pressures? Use the IS-LM-FE diagram and explain briefly.

NO. Lower taxes means that national saving declines (unless there is Ricardian equivalence, in which case national saving will be unchanged). This would lead to a shift to the right of the IS curve, pushing output even further away from YFE. The result is that prices would have to go up even more in order to reestablish general equilibrium.

In its assessment of Chile’s economy, The Economist wrote: *“We still assume that the Central Bank will be successful in re-anchoring inflation and inflationary expectations in the medium term, but this too carries risks, particularly if headline inflation [...] lifts wage demands over the next 12 months. This would cause inflation to overshoot our current forecast of 4% for 2009.”*

- e) Using the Phillips curve framework, explain why The Economist’s inflation forecast for 2009 relies heavily on what will happen to inflation expectations.

Based on the answer in (a), we can say that the economy is right now in a situation where  $u < u^*$  (since  $Y > YFE$ ). Hence, on the short-run Phillips curve, this means that the economy is to the left of the long-run vertical Phillips curve, say at point A. If the monetary tightening works and inflation expectations remain anchored, this would mean the economy moves along the same SRPC, say to point B. If instead inflation expectations rise, this means that the economy might be closer to  $u^*$ , but with a higher rate of inflation, say at point C.



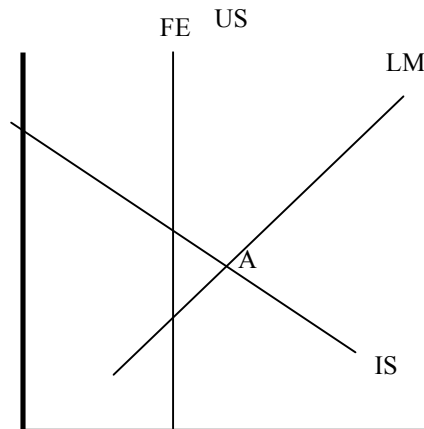
*“Meanwhile, the sizeable interest-rate differential with the US that has emerged this year [...] has contributed to the peso's appreciation.”*

- f) What kind of interest rate differential would explain an appreciation of the peso (i.e., do interest rates in Chile need to be higher or lower than in the US)? Explain briefly.

Interest rates in Chile must be higher. This in turns lead to a higher demand for the peso, hence its appreciation. Another (related) way to answer this question would have been to use the interest rate parity equation.

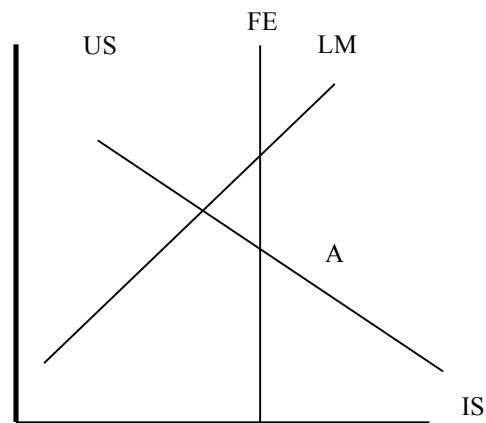
## QUESTION 5: THE CURRENT US SITUATION, FISCAL POLICY AND THE FINANCIAL MARKETS

- a) In 2005, US real GDP grew at 3.5% annual rate and the unemployment rate averaged 5.1%. Inflation, as measured by the Consumer Price Index, was 2.4% on a year on year basis, while excluding food and energy – i.e. core inflation – it was running at 2.2%. In the IS-LM-FE diagram, locate the most likely situation of the US economy in **2005**.



- b) From the point of view of December 2008, the consensus forecast for GDP growth in the fourth quarter of 2008 is  $-4.3\%$ . The headline CPI inflation released on 12/16/08 was  $-1.7\%$ , while excluding food and energy – i.e. core inflation – it was  $0\%$ . The unemployment rate is currently  $6.7\%$  and employment fell by 533 000 jobs in November 2008. In the IS-LM-FE diagram, locate the most likely situation of the US economy in **December 2008**.

- Negative GDP growth
- Negative inflation
- Natural rate of unemployment likely below  $6.7\%$



- c) Describe what are the main factors behind the evolution of the economy you have described from the situation in a) to b). Make sure to interpret it in terms of movements in IS, LM and/or FE.

**Answer:**

- Important fall in real estate prices → wealth effect on consumption → IS curve to the left
- Consumer confidence falling → IS curve to the left
- Liquidity crisis → money multiplier reduced → LM curve to the left
- Solvability concerns, systemic risk → fall in desired investment → IS curve to the left
- Investor confidence → fall in desired investment → IS curve to the left

- d) Based on your analysis up to now, explain the basis of the Fed's decision this week.

**Answer:**

- Economy operating below potential → desired to stimulate investment and consumption
- Bold move (around 100 basis bp cut) in an attempt to improve consumers and investors confidence

- e) The Fed stressed in its statement that it will continue to inject liquidity:

“As previously announced, over the next few quarters the Federal Reserve will purchase large quantities of agency debt and mortgage-backed securities to provide support to the mortgage and housing markets, and it stands ready to expand its purchases of agency debt and mortgage-backed securities as conditions warrant.”

Explain why lowering the Fed funds rate is not sufficient in the current environment and why there is a need for such liquidity injections?

**Answer:**

- Providing liquidity to respond to liquidity crisis: Reduction in money multiplier (because greater tendency to hold cash and fewer loans being made) means that a given injection of liquidity by the central bank does not

translate in the regular increase in the money supply. So central bank needs to inject liquidity in greater amount.

- Targeted balance-sheet intervention to address systemic risk and the fact that regular rate cut do not translate into commensurate reduction in key interest rates (such as mortgage and corporate rates).

After his election in 2008, President-elect Barak Obama announced the elements of an important fiscal stimulus package intended to revive the economy. An important part of the package was about infrastructure project. *The Economist* argued that there is indeed an infrastructure problem in the US, but that lack of money in the past is not the main source of this problem. Instead:

*“The greater problem is the lack of a strategy. No federal office oversees spending on infrastructure. Congressmen appropriate money for individual projects, a few of which are ludicrous (Alaska’s “bridge to nowhere”) and most of which bear no relation to each other. Cash for roads is given to states with few strings attached. “It is as close to a blank cheque as the federal government comes to writing,” says Robert Puentes of the Brookings Institution, a think-tank.”*

Let us consider two kinds of stimulus package:

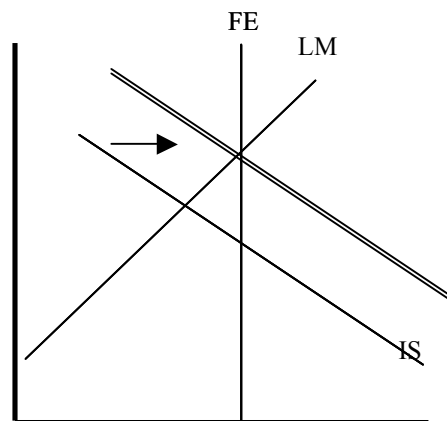
Package A: The “bridge to nowhere package”, where the infrastructure spending does not lead to any appreciable increase in capital (K) or total factor productivity (A), and does not change the labor supply,  $N^s$ .

Package B: A package that leads to desirable infrastructure projects being undertaken, which results in a permanent increase of A.

- f) Starting from the situation depicted in b), show the effect of package A on  $Y$ ,  $r$ , and  $\pi$ , both in the short and medium run. What happens to private investment in the medium run? Explain.

**Answer:**

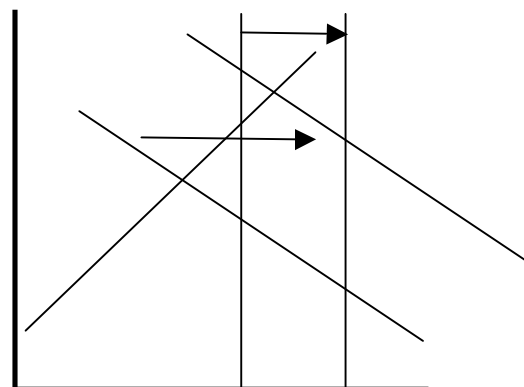
- The IS curve shifts right because of higher G.
- No effect in the short run on desired investment (since A not affected)
- No effect on FE curve (since A not affected)
- Private investment is lower (higher  $r$ ) in the medium run than it would otherwise be. Government expenditure crowds out private investment.



g) Going back to the situation depicted in b), show the effect of package B on  $Y$ ,  $r$ , and  $\pi$ , both in the short and medium run. What happens to private investment in the medium run? Explain.

**Answer:**

- IS curve shifts more (since A is affected and desired investment increases today)
- The potential of the economy increase (FE) since A is higher.
- Private investment is higher in the medium run (desired investment increases as a result of A and output is higher in the medium run). US



h) Explain which package (A or B) is more desirable and why.

Clearly package B. Package A short provides a short stimulus, but in the medium run there is no positive effect (especially if we think that private investment would have been more likely to increase A and K). On top of a stronger short term stimulus, Package B provides a medium term positive effect on economic activity,

Some commentators have linked stock market rallies to increased hope that the Obama administration will pass a large stimulus package.

*“Stocks rose around the world, sending the Dow Jones Industrial Average to a one-month high, as President-elect Barack Obama pledged to boost the economy with the biggest public-works spending package since the 1950s.”, Bloomberg, 12/8/2008*

- i) Based on the discounted cash flow model, explain which package (A or B) you would expect to have a stronger impact on stock prices.

The discounted cash flow model in real terms for stocks is given by:

$$P_t^{\text{Stock}} = RD_t / (1+r_t+\rho_t) + RD_{t+1} / (1+r_t+\rho_t) (1+r_{t+1}+\rho_{t+1}) + \dots$$

We can say that package B will have a stronger positive effect on stock prices: the reason is that the rise in total factor productivity (A) will lead to a larger impact on Y and hence real dividends RD. This higher Y will in turn lead to higher private saving, and therefore a smaller rise in r (relative to package A). Consequently, stock prices should rise more under package B.

- j) Based on the discounted cash flow model, explain which package (A or B) you would expect to have a stronger impact on government bond yields.

$$P_t^{\text{Bond}} = C_t / (1+r_t+\pi_t) + C_{t+1} / (1+r_t+\pi_t) (1+r_{t+1}+\pi_{t+1}) + \dots$$

Here, the impact is unambiguous: C is fixed, both r and inflation go up, so bond prices go down (yields go up). Under package B, the FE curve moves to the right and hence the rise in inflation is more limited. Also, in the medium run, interest rates should be higher under package A. Therefore, we expect yields to rise more under package A.

**QUESTION 6: PHILLIPS CURVE**

Suppose that the economy is in medium-run equilibrium with an inflation rate,  $\pi^*$  of 10% (0.10) per year and a natural rate of unemployment,  $u^*$ , of 5% (0.05). The expectations-augmented Phillips curve is

$$\pi = \pi^e - 0.5(u - u^*).$$

Assume that Okun's law holds so that a 1 percentage point increase in the unemployment rate maintained for one year corresponds to a 2 percentage point decrease in the output gap  $(Y - Y^{FE})/Y^{FE}$ . The central bank is planning to use contractionary monetary policy to reduce the inflation rate to 5% (from 10%), and it is willing to tolerate the unemployment rate rising to 7% for as long as it takes to accomplish this goal.

- a) Assume that inflation expectations adjust so that they are equal to the inflation rate of the past year, i.e., in any given year  $\pi_t^e = \pi_{t-1}$ . Assume that the Fed adjusts policy so that in the year after inflation hits 5%, unemployment returns to its natural rate.

Fill in the table below. How many years would it take for inflation to get to 5%? How large would the output gap be in each year? What would be the sacrifice ratio for this disinflation?

Time	Inflation	Expected Inflation	Unemployment rate	$u - u^*$	Output Gap
0	10%	10%	5%	0	0
1					
2					
3					
...					

- b) Suppose instead that inflation expectations fall more rapidly than the case in part (a). Would this increase or decrease the number of years needed to get inflation down to 5%? Would this increase or decrease the sacrifice ratio, compared to part (a)? Explain, making reference to the role of credibility of the central bank.



*Answers:*

- a. The central bank is willing to tolerate an unemployment rate of 7% to reduce inflation from 10% to 5%. According to Okun's law, when the unemployment rate is 7%, the output gap is  $-2(7\%-5\%) = -4\%$ . The inflation rate at the end of the first year is given by the Phillips curve:  $\pi = 10\% - 0.5(7\% - 5\%) = 9\%$ . In the second year, inflation expectations will thus be  $\pi_t^e = \pi_{t-1} = 9\%$ . Repeating these steps, we can fill up the following table:

Time	Inflation	Expected Inflation	Unemployment rate	$u-u^*$	Output Gap
0	10%	10%	5%	0	0
1	9%	10%	7%	2%	-4%
2	8%	9%	7%	2%	-4%
3	7%	8%	7%	2%	-4%
4	6%	7%	7%	2%	-4%
5	5%	6%	7%	2%	-4%
6	5%	5%	5%	0	0

It thus takes 5 years to reduce the inflation rate down to 5%. The output gap would be -4% in each year.

The sacrifice ratio is the total output lost (relative to potential) divided by the percentage point decrease in inflation, i.e.,

$$\text{Sacrifice ratio} = 5 (4\%) / 5\% = 4.$$

- b. If inflation expectations fell more rapidly, then the short-run Phillips curve would shift down more rapidly, and inflation would reach 5% faster. This would decrease the number of years required to reduce inflation down to 5%, and would reduce the sacrifice ratio compared to case a.

This illustrates the importance of credibility for the central bank. If the central bank is credible when it announces a lower inflation target, so that households and firms come to expect a lower inflation rate, firms that are setting prices are likely not to increase their prices too much. This will result in lower inflation.

## QUESTION 7: FISCAL AND MONETARY POLICY

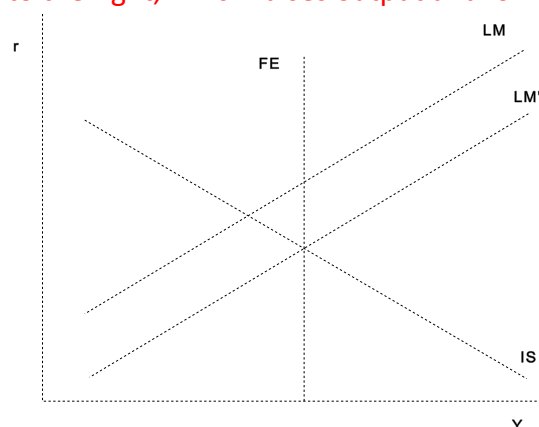
Read the article from the Wall Street Journal titled “Wrong Time for Tax Cuts” (10/31/91) available on the course website: Assume that the economy begins in a situation in which actual GDP is below the full-employment level of GDP.

- a) Show the effects on real output and interest rates of a lump-sum tax cut in the IS-LM-FE model. Would it help to increase output in the short run? Explain. What are the likely effects on national saving? Explain.
- b) Summarize briefly the argument in the article against using tax cuts to stimulate the economy in the short run.
- c) Show the effects on real output and interest rates of expansionary monetary policy in the IS-LM-FE model. Would it help to increase output in the short run? Explain.
- d) Summarize briefly the argument in the article in support of using monetary policy to stimulate the economy.
- e) Do these arguments apply to the 2001-2003 period in the U.S.? Summarize briefly any other advantages or disadvantages of tax cuts.

### *Answers:*

- a. Assuming that Ricardian Equivalence does not hold, a cut in taxes would raise disposable income for consumers and therefore raise desired consumption at any current level of GDP. This would shift the IS curve to the right and result in an increase in output and interest rates in the short run.
- b. While a tax cut would stimulate the economy and help pull the economy out of recession or promote recovery, there are substantial lags in implementing fiscal policy. In particular, it takes time for Congress to decide on and implement a tax cut; by the time the tax cut is implemented, output may very well have risen toward full employment on its own.
- c. Expansionary monetary policy is captured by an increase in the money supply relative to its previous path. An increase in money supply shifts the LM curve

to the right, which raises output and lowers interest rates in the short run.



- d. The article argues that monetary policy is a better tool for expanding the economy because it can be implemented more quickly and it can also react more quickly to changing economic conditions.
- e. Yes. These arguments apply to the 2001-2003 situation in the U.S. The Federal Reserve used expansionary monetary policy beginning in 2001, by lowering the federal funds rate, in order to help expand a slow economy. More recently, the Fed has been increasing the Federal Funds rate, but the rate is still relatively low (some argue that the rate should be pushed higher to avoid overheating the economy). We can also get a sense of the lag it takes to implement fiscal policy from the current situation: President Bush pushed for his new tax cut plan months before it got approved by Congress, and implemented.

**QUESTION 8: INTEREST RATE PARITY**

On January 26, 2000, the nominal interest rate paid on a three-month federal government Treasury bill was 5.340% in the U.S. and 5.034% in Canada. At those interest rates, international bond traders were indifferent between holding Canadian as opposed to US Treasury bills. Assume that uncovered interest rate parity holds

- a) Did the financial market expect the Canada-U.S. exchange rate to appreciate or depreciate over the next three months?
- b) On that date, one Canadian dollar could be purchased for 0.69046 US dollar. What did the market expect the exchange rate to be in three months?
- c) Three months later, on April 26, 2000, when the Treasury bills matured, one Canadian dollar could be purchased for 0.67613 US dollar. Had a Canadian saver purchased the US government Treasury bill back on January 26, what rate of return would he or she have earned?

Answers:

- a. They expected the Canadian dollar to appreciate (or the US dollar to depreciate).
- b. By using the exact formula :  $1+i^{CAN} = 1+i^{US} * E(e_{nom}')/e_{nom}$ , where  $i^{CAN} = 0.05034$ ,  $i^{US} = 0.0534$  and  $e_{nom} = 0.69046$ , we obtain  $E(e_{nom}') = 0.69247$ .
- c. Assume that the Canadian investor uses 1CAD to buy 0.69046USD T-Bill, based on the exchange rate of January 26, 2000. One year later, he or she will have 0.72733USD worth ( $0.69046 * 1.0534$ ), which now needs to be changed back to Canadian dollars. Based on an exchange rate of 0.67613, this corresponds to 1.07573CAD ( $0.72733/0.67613$ ). Hence, the realized return is 7.573% (the initial 1CAD invested yielded 1.07473CAD).

## QUESTION 9: INTEREST RATE PARITY

The Financial Times was reporting on April 25<sup>th</sup>, 2006 that “US investors pour in \$68bn as they seek profit overseas”. According to, Stuart Schweitzer, a JP Morgan global investment strategist, part of this phenomenon is due to expectations about the future behavior of the \$US. To justify this increased investment outside the US, are investors betting that the US dollar will appreciate or depreciate in the future?

*Answer :*

To compare the return on US or foreign investment, we need to value both in terms of the same currency, in this case US\$:

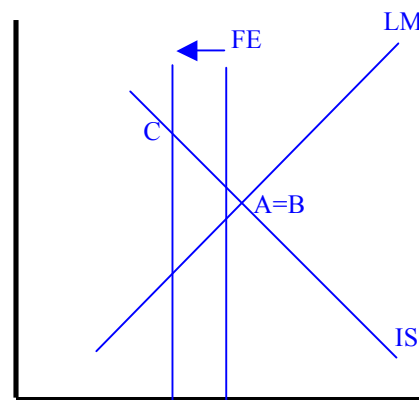
Investing \$1 in the US results in  $\$(1+i)$  in one year from now. While investing abroad results in  $\$(1+i_{FOR}) e / E(e')$ . Therefore, a depreciation of the US dollar (a decrease in  $E(e')$ ) makes foreign investment more attractive.

## QUESTION 10: ECONOMIC CONSEQUENCES OF RECORD HIGH OIL PRICES IN THE US

- a) In the IS-LM-FE diagram, locate the most likely situation of the US economy in the **first quarter** of 2006. Label this point with 'A'.

*Answer: There is no unique answer here as there is uncertainty as to where exactly is the US economy compared to its potential. What is important is that the IS-LM intersection should be close to FE. Most likely it is to the right of FE. Why? Because the unemployment rate is low and probably on or below the natural rate. Moreover, inflation has been moving up slightly but still not far from 2%.*

US



- b) Last week, oil prices have reached record high levels.

*The rise in oil prices, which ended with a \$5 jump this week alone, came amid heightened concerns over Iran's nuclear program, interruptions in Nigeria's oil production and fresh fears about gasoline shortfalls in the United States this summer.*

*While yesterday's price was the highest reached on the New York Mercantile Exchange since oil futures began trading there in 1983, it is still lower than the inflation-adjusted record reached in 1981 of about \$85 a barrel in today's dollars. But it's getting close.*

*Crude oil for June delivery rose to \$75.17 a barrel, up \$1.48. Futures touched an intraday trading high of \$75.35 a barrel. Oil prices, up 23 percent this year, have more than doubled in two years. (NYT, 4/22/06)*

- i. Assume that the oil price increase is temporary (but will last sufficiently long for overall prices to adjust). Starting from point 'A', the situation you depicted in a), show the effect of these new developments in the IS-LM-FE diagram. Label the short run equilibrium with 'B'.

**Answer:** *Oil price shocks depress the ability of firms to produce and thus reduce their profit maximizing level of production. An oil price shock can thus be interpreted as a drop in total factor productivity (A) hence shifts the FE curve to the left. If the oil price shock is temporary (as is assumed here), there is no effect on the IS curve. In fact, there is no effect on the desired investment curve and on the saving curve (for given level of output). In addition, to the extent that the general level*

*of prices is not immediately affected by the rise in oil prices, the LM curve does not move, for constant money supply. As a result, the short-run equilibrium (B) is at the same point as the initial equilibrium (point A).*

*[Note that one could alternatively assume that the rise in oil prices increases  $P$  slightly in the short run, thereby shifting the LM curve up slightly.]*

ii. Locate the medium run equilibrium and label it with 'C'. Explain the effect of the oil price shocks on output in the medium run.

***Answer:** In the medium run, prices tend to increase as equilibrium output ( $Y$ ) -- given by the intersection of the IS and LM curve -- lies to the right of the FE curve. As prices increase, the LM curve shifts to the left, thereby resulting in a lower level of output.*

c) If the developments highlighted so far are the dominant forces driving the economy over the next months, how do you think the Fed should react?

***Answer:** The Fed's main objectives involve maintaining stable prices and stable economic activity. As the FE curve moves to the left and prices tend to increase, the Fed should NOT respond to these recessionary forces by easing monetary policy (i.e. increasing the money supply). In fact this is exactly the mistake that the Fed made in the 1970s in response to oil price shocks. By trying to prevent output from falling toward the new FE curve, the Fed would contribute to raising inflation more. Inflation would in fact continue to increase as long as the Fed prevents output to reach the new FE curve.*

*Instead, the Fed should mitigate the effect of the oil price shock on inflation and would need to reduce money supply to achieve that. This would involve a shift to the left of the FE curve.*

d) As the stock, bonds and foreign exchange markets learn about higher oil prices, how do you expect them to react?

***Answer:** As the financial markets learn about the oil price shock, they realize that, relative to their earlier expectations, output is going to be lower at least for some time, the real interest rate will be higher and that inflation may be higher. This implies that the nominal interest rate ( $i$ ) will also be higher than initially expected.*

*The asset prices should thus respond as follows:*

- *A higher expected future nominal interest rate (than expected) should depress bond prices (from bond pricing equation and since coupons are fixed)*
  - *Stock prices should fall because of lower expected dividends (numerator) and higher expected future real interest rates (denominator)*
  - *The US \$ could go in either direction depending on how US interest rates change relative to foreign interest rates. If US interest rates are expected to increase more than foreign interest rates, this should lead to an appreciation of the US \$.*
- e) If the higher oil prices eventually became perceived as being permanent, how would your analysis in b) change? Would that change your assessment of how the Fed should respond?

***Answer:** Following a permanent reduction in total factor productivity, the expected future MPK is reduced. This lowers the desired investment, thereby shifting the IS curve down. So following an oil price shock, both the FE and IS curves shift left.*

*In this case, an easing of monetary policy might be justified if the IS curve shift is more important than the FE curve shift, as that would bring equilibrium output below the new FE curve.*

**QUESTION 11 – THE GREAT RECESSION**

The US still experiences a very high level of unemployment rate following the severe downturn of the last few years.

Consider the following comment by an analyst: “Everyone talks about the economy being down because of some shock to aggregate demand. Instead, the lack of any significant improvement on the unemployment front indicates to me that the problem is more structural and that the US economy was just hit by a large negative supply shock. In other words, get used to it!”

- a) Do you agree with this statement? Explain the basis for your answer, using the IS-LM-FE graph if possible.

It is unlikely for a few reasons. First, the recession came abruptly, suddenly, and severely. In the IS-LM-FE framework, a negative supply shock means a leftward shift of the FE curve. In the short run, it does not have a lot of impact on output, only once prices start to adjust. So it would be difficult to understand why the recession was so sudden. But more importantly, the model predicts that prices will actually be rising faster after this negative supply shock, while in reality we saw inflation falling.

Let’s now turn our attention to the Phillips curve and continue to analyze this potential supply shock.

- b) Imagine that the economy was indeed hit by a negative productivity shock that affected the natural rate of unemployment. Assuming for now that inflation expectations are unchanged in the short run, show what happens to the long-run and short-run Phillips curves (i.e. LRPC and SRPC). (*Hint: look at the equation for the short-run Phillips curve:  $\pi_t = \pi^e - h(u_t - u^*)$ ).*

So imagine that the SRPC was initially crossing the LRPC at an inflation level of 2.5%. Suppose also that the natural rate of unemployment was around 5% back then. Now, a negative supply shock happens, raising  $u^*$  to, say, 7%. The LRPC moves right to its new position. If inflation expectations are unchanged, it also means that the SRPC will shift right by 2 percentage points, so that it once again crosses the LRPC at an inflation rate of 2.5%.



The same commentator continues his article by saying: “Consequently, the massive amount of liquidity injected by the Fed in the economy will only result in rising inflation over the next few years.”

- c) Once again using the Phillips curve graph, show what eventually happens if the Fed continuously tries to lower the unemployment rate back to its pre-recession level, in the belief that the economy had instead been hit by a negative demand shock.

So imagine the Fed wants to bring back unemployment to 5%, its pre-recession level. By doing so, the economy moves left along the SRPC. Unemployment is down under its natural level, inflation hence rises. Eventually, as the Fed keeps doing that, inflation expectations rise, lifting the SRPC up.

Hence, by continuously trying to lower  $u$  below  $u^*$ , the SRPC keeps going up, meaning that inflation keeps rising.

For the rest of this question, assume that the economy was in fact hit by a large aggregate demand shock.

In order to stabilize and lift the economy, the US government implemented a massive fiscal stimulus over the last two years. Most of this stimulus is set to expire before the end of the year. Some commentators are worried that this could lead to a double-dip recession, i.e. that output may start falling again in a quarter or too. For example, Goldman Sach’s Jan Hatzius has lately been one of the proponents of this scenario.

- d) Start with a negative output gap for the US economy at the end of 2008. Then consider that a fiscal package (rise in  $G$ ) was implemented for 2009 as well as 2010. Using the IS-LM-FE graph, show the evolution of the economy in 2009 (before prices adjust) and 2010 (as prices started to adjust). Indicate the equilibrium in each year by three well-marked points (“2008”, “2009” and “2010”).

In 2009, the IS curve is more to the right than it was in 2008, thanks to the higher  $G$ . The economy is therefore closer to FE (but it should still be a negative output gap, actually very large as we know right now).

In 2010, IS remains at the same position. Prices however started falling, which means LM moves somewhat to the right. This reduces even more the negative output gap.

- e) Now imagine that in 2011,  $G$  falls back to its pre-recession level. What would be the result according to your graph? Does that seem to support Haniutz's fears regarding a fall in output and the possibility of a double-dip recession?

IS returns to its 2008 level. Even if prices continued to adjust somewhat and LM shifted a little more to the right, it still is very possible that output is now lower than it was in 2010. This appears to support Haniutz's fears.

- f) Imagine that today the government in a surprise move announces that it will maintain its stimulus package for a few more years, instead of letting it expire as originally thought (probably because congressmen do not have the courage to scale it back...). As the market learns the new developments, what do you expect the effect will be on both short-term (for example 3-month Treasury bills) as well as long-term interest rates (for example 5-year government bonds)? (*Hint: compare the likely expected path of short-term interest rates before and after the announcement by incorporating the likely reaction of monetary policy*).

So IS does not return to its 2008 level after all. From the point of view of the Fed, it means that it won't have to keep interest rates as low as the markets initially expected them, since fiscal policy is now supposed to remain expansionary for a while. Consequently, the expected path of future short-term rates is now higher. We can therefore expect rates across the board to go up, and longer-term rates probably more so.

## QUESTION 12: TFP AND IS-LM-FE

- a) According to the IS-LM-FE model, what is the effect of a permanent increase in total factor productivity on output, the real interest rate, employment, and the price level in the short run? Assume that the Fed holds the nominal money supply constant and that the economy is originally in general equilibrium. Label the initial point 'A' and the short-run equilibrium 'B' in the IS-LM-FE diagram
- b) What is the short run effect of a permanent increase in total factor productivity on consumption, savings, investment, and equilibrium real money demand?
- c) What is the medium run equilibrium? Label the medium-run equilibrium 'C'.
- d) Compare the medium-run levels of consumption, savings, investment, and equilibrium real money demand in the initial and short run equilibria.
- e) What is the short-run equilibrium if the Fed intervenes optimally?

## Answers:

- a. We start in point A in the Figure below. Following a permanent increase in total factor productivity, the FE curve shifts to the right to FE'. As future total factor productivity is expected to be higher, the future marginal productivity of capital ( $MPK^f$ ) is also expected to be higher. As a result the desired capital stock  $K^*$  increases and desired investment increases (for any given level of interest rate). This is illustrated in the IS-LM-FE diagram by a shift to the right of the IS curve to IS'. As the IS curve shifts right and the LM curve remains unchanged, equilibrium output (Y) increases and equilibrium interest rate (r) increases in the short run (point B).
- b. The increase in output (Y) positively affects consumption but the increase in interest rate (r) has a negative effect. We know that output has bigger effect in Consumption than interest rate, so we expect Consumption to increase. The moved in the IS was due to an increase in the demand for investment. In equilibrium investment is equal to savings; we can therefore conclude that savings also increase. Finally, prices are sticky in the short run and the Fed did not change money supply. It follows that the real money supply is constant, which is equal to real money demand in equilibrium.
- c. Whether prices increase or decrease as we move from the short run to the medium run depends on whether the IS curve has shifted more or less than the FE curve in the short run. A likely case is that the IS curve shifts less than the FE curve in the short run. In that case, equilibrium output is below full-employment output, so that prices should tend to decrease as we move from the short run equilibrium (point B) to the medium run equilibrium (point C). As prices go down, the LM curve shifts to the right to LM' until output eventually reaches  $Y^{FE}$ . This rightward shift of the LM curve also allows the real interest rate to decline relative to point B. The comparison with point A is ambiguous.
- d. Consumption mainly follows output (Y) and therefore increases relative to points A and B. As interest rates go down between points B and C, equilibrium investment level increases. Since investment is equal to savings in equilibrium, we can conclude that savings in medium run equilibrium (point C) are larger than in the short run equilibrium (point B). Finally, as prices decreased between the short run and medium run equilibrium, the real money supply increased between points B and C.
- e. The Fed can push the economy towards general equilibrium (point C) in the short run by increasing nominal money supply. Then, the increase in real money supply (movement in the LM towards LM') is achieved without relying on the slow reaction of prices.

**QUESTION 13 : DETERMINANTS OF INFLATION**

In a commentary in *The Wall Street Journal* (7/20/07) entitled “A Rise-able Fallacy”, it was argued that the idea that economic growth might generate inflation made no sense:

*The idea that an increase in economic growth leads to an increase in inflation -- and that decreased growth reduces inflation – is reflected endlessly in the media. (...) This makes no sense. (...) All other things being equal, an increase in economic growth must cause inflation to drop, and a reduction in growth must cause inflation to rise.*

a) The author explains the basis of this claim as follows:

*Here's why. Inflation, as the old saying goes, is caused by too much money "chasing" too few goods. Just as more money means higher prices, fewer goods also mean higher prices. The connection between the level of production and the level of prices also holds for the rate of change of production (that is, the rate of economic growth) and the rate of change of prices (that is, the inflation rate).*

Based on your understanding of the determinants of inflation explain in what context this reasoning is valid (Hint: What is the relationship between long run inflation and real GDP growth?)

- *In the long run, we know that  $\pi = \% \Delta M - \% \Delta Y$ . The meaning of that equation is that sustained inflation is the result of money supply growing faster than economic growth. This was the basis of our understanding of hyperinflation in Argentina.*
- *Clearly from this equation, if GDP growth increases and the growth of money supply is constant, this will reduce inflation.*
- *So in the long run, the author's assertion makes absolute sense, at least to the extent that growth is not accompanied with faster money growth.*

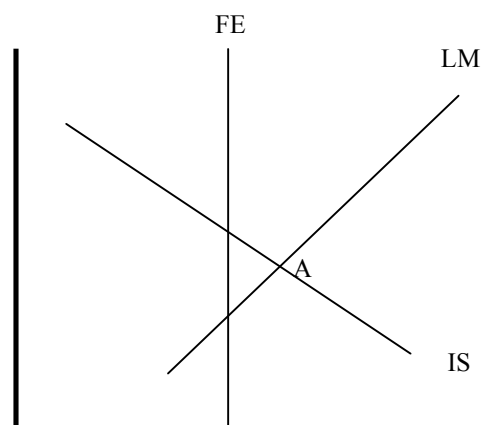
b) Yet, the People's Bank of China – the Chinese central bank – is worried that the fast economic growth the country is experiencing will create inflationary pressures, so much so that they have decided to increase interest rates:

*These developments [i.e. the tightening of Chinese monetary policy] underscore how China's economy, growing at a rate of more than 11% this year, is continuing to barrel ahead, providing support to global growth at a time of*

*increasing uncertainty. Indeed, authorities are still more concerned with addressing the problems presented by China's breakneck expansion than with avoiding the kind of financial freeze that now concerns policy makers in the U.S., Europe and Japan. (WSJ 8/21/07)*

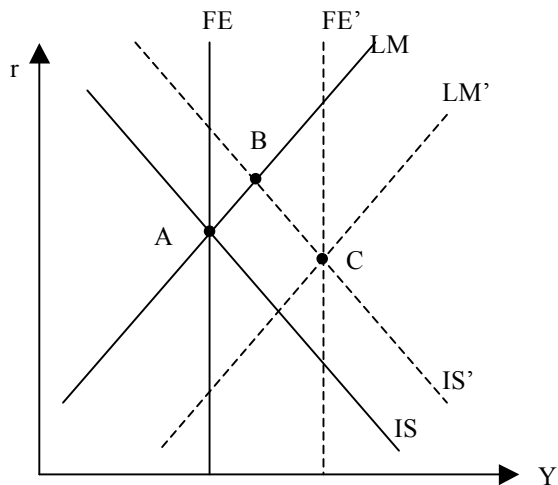
How can you justify this choice by the People's Bank of China? How can you reconcile this with your answer in a?

- *Clearly, the People's Bank of China thinks that there is a risk that fast growth can be inflationary. This is in fact completely consistent with our understanding of the short behavior of the economy based on the IS-LM-FE analysis.*
- *In the short run, since prices are fixed, growth can be driven a surge in aggregate demand (IS-LM) that is not accompanied by an equivalent increase in aggregate supply (FE). This would lead to situation like "A" in the graph below. Eventually, firms will find this level of production unsustainable and will start increasing their prices, which will generate inflation.*
- *The answers in a. and b. can be reconciled once we make a distinction between the short run and the long run determinants of inflation.*



c) Based on your answers in a. and b., how would react to the author's assertion that the idea that fast economic growth generates inflation "makes no sense."

- *The author's fails to distinguish between the short run and long run determinants of inflation. By the same the same token, he does not acknowledge that in the short run there is a distinction between growth driven by aggregate demand and growth driven by aggregate supply.*
- *This assertion is thus at best misleading, especially when made in reference to a central bank preoccupation with too rapid economic growth.*



**QUESTION 14: IS-LM-FE**

*“While consumers and governments struggle with steep oil prices, one of the biggest questions looming over the global economy is this: Will costs ever come down? Unlike the energy crisis of the 1970s, when the world assumed the spike was temporary, high energy prices could be here to stay, according to oil experts.”, AP, 06/12/2008*

Use the IS-LM model to analyze the general equilibrium effects of a permanent increase in the price of oil (a permanent adverse supply shock) on current output, employment, the real wage, national saving, consumption, investment, the real interest rate, and the price level. Assume that, besides reducing the current productivity of capital and labor, the permanent supply shock lowers both the expected future MPK (marginal product of capital) and households’ expected future incomes. (Assume that the rightward shift in labor supply is smaller than the leftward shift in labor demand.) Show that, of the real interest rate rises at all, it will rise less than in the case of a temporary supply shock that has an equal effect on current output.

*Answer:*

The increase in the price of oil reduces the marginal product of labor, causing the labor demand curve to shift to the left from ND1 to ND2 in Figure 1. Since households’ expected future incomes decline, labor supply increases, shifting the labor supply curve from NS1 to NS2 (but by assumption, the shift to the left in labor demand is larger than the shift to the right in labor supply). At equilibrium, there is a reduced real wage and lower employment. The productivity shock results in a shift to the left of the full-

employment line from FE1 to FE2 in Figure 2, as both employment and productivity decline. Because the shock is permanent, it reduces future output and reduces the future marginal product of capital, both of which result in a downward shift of the IS curve. The new equilibrium is located at the intersection of the new IS curve and the new FE line. If, as shown in the figure, this intersection lies above and to the left of the original LM curve, the price level will increase and shift the LM curve upward (from LM1 to LM2) to pass through the new equilibrium point. The result is an increase in the price level, but an ambiguous effect on the real interest rate. Since output is lower, consumption is lower. Since the effect on the real interest rate is ambiguous, the effect on saving and investment are ambiguous as well, though the fall in the future marginal product of capital would tend to reduce investment.

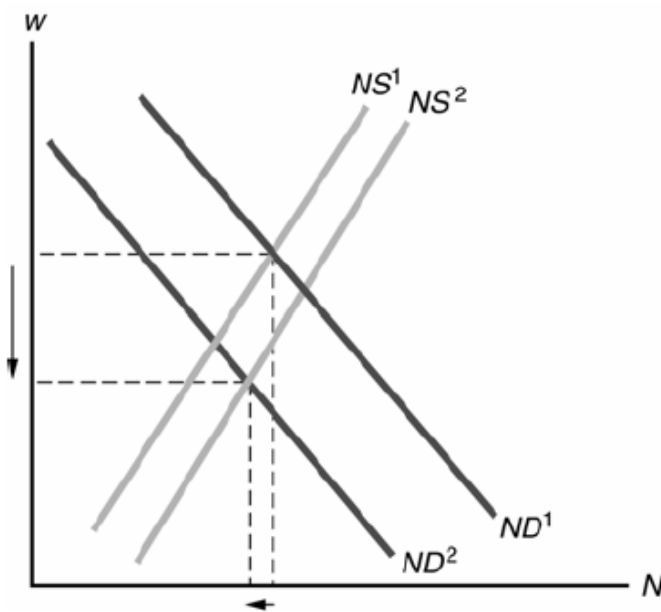


Figure 1

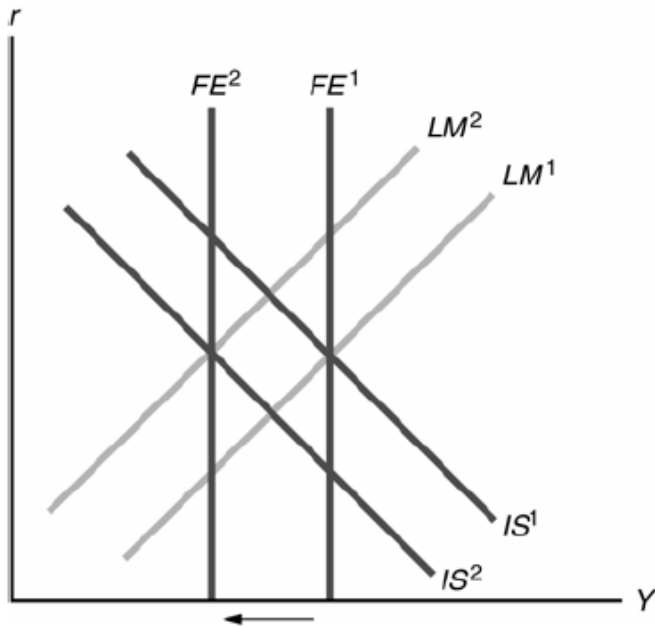


Figure 2

The result is different from that of a temporary supply shock; when the shock is temporary there is no impact on future output or the marginal product of capital, so the IS curve does not shift. In that case the price level increases to shift the LM curve up and to the left from LM<sup>1</sup> to LM<sup>2</sup> in Figure 2 to restore equilibrium. In that case, the real interest rate unambiguously increases. Under a permanent shock, the IS curve shifts down and to the left, so the rise in the real interest rate is less than in the case of a temporary shock, and the real interest rate can even decline.

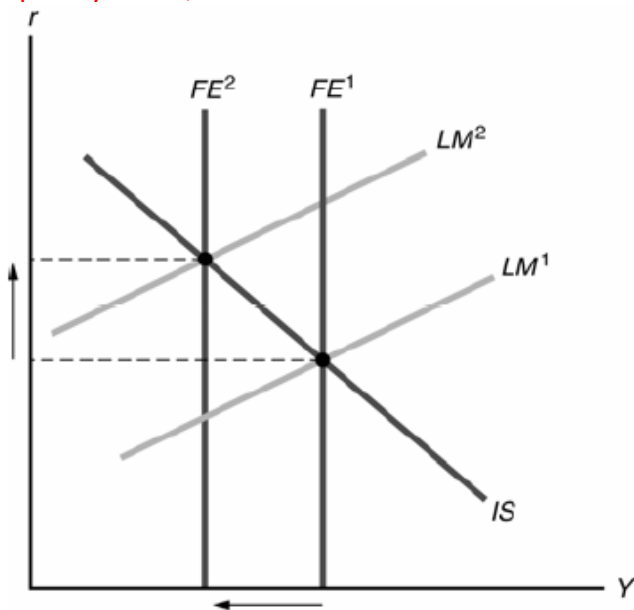


Figure 3



## QUESTION 15: GREENSPAN AND ASSET PRICES

Some economists have recently argued that the expansionary monetary policy of the Fed under Greenspan's helm was to blame for the rise in US stock prices at the end of the 1990s as well as the housing bubble of the last 15 years.

Show how an expansionary monetary policy can explain a rise in stock prices. To support your answer, use both the IS-LM-FE framework as well as the discounted cash flow model in real terms (we did a similar type of exercise when discussing the Big News case).

Expansionary monetary policy corresponds to a shift to the right of the LM curve. This results in lower interest rates as well as higher  $Y$ , at least until the economy returns to general equilibrium.

The discounted cash flow model in real terms for stocks is given by:

$$P_t^{\text{Stock}} = RD_t / (1+r_t+\rho_t) + RD_{t+1} / (1+r_t+\rho_t) (1+r_{t+1}+\rho_{t+1}) + \dots$$

Clearly, since  $RD$  follows  $Y$  over the cycle and  $r$  falls, we expect stock prices to rise.

## QUESTION 16: FIXED EXCHANGE RATE REGIME

Explain why countries involved in a fixed exchange rate regime have to follow the same monetary policy.

If the exchange rate between two currencies is fixed and it is expected to be maintained –i.e.  $e=E(e')$ –, then, from the interest rate parity condition, it has to be that their interest rates are also equal:  $(1+i) = (1+i_{\text{FOR}}) e/E(e')$ .

Another possible answer: To maintain the exchange rate fixed, the Central Bank intervenes in the currency market by exchanging reserves for domestic currency. Money supply is therefore consistent with the targeted exchange rate and not with an independently targeted interest rate.

All of the arguments above assumed free capital flow. If the flow of capital is restricted, it is possible to fix the exchange rate and retain some control over monetary policy (this part is not required for full credit).

**QUESTION 16: PHILLIPS CURVE IN ARGENTINA**

Inflation in Argentina increased again in 2009, running at an annual rate of about 12%. Inflation expectations are however lower at about 8%. The unemployment rate lies at 14%. The Argentinean government has made clear that it won't tolerate an increase in the unemployment rate beyond the current level in the future.

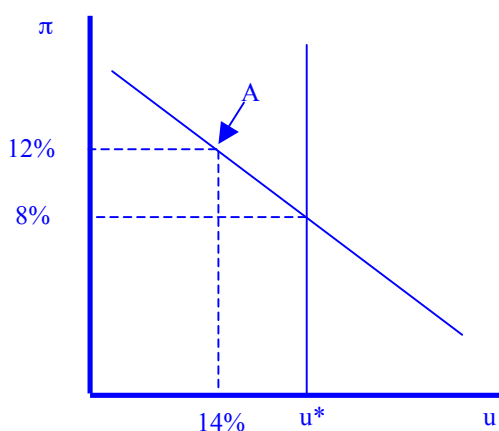
- a) Based on this information and the inflation expectations augmented Phillips curve, is the current unemployment rate higher or lower than the natural rate of unemployment in Argentina?

The expectations-augmented Phillips curve takes the form  $p = p^e - h(u - u^*)$ . As inflation is higher than inflation expectations ( $\pi > \pi^e$ ) this implies that the unemployment rate must be lower than the natural rate of unemployment ( $u < u^*$ ).

- b) How does the current level of real output compare to the full employment of output? Explain briefly.

From Okun's law we have:  $(Y - Y^{FE})/Y^{FE} = -2(u - u^*)$ . This implies that when  $u < u^*$ , output must be higher than the full-employment level of output (i.e., we must have:  $Y > Y^{FE}$ ).

- c) In a diagram, draw the short term Phillips curve and indicate with the letter A the current situation.



d) Assume that the central bank will adjust money supply so as to maintain an unemployment rate of 14%.

i) How do you expect inflation to evolve in the next couple of years? Explain carefully.

To maintaining unemployment below the natural rate, the Argentinean central bank needs to increase money supply fast enough to maintain economic activity above potential output ( $Y^{FE}$ ). In the IS-LM-FE model, this means that the money supply must grow sufficiently fast for the IS and LM curve to cross at the right of the FE curve.

This means that inflationary pressures are building up, and thus that inflation should increase in the next couple of years.

ii) How would inflation expectations evolve?

As inflation remains higher than expectations, the private sector will eventually adjust its expectations upward. We would thus expect inflation expectations to go up.

Note that this would correspond to an upward shift of the short-term Phillips curve.

iii) Based on your answer to the part i), and assuming that inflation in the US remains fairly stable over the next few years, how do you expect the Peso/\$ exchange rate to evolve in the next few years?

Over the course of a few years, relative PPP holds. Relative PPP states that  $\%De_{nom} = \pi^{FOR} - \pi$ . Based on this, as Argentinean inflation increases, the peso should depreciate with respect to other currencies, such as the US \$.

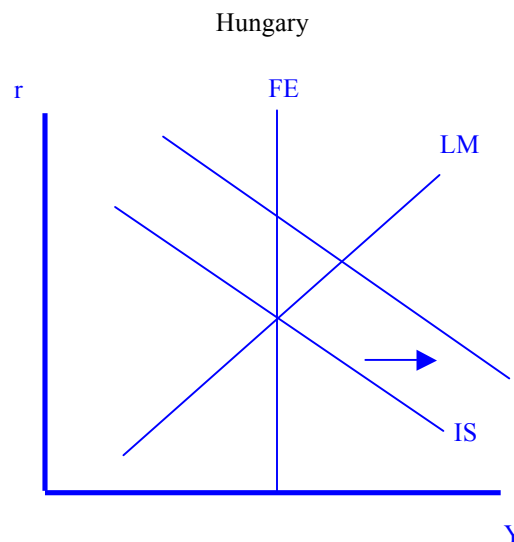
## QUESTION 16: BUDGET DEFICITS, CURRENT ACCOUNT AND EXCHANGE RATES

Hungary was running very large budget deficits in the middle of the 2000s: “The fiscal deficit [in Hungary] based on EU accounting rules hit 6.1 per cent of GDP last year and is on track to exceed 8 per cent this year.” (FT 4/19/06). This raises various concerns about the prospect for its economy in the short run.

a. Using the IS-LM-FE, explain the short run effect of the increase in fiscal deficit on output and interest rate in Hungary. **Explain.**

An increase in the fiscal deficit is caused by either reduction in taxes, which results in higher consumption, or increase in government expenditure. In either case, aggregate savings are lower and aggregate demand is higher (shift IS to the right).

In the Short Run, output increases following the expansion in aggregate demand, and interest rate is higher.



b. During the same period, Hungary’s current account balance deteriorated. In 2005, its current account deficit amounted to 7.5% of GDP in 2005. Based on your answer in a., can the increased budget deficit be a reason behind its large current account deficit? **Explain.**

An increase in budget deficit can be a reason behind the current account deficit. Higher output tends to increase imports. And higher interest rate tends to appreciate the currency, which results in higher imports and lower exports.

A valid answer could be in terms of National Accounting, Expenditure Approach. In an open economy, when national savings decrease, investment is partly financed by increase capital inflows, that is current account deficit:  $S_{priv} + S_{gov} - I = NX$

c. As a result of these imbalances, “Several analysts have pointed to turmoil in Iceland and New Zealand, saying Hungary is next in line to suffer a currency slide if funds continue to withdraw from emerging markets.” (FT 4/19/06).

i. Assume that today foreign investors suddenly find it very likely that the forint (Hungarian currency) will *eventually* depreciate, what would be the implication for the Euro/forint exchange rate today? Make sure to explain the basis of your answer.

If foreign investors expect a future depreciation (decrease in  $E(e')$ ), they would find current return on Hungarian investment lower than on foreign investment:

$$(1+i_{\text{HUN}}) < (1+i_{\text{FOR}}) e / E(e')$$

They would withdraw funds from the Hungarian market, which provokes an immediate depreciation of the currency (decrease in  $e$ ). The interest rate parity condition is restored:

$$(1+i_{\text{HUN}}) = (1+i_{\text{FOR}}) e / E(e'),$$

ii. Hungary is currently under an exchange rate band regime, where the central parity, which is pegged to the euro, is 282.36 forint/euro. (Note: This is the way the exchange rate is quoted in Hungary. If this number goes up, that means that the value forint depreciates). The market exchange rate may deviate from the parity within the +/-15 percent fluctuation band, which implies that it cannot go above 324.71 forint/euro. If the forint/euro exchange rate were to get close to this upper bound, what would the Magyar Nemzeti Bank (the Hungarian central bank) have to do to prevent violating the exchange rate they band it is committed to? What would be the consequences for output?

To prevent further depreciation of the forint, the Central Bank of Hungary will have to conduct contractionary monetary policy in order to increase domestic interest rate. Then, the interest rate parity condition could be restored with a higher exchange rate.

This contractionary monetary policy (LM shifts to the left) would have a negative effect on output.