ECON 421: Business Fluctuations

Spring 2015
Tu 6:00PM–9:00PM
Section 102

Created by
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Based on
Macroeconomics, **?**

Time

In previous analyses, prices were fixed. We will see this translates into a horizontal aggregate supply curve (AS).[1] Now we relax this assumption.

- In the short run, employment, and thus output, respond to changes in the aggregate price level. Thus, higher prices lead to higher output.
- In the medium run, the productive factors in the economy negotiate higher wages so that price come to equal expected prices. Price changes then have no effect on the level of output and the economy returns to it's natural rate of employment.
- In the long run, structural factors underlying the level of output, such as the levels of human or physical capital, can change, allowing for a higher natural rate of employment.

[1] Implying that output is infinitely responsive to prices.

Short Run

Recall from our work on the labor market that:[2]

$$\begin{pmatrix} Firms\ set\ prices \\ so\ that\ wages\ are \\ \frac{1}{1+m}\ below\ prices. \end{pmatrix} = W = \begin{pmatrix} Wages\ depend \\ on\ P^e, \\ u, and\ z. \end{pmatrix}$$

$$P\left(\frac{1}{1+m}\right) = W = \underset{+}{P^e}F(\underset{-}{u},\underset{+}{z})$$

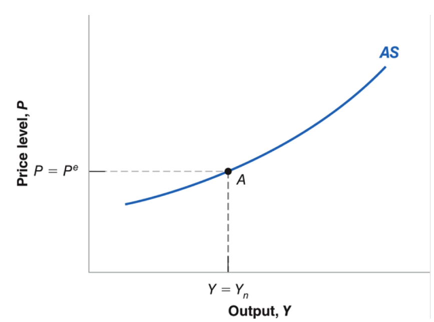
$$P\left(\frac{1}{1+m}\right) = \underset{+}{P^e}F(\underset{-}{u},\underset{+}{z})$$

$$P = (1+m)\underset{+}{P^e}F(\underset{-}{u},\underset{+}{z}), and\ finally$$

$$P = P^e(1+m)F\left(1-\underset{-}{\frac{Y}{L}},\underset{+}{z}\right).$$

[2] It's worth noting that $P = P^e$ if $(1+m)F(u,z) = 1$.

Short Run

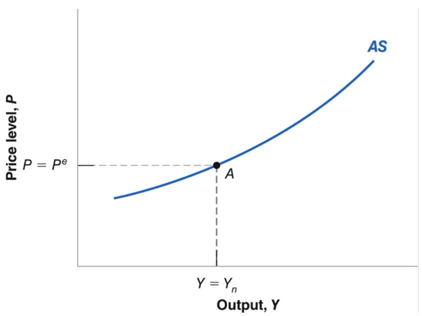


Why is the aggregate supply curve upward sloping? First note that when P changes, W moves proportionately. Intuitive explanations:

- If $W > \underset{+}{P^e}F(\underset{-}{u},\underset{+}{z})$ Workers may confuse changes in W with changes in the relative price of their marginal product.
- If they believe the relative value of their work is rising, they may increase their employment.
- So, an increase in P can cause an increase in Y, making the AS curve upward-sloping.

Short Run

$$P = P^e(1+m)F\left(1 - \underset{-}{\frac{Y}{L}}, \underset{+}{z}\right).$$

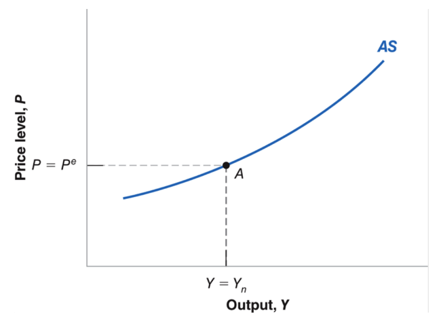


Algebraically:

- Fix every parameter apart from Y $(P^e, m, z, L, etc.)$.
- Isolate the relationship between Y and P.
- Note the negative sign on Y and under the function, F.
- Thus for a given expected price level, P and Y rise together.

Short Run

$$P = P^e(1+m)F\left(1 - \underset{-}{\frac{Y}{L}}, \underset{+}{z}\right)$$

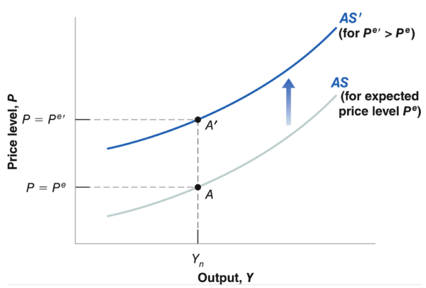


- Given an expected price level, an increase in output leads to an increase in the price level.
- Given some fixed level of unemployment, an increase in the expected price level leads, one for one, to an increase in the actual price level.

From Short to Medium Run

The natural level of output is produced when prices match expected prices.

$$P = P^e(1+m)F\left(1 - \underset{-}{\frac{Y}{L}}, \underset{+}{z}\right)$$

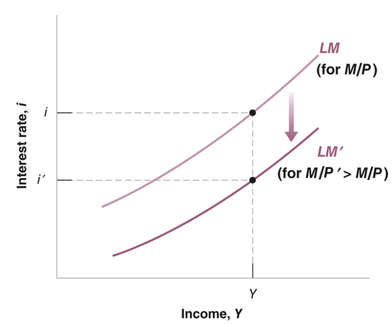


Suppose price expectations are updated to $P^{e\prime}$.

- If the actual $P < P^{e\prime}$, the economy moves downward along the solid AS' curve.
- If actual $P > P^{e\prime}$, the economy moves upward along the solid AS' curve...
- This holds in the *new* short term until expectations are updated again.
- *Expectation updates shift the AS curve.*

In fact, any parameter, such as Y or L shifts the AS curve.

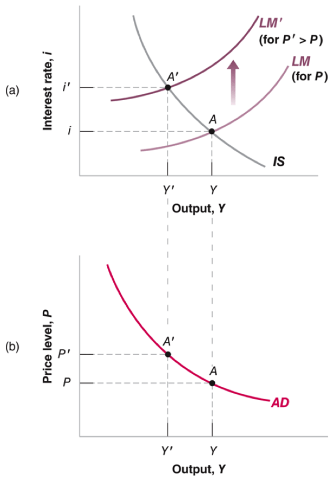
AD Slopes Downward



To understand why the AD slopes downward we need to recall the role of prices in the *IS-LM model*.

- First note that the money market equilibrium says that: $\frac{M}{P} = YL(i)$.
- Suppose the price level falls. This is equivalent to an *increase* in the nominal money stock.
- Notice that the P is in the denominator of the real money stock $(\frac{M}{P})$.

AD Slopes Downward

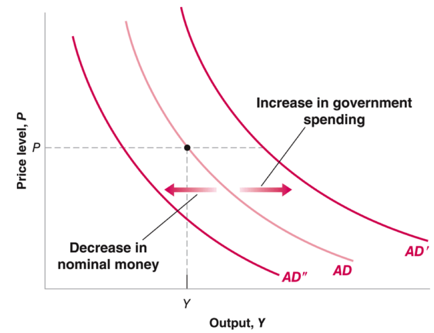


Likewise, an increase in the price level translates into a leftward shift of the LM curve.

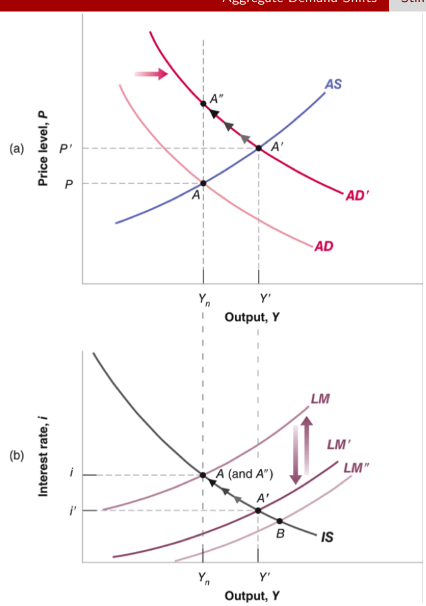
$$\frac{M}{P} = YL(i)$$

- A leftward shift of the LM curve leads to higher interest rates.
- The higher interest rate leads to lower investment and lower output at equilibrium.
- Thus prices and output are inversely related to one another for the AD curve.

AD Shifts

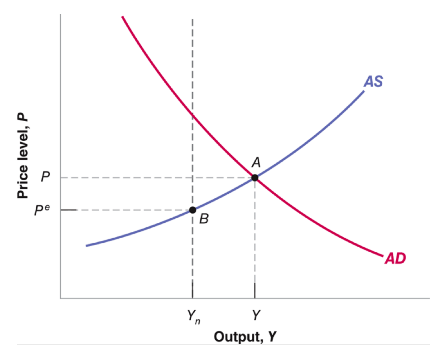


- Similarly, at a given price level, a decrease in *nominal* money decreases output, shifting the aggregate demand curve to the left.
- At a given price level, an increase in government spending increases output, shifting the aggregate demand curve to the right.



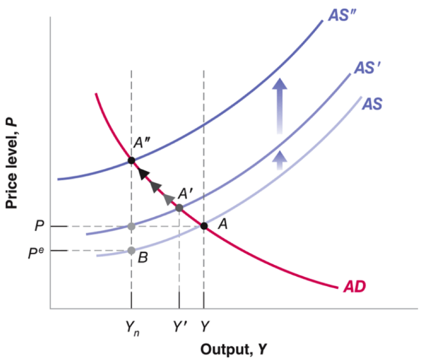
- A rightward shift of the AD occurs whenever anything shifts the IS or LM rightward. $(M\uparrow,\ C\uparrow,\ I\uparrow,\ G\uparrow,\ etc.)$

When a Country is Above the Natural Level of Output



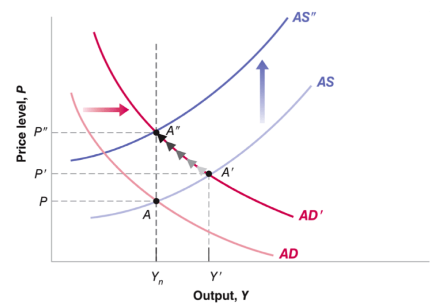
- Consider what happens when the economy finds itself at a level of output greater than the natural rate of output.
- The natural level of output, Y_n, and expected price level P^e are at point B but the economy is operating at unnaturally high level of output: A.

When a Country Operates Above the Natural Level of Output



- The natural level of output, Y_n, and expected price level P^e are at point B but the economy is operating at unnaturally low unemployment: A, so $P > P^e$.
- Expectations will adjust upward until the intersection at A" is achieved.
  - If the prices update completely to A", the adjustment is complete.
  - If prices increase only to A', upward pressure will continue to drive future expected prices upward.

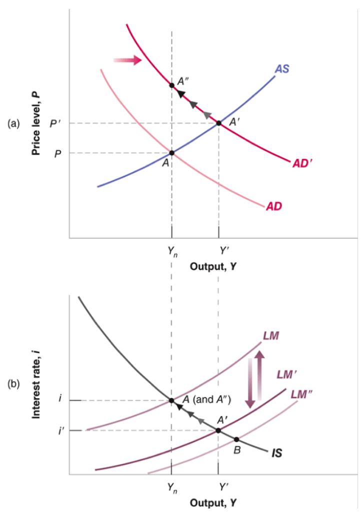
Expansionary Monetery Policy



Suppose the monetary authority increases the money supply.

- This leads to lower interest rates in the money market. (not shown)
- This implies a rightward shift of the LM curve and thus a higher level of output at $P^e = P$. (also not shown)
- In the short run, output increases and prices rise to Y' and P', respectively. $(A \to A')$
- In the medium run, expectations adjust upward and output returns to Y_n. $(A' \to A'')$

Expansionary Monetery Policy

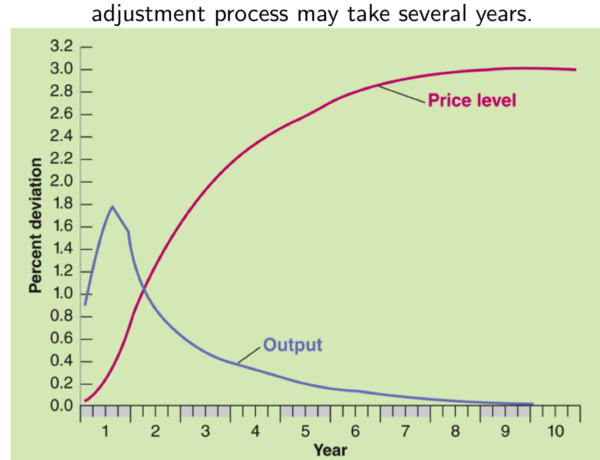


Now consider the situation while tracking the IS-LM graph.

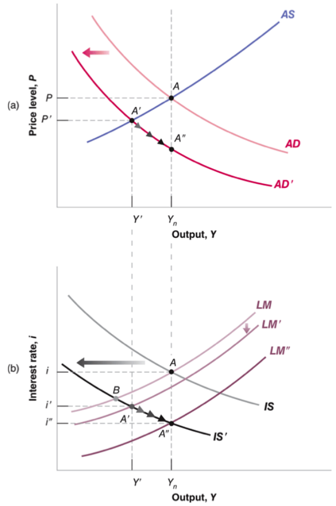
- M implies an initial rightward shift of the LM curve and thus a higher level of output.
- Immediately, in the short run, the higher prices translate to slightly higher interest rates.
- In the medium run, as prices expectations adjust upward completely and output returns to Y_n.

How Long Does This Take?

The graph below, Reproduced from Taylor (1993), suggests that the full adjustment process may take several years.



Tax Hikes



Suppose taxes are increased.

- The IS-LM tells us that this results in a fall in output which manifests itself through a leftward shift of the AD curve.
- Thus prices fall.
- In the medium run, as price expectations adjust downward, the LM[a] and AS curves shift rightward and output returns to Y_n.[b]

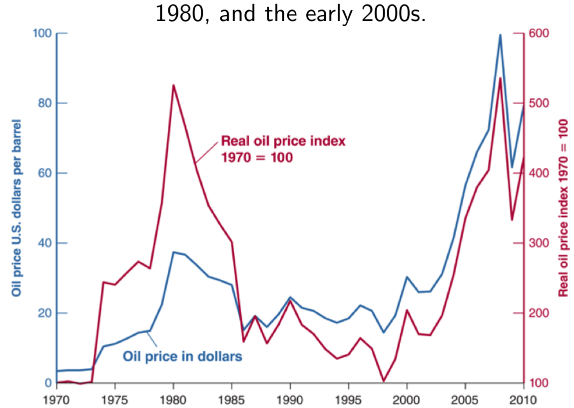
[a] via the rise in $\frac{M}{P}$.
[b] We will see there are reasons to worry this does not always happen smoothly

Equilibrium in the Short Run and in the Medium Run

	Short Run			Medium Run		
	Output Level	Interest Rate	Price Level	Output Level	Interest Rate	Price Level
Monetary expansion	increase	decrease	increase (small)	no change	no change	increase
Deficit reduction	decrease	decrease	decrease (small)	no change	decrease	decrease

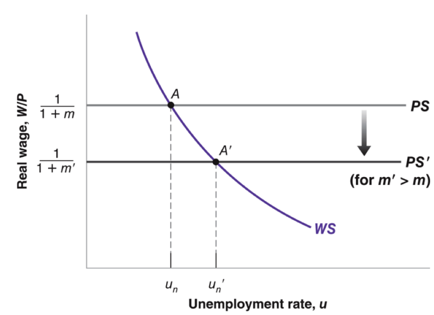
Real Price of Oil

Disregard the blue line. Notice that the real price of oil spikes upward in 1973, 1980, and the early 2000s.



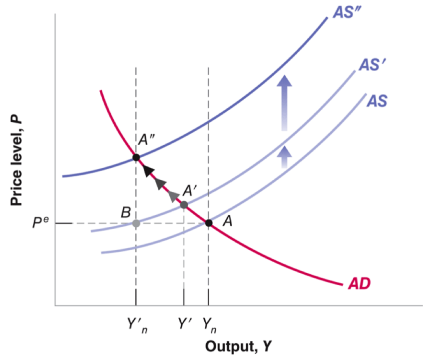
Source: Series OILPRICE, CPIAUSCL Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/. The value 1970.)

Oil Shock Increases Natural Rate of Unemployment



- Here we model the oil shock via the markup.
- Recall this graph from chapter 6.
- An increase in the price of oil leads a larger markup, m, so that the real wage falls.
- The wage setting curve is downward sloping so the natural rate of unemployment falls.

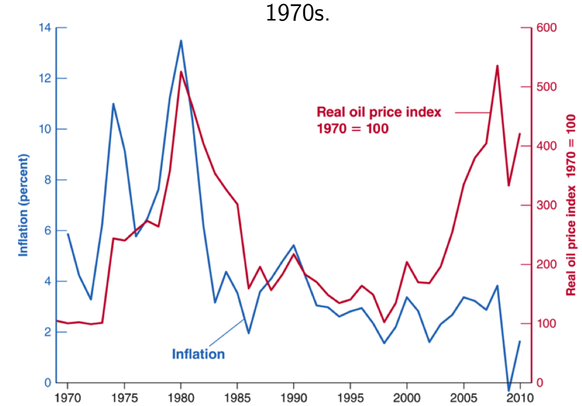
No Obvious Return to Normalcy



- Unlike the response of shifts in the AD curve, there is no direct return to the previous natural rate of output.
- Instead the supply shock alters the natural level of output so that the AS shifts until $p = p^e$.

Differing Reactions to Oil Shocks

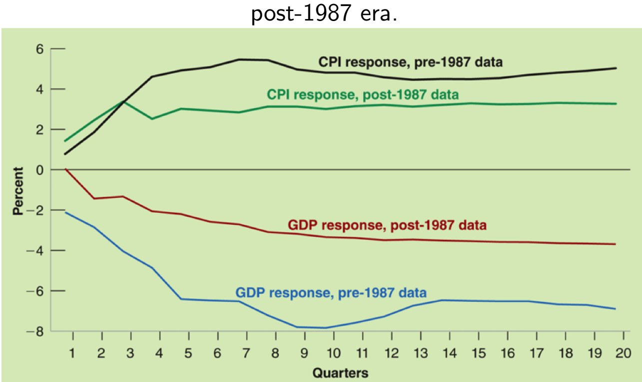
Notice that inflation accompanied the 1980 oil shock, but not the 2000s oil shock. Hypotheses include: workers' waning bargaining power and inflation built into the 1970s.



Source: Real Oil Price Index—see Figure 7-10. *Inflation calculated as* CPIAUCSL Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

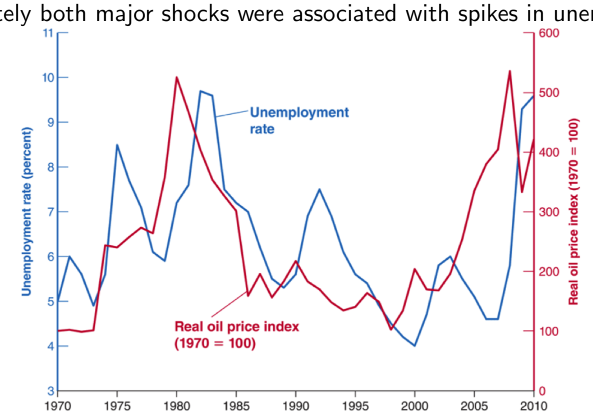
Differing Reactions to Oil Shocks

Notice that the pre-1987 responses to oil shocks were more extreme than in the post-1987 era.



Similar Reactions to Oil Shocks

Unfortunately both major shocks were associated with spikes in unemployment.



Source: Real Oil Price Index—see Figure 7-11. Unemployment rate Series UNRATE: Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

True or False

1. The aggregate supply relation implies that an increase in output leads to an increase in the price level.
2. The natural level of output can be determined by looking solely at the aggregate supply relation.
3. In the absence of changes in fiscal or monetary policy, the economy will always remain at the natural level of output.
4. Expansionary monetary policy has no effect on the level of output in the medium run.
5. Fiscal policy cannot affect investment in the medium run because output always returns to its natural level.
6. In the medium run, output and the price level always return to the same value.

Comments, questions, or concerns?

References

Olivier Jean Blanchard and David Johnson. *Macroeconomics*. Prentice Hall, 6th edition, 2011. ISBN 9780133061635.