

Week 6. Supply-Side Equilibrium

1. Aggregate Supply Curve

Micro: $D = C$ vs Macro: $AD = C + I + G + (X - M) = f(p, n, r, w, tech \dots etc.) = AS$

$AS = Y = Q_{AS} = f(p, n, MPK, MPL, tech, \dots)$ is sloped positively, because producers are motivated by π (profit), where $\pi = TR - TC = p * Q - (w + r) * Q$.

And the profit-maximization can be achieved when

$$\frac{\partial TR}{\partial Q} \left(= \frac{\partial pQ}{\partial Q} = p \right) = \left((w + r) = \frac{\partial (w + r)Q}{\partial Q} = \right) \frac{\partial TC}{\partial Q}, \quad \text{where } \frac{\partial \pi}{\partial Q} = \frac{\partial (TR - TC)}{\partial Q} = 0$$

So, the response of **output** to a Δ **price level** depends on the response of costs to π **price of input** (wages & rents, or w & r , or MPL & MPK). Firms normally can purchase L & K at prices that are fixed for some period of time. Thus higher selling prices make production more profitable. $\pi \uparrow = p \uparrow * Q - (\bar{w} + \bar{r}) * Q$

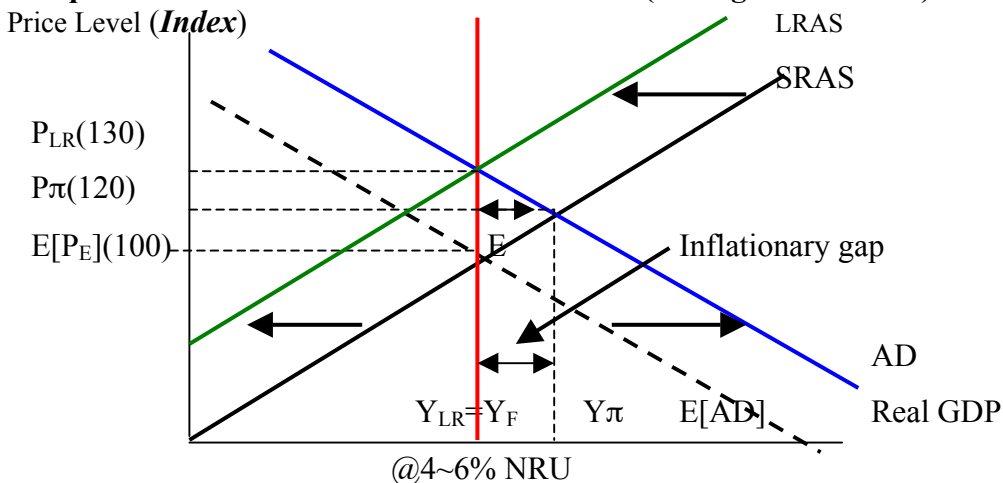
(Costs are mostly fixed for periods of time, because firms decide how much to produce by comparing their selling prices w/ their costs of production; and production costs depend mainly on input prices.)

2. Shift of AS Curve

While Δp level moves the economy along the AS curve, other variables shift the entire AS curve. Factors that shift AS curve are wage (MPL), rent (MPK), technology & productivity, supplies of K & L. Wages account for more than 70% of all the inputs.

- i) If profits decrease, the firm would cut back on production. Therefore, if wages $\uparrow \rightarrow AS \downarrow \rightarrow$ The AS shifts in (to the left). If wages $\downarrow \rightarrow AS$ curve shifts out (to the right).
- ii) If price of K (rent or MPK) increase/ decrease $\rightarrow AS$ curve will shift in/ out.
- iii) Technological breakthrough \uparrow productivity, thus shifts As curve out.
- iv) If wages don't change, \uparrow productivity \downarrow production costs, thus \uparrow profitability $\rightarrow \uparrow Y$.
- v) As Labor Force \uparrow in both quantity and quality, and as the Capital Stock \uparrow through I, AS curve will shift out, meaning more output (Y or Q) at given price (\bar{p}).

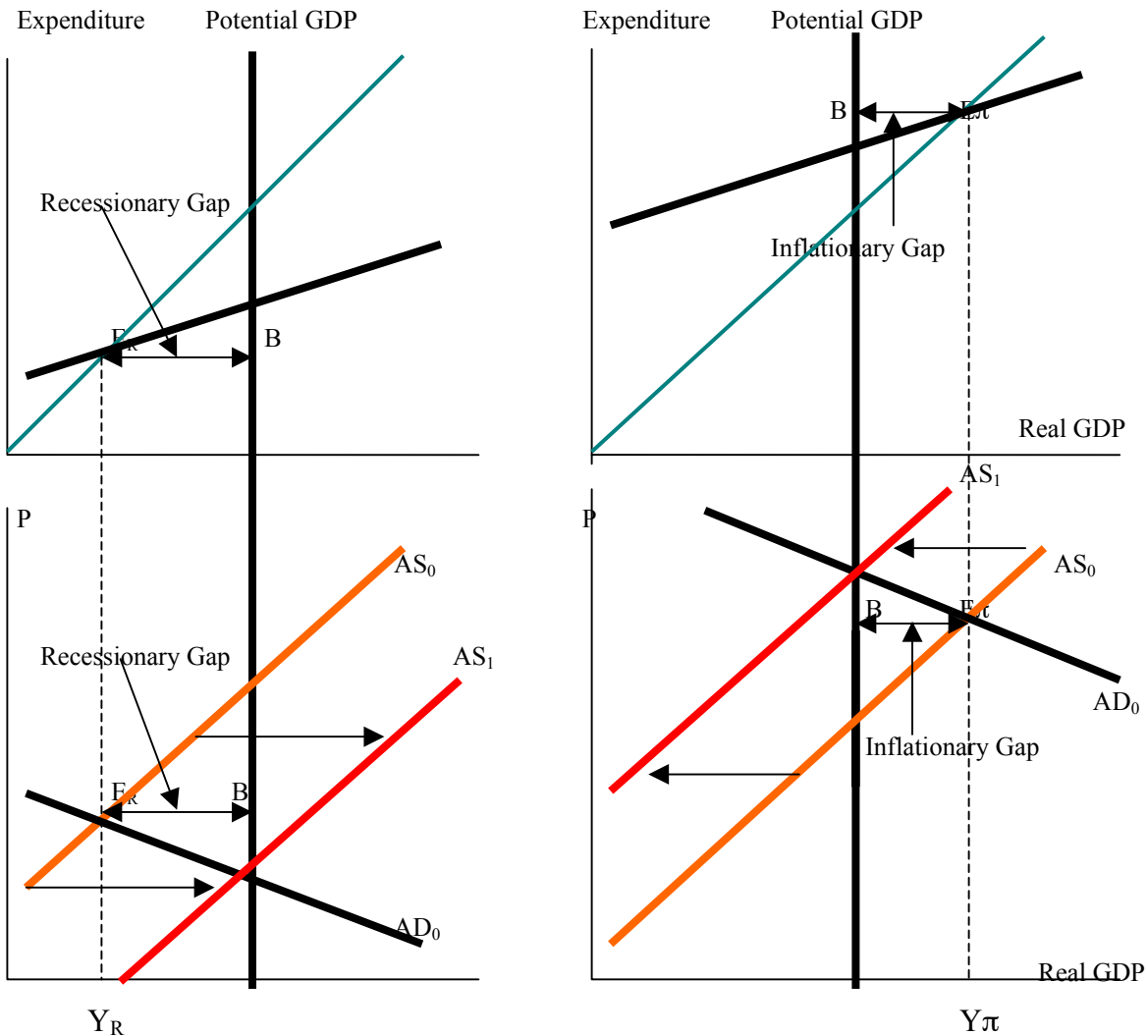
3. Equilibrium between AD & AS in the Limit (Facing Potential Y_F)



4. Recessionary Gap in terms of AD-AS curves

i) Neo-Classical Theory

Recessionary Gap is caused by inadequate consumer spending or by anemic investment spending. There will be a considerable amount of cyclical unemployment. Businesses will have little trouble finding workers. Current employees will be eager to hang on to the job. → difficult for workers to win wage increase. Wages ↓ shifts AS curve out. → Prices ↓. → Recessionary gap ↓. Therefore, deflation erodes the recessionary gap, eventually leading to Y_F .



Self-Correcting Mechanism

As the recession deepens and lengthens, workers' need to be employed would overwhelm their resistance to wage cuts. Firms, too, would become increasingly willing to cut prices as the period of weak demand persists. The self-correcting mechanism does operate, if ever, only too slowly and weakly at heavy cost, thus giving rise to the need for *gov't stabilization policy* ($AD \uparrow$ vis-a-vis *Structural Adjustment*: $AD \downarrow$). So, it's the question of how long we can afford to wait.

Self-correcting mechanism works on the AS-side while expansionary/contractionary fiscal/monetary policies work on the AD-side.

Critiques of Neo-Classical Explanation

Deflationary Spiral: Businesses may be reluctant to hire more when they see no prospects of consumption increasing, as consumers, afraid of depleting their wealth, are unwilling to spend (*cf.* paradox of thrift).

ii) **Keynesian Theory of Wage Rigidity:** Adjustment process proceeds painfully slowly, because prices and wages are sticky and make it difficult for deflation to erode the recessionary gap (ratchet effect).

iii) **Psychological Factors/ Efficiency Wage:** Workers have profound psychological resistance to accepting a wage reduction. If wage ↓, they would either quit or devote less care to work (shirking). Employers, well aware of this, are reluctant to cut wage, because it's bad for morale. To prevent moral hazard, firms pay high wages (efficiency wage). However, drawback is why psychological resistance started only after WWII.

iii) **Less Severe Biz Cycles after WWII:** Because workers and firms came to believe that recessions would not necessarily turn into depressions, they decided to wait out the bad times rather than accept the wage or price reductions.

iv) **Productivity Concerns:** Productivities of individual workers are hard to identify. Firms worry that a general wage cut might result in the loss of their best employees. Therefore, firms pay efficiency wage to avoid adverse selection.

v) **Minimum Wage**

Prices and wages generally fall only sluggishly when D is weak. The implication of this rigidity is that recessionary gap cannot cure itself w/o some deflation. If wages and prices will not fall, recessionary gaps will linger for a long time below potential GDP, and probably on to the deflationary spiral.

5. Adjusting to Inflationary Gap in terms of AD-AS Curves

i) Neo-Classical Explanation

Tight labor market produces inflation that eventually eliminates the gap though in a slow and painful way. When eqm GDP is above potential GDP, jobs are plentiful and L is in great demand. Wages ↑ → ↑ production costs (∵ TC ↑ although AC ↓) → Shift AS curve in (downsize) → Inflationary gap ↓ *cf.* graph 2 on p3

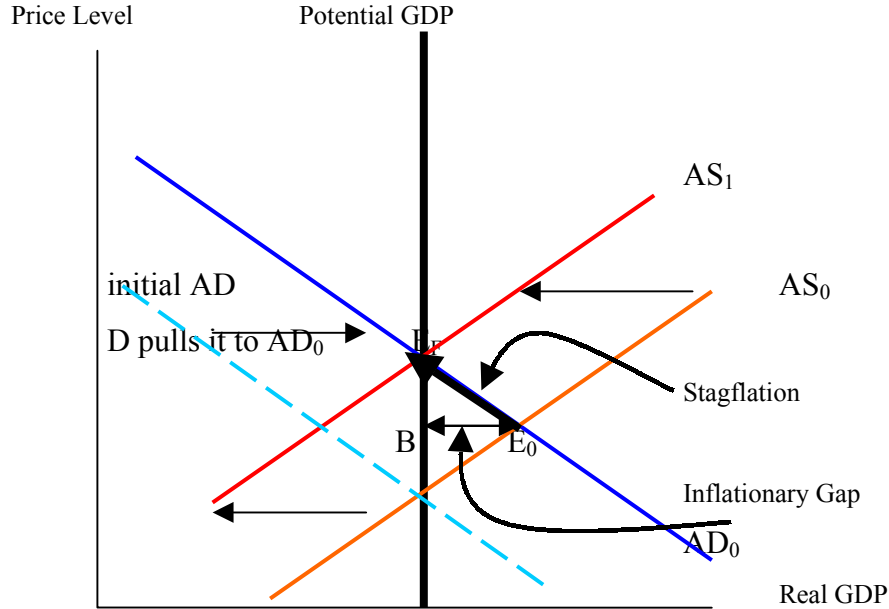
Inflation eventually erodes inflationary gap, and brings the economy to the E_F :

Rising prices eat away at the purchasing power of consumers' wealth, forcing them to cut back on consumption. Also, exports ↓, imports ↑ (∵ $ph/pf > 1$) → Eventually, AD is scaled back to the economy's capacity to produce, but the economy experience stagflation (↑p+↓Y) until the gap is eliminated. An Eqm_{LR} is established w/ ↑p level and GDP = potential GDP.

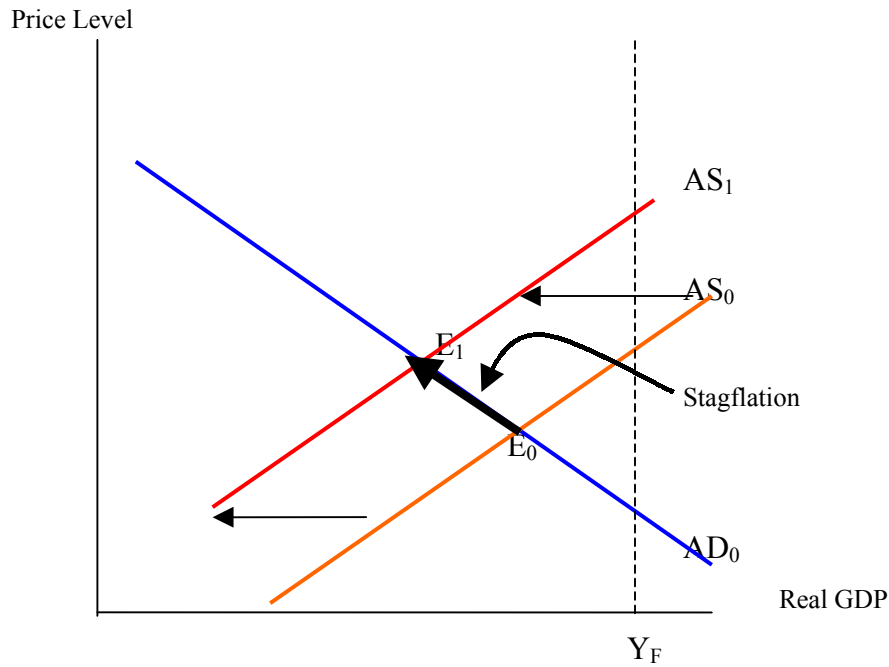
As w/ recession, self-correction operates, but only very slowly and at heavy cost (stagflation) and only in the absence of additional forces propelling AD curve out. If AD shifting out at the same time AS is shifting in, there will be an inflation, but inflationary gap won't shrink.

6. Type I Stagflation caused by Demand-Pull Inflation or Excessive AD

Intense demand for goods and labor pushes the prices and wages. Both rising wages and prices are symptoms of too much AD. A period of stagflation is part of the normal aftermath of a period of excessive AD. Output falls while prices rise as the economy adjusts. A brief period of stagflation is a natural course of adjustment/correction that comes after a demand-pull inflation.



7. Cost-Push Inflation (AS Side) or Type II Stagflation



Adverse supply shocks cause a fall in output and acceleration in inflation. Favorable supply shocks tend to push output up and reduce inflation.

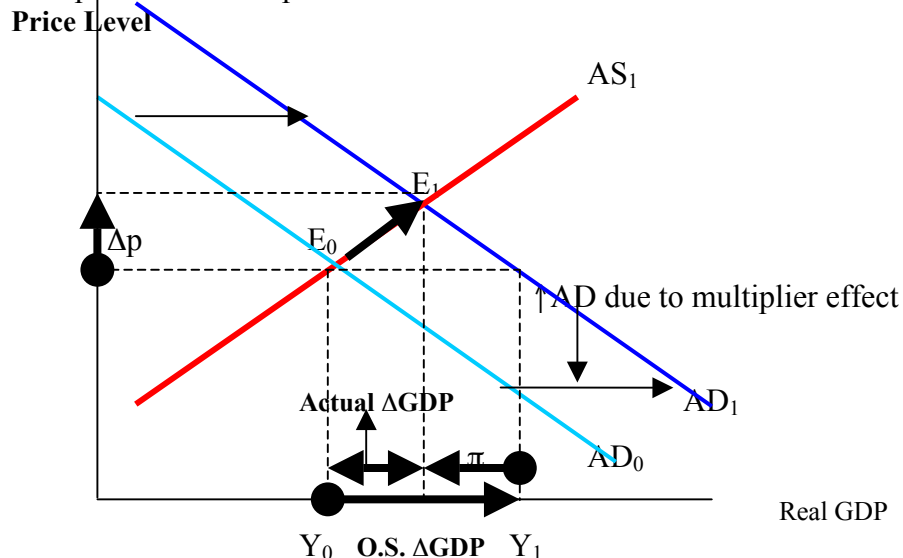
The capital culprit of 70's stagflation where unemployment and inflation soared at the same time was the rising energy price. Higher input prices such as energy prices shift the AS curve in. If the AS shifts in, production (output) ↓ and prices ↑. Equilibrium shifts up to the left, and *output falls while prices rise*. Stagflation is the typical result of adverse supply shift.

8. Inflation and Multiplier

Inflation reduces the size of the multiplier.

$$\pi \uparrow \rightarrow P_H \uparrow \rightarrow (X-M) \downarrow \ \& \ \text{MPC} \downarrow \rightarrow \frac{1}{(1 - \text{MPC})} \downarrow$$

i) As the multiplier chain progresses under π , prices will also rise. This will reduce net exports and dampen consumer spending, because rising price will erode consumers' purchasing power (*iff* \bar{e} , where $e = f(r_h - r_f)$). So the multiplier chain will not proceed as far as it would have been in the absence of inflation. "How much inflation results from the rise in demand" or "how much of the multiplier chain is cut off by inflation" depends on the slope of the AS curve.



ii) Price level is also pushed up by the rise in investment demand, because value of bonds and deposits ↓ ($\because \pi$). E_{qm} is reestablished at higher levels of output and higher prices through the process of inflation. Oversimplified formula ignores the effects of higher price level. ($AD_t \uparrow \rightarrow p_t \uparrow \rightarrow \downarrow b_t \rightarrow I_t \uparrow \rightarrow AD_{t+1} \uparrow$) This cuts the multiplier effect by the same token as the above graph.

9. Steps in Calculating the Actual Multiplier

- i) Shift the expenditure skdl vertically by the amount of autonomous shift in spending.
- ii) Use 45° diagram or O.S. formula to calculate the multiplier effect on GDP that would occur if price level didn't change.
- iii) In the AS-AD diagram, see how the price level will react. Enter the multiplier effect from ii) as a horizontal shift of the AD curve.
- iv) The AS-AD diagram will show the actual effect on real output as well as the resulting in/deflation.