More on IS-LM and Crowding Out (rev. 3/2)

Suppose the IS curve is given by:

\[
Y = \left( \frac{1}{1 - c(1 - t) + m} \right) \left[ \bar{A} + \frac{\text{EXP}}{\bar{M}} - \frac{\text{IMP}}{\bar{M}} + (n + v)q - b \right] \quad \text{let} \quad \bar{\alpha} \equiv \left( \frac{1}{1 - c(1 - t) + m} \right) \quad \text{<IS>}
\]

and the LM curve by:

\[
i = -\left( \frac{1}{h} \left( \frac{\bar{M}}{P} - \mu \right) \right) + \left( \frac{k}{h} \right) Y \quad \text{<LM>} \quad \text{[This is the LM curve in Problem Set 2, Problem #2]}
\]

Graphically:
To obtain equilibrium income substitute the LM curve into the IS:

\[ Y = \alpha \left[ A + EXP - IMP + (n + v)q - b\left(\frac{1}{h}\right)\left(\frac{M}{P} - \mu\right) + \frac{k}{h}Y \right] \]

Bring the multiplier and the \( Y \) term to the left hand side.

\[ Y\left(1 - c(1 - t) + m + \frac{bk}{h}\right) = A + EXP - IMP + (n + v)q + \left(\frac{b}{h}\right)\left(\frac{M}{P}\right) - \left(\frac{b}{h}\right)\mu \]

Divide both sides by the term in parentheses to obtain equilibrium income:

\[ Y_0 = \hat{\alpha} \left[ A + EXP - IMP + (n + v)q + \left(\frac{b}{h}\right)\left(\frac{M}{P}\right) - \left(\frac{b}{h}\right)\mu \right] \]

where \( \hat{\alpha} = \frac{1}{1 - c(1 - t) + m + \frac{bk}{h}} \)

Note that this is smaller than the Keynesian multiplier \( \bar{\alpha} \)

\[ \hat{\alpha} \leq \bar{\alpha} = \frac{1}{1 - c(1 - t) + m} \]

This means that for a given increase in government spending \( \Delta GO \) the increase in income is smaller. To see this, take the total differential,

\[ \Delta Y = \hat{\alpha} \left[ \Delta A + \Delta EXP - \Delta IMP + (n + v)\Delta q + \left(\frac{b}{h}\right)\Delta \left(\frac{M}{P}\right) - \left(\frac{b}{h}\right)\Delta \mu \right] \]

and set \( \Delta A = \Delta GO \), while everything else stays constant. Then:

\[ \Delta Y = \hat{\alpha}\Delta GO \Rightarrow \frac{\Delta Y}{\Delta GO} = \hat{\alpha} \]

To see what happens why this is the case, i.e., that expansionary fiscal policy is less effective in an IS-LM world than in a Keynesian Cross world, consider an increase in government spending on goods and services, \( \Delta A = \Delta GO \) (all other autonomous spending is held constant).
In the Keynesian Cross world, $Y$ would have risen to $Y'_0$. In the IS-LM world, income only rises to $Y_1$. That’s because as income rises, money demand rises even as the money supply is held fixed. Incipient excess money demand has to be eliminated, and at a higher income level, that can only be accomplished by a higher interest rate, which affects negatively investment. The difference between $Y_1$ and $Y'_0$ is the amount of income “crowded out” due to “crowding out” of investment arising from higher transactions demand for money.

Notice that the larger the $b$ (which implies a flatter IS curve), the more crowding out there is. Similarly, the multiplier $\hat{\alpha}$ is smaller the larger $b$ is. That’s because a large $b$, holding all else constant, means that for any given interest rate increase, more investment is crowded out, resulting in a larger decline in income relative to $Y'_0$.

Further notice that the larger $h$ is, the flatter the LM curve, and the less crowding out there is. Similarly, the larger $h$ is, the larger the multiplier $\hat{\alpha}$. That’s because when $h$ is large, as income and money demand rise, only a small increase in interest rates is necessary to re-equilibrate the money market, and hence only a small decline in investment occurs.