Economics 21 **Spring 2016**

IS-LM Model Release 2.0

Goods Market Equilibrium Condition:

$Y = C + I + G + NX$

Behavioral Equations:

$C = c_0 + c_1(Y - T)$

$T = t_0 + t_1 \cdot Y$

$I = i_0 + i_1 \cdot Y - i_2 \cdot r$

where r is the real interest rate

$G = g_0$

$NX = nx_0 - nx_1 \cdot Y - nx_2 \cdot r$

Asset Market Equilibrium Condition:

$$\frac{M^s}{P} = \frac{M^d}{P} = l_1 \cdot Y - l_2 \cdot i$$

where i is the nominal interest rate. $i = r + \pi^e$ where π^e is expected inflation. In the context of the IS-LM model, we will always consider π^e to be exogenous (even though in the Inflation Model it is endogenous). This means that in the context of IS-LM, you don't need worry about π^e changing on its own. You only need to be able to analyze how an exogenous change in π^e would shift the curves. The easiest way to do this is to write the model in (i,Y) space and shift the IS curve when π^e changes.

!!!Reduced Form Equations!!!

Reduced Form for Y:

$$Y = \frac{Z_0 + \frac{(i_2 + nx_2)}{l_2}\frac{M^S}{P} + (i_2 + nx_2)\pi^e}{(1 - MPS) + \frac{l_1}{l_2}(i_2 + nx_2)}$$

where as before:

$Z_0 = c_0 - c_1 t_0 + i_0 + g_0 + nx_0$

$MPS = c_1 + i_1 - c_1 t_1 - nx_1$

The changes are:

1) $i_2 + nx_2$ replaces i_2 everywhere because changes in r now affect NX as well as I, and

2) π^e appears as another exogenous variable. An increase in π^e shifts the IS curve up by $\Delta\pi^e$ and out by $(i_2 + nx_2)\Delta\pi^e/(1\text{-}MPS)$.

Reduced Form for r:

$$r = \frac{\frac{l_1}{l_2} Z_0 - \frac{(1-MPS)}{l_2}\frac{M^S}{P} - (1-MPS)\pi^e}{(1-MPS) + \frac{l_1}{l_2}(i_2 + nx_2)}$$

The Reduced Form equations are obviously more complex, but since we will consider π^e exogenous, the multipliers for Z_0 and $(M/P)^s$ remain unchanged, **except** for the $(i_2 + nx_2)$ term.

$$\frac{\Delta Y}{\Delta Z_0} = \frac{1}{(1-MPS) + \frac{l_1}{l_2}(i_2 + nx_2)}$$

Or, if you are Janet Yellen, and care about GDP:

$$\frac{\Delta Y}{\Delta (M^s/P)} = \frac{\frac{(i_2 + nx_2)}{l_2}}{(1-MPS) + \frac{l_1}{l_2}(i_2 + nx_2)}$$

and for completeness, we now have:

$$\frac{\Delta Y}{\Delta \pi^e} = \frac{(i_2 + nx_2)}{(1-MPS) + \frac{l_1}{l_2}(i_2 + nx_2)}$$