

Exercise Pack

PRACTICE QUESTIONS WITH ANSWERS

Macroeconomic Environment (51-852-02)
MBA HEC Montréal

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N.B.:

- This exercise pack is a companion to the course Macroeconomic Environment (51-852-02).
- 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.

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TRUE/FALSE/UNCERTAIN QUESTIONS

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

- a) Between 2005 and 2006, the GDP of Japan calculated using year 2000 prices increased at a rate of 2.3%, while GDP computed with current prices rose by 1.2%. We can hence conclude that Japan experienced an inflation rate of only 1.1% over this period.

False. Since real GDP grew faster than nominal GDP, it must mean that prices actually fell over that period of time. In other words, inflation was actually equal to -1.1%.

- b) The important stock market decline that we have experienced in the U.S. since the beginning of the year should contribute to reduce national saving.

False. This is a negative wealth which should lead to a rise in saving.

- c) A recession in the U.S. is defined as two consecutive quarters of negative real GDP growth.

False. This is a rule-of-thumb, this is not the definition. Recessions are not defined solely in terms of real GDP. They are determined by the NBER Business Cycle Dating Committee, who seek to determine broad movements in many economic indicators. For instance, the last recession in the U.S. did not have two consecutive quarters of real GDP growth.

- d) Over the past twenty years the U.S. net foreign asset position has deteriorated, and the U.S. has gone from being a net creditor to the rest of the world to being a net debtor. This implies that over these past twenty years the U.S. has, on average, been running a capital and financial account deficit.

False. The CA and KFA both need to be going in opposite directions. In this case, there was a CA deficit but a KFA surplus.

- e) In 2007, production of Bombardier (a Canadian company) made in Ireland contributed both to the Canadian GDP and to Irish GDP for that year.

False. It will not contribute to Canadian GDP as it was not carried on Canadian soil.

- f) “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.”¹

False. On the basis of the quantity theory of money, $\pi = \% \Delta M - \% \Delta Y$. Hence, according to this equation, a fall in the growth rate of Y leads to higher inflation. Intuitively, this simply means that the circulating stock of money is “chasing” a smaller quantity of goods and services.

- g) Between 2000 and 2001, nominal GDP growth in Turkey was 44.63% with inflation at 51.85%. These measures imply that Turkey had a real economic expansion during that year.

False. The GDP deflator, which is an index of prices for the entire production, is computed as Nominal GDP/Real GDP. Taking growth rates: $\% D \text{ Deflator} = p = \% D \text{ Nominal GDP} - \% D \text{ Real GDP}$. The growth rate of inflation in Turkey was 51.85% and the growth rate of nominal GDP was 44.63%. The growth rate of real GDP is therefore: $\% D \text{ Real GDP} = \% D \text{ Nominal GDP} - p = -7.22\%$. That is, Turkey had an economic contraction during that year.

- h) Between January 2002 and January 2012, the Japanese Consumer Price Index (CPI) decreased by 1%, while the US CPI rose by 28%. This should imply that the yen appreciated relative to the US dollar over the same period.

True. Long run exchange rates are determined according to inflation differentials with $\% \Delta e_{nom} = \pi^{FOR} - \pi$. Therefore, if Japan is the home country and inflation in the US exceeds inflation at home, it follows that $\% \Delta e_{nom} > 0$ so that the Japanese yen appreciated relative to the US dollar.

- i) Between April and May 2011, nominal interest rates on 10-year US Treasuries fell by 0.3 percentage point, while 10-year inflation expectations from the Thomson Reuters/University of Michigan survey fell by 0.5 percentage point. This implies that the 10-year real interest rate decreased over the same period.

False. The real interest rate equals the nominal interest rate minus expected inflation. Therefore, the change in the real interest rate equals the change in the nominal interest rate minus the change in expected inflation. If the nominal interest rates fell by less than expected inflation, then the real interest rate necessarily rose.

¹ From “A Rise-able Fallacy” by David R. Henderson. A commentary published in the Wall Street Journal, July 20, 2007, page A12.

- j) Suppose that job growth exceeded population growth last month in the United States. This would imply that the U.S. unemployment rate fell in the same month.

Uncertain. The unemployment rate measures the number of individuals looking for work as a fraction of the total number of individuals in the labor force (i.e., individuals with jobs and those looking for work). This means that even if the total number of jobs rises, one cannot know what happens to the unemployment rate since that also depends on the total number of individuals looking for work which could increase or decrease.

- k) In 2005, China's national savings were 49% of GDP with private savings representing 51% of GDP. These measures suggest that the Chinese government ran a public sector deficit in 2005.

True. We know that national savings equals private savings plus public savings. Since national savings is exceeded by private savings by 2%, it must be that public savings are -2% so that the government is running a public deficit of 2%

- l) AIR Worldwide, a catastrophe-risk modeling firm, estimated that Japan's economic losses from the earthquake and tsunami could pass \$30 billion, mainly due to the destruction of the capital stock (e.g., private houses and infrastructure). According to the Solow model seen in class, such a catastrophe should result in a lower steady state level of income per capita.

False. According to the Solow model, if there is no change in the investment rate, population growth, or depreciation, then there is no change in the steady state level of income per capita. Therefore, while the earthquake temporarily reduces income per capita, the level of income per capita eventually returns to its original point.

- m) Since 2005, France has been running sustained current account deficits. This implies that France is a net debtor to the rest of the world (i.e., the value of its liabilities to the rest of the world exceeds the value of its assets held in the rest of the world).

Uncertain. Assets and liabilities are stock variables whereas the current account deficit is a flow variable. The flow variable only indicates the change in the stock but not whether the stock is positive or negative, and either case is possible. In fact, France holds negative net national debt (i.e., positive net foreign assets)

and it has been increasing this debt (i.e., running down its assets) by running sustained current account deficits.

- n) It is argued that consumption was one of the main engines behind U.S. growth over the last twenty years. Recently, the U.S. personal saving rate has been rising from about 1% to close to 6%. This new development, if sustained, is therefore likely to lead to lower output per capita in the long run.

False. A rise in the personal saving rate should lead in the long run to a higher level of K/N , hence a higher level of Y/POP (all else being equal).

ESSAY QUESTIONS

QUESTION 1 - INFLATION AND INTEREST RATE

In an interview back in 2008, the governor of the Bank of Canada, Mark Carney, was asked whether a recession in Canada was possible. He answered:

"We are predicting very marginal growth in 2009. By definition that's close to negative growth, and if we have a balanced forecast you can see it going either side, so it's a possibility." (Bloomberg, 10/11/08)

This statement was interpreted by some analysts as suggesting that further interest rate cut are likely in the coming months. Given that the overnight rate is now at 2.25%, there is a possibility it might be lowered to 2% at the next meeting and maybe lower after.

- a) Assuming you agreed with these analysts, and assuming that inflation will be maintained close to its target of 2%, what would this imply about the real interest rate in Canada over the following months?
- Should use definition of real interest rate: $r = i - \pi^e$.
 - So if i is lower than π^e , the real rate is negative.
 - Answer should say something to the effect that what matters is expected inflation. The central bank target could be a good proxy for expected inflation.
 - So if $\pi^e = 2$ and i falls below 2, that would imply that real rate are expected to become negative over the coming months in Canada.

b) Michael Gregory, a senior economist at BMO Capital Markets in Toronto, said: “it would cross ‘a very important line’ for Carney to take borrowing costs below inflation.” Comment on what it means to “take borrowing costs below inflation” and whether or not you agree that this is a “very important line.” (**Note: “Borrowing costs” refers to the “overnight rate”**)

- Taking borrowing cost below inflation does not mean anything in itself. What matters, again is, expected inflation. Taking borrowing cost below expected inflation simply means a **negative real rate**.
- Is that an important line? No. There is nothing special going on when the real rate crosses zero. Student should mention the fact that we have seen that before: in the 1970’s, and as recently as 2003 in the U.S.
- Basically, the answer should be critical of M. Gregory’s statement.

QUESTION 2 - GROWTH, RECESSION AND EMERGING ECONOMIES

In the midst of the global recession in 2008, the International Monetary Fund (IMF) announced that it was slashing its growth forecasts. As reported in the Wall Street Journal on November 7th 2008:

“The IMF now sees the global economy’s growth slowing to 3.7% this year and 2.2% in 2009; next year’s growth forecast is well below the 3% level the fund traditionally considers the threshold for a world recession.”

According to the Wall Street Journal, it seems that a world recession is defined as a rate of real GDP growth of 3%. However, this is qualified later in the article as follows:

“But IMF chief economist Olivier Blanchard reiterated that he doesn’t see the 3% level as a ‘useful’ definition of a recession, considering negative growth as more accurate.”

There is clearly an inconsistency between what the Wall Street Journal reports as being the “usual” IMF definition of a world recession and the ‘useful’ definition stated by the IMF chief economist.

a) Explain why Blanchard considers negative growth as more accurate.

- Conceptually, a recession is a reduction in the level of real economic activity or production. So a recession should be associated with negative growth in measured output.
- Blanchard is just stating the conceptual definition discussed in class.

- b) Explain why there is still a sense in which growth below 3% for the world economy could be associated with an important global slowdown, even though 3% growth for the US and Canada would be considered a healthy expansion of the economy.
- As part of the world production there is the production of emerging economies. The growth of the world production is an average of the growth of all countries of the world.
 - Emerging economies are like bathtub with less water. They should naturally grow faster than developed economies. Even in the face of an important global slowdown, we would not expect these economies to grow at a negative rate (6% growth for China would be a major slowdown).
 - Since emerging economies are contributing positively to this average, the growth rate of the world economy falling below a certain level (e.g. below 3%), would be consistent with all developed economies of the world being in an outright recession (i.e. having negative growth) and emerging economies having positive growth, but way below their potential.

QUESTION 3: THE LABOUR MARKET IN SPAIN

Spain went through a period of high growth over the last decade. However, it has also been hit hard by the current recession. Recently, the unemployment rate climbed to 14.6%. In this context, some believe that a reform of the labour market represents an occasion to jump start the economy.

« "We urgently need labor-market reforms for their short-term impact on hiring," Bank of Spain Gov. Miguel Ángel Fernández Ordóñez said last week. [...] Spain's main employer's association, the CEOE, is pushing hard for a labor-market reform that, among other things, would lower dismissal costs.», Wall Street Journal, 22 février 2009

- a) How would you analyze the impact of lower dismissal (firing) costs? Explain your answer briefly and illustrate it graphically.

Lower firing costs will lead to higher labour demand (the potential cost of an employee is now lower, if the firm was to want to shed labour in the future). The labour demand curve will shift to the right in the medium/long run, leading to higher employment and wages.

The rapid growth of the Spanish economy led to a massive inflow of foreign labour. However, starting at the end of 2008, the Spanish government is offering large monetary sums to immigrants who decide to go back to their country of origin.

- b) From the point of view of a worker with a Spanish citizenship, is this a positive or negative measure? Illustrate your answer graphically.

These monetary incentives should push foreign workers to leave, leading to a fall in the supply of labour. In turn, this will lead to a raise in real wages, to the benefit of Spanish workers.

QUESTION 4: GROWTH IN IRELAND (PRE-CRISIS)

In 1987, Ireland's GDP per capita was 50% that of the US. Over the following 20 years, however, Ireland experienced a period of high growth: GDP per capita grew at a rate of 6.5% per year on average, compared to 2.5% for the US.

- a) How would (briefly) explain such phenomenon?

The Solow model implies that countries should eventually converge towards similar levels of output per capita. The Irish capital stock was lagging behind in the 1980s. The Solow model predicts that if Ireland has structural parameters relatively similar to those in the US (e.g. saving rate, population growth rate, etc.), then convergence should occur. Even if those parameters are different, it could also be that capital inflows into Ireland, particularly from Europe, led to some convergence.

Also, Ireland invested heavily into human capital (schools, universities, etc.) after joining the EU in 1973. And in fact, looking at the data, one can see that a significant part of growth was due to some catching up in terms of productivity levels.

- b) In 2008, GDP per capita in Ireland was only 10% less than in the US. If GDP per capita in both countries were to keep rising at the same rates than over the last 20 years (6.5% vs. 2.5%), Ireland's GDP per capita should be equal to US GDP by 2011 and be 30% higher by 2017. Do you believe such scenario is likely to materialize? Explain your answer briefly, drawing on what we have covered in class regarding growth theory.

It is very unlikely, even once Ireland gets out of its current deep recession. As discussed in (a), most of the growth over the last 20 years was part of a

convergence process. As for any transition economies, we expect the growth rates to slow down as Ireland approaches its steady state levels of K/N and Y/N . From then on, most of growth will be due to incremental productivity improvements, as is the case in the US.

QUESTION 5: GROWTH ACCOUNTING

This problem's goal is to clarify, with a numerical example, the notions of a production function, of marginal product of capital and labor, and of total factor productivity (A).

The following data give real GDP, Y , capital, K , and labor, N , for the U.S. economy in various years.

Year	Y	K	N
1960	2377	2606	65.8
1970	3578	3850	78.7
1980	4901	5569	99.3
1990	6708	7419	118.8
2000	9191	9849	135.2

Units and sources are the same as in AB Table 3.1. Assume that the production function is $Y = AK^{0.3}N^{0.7}$.

- a) By what percentage did U.S. total factor productivity grow between 1960 and 1970? Between 1970 and 1980? Between 1980 and 1990? Between 1990 and 2000?

The growth rates in factor productivity are 18%, 4%, 11%, and 15% for the periods 1960 – 1970, 1970 – 1980, 1980 – 1990, 1990 – 2000, respectively.

- b) What happened to the marginal product of labor between 1960 and 2000? Calculate the marginal product numerically as the extra output gained by adding 1 million workers in each of the two years. (The data for employment, N , are measured in millions of workers, so an increase of 1 million workers is an increase of 1.0.)

The marginal productivity of 1 million workers increased from 25 million units of real output in 1960 to 48 million units of real output in 2000.

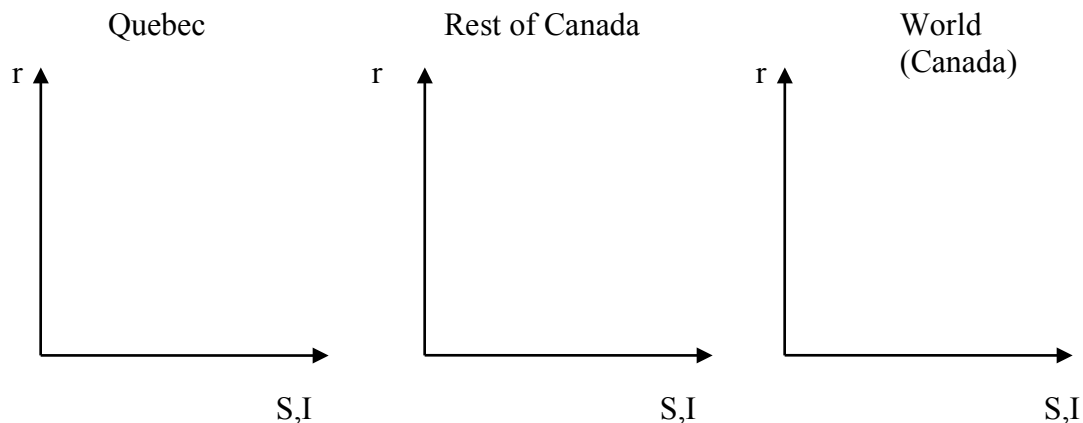
QUESTION 6: INVESTMENT IN QUEBEC

Over the last few years, private investment has been particularly weak in Quebec relative to the rest of Canada. The Quebec Ministry of Finance, worried about this situation, mandated a group of economists to determine the causes of the problem and to propose solutions.

- a) Is the government right to worry about this situation, and why? On the basis of what we have covered in class, what are the long term consequences of a low rate of investment on Quebec's economy?

Based on the Solow model, if the investment rate is low, we can expect that in the long run K/N and Y/N will be negatively affected.

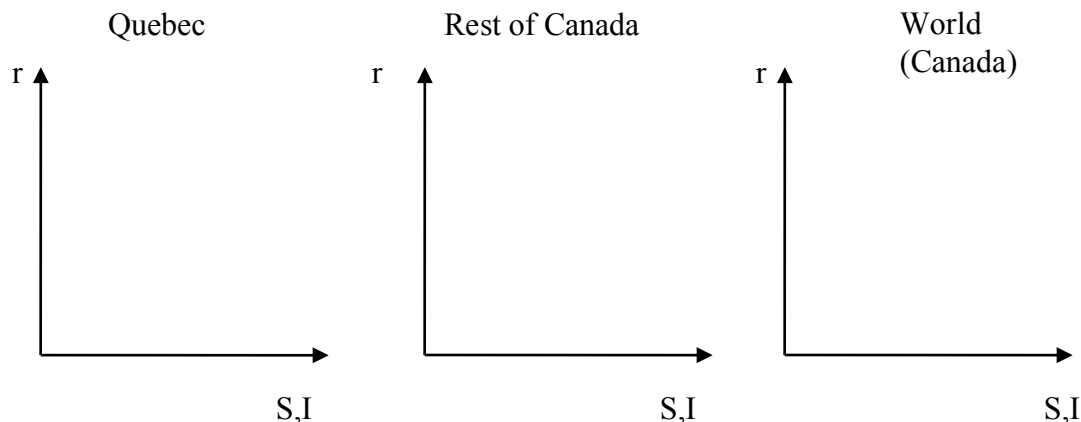
- b) Many economists on the committee point at the low saving rate in Quebec as the reason behind the poor investment performance in the province. On the basis of the saving/investment framework in an open economy, explain why a sudden drop in the saving rate (not caused by the real interest rate) in Quebec could explain its investment performance. *To answer this question, consider that the world consists only of Canada. Also, assume that Quebec is initially in a current account deficit situation.*



- Initially : Quebec has $CA < 0$ and the rest of Canada has $CA > 0$.
- In Quebec, the saving curve shifts to the left.
- Same thing for the saving curve for the whole Canada.
- Interest rate in Canada rises.
- Hence, investment falls in Quebec as well as in the rest of Canada.

- c) Other economists believe instead that the explanation comes from a rapid rise in A in the rest of Canada compared to Quebec. Focusing on the impact of such

event on the investment decisions of firms, do you believe such scenario could explain the weak investment rate in Quebec?



- In the rest of Canada, the investment curve shifts to the right.
- Same thing for Canada.
- Interest rate in Canada rises.
- Hence, investment in Quebec falls, while it rises in the rest of Canada (C falls because of higher r ; G is constant, $NX=CA$ is lower; hence I must go up since Y is constant)

d) To determine which one of these potential explanations is the right one, you gather data on the trade balance of Quebec (exports minus imports) with the rest of Canada. On the basis of this information and your answers to parts b) and c), which explanation appears more plausible? Why?

Quebec's trade balance with the rest of Canada (millions of dollars)				
<i>Source : Institut de la statistique du Québec</i>				
2001	2002	2003	2004	2005
-1	-1	-2	-3	-3
1	6	5	9	0
2	5	2	9	6
8	1	3	6	0

- Both explanations predict a fall in I , so we must use the information on NX to make a decision
- Given the data, it looks like the first explanation (fall in saving rate in Quebec) is the most likely

QUESTION 7: FISCAL POLICY, SAVING AND INVESTMENT

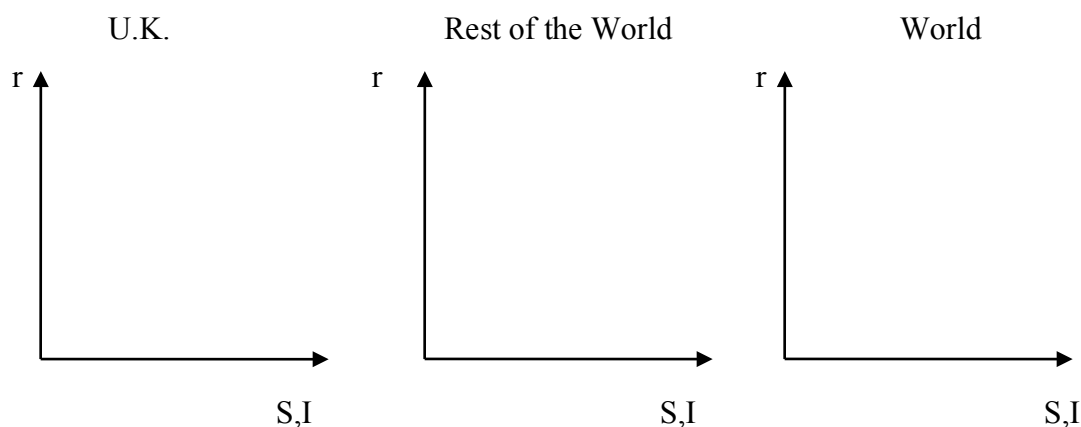
In response to the global economic slowdown, the British Prime Minister Gordon Brown called in 2008 on the rest of the world to act in a coordinated manner, especially in terms of fiscal policy.

« *Gordon Brown is to use this weekend's financial summit in Washington to call for co-ordinated tax cuts across the world's major economies to help reduce the depth of the global downturn.* » , The Times, November 11, 2008.

- a) Assume that all countries of the world implement a tax cut (think of a one time tax rebate). What will ultimately be the effect on interest rate? Illustrate your response using the appropriate graph and briefly explain.

The saving curve ($Y-C-G$) will shift to the left since C will rise somewhat following the tax cut, while Y and G do not change. In other words, the fall in govt saving due to the tax cut will only be compensated partly by a rise in private saving, so that the net effect is a fall in national saving. This will raise the interest rate.

- b) Now imagine that Gordon Brown is not able to convince the other countries and the U.K. is the only country implementing the tax cut. Using the graphs below, show what will be the impact of such measure on the U.K. current account and the world interest rate. (Note that the U.K. starts from a current account deficit). Explain.



- Assume that the UK is a large open economy. The answer (qualitatively) is unchanged if it is a small open economy.
- The UK saving curve shifts to the left, and hence so does the world saving curve.
- The World interest rate increases.

- This rise in r leads to more saving and less investment in the ROW, i.e. the current account in the rest of the world is now even more positive.
- This must mean that the CA in the UK is now even more negative.

Around the same time, the Chinese government surprised the market by announcing an important fiscal stimulus plan:

« China announced on Sunday a “massive infrastructure spending program” as part of a new fiscal stimulus plan aimed at boosting the country’s rapidly slowing economy. The government said the spending plan reflected a decision to adopt an “active” fiscal policy to deal with the global financial crisis. », Financial Times, November 10th, 2008

- c) The Chinese government intends to invest the package in education, transport infrastructure and in the promotion of technological innovation. Assuming that this materializes in an increase in total factor productivity (A), what should be the impact on employment and real wages in China? Illustrate your answer graphically and explain briefly.

As seen in class, the rise in A will boost labour demand, putting upward pressure on N as well as W/P .

You could also argue that since workers expect to be richer in the future, this will lead them to supply less labour (income effect), raising even more the real wage. That being said, this effect is likely to be much smaller than the one on labour demand.

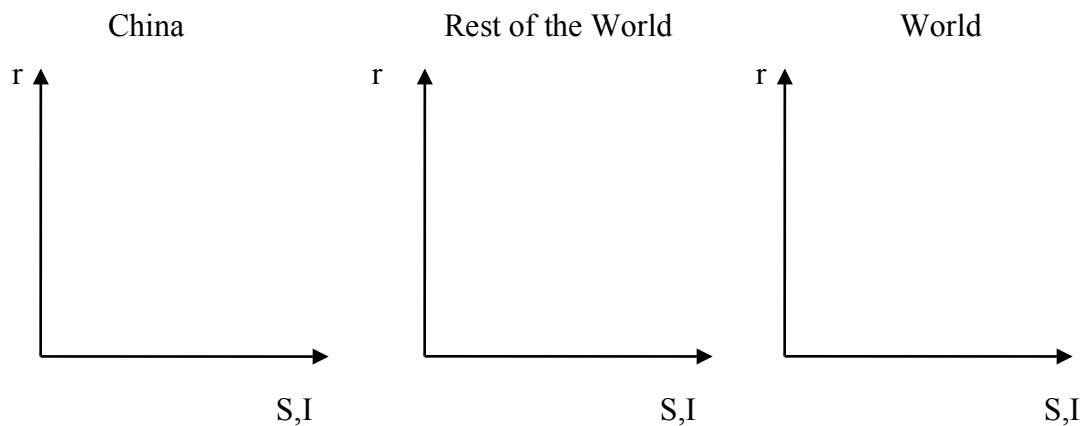
- d) What should the impact on private saving of the developments you found in c.? Explain briefly why?

The higher wages mean higher income. If this is realized today (i.e. higher current income), some of it will be spent but also some of it will be saved, and in this case private saving increases.

If you make the assumption that the rise in A will only happen in the future, that means that expected higher income will lead to higher consumption today, and less saving (since today’s income is unchanged). So private saving falls.

What’s important is obviously that the assumption made was coherent with the following answer provided.

- e) In order to simplify your response, assume that the effect you described in d. is negligible and can be ignored. Limiting yourself to the effect on government saving and private investment, can you unambiguously determine the effect of these fiscal measures on the Chinese current account? On the world interest rate? Illustrate your answer using the graph below and explain briefly (Note that China currently has a current account surplus).



- Rise in G to finance these programs will lead to a fall in the Chinese saving curve.
- Private investment will increase to the rise in A (I curve shifts right)
- Both these forces, at the world level, will lead to higher world interest rate.
- This in turn implies that the CA increases in the rest of the world.
- So you know that, unambiguously, the CA falls in China.

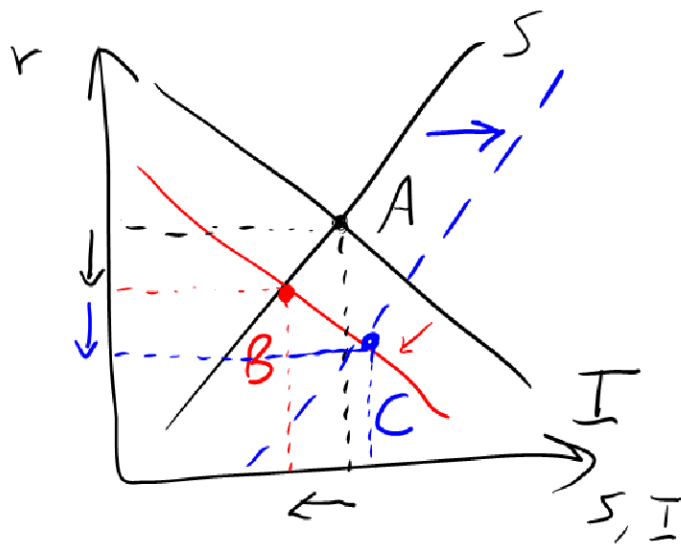
- f) If the effects you described in e. were permanent, how do you think this would affect i) the long term standard of livings in China and ii) its growth rate in the long term? Explain.

- Most importantly, the rise in A will lead to higher GDP per capita.
- In addition, one could try to argue that the rate of investment is likely to be higher now, meaning more water coming into the bathtub and hence a higher steady state of K/N (and in turn GDP per capita)
- Unless these programs lead permanently to faster GROWTH of A (which is unlikely), then the growth rate in the long run will not necessarily be affected much, just the level.

QUESTION 8 : FISCAL POLICY, SAVING AND INVESTMENT

The first two questions ask you to study the situation of the world economy (closed economy).

- a) During the Great Recession, business confidence dropped precipitously around the world, due to a very negative outlook of firms regarding future business conditions. Using the saving and investment diagram for a closed economy, and starting from the initial equilibrium labelled 'A', explain the implications of firms' collapsing confidence about future economic conditions for the real interest rate, saving and investment. Label the new equilibrium with the letter 'B'.



Due to lower confidence, firms scale back investment. As a result, the investment curve will shift to the left, leading to a lower level of investment and saving, as well as a lower level of the interest rate.

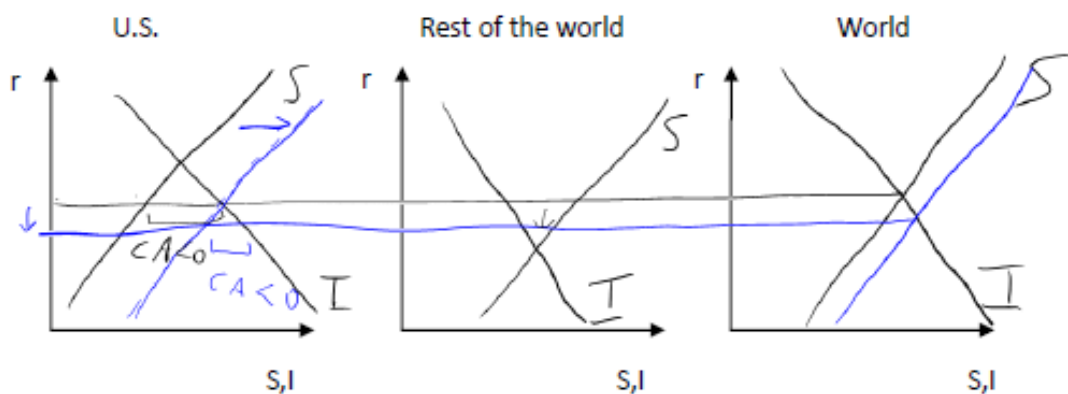
- b) If this lower confidence by firms is also accompanied by a drop of consumer confidence about their **future** income, what would be the impact on the saving and investment market? Assume that the impact of increased current income on saving is negligible. Starting from point 'B' above, illustrate in the same graph the implication of this change in consumers' behaviour and label the resulting equilibrium 'C'. What can we say about investment in 'C' relative to 'A'?

If consumers expect future incomes to be lower, they will want to save more today to support future consumption. On the plot, it means that the real interest rate will fall, yet it is unclear what will be the net effect on investment. The firms' reaction is likely to be stronger so that I and S fall in equilibrium, but it is not possible to know for sure.

Over the last few years, a growing consensus emerged that the recent crisis was a result of large global imbalances. As a result of the deep recession of 2008-2009, most national governments decided to implement large fiscal stimulus packages in order to revive their economies.

NOTE: For every question that follows, start from a situation where the U.S. has a negative current account. Each question should be answered independently from the others.

- c) Many analysts have recently been worrying about the large U.S. fiscal deficits on the horizon. In fact, a majority of Americans believe that the government will have to raise taxes significantly in the near future. What is the impact of such scenario on the U.S. current account position? Show graphically and explain briefly.

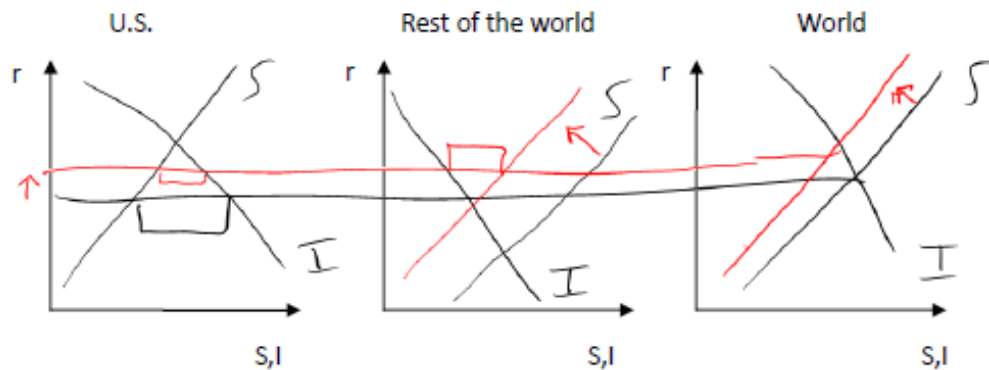


Higher taxes mean lower expected disposable income in the future. Hence, consumers should save more today. Starting with $CA < 0$ in the US, this event will lead to a smaller current account deficit in the US, or even possibly a surplus.

- d) “China’s [...] consumption as a share of GDP has fallen and is extremely low by international standards: only 35%, compared with 50-60% in most other Asian economies and 70% in America. [...] The most popular explanation is that Chinese households have been saving a bigger slice of their income because of an inadequate social safety net. [...]”

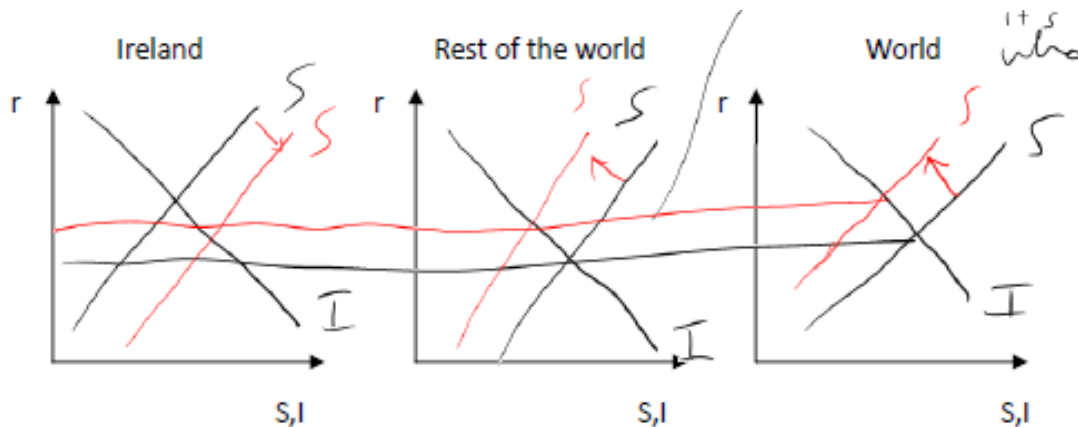
The Beijing government is acting: it doubled spending on health care, education and social security between 2005 and 2008. This year the government has increased pensions coverage and payments to low-income households. It has also pledged to provide basic health care for 90% of the population by 2011”, The Economist, July 30, 2009.

What would be the likely impact of the Chinese government's actions on the US current account? Suppose that China is a large open economy.



The objective is to lower personal saving in China. In addition, you could argue that this extra G spending will lower govt saving. This will lead to a smaller CA deficit in the US, maybe even a surplus.

- e) Ireland has actually had to raise taxes during the recession. If all other countries instead implemented tax cuts, can you determine what will be the ultimate impact on the Irish current account? Explain and show graphically. *Note: Assume that Ireland is a small-open economy, and that it was initially in a current account deficit position.*

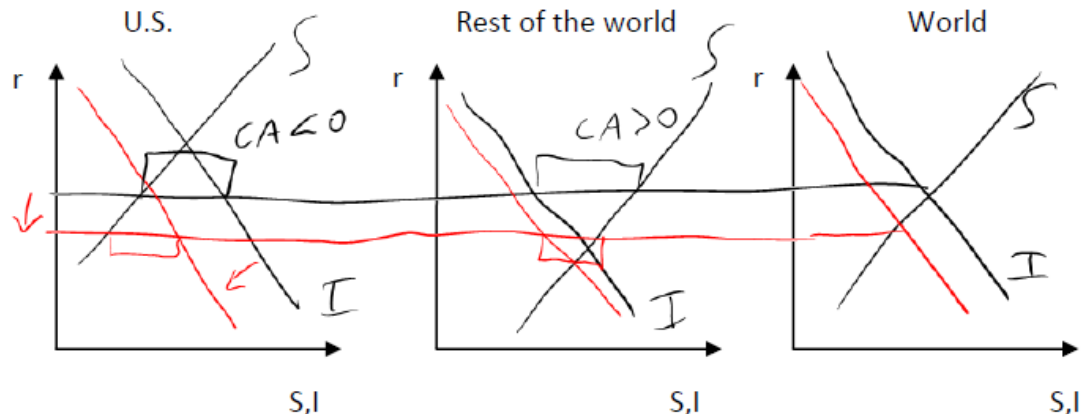


The rise in T in Ireland will probably mean a fall in personal saving, but a rise in govt saving. Net, we expect national saving to rise (vice-versa for the rest of the world).

- 1) Shift right of S in Ireland: improves CA balance
 - 2) Shift left of S in ROW: raises r , lowers I and raises S in Ireland, so CA improves
- Hence, CA of Ireland will for sure improve.

Note: ROW has $CA=0$ since it's almost whole world

- f) During the recession, U.S. firms have reduced drastically their expenditures in investment goods (I). In contrast, investment was much less affected in the rest of the world, particularly in Asia. Show the impact on the U.S. current account graphically. Could this be a potential explanation for the shrinking U.S. current account deficit over the last two years?



1) $\downarrow I$ in US \Rightarrow lowers r , smaller CA deficit in US

2) $\downarrow I$ in Row \Rightarrow lowers r , makes CA deficit in US larger

A priori, not obvious which effect is stronger. Given that fall in I was much larger in US, likely that (1) wins, and it can explain smaller CA deficit.

- 1) Fall in investment in the US: lowers r and leads to a smaller CA deficit in the US.
- 2) Fall in investment in the rest of the world: leads to lower r and a larger CA deficit in the US

A priori, it is not obvious which effect is stronger. Given that the fall in investment was much larger in the US, it is likely that the effect (1) is stronger, and that it can explain a smaller CA deficit.

QUESTION 9: NATIONAL ACCOUNTING

Consider an economy that produces only three types of fruit: apples, oranges, and bananas. In the base year (a few years ago), the production and price data were as follows:

Fruit	Quantity	Price
Apples	3,000 bags	\$2 per bag
Bananas	6,000 bunches	\$3 per bunch
Oranges	8,000 bags	\$4 per bag

In the current year, the production and price data are as follows:

Fruit	Quantity	Price
Apples	4,000 bags	\$3 per bag
Bananas	14,000 bunches	\$2 per bunch
Oranges	32,000 bags	\$5 per bag

- a) Find nominal GDP in the current year and in the base year. What is the percentage increase since the base year?
- b) Find real GDP in the current year and in the base year. By what percentage does real GDP increase from the base year to the current year?
- c) Find the GDP deflator for the current year and the base year. By what percentage does the price level change from the base year to the current year?
- d) Would you say that the percentage increase in nominal GDP in this economy since the base year is due more to increases in prices or increases in the physical volume of output?

Answers:

- **Base-year quantities:**

	<i>At current prices</i>	<i>At base-year prices</i>
Apples	3,000* \$3 = \$9,000	3,000*\$2 = \$6,000
Oranges	6,000* \$2 = \$12,000	6,000*\$3 = \$18,000
Bananas	8,000* \$5 = \$40,000	8,000*\$4 = \$32,000
Total	\$61,000	\$56,000

- **Current-year quantities:**

	<i>At current prices</i>	<i>At base-year prices</i>
Apples	4,000* \$3 = \$12,000	4,000*\$2 = \$8,000
Oranges	14,000* \$2 = \$28,000	14,000*\$3 = \$42,000
Bananas	32,000* \$5 = \$160,000	32,000*\$4 = \$128,000
Total	\$200,000	\$178,000

- a) Nominal GDP is just the value of a given year (say 2004) production at that year (2004) prices:

Nominal GDP for the base-year: **\$56,000**
 Nominal GDP for the current year: **\$200,000**

Nominal GDP grew $100 \times (200,000 - 56,000) / 56,000 = \mathbf{257\%}$ between the base and current year.

- b) Real GDP for the current year is obtained by evaluating current quantities at base-year prices. From the table above, current real GDP is 178, 000. Note that

real GDP for the base-year is by construction equal to base-year nominal GDP, i.e. 56,000. The growth rate of real GDP is then equal to:

$$100 * [178,000 / 56,000 - 1] = 218\%$$

- c) As seen in class, the GDP deflator is equal to $100 * [\text{nominal GDP} / \text{real GDP}]$. In the present example we have:

$$100 * [200,000 / 178,000] = 112.4$$

Inflation (based on the GDP deflator) is defined as the rate of change in the GDP deflator, which is equal to:

$$100 * [112.4 - 100] / 100 = 12.4\%.$$

Note that we made use of the fact that by definition the GDP deflator is equal to 100 in the base-year.

- d) Nominal GDP rose 257%, but prices are up 12.4%, so most of the increase (218%) in nominal GDP is resulting from the increase in real output, not prices.

QUESTION 10: SAVING AND INVESTMENT

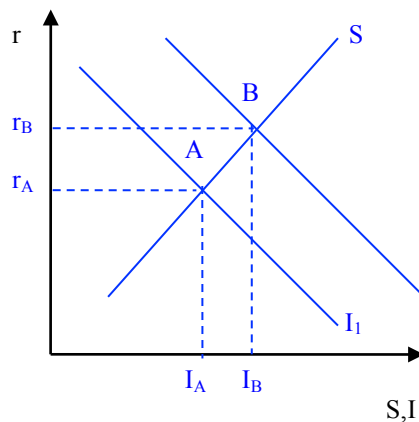
According to The Economist of 2/23/06, "If the latest figures are to be believed, then last year, Japan (yes, Japan) grew faster, at 2.8%, than any G7 economy except America. And as of the final quarter of the year, it was growing faster than America as well, clocking up a 4.2% growth rate, year-on-year. Japan's GDP figures are notoriously prone to revision, so some of the shine may yet come off last year's performance. What is not in doubt, though, is that Japan's recovery is solid and increasingly broad-based."

- a) Assume for now that Japan is a closed economy. An important part of the improvement in the Japanese outlook is due to firms' improved confidence about future productivity. In fact, "Companies with growing order books are spending on capital goods: fixed-capital investment grew at an annualised 7.2% in the last quarter of the year, while the outlook for machinery orders looks buoyant." (The Economist, 2/23/06) Using the saving and investment diagram for a closed economy, and starting from the initial equilibrium labeled 'A', explain the implications of firms' improved confidence about productivity for the real interest rate, saving and investment. Label the new equilibrium with the letter 'B'.

If firms are more confident about future productivity, their desired level of capital is higher and therefore, for a given interest rate, they are willing to increase the level of investment.

The goods market is not in equilibrium at interest rate r_A . At r_A , there are not enough savings to finance the increasing investment demand.

The interest rate therefore rises to r_B and the equilibrium in the goods market is restored. The new equilibrium levels of savings and investment are larger ($I_B=S_B > I_A=S_A$).

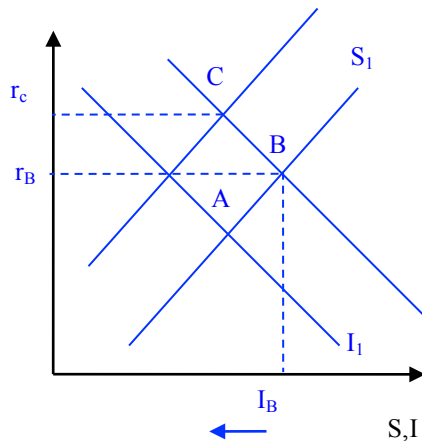


- b) If this increased confidence by firms is also accompanied by an increased consumer confidence about their future income, what would be the impact on the saving and investment market? Assume that the impact of increased current income on saving is negligible. Starting from point 'B' above, illustrate in the graph the implication of this change in consumers' behavior and label the resulting equilibrium 'C'. What can we say about investment in 'C' relative to 'A'?

Consumers increase expenditure in anticipation of higher future income. As a result, their current level of savings decreases. r_B is not anymore an equilibrium: at r_B national savings are not enough to finance the desired level of investment.

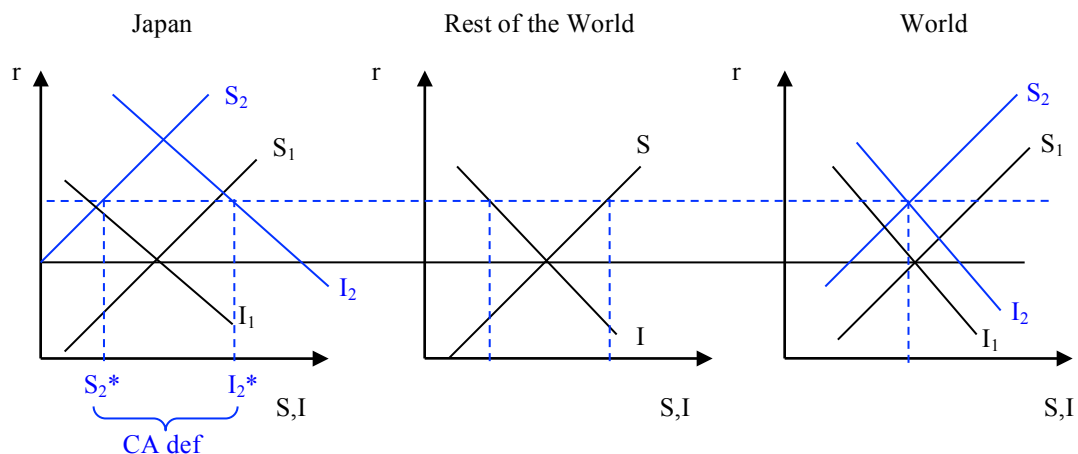
The equilibrium interest rate therefore increases to r_C , which depresses the desired level of investment. The equilibrium level of investment I_C is definitely lower than I_B .

We cannot unambiguously rank I_C with respect to I_A . The increase in interest rate due to lower national savings may (or may not) offset the positive effect of firms' confidence on the resulting level of investment.



- c) An important part of the improvement in the Japanese outlook is due to firms' improved confidence about future productivity. In fact, "Companies with growing order books are spending on capital goods: fixed-capital investment grew at an annualised 7.2% in the last quarter of the year, while the outlook for machinery orders looks buoyant." (The Economist, 2/23/06). We now want to understand how the implications you have derived so far change once we recognize the fact that Japan is a large open economy. Assume also that increased confidence by firms is also accompanied by an increased consumer confidence about their future income.

Consider the case where Japan is a large open economy. Using the open economy saving and investment diagrams and starting from the initial situation depicted, show graphically the effect of the increased confidence of firms and consumers. Label the resulting level of equilibrium saving and investment in Japan by S_2^* and I_2^* respectively. What is the effect on the Japanese current account balance? **Explain.**



The effect of increase confidence on Japanese economy puts upward pressures on the world interest rate: Japanese firms are demanding more resources and Japanese consumers are reducing their contribution to world savings.

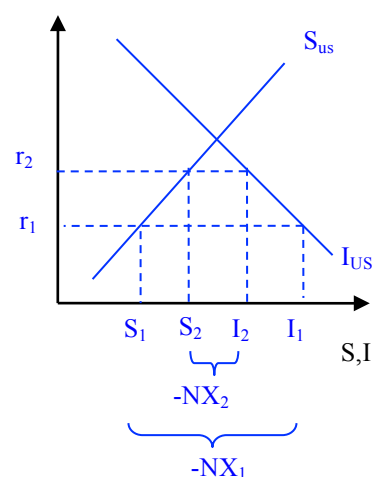
Still, the impact on the interest rates is lower than in the closed economy case. When world interest rate rises, the rest of the world reduces its investment level and increases savings. When international financial markets are integrated, this excess of savings in the rest of the world (CA surplus) is reallocated into the growing Japanese economy, where expected return on capital is larger. In other words, Japan is now running a CA deficit. Indeed, during January 2006 Japan run its first CA deficit in more than two decades.

- d) Based on your analysis, what should the effect of that increased confidence in Japan on the US current account?

Higher world interest rate incentives US citizens to increase their savings and increases the cost of capital, which reduces the level of investment.

In other words, US expenditure decreases (both domestic consumption and investment are now lower) and the equilibrium in the goods market is restored with lower current account deficit.

$$NX_2 = S_2 - I_2 > NX_1 = S_1 - I_1$$



QUESTION 11: LABOUR MARKET

- a) In the wake of the current recession, governments have offered businesses numerous tax credits in order to boost private investment. What do you believe would be the effect of such policies on employment and real wages? Explain briefly and show graphically.

The direct impact of such tax credits should be a boost to investment. Then, as the capital stock rises, there is higher and higher demand for labor, as firms want to hire workers to use the new machines. This leads to a rightward shift of the labour demand curve, which yields a rise both in N and W/P.

Germany's labour market has fared remarkably well during the last recession, with very limited job losses compared to other countries. According to German Labour Minister Ursula von der Leyen:

"The labour statistics offer the strongest affirmation yet that the government's strategy of keeping workers in their jobs during the crisis through generous subsidies to business has worked.", WSJ, October 28, 2010.

- b)** In the context of a recession, what would be the impact of such policy (e.g. an employee works 30 hours instead of the usual 40, with the government subsidising firms for the missing 10 hours) on the labour market? Do you believe this policy could minimize the negative impact of the recession on employment? Show graphically.

In a recession, a firm may be reluctant to keep an employee for which there is little work to do. Instead of paying this employee for a full salary while he/she is doing only 30 hours of productive work, the firm may well decide to fire the worker. This, in turn, would shift the N_d curve to the left.

The policy is aimed at avoiding that: here, the government pays the wages for the "idle time", i.e. the 10 hours the employee is not really needed. This eliminates the incentive for the firm to fire the worker. The result is less of a shift of the N_d , minimizing the negative impact on employment.

- c)** Other countries, such as the US, have instead extended or increased unemployment benefits as the recession dragged on in order to avoid an even larger fall in consumption. Comparing this policy to the one described in b), and assuming both are abandoned once the recession is over, which one would you argue is most likely to minimize the rise in the natural rate of unemployment in the long run? Explain briefly.

Probably policy in b). By keeping workers employed, the policy minimizes the depreciation of skills, and hence the rise in the natural rate of unemployment. The downside is that it may artificially keep alive jobs in sectors that are in decline, which then has a detrimental effect on the economy. However, if the measure is limited to the recession years, this should have limited negative impact on employment in the long run.

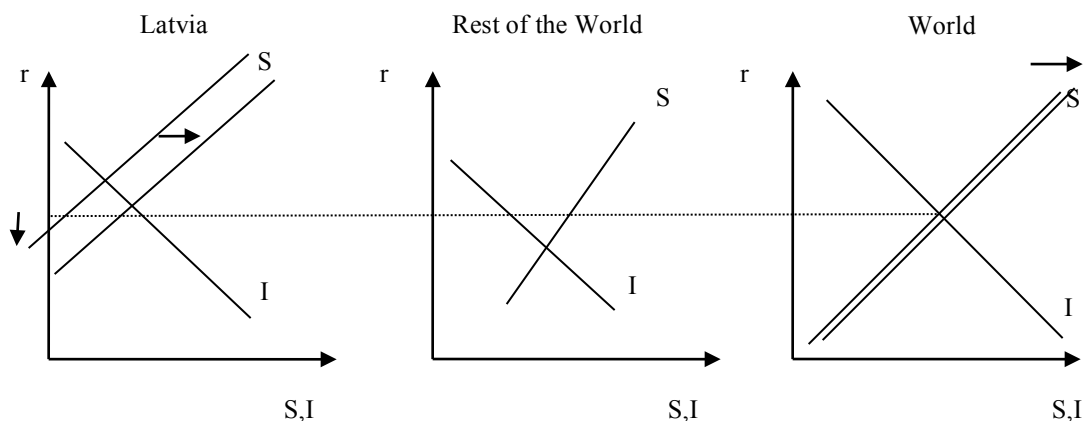
QUESTION 12: SMALL OPEN ECONOMY

Latvia experienced in the mid 2000s a rapid expansion which has led to an unsustainably large current account deficit:

Data for the third quarter of 2006 have reinforced worries about the overheating of the Latvian economy. Its breakneck economic growth has not slowed—at 11.8% year-on-year in the third quarter, real GDP growth was up from 11.1% in the second quarter and kept growth close to 12% for the first three quarters. The economy is running a large positive output gap and is developing dangerous imbalances, including the alarmingly wide current-account deficit, which reached 24.2% of GDP in the third quarter of 2006 (up from 12.9% in the same period of 2005) and amounted to 19.3% of GDP in the first nine months of 2006. (The Economist, 1/12/07).

The large current account deficit is driven by the excessively high growth of domestic aggregate demand. The International Monetary Fund recommended back then using restrictive fiscal policy (i.e. reduction in government expenditures and/or increase in taxes) as a way to cool off demand and reduce the current account deficit.

Explain and illustrate, using the open economy saving and investment market diagram, how restrictive fiscal policy should contribute to a reduction in Latvia's current account deficit.



- Restrictive fiscal policy means an increase in T or a decrease in G
- National Saving = $S = T - G + Y - C - T$
- From the definition of national saving, an decrease in G means that S would be increased at any interest rate (shift of the Saving supply curve to the right)

- An increase in T would increase government saving ($T-G$). But the effect on national saving depends on how consumers adjust consumption to the increase in T . If they don't adjust consumption, private saving would decrease by the same amount as the increase in government saving and national saving would stay unchanged (unlikely). If they reduce consumption in response to the lower disposable income, then private saving will decrease by less than the increase in government saving → Net increase in national saving.
- Restrictive policy, through G or T , should then increase national saving at any interest rate.
- This increase in Latvia's national saving should have a tiny effect on the world saving and investment market (small open economy), but if it did, this would reduce the world interest rate.

As we can see from the graph above, this would reduce the excess of investment over domestic saving and hence the current account.

QUESTION 13: LONG RUN GROWTH

"Productivity growth is perhaps the single most important gauge of an economy's health. Nothing matters more for long-term living standards than improvements in the efficiency with which an economy combines capital and labour.", The Economist, November 12, 2009.

- a) Explain this statement based on what we have covered in class. Do you agree that nothing matters more than TFP in the long run? Why or why not?

As per the Solow model, as an economy is transitioning or converging toward its steady state, growth is mostly driven by capital accumulation. As the economy gets closer to its SS, then growth cannot be sustained by K anymore, it eventually needs to come from productivity improvements. This can take many forms, obviously: technological progress, infrastructure building, better governance, economic environment conducive to investment, etc.

"Unfortunately, productivity growth is itself often inefficiently measured. Most analysts focus on labour productivity, which is usually calculated by dividing total output by the number of workers, or the number of hours worked."

- b) China has experienced important growth in labour productivity over the last decade, relative to advanced economies (e.g. U.S.). How could you explain such phenomenon? Use the analytical framework of the Solow model to answer this question.

Recall what the definition of labour productivity is:

$$Y/N = (AK^\alpha N^{1-\alpha})/N = A(K/N)^\alpha$$

China is a developing country which is going through a convergence phase. According to the Solow model, this should be coming from rapid accumulation of capital, K . Based on the formula above, this in itself should lead to high growth in labour productivity, even if A was to grow very slowly. (a little bit more: In a country like the US or Canada, where K/N has reached its steady state, long-term growth in Y/N must be closely related to growth in A).

“In China where a one-child policy is in place, roughly 10% of the population is over the age of 65. The UN projects this percentage to increase by 25% by 2050. It makes sense to ask if China will get old before it gets rich.”, National Post, October 16, 2009.

- c) Since 1979, China has been implementing a policy limiting each family to a single child (“one-child policy”). What do you think will be the impact of this policy on Chinese GDP per capita in the next decade or so as the working-age population shrinks relative to the total population? What about the very long run (60-80 years)?

In the medium run, the implementation of the one-child policy will mean that the N/Pop will actually fall, as the population gets older. Most likely, this will compensate any possible rise in Y/N over the next decade or so, and hence will have a negative impact on Y/Pop .

In the very long run, as older generations pass away, N/Pop will go back to the normal i.e. higher level (in other words, the age pyramid won't be skewed anymore towards old age people). In addition, the slower population growth rate will imply from the Solow model that K/N and Y/N will reach a higher steady state. Hence, in the very long run, the Chinese policy will have a positive impact on Y/Pop .

QUESTION 14: CONSEQUENCES OF QUANTITATIVE EASING

There have been numerous reactions to the recent announcement by the Fed to implement a second round of quantitative easing (QE2). Some reactions have been particularly negative:

“A group of Republican economists have also written an open letter to Fed chairman Ben Bernanke saying that the “planned asset purchases risk currency debasement and inflation”.”, Financial Times, November 16, 2010.

- a) Why are the Republican economists worried that the new round of quantitative easing may lead eventually to higher rates of inflation? Explain briefly using the concepts we have covered in class.

This is a straight implication of the quantity theory of money.

$$\% \Delta P = \% \Delta M - \% \Delta Y$$

These economists believe that this injection of liquidity will eventually make its way into the broader money supply, leading to higher inflation.

“William Dudley, president of the New York Fed, dismissed concerns that the Fed’s policy could lead to inflation, saying that the central bank has the tools to withdraw the additional stimulus if it needs to.”

- b) Thinking about the way injections of liquidity by the central bank affect the money supply, why do you think is Mr Dudley not particularly worried that inflation will increase in the near future? Explain briefly.

First, one needs to be convinced that the commercial banks will indeed want to use this extra liquidity (which they got in exchange of bonds) to make additional loans, which will then become deposits/saving and raise the money supply. Given the fact that the very large injection of liquidity over the past few years had almost no impact on M and hence inflation, it is not clear why this time it would be different.

You may also say that inflation expectations are very low, or that the economy is still running very slow.

- c) Explain in a few sentences how the Fed could proceed if it eventually wanted to “withdraw the additional stimulus”.

We talked mainly about two ways in class:

First, it could do reverse open market operations, by selling back the bonds to commercial banks in exchange of liquidity, which will in turn lower their reserves. This will avoid the risk that all the reserves currently owned by the banks will turn into a big jump of the money supply.

Second, the Fed has implemented a new policy: paying interest on the reserves the commercial banks have at the Fed. Hence, if the Fed is worried that these reserves could quickly turn into new loans, it could increase this interest rate, giving a disincentive for banks to lend.

“Separately, countries from Brazil to Germany have attacked the policy as a ploy to weaken the dollar.”

- d) The CPI rate of inflation in Brazil is 5.2% while it is 1.8% in the Euro area. Assuming that these inflation rates do remain stable over the next couple of years, which country (Germany or Brazil) is most likely to experience a significant appreciation of its currency versus the US dollar over the medium run (all else being equal)? Explain briefly.

Brazil. Since its inflation rate is the highest, it is the most likely to see a depreciation of its currency versus the USD. This follows straight from purchasing power parity theory.

$$\% \Delta e_{\text{nom}} = \pi_{\text{FOR}} - \pi_{\text{DOM}}$$

QUESTION 15: SAVING AND INVESTMENT

As the recovery is taking its time, governments have tried to find various ways to revive their economies. Here is a measure which was announced by the Obama administration two months before the US midterm elections:

“President Barack Obama will on Wednesday announce sweeping new plans to stimulate the US’s anaemic recovery, proposing businesses be able to write off all investments in their plants from now until the end of next year, a move that would amount to a \$200bn tax cut for business.”, Financial Times, September 7, 2010

The policy essentially means that firms will be able to claim investment in capital stock to lower their tax bill for the current fiscal year. Assume that the US is a closed economy.

- a) Assuming that this policy is maintained over the next few years, what will be its likely impact in the medium/long run on the levels of investment and consumption in the U.S. (all else being equal)? Show graphically and explain briefly.

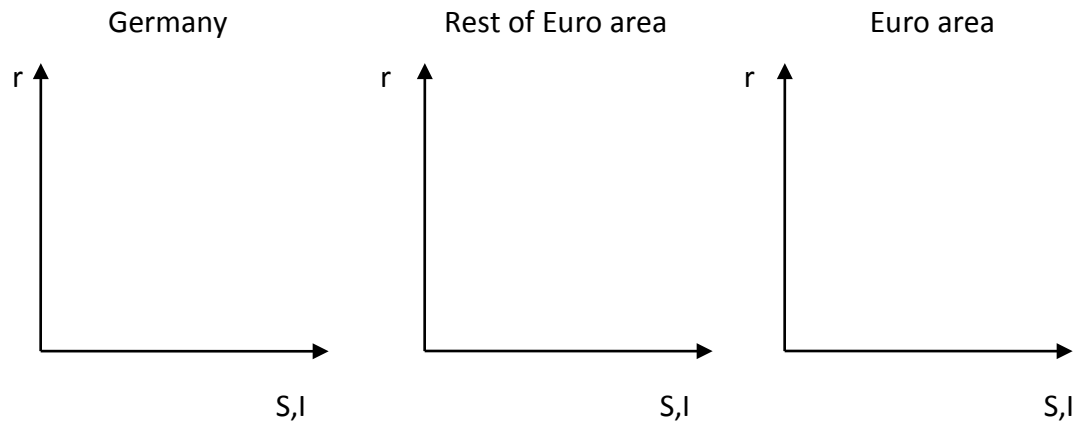
- The policy should push the investment curve to the right.
 - This in turn will lift the real interest rate in the US.
 - In equilibrium, investment will be higher.
 - Higher r will mean that private consumption is lower (private saving is higher)
- b)** Some Republicans have criticized the plan. Instead they counter that limiting the size of the government would eventually lead firms to increase their expenditures in capital goods. Explain this logic, using a graph to support your answer.
- Here, the size of the government arguably refers to the size of G in the economy. However, some students may have made other assumptions, such as that it's instead T that falls (tax rates are decreased). That's fine, as long as the rest of the answer is coherent. The question was not super clear I admit.
 - However, saying right away that "government saving" is directly limited does not make much sense, so points taken here.
 - Fall in G will lead to higher government saving. The S curve will move to the right.
 - r will fall, investment will rise.
- c)** Imagine that consumers expect future increases in income taxes in order to finance the investment subsidy. Is this effect likely to weaken or strengthen the impact of the policy on firm investment? Show graphically and explain briefly.
- If they expect their tax bill to increase in the future, this is likely to induce them to save more now (similar to the effect of an expected fall in future disposable income)
 - S moves to the right even more than in b), the interest rate falls even more, and hence this effect will tend to strengthen the impact of the policy.

For questions d) and e), assume that the Euro zone is a closed economy (in fact for most European countries, a very large portion of their trade is with other European nations, so this is not such a horrible assumption!).

Right before the financial crisis, in 2006, Germany had a moderate current account surplus with the rest of Europe. The last few years saw a drastic increase in the current account surplus of Germany (now 6% of GDP).

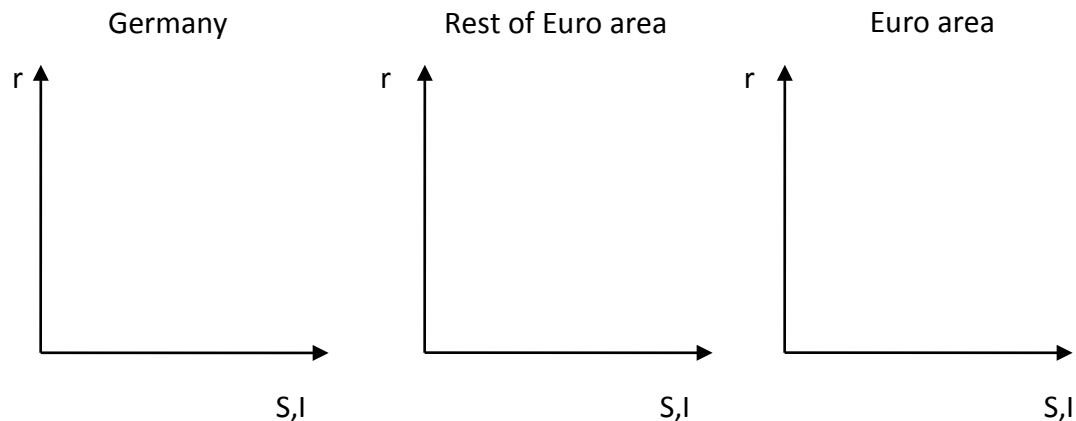
- d)** Some have argued that this increase in the current account surplus is the result of a rapid rise in optimism by firms as the German economy appeared to be

recovering faster than other advanced economies. According to you, is this a plausible explanation? Use the graphs below to support your answer.



- Students should have Germany initially in $CA > 0$, and opposite for Rest of Euro area
- Rise in optimism by firms leads them to invest more: I curve in Germany shifts right
- This then leads to a rightward shift in the Euro area I curve
- The Euro area interest rate increases
- Higher r means that in the rest of the Euro area, S increases and I falls, leading to a rise in the CA
- So in Germany the CA should have fallen
- Cannot be an explanation

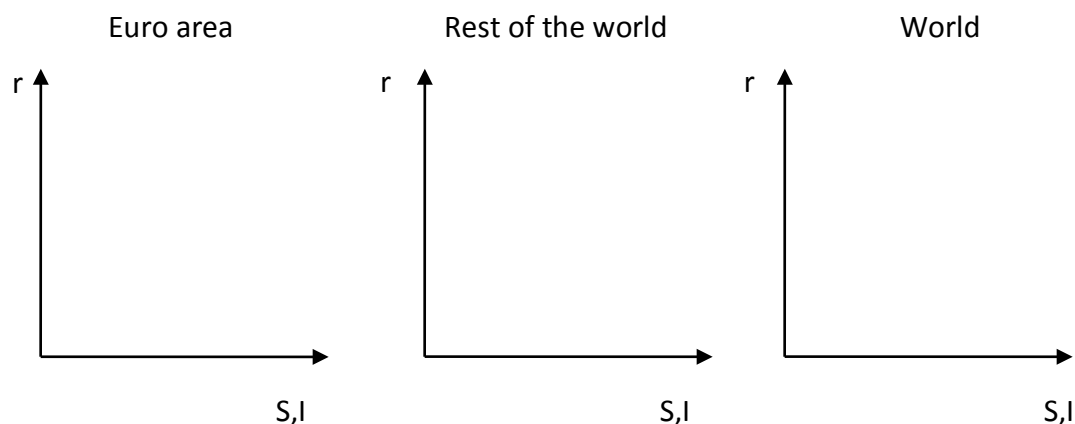
e) Compared to other European countries, Germany's fiscal response to the crisis was relatively small (for simplicity, only consider the spending side of any fiscal stimulus package). According to you, is this a plausible explanation for the rise in the current account surplus in Germany? Use the graphs below to support your answer.



- So imagine that G in the Rest of Europe rises (or at least rises by more than in Germany). This leads to a fall in national saving in the rest of Europe.
- The Euro area interest rate increases.
- This means saving up and investment down in Germany
- So the German CA rises

Now consider the Euro area as an open economy. The Euro area has currently a balanced current account.

- f) The troubles that have recently plagued Greece and Ireland have led to a lot of uncertainty regarding the economic recovery in Europe. By focusing on the reaction of European consumers, what do you believe could be the impact of this increased uncertainty on the current account of the Euro zone. Explain briefly and use the graphs below to support your answer.



- As discussed in class, uncertainty is something that should have an impact on private saving. In particular, higher uncertainty should lead to more private saving.
- The S curve in Europe shifts right
- The world interest rate falls
- The CA in the ROW is now negative.
- So the CA in the Euro Area is positive.

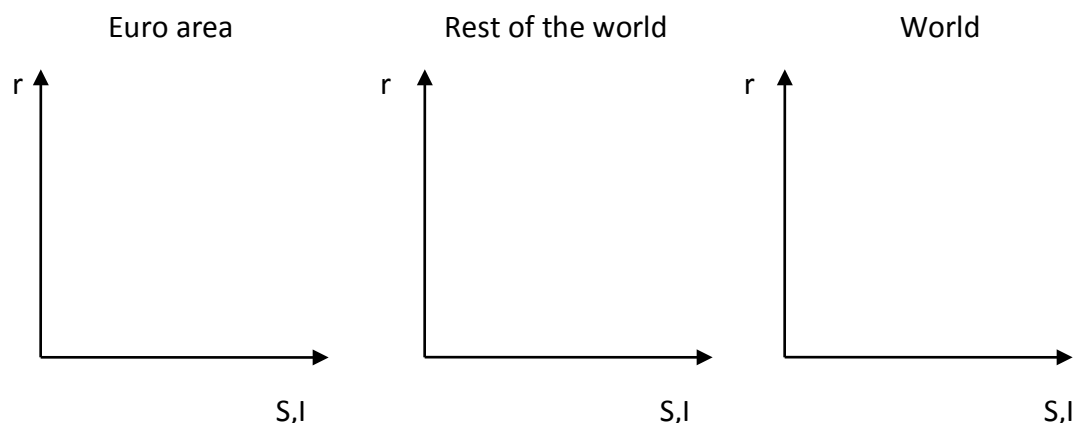
“The high interest rates in many peripheral European countries such as Greece, Ireland or Portugal since the spring of 2010 attracted foreign investors who were lured by the higher rates of return in the area. This then explains the subsequent appreciation of the common currency that was observed in the summer and fall of 2010.”

g) Is this a sensible explanation for the appreciation of the euro over the last few months? Comment briefly.

- Not at all, this makes no sense.
- The high interest rates reflect higher perceived risk of default
- They are high in those countries because investors don't want to buy them, so they need to be compensated (risk premium)

“China will adopt various measures to boost domestic demand and to ensure private consumption rises continuously and quickly to contribute to global economic development”, Chinese President Hu Jintao during the G20”, WSJ, November 12, 2010.

h) What will be the impact of these measures to boost Chinese consumption on the level of private consumption in the Euro zone? Explain briefly and use the graphs below to support your answer.



- The boost in Chinese consumption will lead to a fall in saving in the ROW
- This means a rise in the world interest rate
- This pushes private saving up the Euro area
- Since income is constant, it means that C in the Euro area will go down
- (not asked: The end result is $CA > 0$ in the Euro area)

QUESTION 16: SOLOW MODEL

According to the Solow model, how would each of the following affect output per worker in the long run (that is, in the steady state)?

- a) The destruction of a portion of the nation's capital stock in a war.

The destruction of some of a country's capital stock in a war would have no effect on the steady state, because there has been no change in any parameter of the economy (e.g. saving rate, depreciation rate, population growth, etc.). Instead, k is reduced temporarily, but equilibrium forces eventually drive k to the same steady-state value as before.

- b) A permanent increase in the rate of immigration (which raises the overall population growth rate).

In the context of the bathtub analogy, a rise in the population growth rate means that more water drains out. This leads to a lower the steady state level of capital stock per worker, and hence output per worker.

- c) A temporary rise in the saving rate.

A temporary rise in the saving rate has no effect on the steady-state equilibrium. The economy will go back to same steady state level once the saving rate goes back to its original level.

- d) A permanent increase in the fraction of the population in the labor force (the population growth rate is unchanged).

The increase in the size of the labor force does not affect the growth rate of the labor force, so there is no impact on the steady-state capital-labor ratio or on output *per worker*. However, because a larger fraction of the population is working, output *per person* increases.