Advice for Students: Macroeconomics

These are answers to questions that students submitted to my "Economics Central" web site.

What are the history and functions of the U.S. Federal Reserve (the Fed)?

Question: I'm doing a school project on the Federal Reserve System for my Ac/Dec class and I'm a bit lost on some of the explanations of our nation's Federal Reserve System. Particularly the things I'm having trouble understanding involve the Reserve Requirement, Discount Rate, Monetary Expansion, and what the Open Market Operations group does for our economy. Can you help?

Answer: In order to understand the Federal Reserve system, you have to know a little bit about the history of banking. Banks started out as gold warehouses. Gold is heavy, and when you have a lot of gold with you, you might get robbed. Therefore, instead of carrying their gold around with them all the time, people would deposit their gold in a gold warehouse and get a receipt. When they wanted to buy something, they'd go back to the warehouse, present the receipt, get some gold, and then use the gold to buy what they wanted. Eventually, people realized that they didn't need to go back to the warehouse. To buy something that cost an ounce of gold, they'd just give the seller a receipt for an ounce of gold. The seller, knowing that he or she could redeem the receipt, accepted it as payment. So these warehouse receipts became the first paper money.

Then, in the 16th century in Europe, the people who owned the gold warehouses realized something else. They realized that on any given day, only a few people would actually come to the warehouse and trade in the receipts for gold. As a result, the warehouse owners decided that they didn't need to keep all the gold on hand: they could loan out some of it and charge interest. That way, they'd not only make money from the fees people paid to warehouse their gold, but also from the interest -- the only hitch being that the gold they were loaning didn't belong to them. That was the beginning of the most common current banking method, which is called "fractional reserve banking" because banks keep only a fraction of the money people deposit with them.

Contemporary banks keep two kinds of deposits: demand deposits and time deposits. Demand deposits are supposed to be available *on demand*: if you walk into the bank and ask for the money in your savings or checking account, the bank has to give it to you. Time deposits are for an agreed-upon period of time: CDs and bonds are time deposits. If you have a bond that matures in 10 years, the bank doesn't have to give you your money until the 10 years are up.

The problem with fractional reserve banking, which the Federal Reserve was supposed to solve, was that if everyone demands his/her money, some people won't be able to get it because most of the money (including most money in demand deposits) is loaned out. When people think that a bank might go bankrupt and they might lose their deposits, too many of them show up to demand their money, and it's called a "bank run." In 1907, there was a serious (though brief) depression and a lot of bank runs. The Federal Reserve, created in 1913, was supposed to do two things.

First, it was to be a "lender of last resort" and loan money to banks to reassure the public that they could get their money back, thereby preventing bank runs.

Second, some people thought that the 1907 depression was caused by a shortage of money, which at that time was gold or silver. The Federal Reserve took over functions to regulate the amount of money in the U.S. economy and, people hoped, prevent future depressions. In the decades following its establishment, the Fed gradually weaned the U.S. off the gold standard and onto a "fiat" money standard: paper money that was accepted not because it could be redeemed for a valuable commodity, like gold, but because the government decreed by fiat that everyone had to accept it -- it was "legal tender."

Of course, the Fed did a very poor job of preventing depressions. Before the Fed was created, depressions were typically very deep and very short. After the Fed, they were still deep but they tended to last a lot longer. It's also fairly uncontroversial that the Fed caused the 1929 crash and the depression of the 1930s by first rapidly expanding the money supply (in the 1920s) and then contracting it in 1929 and the years that followed.

The biggest problem that the Fed introduced was uncertainty: nobody knew if the economy would be flooded with money or starved of it. With gold or a gold standard (where paper money was redeemable in gold), you knew that the amount of money in circulation probably wouldn't change too much or too fast. With fiat money, the amount of money in circulation could change as fast as new currency could be printed or as fast as the Fed could create new bank reserves.

That's a long-winded preamble to answering your questions, but I hope it gives you a little context for understanding what the Fed is and why it's a mixed blessing. When the economy slows down, the Fed can increase the money supply, which lowers the value of each dollar and decreases business costs, as well as lowering interest rates -- thereby helping to get things moving again. The downside is that such artificial fluctuations in the money supply and interest rates give a temporary boost, but can cause more economic depressions later.

The Fed's Open Market Committee buys and sells government securities in a way that increases or decreases the amount of bank reserves in the economy. For example, suppose that the FOMC buys $10,000,000 in government securities from the Jones Bank. The Fed writes a check for $10,000,000 and gives it to the bank, which deposits it with the Fed. As for the $10,000,000, the Fed simply created the new money out of thin air. As a result, the total quantity of bank reserves in the economy has increased by

$10,000,000. And because the Jones Bank is a fractional-reserve bank, it can loan out several times the amount of its new reserves, increasing the money supply by even more than $10,000,000.

How much more than $10,000,000 can the Jones Bank loan out? That's determined by the *reserve requirement*. The Fed requires banks to keep a certain minimum percentage of their deposits on hand in case they need to pay off some of their depositors. Therefore, another way that the Fed can expand the money supply is by decreasing the reserve requirement, allowing banks to loan out more of the money they've got.

The discount rate, about which you also asked, is the interest rate that the Fed charges to banks when it loans them money. By lowering the discount rate, the Fed can make it cheaper for banks to borrow money, and thereby encourage them to offer lower interest rates on their own loans. This is, however, not one of the more powerful tools at the Fed's disposal.

Here are some places you can find more information about the Fed, the discount rate, the FOMC, and monetary expansion:

Books

- Gregory Mankiw, *Principles of Economics* 2nd edition, Ch. 27 ("The Monetary System")
- Paul Samuelson and William Nordhaus, *Economics* 17th edition, pp. 521-529.
- R. Glenn Hubbard, *Money, the Financial System, and the Economy* 3rd edition, Ch. 17 ("The Money Supply Process")
- Murray N. Rothbard, *America's Great Depression*
- Adam Smith, *The Wealth of Nations,* Book II, Chapter II; if you can get the University of Chicago Press 1976 edition, look especially at pp.310-312. This is an early discussion of how fractional-reserve banking can increase the money supply. Note that Smith, who in 1776 stood at the beginning of modern economics, was dead-on accurate when he described the *mechanics* of monetary expansion, but was largely mistaken in his description of its *effects.*

Web links

- The FOMC: http://minneapolisfed.org/info/policy/whatfomc.html
- The federal funds rate: www.federalreserve.gov/fomc/fundsrate.htm

- The discount rate: www.chicagofed.org/publications/glossary/monetary.cfm#DiscountRate
- The current recession: www.ntrs.com/library/econ_research/weekly/us/010330.html
- The Fed and recessions: www.lewrockwell.com/rockwell/business-cycle.html
- The history of money and banking: www.mises.org/money.asp

How does the Fed use monetary policy to fight recessions? How does Congress use fiscal policy to fight recessions?

Question: Why might the Fed find it significantly easier to expand the money stock (money supply) in a period of prosperity than in a period of recession? If Congress wants to use fiscal policy to counter recessions, should it cut taxes when the recession is a suspicion, when it's a widespread conviction, or when it's officially announced?

Answer: Those are obviously homework questions, so I can't answer them for you directly. But I'll help you think them through a little bit. Let's start with your question about the Fed:

- Why might the Fed find it significantly easier to expand the money stock (money supply) in a period of prosperity than in a period of recession?

To answer this, there are three other questions you need to ask:

1. What are the methods by which the Federal Reserve can expand the money supply?
2. What happens during economically prosperous times that's related to how the Fed expands the money supply?
3. What happens during recessions that's related to how the Fed expands the money supply?

Once you get the answer to the first question, the other questions will be easy. How does the Fed expand the money supply? The main way is by open-market operations, which increase two things: (a) the amount of currency in circulation, and (b) bank reserves.

Do people use currency differently in recessions than when the economy is good? No, they don't, so let's cross that off and forget about it. We now know that our answer must have something to do with bank reserves. What do banks do with their reserves? How

do banks make money? If you don't know the answer to that one, ask someone with a MasterCard or an auto loan.

We've figured out that the way the Fed expands the money supply is connected to what banks do with their reserves, which in turn is affected somehow by prosperity and recession. Now all you need is to figure out how and why prosperity and recession might affect what banks do with their reserves, and you've got your answer to the first question. Now, let's look at your second question:

- If Congress wants to use fiscal policy to counter recessions, should it cut taxes when the recession is a suspicion, when it's a widespread conviction, or when it's officially announced?

This question is not a purely economic question because it asks what Congress “should” do. That depends on how much risk Congress and the public are willing to take that the country will experience a full-blown recession. It’s also important to realize that cutting taxes temporarily is one of the least effective fiscal remedies for recession because people base spending decisions on their expected long-term income, not on short-term increases from tax cuts. Nobel laureate economist Milton Friedman advanced and verified that idea, calling it the “permanent income hypothesis.” The most effective fiscal measures are those that either (a) preserve jobs that would otherwise be lost, or (b) create longer-term jobs, such as building or repairing highways and other infrastructure.

For more information, see:

- Gregory Mankiw, *Principles of Economics* second edition, Chapter 27, "The Monetary System"
- Paul Samuelson, *Economics* sixteenth edition, Chapter 26, "Central Banking and Monetary Policy"
- R. Glenn Hubbard, *Money, the Financial System, and the Economy* third edition, Chapter 17, "The Money Supply Process"

What is the major goal of monetary policy?

Question: Why is Price Stability the major goal of monetary policy?

Answer: There is no consensus about what "the" major goal of monetary policy should be: the answer depends on who you ask. If you ask Nobel laureate economist Milton Friedman, the dean of monetary policy, he'd say:

> *"The rule that has most frequently been suggested by people of a generally liberal persuasion is a price level rule; namely, a legislative directive to the monetary*

authorities that they maintain a stable price level. I think that this is the wrong kind of a rule." (Capitalism and Freedom, p.53)

Friedman goes on:

"My choice at the moment would be a legislated rule instructing the monetary authority to achieve a specified rate of growth in the stock of money." (ibid, p.54)

Thus, Friedman favors increasing the money supply by a fixed percentage every year, regardless of the behavior of the price level. Other economists, such as Ludwig von Mises and Nobel laureate F.A. Hayek, argue for basing money on commodities such as gold that make it difficult for a country's central bank to change the amount of money *at all.* Mises, for example, wrote that:

"The service which money renders to the economic community is independent of the amount of money. Whether the absolute amount of money in a closed economic system is large or small does not matter. In the long run, the purchasing power of the monetary unit will establish itself at the point at which the demand for money will equal the quantity of money." (Interventionism: An Economic Analysis, p.35.)

Still other economists, such as Murray N. Rothbard, reject the idea that any country should have a central bank in control of its money supply, and point to the havoc that the Federal Reserve has caused since its founding in the early years of the 20th century. They argue that just as the private sector has proven it can supply other commodities better than government or quasi-government agencies such as the US Federal Reserve, so it would do a better job of supplying money.

Even the Federal Reserve does not contend that price stability is "the" major goal of monetary policy. "Monetary Policy and the Economy," a publication available at www.federalreserve.gov, states:

"Many analysts believe that the central bank should focus primarily on achieving price stability ... However, policymakers must consider the long-and short-term effects of achieving any one goal. For example, in the long run, price stability complements efforts to achieve maximum output and employment; but in the short run, tension can arise between efforts to reduce inflation and efforts to maximize employment and output ... makers of monetary policy must decide the extent to which they should focus on defusing price pressures or on cushioning the loss of output and employment." (pp.1-2)

Therefore, the question's assumption that price stability is "the major goal" of monetary policy seems dubious. However, there are reasons why price stability is a good thing. Producing enough goods to maintain a high living standard requires planning for the future, and a stable price level makes it easier to do that because it makes the future more predictable. In addition, if you include interest rates as prices -- as indeed they are, being prices for borrowing money -- changes in the price level can distort investment decisions, leading to the boom-and-bust of the business cycle. The thing to remember, though, is that changes in the price level are generally an effect of deeper economic

forces, not a cause in themselves. The cause is usually the central bank's (in the US, the Federal Reserve's) ill-informed or politically-driven changes in the supply of money and credit.

If you want to read more about this issue, I suggest the following:

- Milton Friedman, *An Economist's Protest,* Chapter 3, "Monetary Policy"
- Dornbusch, Fischer, & Startz, Macroeconomics 8th edition, Chapter 16, "The Fed, Money, and Credit"

Where can I find up-to-date statistics about the U.S. money supply?

Question: What website has the monthly (or weekly or daily) statistics of money supply (M1, M2, M3, MZM, etc.)? I read all of the time that the money supply has changed by some major percentage (15%, 20%, -10%) but they seldom define what money supply figure they are talking about, nor clarify the time period and how they did the comparison. I would like to track the data myself, but I can't find it on the web. I would appreciate any ideas you have about where I can see the actual money supply data. Thanks so much!

Answer: I'd suggest that you look at the Federal Reserve Board of Governors site, specifically this page:

- www.federalreserve.gov/releases/

That should have the information you want.

How is the demand for money related to velocity of circulation?

Question: If the income elasticity of money demand is 2/3 and the interest elasticity of money demand is -0.1 Real income is expected to grow by 4.5 percent over the next year, and teh real interest rate is expected to remain constant over the next year. The rate of inflation has been zero for several years. By how much will velocity change over the next year if the central bank follows the policy that achieves zero inflation? I am struggling with this.

Answer: It looks to me as if you have a simple problem that includes some irrelevant information to throw you off the track.

First, note that the interest elasticity would only matter if the interest rate were going to change. Because the interest rate is assumed to be constant, you can throw out all the information about the interest rate. Also, price inflation is assumed to be zero, and the central bank is assumed to be following the same policies as before. Thus, any change in the velocity of money (in the problem's simple model) will result from the 4.5 percent increase in real income.

Now, there are several different equations, of various mathematical complexity, that relate the demand for money to aggregate income and to the velocity of money. The result you get will depend on which one you're using. However, using the original Irving Fisher equation, you have:

$$V = PY/M$$

where V is the velocity of money, P is the price level, Y is aggregate income, and M is the money supply. Your problem specifies that income Y increases by 4.5%, but that the income elasticity of the demand for money (M/P) is equal to 2/3. Therefore, the demand for money will increase by two-thirds of 4.5%, or 3.0%. You can then plug the numbers into Fisher's original equation, as follows:

$$(1.045 * Y)/V = 1.03 * (M/P)$$

which rearranges to

$$Y/V = (M/P) * (1.03/1.045)$$

and rearranges again, to

$$V = Y / (0.986 * [M/P])$$

and finally gets us to:

$$V = PY / (0.986 * M)$$

I'm sure that you can take it the rest of the way on your own. I'd suggest that you try out a few values of the different variables to verify your answer. If you want to read more about these issues, I recommend the following:

- Gregory Mankiw, *Macroeconomics* 4th edition, pp.161-164 and 494-499.
- Dornbusch, Fischer, & Startz, *Macroeconomics* 8th edition, pp.359-369.
- R. Glenn Hubbard, *Money, the Financial System, and the Economy* 3rd edition, pp.610-628.
- Ludwig von Mises, *Theory of Money and Credit* Chapter 8 Part II (pp.146-176 of the Liberty Classics edition).

- John P. Judd and John L. Scadding, "The Search for a Stable Money Demand Function: A Survey of the Post-1973 Literature." *Journal of Economic Literature,* Vol. 20, No. 3. (Sep., 1982), pp. 993-1023.

- William A. Bomberger, "Income, Wealth, and Household Demand for Deposits." *The American Economic Review,* Vol. 83, No. 4. (Sep., 1993), pp. 1034-1044.

- Milton Friedman, "A Theoretical Framework for Monetary Analysis." *The Journal of Political Economy,* Vol. 78, No. 2. (Mar. - Apr., 1970), pp. 193-238.

Do we really have to choose between inflation and unemployment?

Question: I am uninspired on a paper that is due very soon. I already have much information regarding both inflation and unemployment; but am looking for justification of lower inflation at the risk of higher unemployment. So my question is this: Are there capitilast countries that keep inflation low at risk of high unemployment? If so, do they do it by using the central bank? Also, if this is true, what are the reasons? (stated or unstated, I imagine no-one would actually say "we prefer low inflation over low unemployment")

Answer: Perhaps I can inspire you by pointing out a different approach to your paper topic: That the whole idea of a tradeoff between inflation and unemployment is a false dilemma.

It's true that many uninformed people talk as if we have to choose one or the other: either

- The central bank inflates the money supply, giving us more employment and business activity but with rising prices, or

- The central bank doesn't inflate the money supply, giving us less employment and business activity, but with stable prices.

It's also true that in the context of some institutional frameworks and public expectations about the future, the economy does seem to work that way.

Let's step away from unemployment for a moment and consider an arbitrary good X. You know from your studies that if there is a surplus of X, the price of X will tend to fall toward the market-clearing level at which the quantity of X supplied equals the quantity demanded.

Ask yourself a question: What could cause persistent surpluses of X? The obvious cause is something that prevents the price of X from adjusting toward its market-clearing level.

Apply that to unemployment: If minimum-wage laws, union contracts, government regulations, and other barriers prevent the cost of labor from adjusting to its market-clearing level, the result is persistent unemployment. (Remember that the cost of hiring a worker is more than just the wages paid to the worker: it includes all costs that must be paid by the employer.)

Now, what happens when the central bank inflates the money supply? The value of the monetary unit decreases: a larger supply of dollars means that each dollar is worth less. And that means, in turn, that labor costs denominated in dollars *also* decrease.

So you can see that inflation is kind of a back-door way to adjust the cost of labor down to its market-clearing level, on the assumption that prices can rise more quickly and easily than wages. But inflation has negative long-term effects on the economy (it's a primary cause of the business cycle), so a healthier way to cope with unemployment is to remove the barriers that prevent labor costs from adjusting to their market-clearing level. For people whose skills are so low that they are virtually unemployable at any wage, you could provide job training and counseling to help them find and keep employment.

So I would suggest, if you want an interesting paper topic, that you try rejecting the inflation vs. unemployment dilemma altogether, and look instead at how to correct the problems that keep labor costs higher than their market-clearing levels. Those problems are the primary causes of persistent unemployment.

Here are some additional sources of information that you might find helpful:

Books

- Gregory Mankiw, *Principles of Economics* 2nd edition, Ch. 26, especially pp.591-601.
- Paul Samuelson and William Nordhaus, *Economics* 17th edition, pp.671-679.

Web links

- The Phillips curve: www.mises.org/fullarticle.asp?record=149&month=05
- Unemployment and minimum-wage laws: http://fee.org/freeman/98/9812/economicnotions.html
- Unemployment causes and cures: www.cato.org/pubs/pas/pa004es.html

Why does low inflation make the dollar stronger and more stable?

Question: Why does low inflation make the dollar stronger and more stable?

Answer: First, a terminological point. "Strong" is an unfortunate word choice in this context, though it's commonly used. The dollar is "strong" when, compared to other currencies, it's more valuable than it has been in the recent past. Thus, "strong" is a relative thing.

Moreover, "strong" suggests "good," so that people think it's good to have a strong monetary unit and bad to have a weak one. That's not a hard-and-fast rule; it all depends on the circumstances.

For example, let "currency X" stand in for all foreign monetary units, and suppose that the current exchange rate between the dollar and currency X is $2 per X.

At $2 per X, is the dollar strong or weak? That depends. If the dollar was recently trading at a rate of $1 per X, then the dollar is weak because it's declined in value relative to X. But if the dollar had been trading at $4 per X, then the dollar is strong, because it's increased in value relative to X.

A "strong" dollar is generally good for imports and bad for exports; a "weak" dollar is the opposite.

Now, to your question. Inflation means increasing the supply of money and credit in the economy. When you increase the supply of something (other things being equal), the value of each unit decreases.

Because a strong dollar is one that has increased in value relative to other currencies, it falls directly out of the definition that low inflation makes the dollar "stronger" than it would be if inflation were higher. A related reason is that low inflation makes the dollar a more attractive investment because people know it's not going to lose its value very fast compared to other currencies.

Your question about why low inflation makes the dollar more stable has the same answer. Low inflation means the dollar's value doesn't change very fast, which is another way of saying that its value is relatively stable.

What is the relation between aggregate demand and GDP?

Question: Gross Domestic Product determined via the expenditure method is the sum of the final expenditure on UK produced goods and services measured at current market prices, i.e., *GDP = C+I+G+(X-M)*, where *C* = Consumers expenditure, *I* = Gross Capital investment, *G* = Government Spending, *X* = Exports and *M* = Imports. Aggregate Demand (AD) is the total demand for goods and services produced within an economy over a period of time. AD can also be calculated via *C+I+G+(X-M)*. Are GDP and aggregate demand effectively the same measure? If not, how can they be calculated in the same way?

Answer: Aggregate demand is a function that *relates* GDP to the price level (and depending on the context, to other variables as well). Thus, aggregate demand is a curve with GDP on the X-axis and the aggregate price level on the Y-axis. Aggregate demand shows the total amount of goods and services demanded at various aggregate price levels.

For a good mental picture of the relationship between aggregate demand and GDP, just remember what you learned in first-year economics about the relationship between the demand curve for a good and the quantity demanded of that good. The demand curve plots the amount of the good demanded on the X-axis versus the price of the good on the Y-axis. As the price goes up, the quantity demanded goes down (unless, of course, it's a Giffen good). Each point on the curve shows the quantity of the good demanded at a particular price.

Likewise, each point on the aggregate demand curve shows the "quantity of GDP" demanded at a particular aggregate price level. At lower aggregate price levels, that is, lower down on the Y-axis, more GDP is demanded; as the aggregate price level increases, the quantity demanded decreases, so the curve slopes downward.

If you want to do further reading about the relationship between aggregate demand and GDP, I suggest the following:

Textbooks you might own or which you can easily find at the library:

- Samuelson and Nordhaus, *Economics*,16th edition, pages 381-390.
- Mankiw, *Principles of Economics*, second edition, pages 706-712 and 733-757.

How can I solve the Keynesian cross model for equilibrium income?

Question: Would like to know about how the simple Keynesian cross model may be solved for a unique equilibrium level of national income. And What impact a fall in interest rate would have on the equilibrium?

Answer: As I'm sure that you've read, the simple Keynesian cross model plots actual and planned expenditures (on the Y axis) against total income on the X axis. The full equation of the planned expenditure line is:

$$E = C(Y - T) + I + G,$$

where E is planned expenditure, C is consumption, I is investment, and G is government spending. C is a function of disposable income, so it's written as $C(Y - T)$, where Y is income and T is taxation, so $Y-T$ is the amount of income left after taxes.

Also, the simple model assumes that taxes T, government spending G, and investment I are all constant. This makes E a function only of Y, because Y is the only independent variable that changes on the right side of the equation. Because the equation describes a linear function, we can rewrite it as:

$$E = mY,$$

where E is planned expenditure, Y is total income, and m is the slope of the line that plots E as the dependent variable against Y as the independent variable.

Now, this model says that at equilibrium, actual expenditure equals planned expenditure. Actual expenditure equals GDP, so at equilibrium:

$$E = GDP$$

and because we previously found that

$$E = mY,$$

we get

$$Y = GDP/m,$$

which I believe answers your first question.

Your second question was about the effect of interest rate changes on income. A fall in interest rates will very likely cause investment I to increase, which shifts the planned expenditure line up. This raises the point of intersection between the planned expenditure line and the actual expenditure line to a higher level, meaning that

(according to this model) equilibrium occurs at a higher level of total income. The model predicts the opposite effect if interest rates increase: total income will fall.

You should realize that these models are useful to help you see relationships between different parts of the economy, but they vastly over-simplify the realities of the situation. As a result, they are interesting classroom exercises but are not useful tools for making real-world economic forecasts.

Here are some additional information sources for you:

- Gregory Mankiw, *Macroeconomics* fourth edition, pp.258-269.
- Fiscal Policy: The Keynesian Cross (a fairly straight-ahead tutorial on the model), at www.swcollege.com/bef/cebula/macro_b03_dialog.html.

What is the IS-LM model, and what can you do with it?

Question: Could you please provide detail as to what the IS and LM model is? How is it useful to determining economic policy? How does the Phillips Curve tie into the Model?

Answer: The IS-LM model is a simplified example of an economy in equilibrium and is based on Keynesian macroeconomic ideas.

The IS-LM graph shows the interest rate on the Y axis and GDP on the X axis. The IS (investment-saving) curve shows the pairs of interest rates and GDP at which savings = investment, and slopes downward as GDP increases. The LM (liquidity preference-money supply) curve shows the points at which the supply of money and the demand to hold money are equal, and slopes upward as GDP increases.

Most mainstream economists do not view the IS-LM model as a particularly useful tool for analyzing real-world economies.

In 1993, for example, one economist wrote in the *Journal of Economic Perspectives* that "The IS-LM model has no greater prospect of being a viable analytical vehicle for macroeconomics in the 1990s than the Ford Pinto has of being a sporty, reliable car for the 1990s." (Robert King, "Will the New Keynesian Macroeconomics Resurrect the IS-LM Model?", *Journal of Economic Perspectives*, Winter 1993)

Most introductory economics textbooks no longer cover the IS-LM model in any detail, though older ones did -- and when I say "older," I mean published 20 years ago or more, such as old editions of Paul Samuelson's *Economics*. If you want to read more about the IS-LM model, the following books cover it well, and you should be able to find them at the library:

- Gregory Mankiw, *Macroeconomics* fourth edition, pp.257-280 (Chapter 10).
- Rudiger Dornbusch, Stanley Fischer, and Richard Startz, *Macroeconomics* eighth edition, pp.213-236 (Chapter 10).

Why does the value of the multiplier change when you add an income tax?

Question: Why does the numerical value of the multiplier decline when an income tax is added to the income-expenditure model?

Answer: In Keynesian macroeconomic theory, the multiplier is defined as the change in income Y divided by the change in autonomous aggregate demand Aa. With an income tax, the theory says that equilibrium income Y0 equals

Aa / 1 - c(1-t),

where c is the marginal propensity to consume and t is the tax rate. Now, look at the denominator of that expression:

1 - c(1-t)

As the tax rate t increases, the value of the expression c(1-t) decreases. We're subtracting that expression from 1, so as the value of the expression decreases, the value of the denominator increases. By simple algebraic manipulation, we can rearrange the equation as:

Y0/Aa = 1/1-c(1-t).

As the tax rate t increases, the denominator of the right side of the equation increases. As that happens, the value of the expression decreases, and hence, so does the value of the multiplier. If you need convincing, use a constant value of c and plug various tax rates into the equation to see for yourself.

Can you calculate how much consumer spending would change based on a change in the CPI?

Question: I am an economics student. Now I have question probably sounds silly. Ok, here it is: If we know CPI has increased from 200 to 210 between Year 0 to Year 1. At the same time, the population of the country has also increased 7.5% between these two years. Could we calculate the percentage of real increase of consumption per person between the year 0 and year 1. If it is possible to calculate from the given

information, is there a 0.5% - 4.9% increase or 5.0% - 7.49% or more than 7.5% increase.

Answer: Let's look at two possible cases, country A and country B, that conform to your assumptions: that in the course of a year, population increases by 7.5% and the CPI increases by 5.0%. (We are leaving out any complications about how the CPI is calculated, but you should realize that CPI reflects price changes in a specific group of products, and does *not* reflect price changes of all products in the economy. As a result, CPI can be misleading in some situations.)

In both countries, the population in year 0 is 1,000 people and the price of a basket of goods in year 0 is $200. The next year, in both countries, the population is 1,075 (a 7.5% increase) and the price of a basket of goods is $210. That's all the information we can derive from your assumptions, and it's the same for both countries. Let's add two more assumptions: that in year 0 both A and B have the same gross domestic product: $1,000,000, or $1,000 per person; and that the marginal propensity to consume is the same in both countries.

Now, here's where countries A and B differ. In year 1 (the second year), country A's GDP increases by 10 percent, to $1,100,000; while country B's GDP increases by 50 percent, to $1,500,000. These are unrealistic numbers, of course, but I'm using them to make a point.

Per capita GDP in country B is now $400 higher than it is in country A. Some of that extra GDP will be put into saving and investment, but because A and B have the same marginal propensity to consume, and there *is* more GDP per capita in country B, the percentage increase in consumption in B will be higher than it is in A.

Now, obviously, an increase in real GDP would affect the price level, but we can't be sure by how much.

The point of this simplified example is that based only on the information you gave, per capita consumption might increase a lot, a little, or somewhere in between -- depending on factors not specified in your assumptions. Therefore, based only on the information you gave, one can't calculate a specific amount by which per capita consumption would increase or decrease.

What's the relation between interest rates and the amount of loanable funds?

Question: I seemed to have been blessed with a brain that doesn't really understand the relationship between interest rates and loanable funds when there is both an increase in interest rates and a decrease in interest rates. Could you please explain this complex idea or I shall never be able to sleep again.

Answer: Probably what confuses you are things that you really don't need to worry about to understand the basic ideas.

In the real world, there are lots of complications. The amount that banks can loan out is affected not only by the amount of deposits they have, but by the type of deposits they have and the "reserve requirement" imposed by the Federal Reserve. And, of course, there are many different *ways* to loan out money.

Interest rates are a price, just like the price you pay for food, textbooks, or CDs. Interest is the price you pay for getting money *now* that you won't pay back until sometime in the future.

Interest has two main parts. First, the lender charges you for getting the money *now* instead of in the future: that's because people, including the lender, generally prefer to have money now instead of having it in the future. The lender is giving up the right to have the money now, and you are getting that right.

Second, the lender charges you for the *risk* that you won't pay the money back. No matter how good a credit risk you seem to be, there's a chance you might skip the country or be hit by a truck, and as a result, the lender wouldn't be repaid.

Now, having said all that, I advise you to ignore it for the moment.

To see the big picture, forget the details and just think about supply and demand. If interest is the price you pay for borrowing money, what do you already know about it from your previous economic studies? You know that you can draw supply and demand curves for loanable funds just as you can for any other good.

Other things being equal, increased interest rates cause more people to want to loan more money, leading to a greater quantity of available loan funds. At the same time, those rates mean that fewer people want to borrow money, leading to a smaller quantity demanded. These two forces tend to push the interest rate and the quantity of loanable funds toward an equilibrium level at which the quantity supplied equals the quantity demanded. The converse process applies when interest rates decrease.

What is the difference between short-run and long-run equilibrium?

Question: Can you tell me what the difference is between short-run equilibrium and long-run equilibrium?

Answer: The short run is the time period in which productive capacity (such as factories, raw materials, skilled labor, etc.) cannot change very much. The long run is the time

period beyond that, where you might have built new factories, hired new skilled workers, and so forth.

For example, suppose that after the current terrorist scare is over, there is a sudden increase in the demand for passenger airplanes as people start flying again. It takes *time* for productive capacity to be shifted into the construction of new passenger airplanes, so in the short run, the quantity of planes that the economy can produce each month is hard to increase. Over the long run, on the other hand, you can build as many new factories as you like.

Short-run equilibrium is the state toward which markets move in the short run, when the amount and uses of factors of production are fixed. Long-run equilibrium is the state toward which markets move in the long run, when the amounts and uses of factors of production can be changed.

If you want to read more about the issue, I'd suggest that you look at Paul Samuelson's *Economics*, 16th edition, pp.142ff.

When does the "sticky wage model" apply?

Question: In the sticky wage model what are the consequences, for the adjustment process, if nominal wages are fully indexed to the price level?

Answer: If nominal wages are fully indexed to the price level, the sticky wage model does not apply.

The whole idea of the sticky wage model, as its name implies, is that nominal wages cannot easily or quickly adjust to changes in the price level to keep real wages constant. If the price level goes up but nominal wages do not change, then real wages have effectively fallen. That spurs hiring more labor and producing more output, but at the expense of workers whose incomes have decreased.

If wages are fully indexed to the price level, then wages are not sticky and the issue does not arise.

How is the price level related to real income?

Question: This is a question for my econ mid-term practice exam. If price level rises faster than your money income, then your real income: Increases, decreases, remains the same, or fluctuates.

Answer: It would be wrong for me to answer an exam question *for* you, but let's think it through. Suppose that your income is $5 a week and that the economy's only consumer good is loaves of bread, which cost $1 each. Then you can buy five loaves of bread with your weekly income.

Now, suppose that the price of a loaf of bread goes up to $2.50, but you still earn $5 a week. Your weekly income can now buy only two loaves of bread, whereas before, it could buy five loaves of bread.

I leave it to you to figure out if that's an increase or a decrease in your real income.

How are price level data expressed?

Question: This is another question for my econ mid-term practice exam. Economic data that are adusted for price-level changes are said to be expressed in terms of: historical dollars, variable dollars, nominal dollars, or real dollars.

Answer: I'd have to pick "real dollars," though it's more common to say "constant dollars."

By the way, the "price level" is calculated by looking at a specific collection of products -- not at *all* products in the economy. Because of that, there's an on-going argument about how it should be calculated and which products should be included. Some people claim that the official price level statistics aren't very accurate as a picture of the price level in the whole economy.

What is the Harrod-Domar economic growth model?

Question: I need info on the Harrod-Domar model for a growth-related assignment, and our bookstores have no copies of the text left. Can you e-mail both the equation and an explanation?

Answer: I suspect that the reason the bookstore has no copies of your textbook is that it was published in 1956 and isn't used anymore. The Harrod-Domar model was popular in the 1940s and 1950s, but has long since been abandoned. It's a little out of my area, but here's an answer:

Based on the Keynesian idea that savings and investment might not always match up, Harrod and Domar independently reached similar conclusions about the conditions under which savings and investment could be kept in sync and the economy could be

kept growing. Where Y is real income, s is the marginal propensity to save, and v is the marginal capital-output ratio:

saving = sY

*investment = v * change in Y*

and for equilibrium to be maintained with growth,

*v * change in Y = sY*

change in Y / Y = s/v