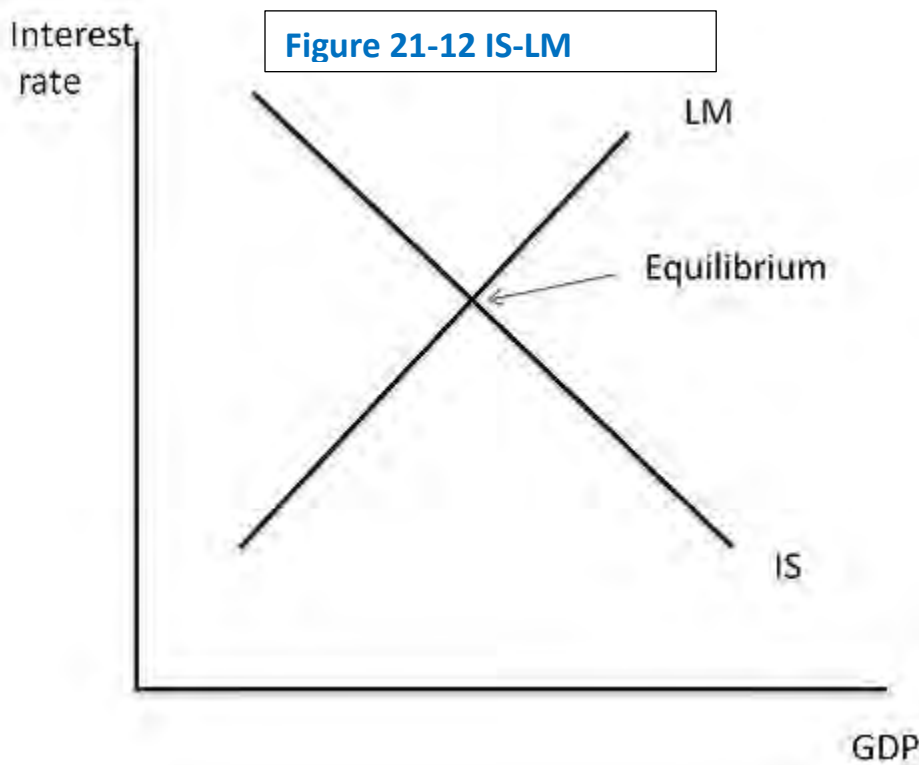
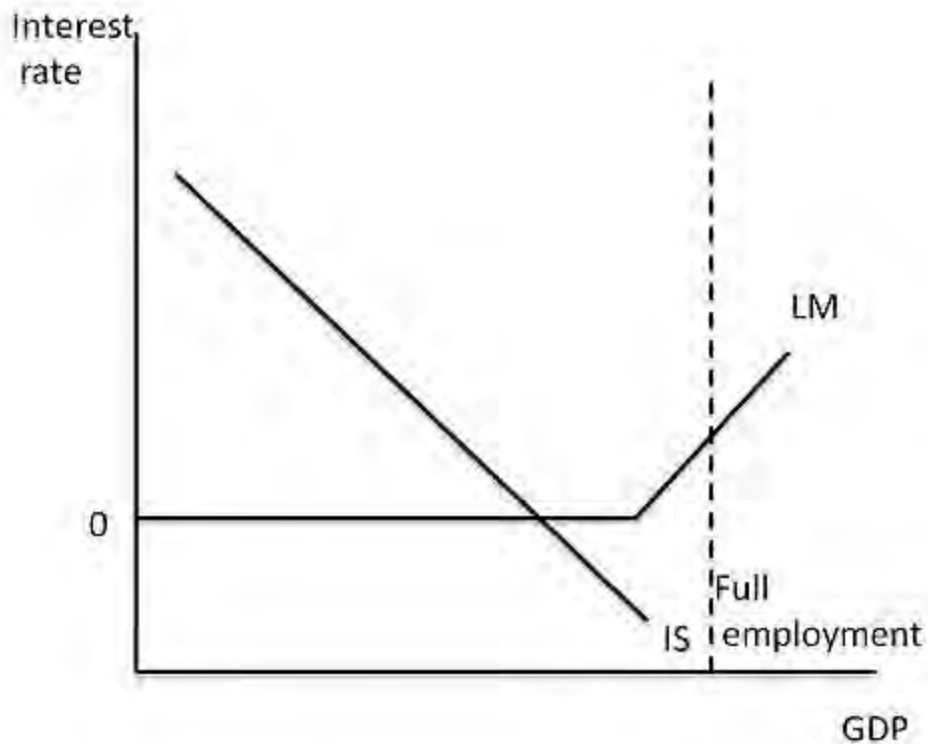


IS-LM or IS-MP Lecture notes: How can we get everything real and monetary into one diagram, with the interest rate on one axis (which could be zero) and real GDP (employment) on the other axis? Answer: the IS-LM or IS-MP curve, in fact we have everything to build this diagram, and once we do we can throw out most of the other diagrams and focus on the key macro variables (and outcomes).

Recall that $I = S$ in equilibrium (this is the Metzler and the loanable funds diagram above). So $I(r) = S(Y)$ the interest rate determines investment I and then GDP (Y) adjusts to make $S = I$ (this is the multiplier effect on the AD curve). Letting the interest rate change investment and having income or Y adjust to make savings equal investment maps out the IS curve,



See Mankiw page Chapter 21 Page 273

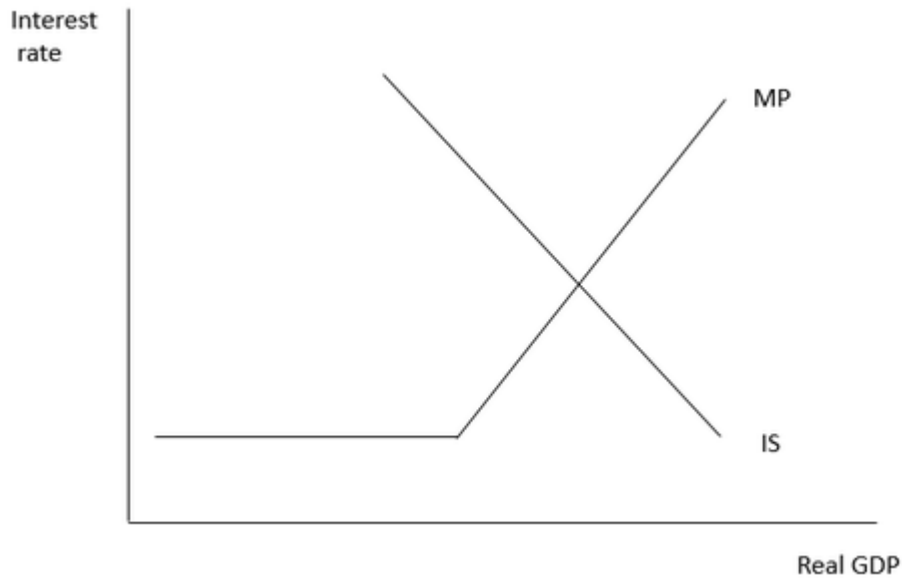


Or with a zero lower bound below full employment.

Where do we get the LM curve? Take the money demand curve, and shift it the right as income (AD) increases, you will see the interest rate rise. So we take the loanable funds diagram, and the money demand diagram and add GDP (Y)

Better yet, get rid of the LM curve and replace it with Monetary Policy (the MP curve). Assume Janet Yellen looks at GDP (Y or employment) and sets the interest rates she wants, subject to the zero lower bound of course,

Figure 21-13 IS-MP curve with zero lower bound (see Krugman on Phantom crisis below, or [Romer's more formal approach to](#) Mankiw).



More formal treatments (in case you are interested, not required, at all)

David Romer's class notes,

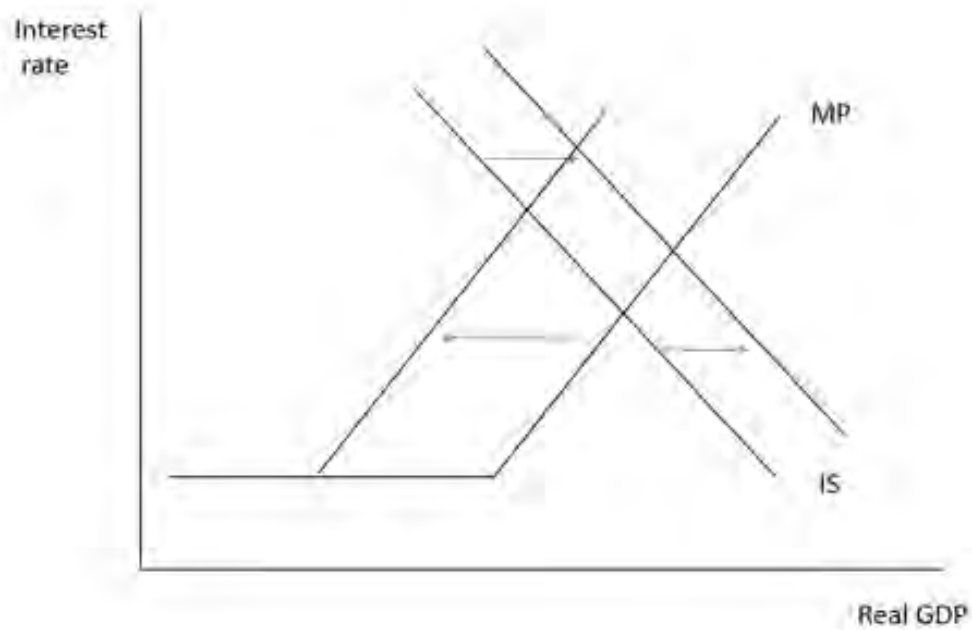
<http://elsa.berkeley.edu/~dromer/papers/ISMP%20Text%20Graphs%202013.pdf>

The New Keynesian IS-LM and IS-MP Models

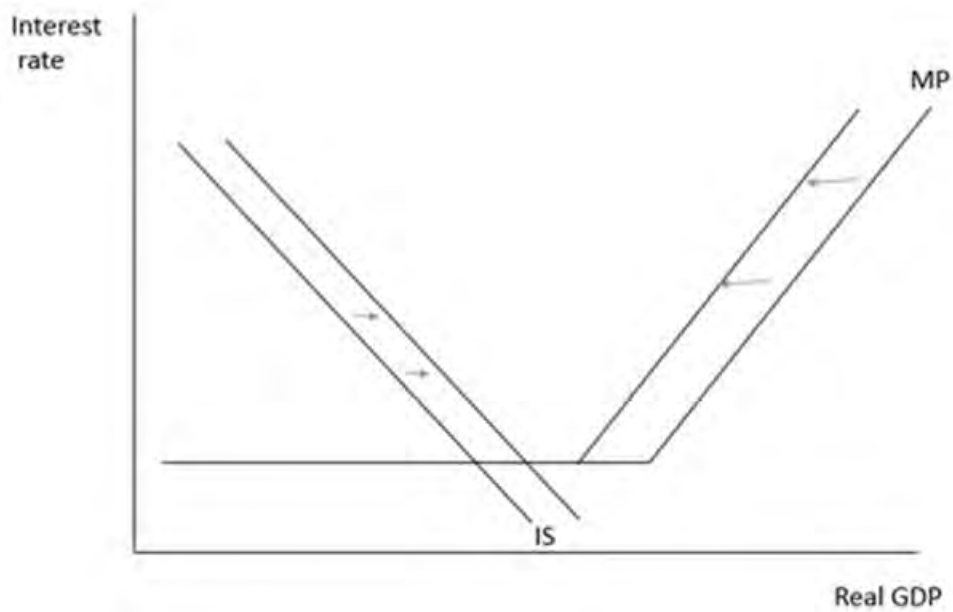
David Romer's name has come up several times in recent discussions of the IS-LM and IS-MP models. This is how Romer's new edition of his [graduate level macroeconomics book](#) derives the IS-LM and IS-MP curves: Assume that firms produce labor using labor as the only input, i.e. $Y = F(L)$, $F' > 0$, $F'' \leq 0$, and that government, international trade, and capital are left out of the model for convenience (so that $Y = C + I + G + NX$ becomes $Y = C$). Also assume that "There is a fixed number of infinitely lived households that obtain utility from consumption and from holding real money balances, and disutility from working. For simplicity, we ignore population growth and normalize the number of households to 1. The representative household's objective function is":

<http://economistsview.typepad.com/economistsview/2011/10/the-new-keynesian-is-lm-and-is-mp-models.html>

OK now for the finally, a loss of confidence in U.S. bonds with a zero FF rates!!
(drum roll....ta da!)



Here there is good news and bad news, interest rates rise as MP curve shifts left, but NX shifts the IS curve to the right, toss up, unless....



If interest rates stay at zero, we get benefit of greater NX with no increase in interest rates, bad news, a debt crises turns into good news for U.S. workers (but not EU or Japan or Chinese workers, beggar thy neighbor...)

Krugman Appendix: IS-LMentary

By Paul Krugman, October 11th 2011, [New York Times, blogpost](#)

http://krugman.blogs.nytimes.com/2011/10/09/is-lmentary/?_r=0

A number of readers, both at this blog and other places, have been asking for an explanation of what IS-LM is all about. Fair enough – this blogosphere conversation has been an exchange among insiders, and probably a bit baffling to normal human beings (which is why I have been labeling my posts “wonkish”). [Update: IS-LM stands for investment-savings, liquidity-money -- which will make a lot of sense if you keep reading] So, the first thing you need to know is that there are multiple correct ways of explaining IS-LM. That’s because it’s a model of several interacting markets, and you can enter from multiple directions, any one of which is a valid starting point.

My favorite of these approaches is to think of IS-LM as a way to reconcile two seemingly incompatible views about what determines interest rates. One view says that the interest rate is determined by the supply of and demand for savings – the “loanable funds” approach. The other says that the interest rate is determined by the tradeoff between bonds, which pay interest, and money, which doesn’t, but which you can use for transactions and therefore has special value due to its liquidity – the “liquidity preference” approach. (Yes, some money-like things pay interest, but normally not as much as less liquid assets.)

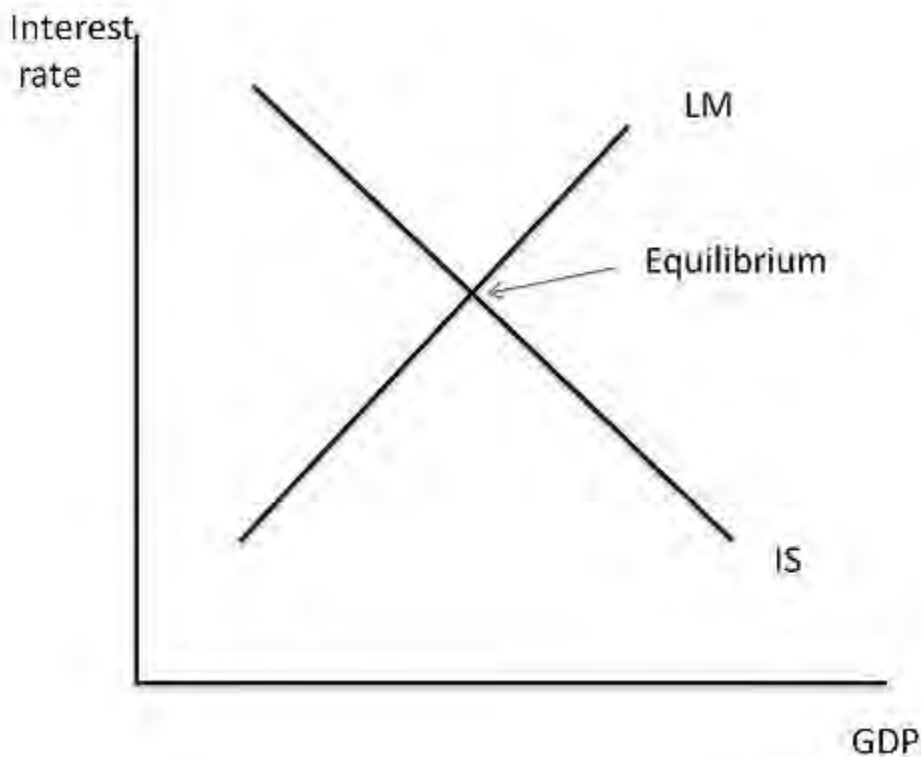
How can both views be true? Because we are at minimum talking about *two* variables, not one – GDP as well as the interest rate. And the adjustment of GDP is what makes both loanable funds and liquidity preference hold at the same time.

Start with the loanable funds side. Suppose that desired savings and desired investment spending are currently equal, and that something causes the interest rate to fall. Must it rise back to its original level? Not necessarily. An excess of desired investment over desired savings can lead to economic expansion, which drives up income. And since some of the rise in income will be saved – and assuming that investment demand doesn’t rise by as much – a sufficiently large rise in GDP can restore equality between desired savings and desired investment at the new interest rate.

That means that loanable funds doesn’t determine the interest rate per se; it determines a set of possible combinations of the interest rate and GDP, with lower rates corresponding to higher GDP. And that’s the IS curve.

Meanwhile, people deciding how to allocate their wealth are making tradeoffs between money and bonds. There's a downward-sloping demand for money – the higher the interest rate, the more people will skimp on liquidity in favor of higher returns. Suppose temporarily that the Fed holds the money supply fixed; in that case the interest rate must be such as to match that demand to the quantity of money. And the Fed can move the interest rate by changing the money supply: increase the supply of money and the interest rate must fall to induce people to hold a larger quantity.

Here too, however, GDP must be taken into account: a higher level of GDP will mean more transactions, and hence higher demand for money, other things equal. So higher GDP will mean that the interest rate needed to match supply and demand for money must rise. This means that like loanable funds, liquidity preference doesn't determine the interest rate per se; it defines a set of possible combinations of the interest rate and GDP – the LM curve. And that's IS-LM:

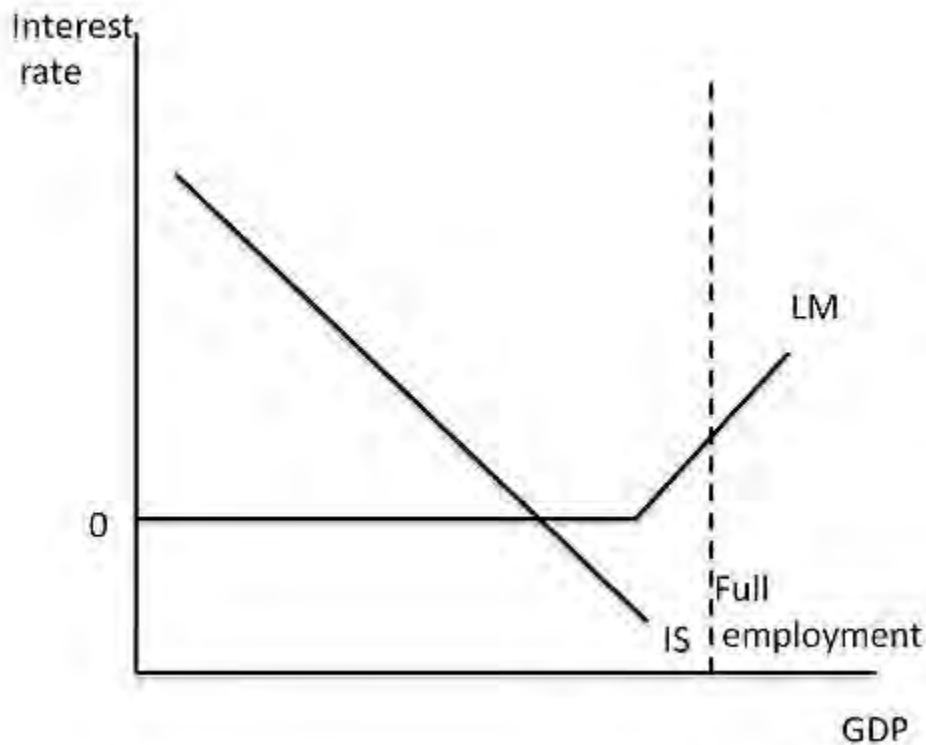


The point where the curves cross determines both GDP and the interest rate, and at that point both loanable funds and liquidity preference are valid.

What use is this framework? First of all, it helps you avoid fallacies like the notion that because savings must equal investment, government spending cannot lead to a rise in total spending – which right away puts us above the level of argument that famous Chicago professors somehow find

convincing. And it also gets you past confusions like the notion that government deficits, by driving up interest rates, can actually cause the economy to contract.

Most spectacularly, IS-LM turns out to be very useful for thinking about extreme conditions like the present, in which private demand has fallen so far that the economy remains depressed even at a zero interest rate. In that case the picture looks like this:



Why is the LM curve flat at zero? Because if the interest rate fell below zero, people would just hold cash instead of bonds. At the margin, then, money is just being held as a store of value, and changes in the money supply have no effect. This is, of course, the liquidity trap.

And IS-LM makes some predictions about what happens in the liquidity trap. Budget deficits shift IS to the right; in the liquidity trap that has no effect on the interest rate. Increases in the money supply do nothing at all.

That's why in early 2009, when the WSJ, the Austrians, and the other usual suspects were screaming about soaring rates and runaway inflation, those who understood IS-LM were predicting that interest rates would stay low and that even a tripling of the monetary base would not be inflationary. Events since then have, as I see it, been a huge vindication for the IS-LM types – despite some

headline inflation driven by commodity prices – and a huge failure for the soaring-rates-and-inflation crowd.

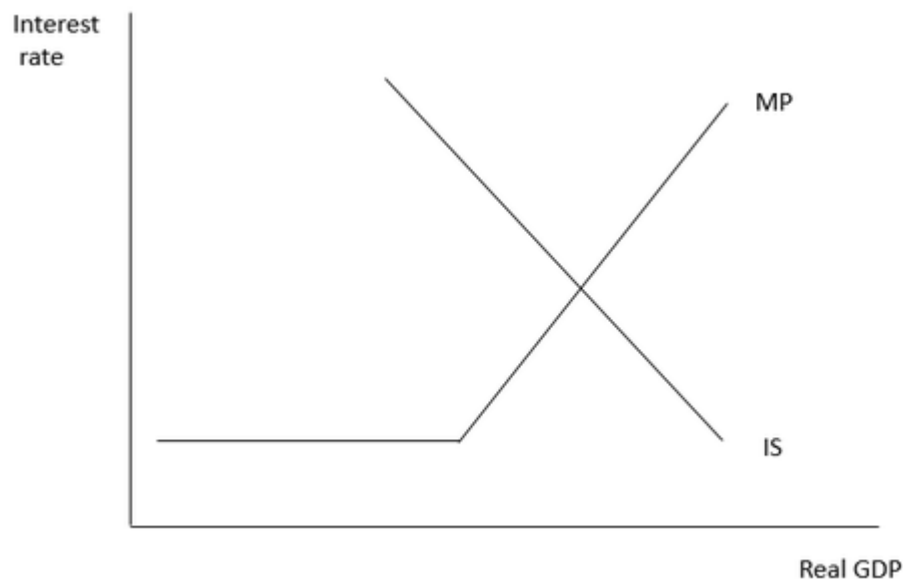
Yes, IS-LM simplifies things a lot, and can't be taken as the final word. But it has done what good economic models are supposed to do: make sense of what we see, and make highly useful predictions about what would happen in unusual circumstances. Economists who understand IS-LM have done vastly better in tracking our current crisis than people who don't.

Phantom Crises (Wonkish)

[Simon Wren-Lewis](#) is puzzled by a [Ken Rogoff column](#) that sorta-kinda defends Cameron's austerity policies. His puzzlement, which I share, comes at several levels. But I want to focus on just one thing: Rogoff's assertion that Britain could have faced a southern Europe-style crisis, with a loss of investor confidence driving up interest rates and plunging the economy into a deep slump.

As I've [written before](#), I just don't see how this is supposed to happen in a country with its own currency that doesn't have a lot of foreign currency debt – especially if the country is currently in a liquidity trap, with monetary policy constrained by the zero lower bound on interest rates. You would think, given how many warnings have been issued about this possibility, that someone would have written down a simple model of the mechanics, but I have yet to see anything of the sort.

Let's start with something like a canonical model – a model in which there's an IS curve representing the effects of interest rates on demand, and monetary policy is described by some kind of Taylor rule. [David Romer](#) calls this the IS-MP model, and it looks something like this at a given point of time:

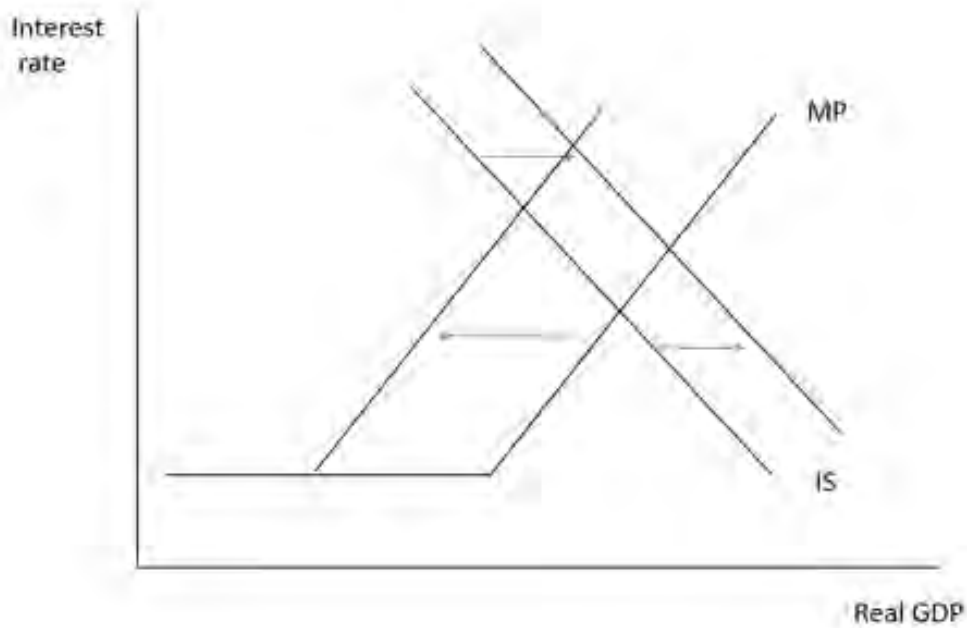


Here the MP curve represents the central bank's response function for a given rate of inflation, with rates rising if output goes up a la Taylor. The flat section represents the zero lower bound.

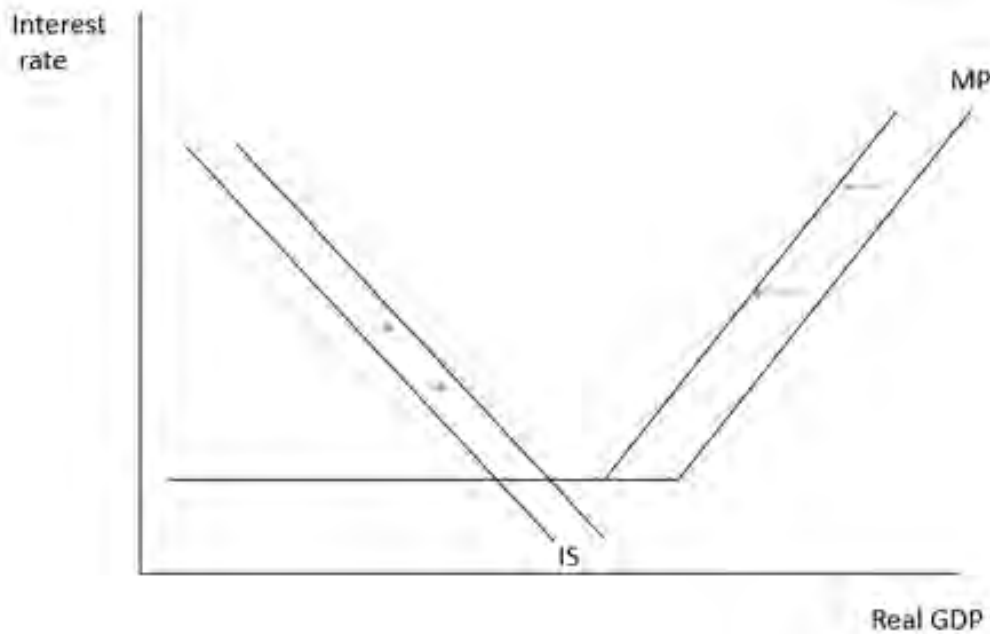
As Romer points out in his notes, this can be reinterpreted as an open-economy model if we let capital flows be influenced by the exchange rate (most international econ types tend to think in terms of stocks rather than flows, but it doesn't really matter here), so that a lower interest rate leads to currency depreciation. In this case the IS curve includes the effect of a weaker currency in promoting net exports.

Now suppose that investors turn on your country for some reason. This can be represented as a decline in capital inflows at any given interest rate, so that the currency depreciates. If you have a lot of foreign-currency-denominated debt, this could actually shift IS left through balance-sheet effects, as we learned in the Asian crisis. But that's not the case for Britain; clearly, IS shifts right. If LM doesn't shift, the interest rate will rise, but only because the loss of investor confidence is actually, through depreciation, having an expansionary effect.

We could modify this conclusion if the central bank is worried about the inflationary effect of depreciation, so that MP shifts left. In this case we could, possibly, have a contractionary effect of lost investor confidence – but the channel runs through the inflation fears of the central bank, which doesn't seem to be at all what Rogoff or others are talking about:



Furthermore, suppose that we start in a liquidity trap. In that case monetary policy is initially tighter than the central bank would like, so that even if MP shifts left it won't matter unless the shift is very large:



My point is that what sounds like a straightforward claim – that loss of foreign confidence causes a contractionary rise in interest rates – just doesn't come out of anything like a standard model. If you want to claim that it will happen nonetheless, show me the model!

Now, you might argue that IS-MP is a model of the short-term interest rate, and we're talking about long-term rates here. But long rates are largely determined by expected future short rates, so this argument doesn't make sense unless you have some story about why short rates should rise somewhere along the way.

Furthermore, as Wren-Lewis says, even if there is somehow a squeeze on long-term bonds, why can't the central bank just buy them up? Yes, this is "printing money" – but when you're in a liquidity trap, that doesn't matter. (Alternatively, you can take a consolidated view of the government and central bank balance sheets, in which case what we're effectively doing is refinancing at the zero short-term rate.)

I know that many people find this line of argument, in which a loss of investor confidence is if anything expansionary, deeply counterintuitive. But macro, and especially liquidity trap macro, tends to be like that. So don't give me your gut feelings; give me a coherent story about who does what, i.e. a model. I eagerly await a response.

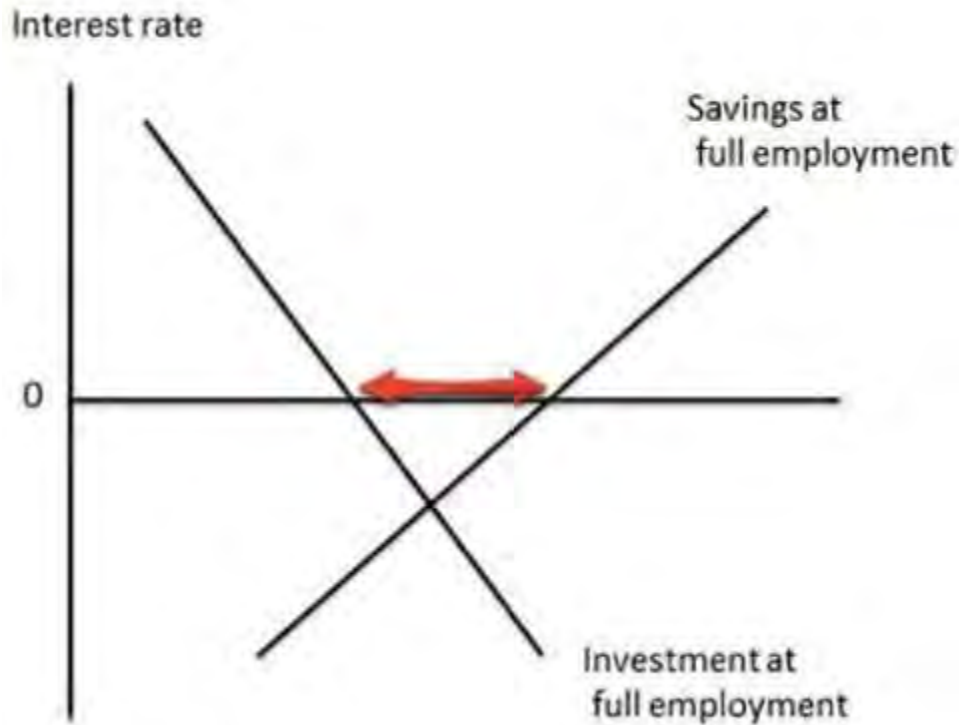
<http://krugman.blogs.nytimes.com/2013/10/03/phantom-crises-wonkish/>

March 19, 2013, 1:16 pm [113 Comments](#)

Misunderstanding IS-LM (Wonkish and Unimportant)

Some readers have asked me to reply to this [Steve Keen piece](#) claiming that I don't understand the IS-LM model. Sigh. I really don't want to spend time fighting against people with whom I don't really have a current policy disagreement — and this is so silly, besides. But to satisfy those who are for some reason nervous, here's a brief explanation of why *somebody* doesn't understand IS-LM.

Keen starts from a picture I drew to illustrate the nature of a liquidity trap:



He then says, aha! The IS market is out of equilibrium when we're in a liquidity trap, but Krugman writes as if it were in equilibrium! Gotcha!

Um, it pays to read the labels. Those savings and investment curves are what the supply and demand for funds *would be if the economy were at full employment*. They're not the curves that actually apply when the economy is operating below full employment. In the IS-LM model, the quantity of funds supplied is always equal to the quantity of funds demanded — because the level of output adjusts. This is true both when the zero lower bound applies and when it doesn't.

In fact, that's the essential insight of IS-LM: both liquidity preference and loanable funds are true, which is possible because both the interest rate and income are adjusting variables. Hicks could have told you that; in fact, he did. So what Keen thinks is a big logical fallacy on my part is just a failure of reading comprehension on his part. Look, IS-LM could be all wrong; but I am accurately reflecting the way that model works. And while I am not infallible, I have done a lot of economic modeling in my time; if you think that I've made an elementary logical error, you might want to check your reasoning very carefully before going with it.

So can we get back to serious stuff?