Chapter 9: Aggregate Supply / Aggregate Demand [1]

1 Aggregate Supply (AS) / Aggregate Demand (AD) Model

1.1 Time horizons in macroeconomics

Long run: prices are flexible, respond to changes in AS or AD.

Short run: many prices are "sticky" at some predetermined level; prices are fixed and can't change until we enter the long run. Why are prices sticky in the short run? Think labor contracts, periodic wage renegotiations (you can bargain for a higher wage once per year, for example), catalogs, menus, etc.

1.2 Aggregate demand (AD)

The aggregate demand curve traces out the relationship between the price level and the quantity of output demanded. How to derive the AD curve?

1. Fix velocity ($V = \bar{V}$) and the money supply ($M = \bar{M}$); the quantity equation $MV = PY$ implies a negative relationship between the price level P and output Y (it traces out a hyperbola in P vs. Y space because the product PY equals a constant, $\bar{M}\bar{V}$).

2. Aggregate demand is a function of the money supply M; with fixed prices, an increase in M shifts the AD curve to the right.

1.3 Long-run aggregate supply (LRAS)

In the long run, output is determined by available factors and the production technology: full employment $Y_{FE} = \bar{Y} = F(\bar{K}, \bar{L})$. $\bar{Y}$ does not depend on P, so the LRAS curve is vertical in P vs. Y space.

1. Changes in the demand for goods and services (C, I, G) only affect P, not Y.

2. Changes in the money supply (M) only affect nominal variables (we say that money is neutral here).

3. An increase in M shifts the AD curve to the right; in the long run, this raises the price level but leaves output unchanged at $\bar{Y}$ (expansionary monetary policy is purely inflationary).

1.4 Short-run aggregate supply (SRAS)

Assumptions:

1. Prices are fixed (sticky, stuck at some predetermined level). The SRAS curve is horizontal in P vs. Y space.

2. Firms are willing to sell as much at that price level as their customers are willing to buy (you can scale up output as much as you want without putting upward pressure on prices). If the AD curve shifts to the right, output rises in the short run.

1.5 Short-run to long-run dynamics

Over time, prices gradually become "unstuck" as we transition from the short-run to the long-run. When this happens, will P and Y rise or fall?

Short-run equilibrium	In the long-run ...
$Y > \bar{Y}$	$P \uparrow$ and $Y \downarrow$
$Y = \bar{Y}$	P and Y unchanged
$Y < \bar{Y}$	$P \downarrow$ and $Y \uparrow$

The adjustment of the SRAS curve through the labor market is what moves the economy to its long-run equilibrium. Let's describe this process step-by-step using the example of a recession.

1. In a recession, $Y < \bar{Y}$ and output falls short of its full employment level (positive output gap).

2. Output below potential suggests that unemployment is increasing, so the labor supply curve shifts to the right in the labor market (more people are willing to work).

3. Wages fall so firms can hire labor at a lower price; production costs decrease, shifting the SRAS curve downwards. Output can now be produced at a lower unit cost.

4. This process of SRAS adjustment occurs until all three curves (AD, SRAS, LRAS) intersect and long-run equilibrium is restored.

1.6 AS / AD shocks

A negative demand shock shifts AD to the left, depressing output and employment in the short run. Over time, prices fall and the economy moves down its AD curve towards full employment.

A supply shock alters production costs and affects the prices that firms charge. Adverse supply shocks push costs and prices up, while favorable supply shocks lower costs and prices. An adverse supply shock will result in $P \uparrow$ and $Y \downarrow$ in the short run ($Y < \bar{Y}$); this is known as stagflation (example: oil prices).

1.7 Monetary policy

Stabilization policy: policy actions taken to reduce the severity of short-run economic fluctuations (the business cycle). How to respond to:

1. Demand shocks: the central bank should change the money supply, M, to offset the shock and keep the AD curve unchanged. Relatively straightforward.

2. Supply shocks: you don't want to necessarily correct these shocks. In the case of an adverse supply shock, the policymaker faces a trade-off between stabilizing Y and stabilizing P in the short-run.

2 Exercise: AS / AD Model

Consider the model of aggregate supply and aggregate demand. In this economy,

$$K = 100 \tag{1}$$

$$L = 25 \tag{2}$$

$$M = 200 \tag{3}$$

$$V = 25 \tag{4}$$

LRAS:

$$Y = F(K, L) = K^{\frac{1}{2}} L^{\frac{1}{2}} \tag{5}$$

SRAS:

$$P = 25 + 1.5Y \tag{6}$$

With the information above, please answer the following questions:

a)   Write an equation for the AD curve.

b)   In the long-run, identify P_{LR} and Y_{LR}.

c)   Check that your long-run equilibrium satisfies the SRAS curve.

d)   Suppose that V increases to 30 in this economy; this only affects the AD curve. Derive the new AD curve.

e)   Find the new short-run equilibrium (P_{SR}, Y_{SR}).

f)   Find the new long-run equilibrium (P_{LR}, Y_{LR}).

g)   Let's say that the long-run adjustment mechanism shifts the SRAS curve up to meet the new intersection of the AD and LRAS curves. Solve for the SRAS curve that will prevail in long-run equilibrium.

h)   Draw a graph in P vs. Y space that represents the AD shift that occurs in part (d). Label equilibrium points (P_{SR}, Y_{SR}) and (P_{LR}, Y_{LR}). Draw arrows indicating the adjustment path from short-run to long-run equilibrium. Why does the SRAS curve shift during long-run adjustment?