Aggregate Demand – Aggregate Supply

1. Deriving Aggregate Supply

Derive the Aggregate Supply Curve by using the wage setting and price setting equations from Chapter 6:

\[ W = P^e F(u, z) \]  
\[ \frac{P}{W} = (1 + \mu) \Rightarrow P = W(1 + \mu) \]

Substitute (6.1) into (6.5):

\[ P = [P^e F(u, z)](1 + \mu) \]

We want to re-express (7.1) into an expression relating the price level \( P \) to output, \( Y \). In order to do this, recall:

\[ u = \frac{L - N}{L} = 1 - \frac{N}{L} = 1 - \frac{Y}{L} \quad \text{for} \quad Y = AN, A = 1 \]

Substituting this expression for \( u \) into (7.1), one obtains:

\[ P = P^e (1 + \mu)F\left(1 - \frac{Y}{L}, z\right) \]

Notice \( z, \mu \) are shift variables. \( P^e \) is the vertical intercept of the line at \( Y_n \).

Notice if the expected price level rises, then the AS curve shifts.

2. Deriving Aggregate Demand, Again

Now, let’s move to the demand side, to obtain an expression called the Aggregate Demand equation in P-Y space. This involves the IS and LM curves, which we will write in a non-parametric – or functional – form:

\[ Y = C(Y - T) + I(Y, i) + G \quad \text{<IS schedule>} \]
\[ M / P = YL(i) \quad \text{<LM schedule>} \]
Recall, changes in the autonomous components of T, C, I, or in G, will shift the IS curve, and changes in the money supply will shift the LM curve.

Notice that if one holds constant all terms in the IS curve, and holds the nominal money supply (M) constant, considering differing price levels will imply differing income levels, thereby tracing out a line.

One way to think of this graph is that in the past, we solved for equilibrium income, at point A, because we held the price level constant.

Notice instead of keeping track of separate IS and LM curves in P-Y space, we can solve for the aggregate demand curve:

\[ Y = Y \left( \frac{M}{P}, G, T \right) \]  

<Aggregate Demand schedule>

Notice that if we used the parametric expressions for the IS and LM curves, the aggregate demand curve would be written as:
(7.3') \[ Y = \hat{\gamma} \left[ \Lambda_0 + \frac{b_2}{h} \left( \frac{M_0}{P} \right) - \frac{b_2 \mu_0}{h} \right] \]
for \[ \hat{\gamma} = \frac{1}{1 - c_1(1 - t_1) - b_1 + \frac{b_2}{h}} \]

Notice that changes in the real money stock, \( G \), or the autonomous component of \( T \) would shift the AD curve:

3. Putting \( AD \) and \( AS \) Together

In the short run, equilibrium output and the price level are given by the intersection of the two curves.

When the price level exceeds the expected price level, the expected price level is re-set at a higher level; the wage setters raise the wage they set, pushing up the price level. This is represented as an upward shift in the AS.
This process repeats as long as output exceeds the natural level of output (potential GDP). Only when the expected price level equals the actual will this process cease.

It is of interest to consider the short, medium, and long term implications of a monetary expansion. If the price level stayed constant, the LM would have shifted out as in the IS-LM analysis; but as output rises to \( Y' \), the price level rises, so the LM shifts to only \( LM' \). Eventually as the price level rises sufficiently high that \( Y = Y_n \), and the economy reaches \( A'' \), then the price level is proportionately higher – that is, if the money supply were increased by 10%, then the price level would be 10% higher in the end. This phenomenon is called long run money neutrality.