

1 The IS/LM model (Romer Chapter 5).

I have become aware that the IS/LM material is confusing to some. This note is intended to help you, if you are one of those.

You can use the book if you prefer, but I expect you to know the following: The IS-relation can be said to describe the equilibrium in the goods market for a given level of the real interest rate. The IS relation is derived from the demand components:

$$C = \alpha_o + \alpha_1(Y - T),$$

where C is (real) consumption, Y is output, and T is net taxes (taxes minus transfers) and we refer to $Y - T$ as disposable income. (I will assume that you can handle simple extensions of this, such as $T = t_0 + t_1Y$ where t_1 then is the tax-rate.) We assume that $\alpha_1 < 1$.

$$I = \beta_0 - \beta_1 r,$$

where I is fixed investment, r is the real rate of interest, and β_1 is a positive parameter. Government consumption G is usually taken to be exogenous. Define total demand as $E = C + I + G$ and you get by adding up that

$$E = \text{constant} - \beta_1 r + \alpha_1 * (Y - T).$$

For fixed T and given r you can plot this as a line with slope less than one as a function of Y . The “supply function” is simply Y , which means that all demand will be satisfied—this is the 45 degree line in a Y, E plot (if you don’t plot it you would just say that output is demand determined). Setting $E = Y$, you get the IS-curve solving for Y as a function of r (or r as a function of Y).¹

The LM relation is derived from the demand for money

$$M^d = P L(Y, r + \pi^e),$$

where P is the price level, and π^e is expected inflation. Sometimes we just write the relation as

$$M^d = P L(Y, i),$$

where i is the nominal interest rate $r + \pi$. The L -function is the demand for real money and if i is the interest rate on bonds then it should be i that enters the relation because the alternative to

¹The supply relation here is, of course, a bit of a joke and, in my view, the IS-relation only is useful in situations with free resources. More advanced treatments, of which we will cover some, base supply function on labor’s choice between labor and leisure—none of the relations used in modern macro models are, however, realistic enough to actually “take to the data” (meaning, that econometricians would take them serious enough to estimated them).

holding money is holding bonds (or buying goods)—for the main idea this doesn't matter a lot. Given an exogenous supply of money M , setting $M = M^d$ (equilibrium in the money market) gives

$$M = P L(Y, i),$$

and for a fixed M and fixed price level P this gives Y as an implicit function of r . Because L is increasing in Y and decreasing in i (and thus in r) setting $L(Y, i) = \text{constant}$ gives Y as an increasing function of r (if Y increase, L will tend to increase, so to keep it constant r has to also increase). Write L as a linear function if this isn't clear and you can solve it in detail.

Romer points out that in modern models (and practise) economists often think of the Fed as directly setting r as a function of Y (and of inflation)...either way, you get a relation like the LM-curve.

Now you should yourself be able to find the intersection of the LM and the IS curves and thereby find the equilibrium in the economy. I won't type this up: there are very detailed treatments in undergraduate textbooks such as Mankiw's intermediate text.

Note that as far as the LM-curve is concerned an increase in P has the same effect as an decrease in M . This gives you the AD-curve: output as a function of P .

Note: Often economists like to write things as a function of inflation (after all, we care about inflation, and not about the absolute price level), but this is equivalent. In this chapter, we do not consider dynamics. The past is given, including last years price level P_0 , say. So, because $\pi = \frac{P - P_0}{P_0}$ and P_0 is given, there is a one-to-one relation between π and P .

Why do we look at this? The IS/LM model is considered out-of-date in academia because there is no modeling of behavior. However, modern forecasting models usually contain an IS/LM core. Why does it matter to model behavior if the models work? Consider the multiplier. This is really what we care about, if the government lowers taxes or increases G how much will the economy expand. The question of the effect of government stimulus is *the* main question in the press right now. In the model, the effect is bigger the larger the marginal propensity to consume (α). We will spend a lot of time on this and show, for example, that temporary tax breaks have very small effects unless many consumers are credit constrained.

The main feature underlying models with Keynesian properties is that producers will satisfy supply at given prices. In most modern models with optimizing agents this is still assumed to be the case—we have made little progress on modeling price setting (modern models will typically assume prices are only fixed for one period and have a dynamic dimension, nonetheless the fix-price assumption is central.).

So I think it is still quite fair to say that the agenda of modern macroeconomics is still the agenda set by Keynes, although the details of models look very different from the basic IS/LM model.