Phillips Curve and Aggregate Supply

- Keynesian IS/LM model provided aggregate demand side.
- How did Keynesians explain price change over time?
- Phillips curve was empirical relationship between (wage) inflation and unemployment
    - Original was for UK wage inflation
    - Looks about the same with price inflation and for other countries
- Simple "theory"
    - When output booms ($Y > \bar{Y}$), then unemployment is low and wages will tend to rise
    - Wage increases will be passed along through prices, so inflation is high when unemployment is low
    - Downward-sloping Phillips curve results
    - Problem with simple theory is that it fails to distinguish between real and nominal wages
        - Tight labor market should increase *real* wages
        - For real wages to rise, nominal wage must increase by more than prices

Modern Phillips curve (due to Friedman and Phelps)

- There is a long-run equilibrium ***natural*** rate of unemployment to which the labor market tends to return
    - Natural rate depends on structural characteristics of labor market, which vary greatly across countries and time
    - In an equilibrium labor market (no general shortfall or surplus of demand for labor), unemployment is a process of matching workers with jobs
    - Because both are highly heterogeneous, this will be highly imperfect and there will be pools of vacant jobs and unemployed workers coexisting
    - The size of this equilibrium pool of unemployed workers (as a percentage of the labor force) is the natural unemployment rate
    - Natural rate will depend on degree of heterogeneity, mismatch, information flows, and legal framework (unemployment insurance, minimum wage, etc.)
    - We will study natural rate of unemployment toward the end of the course
- We think of $u = u_n$ when $Y = \bar{Y}$, although in practice u tends to lag behind Y
- Given people's expectations of inflation, real wage will increase iff increase in nominal wage exceeds expected inflation
- Modern version of Phillips's adjustment hypothesis:

$$Y > \bar{Y} \Leftrightarrow u < u_n \Rightarrow \pi > \pi^e$$
$$Y = \bar{Y} \Leftrightarrow u = u_n \Rightarrow \pi = \pi^e$$
$$Y < \bar{Y} \Leftrightarrow u > u_n \Rightarrow \pi < \pi^e$$

- Modern Phillips curve predicts:
  - Vertical long-run Phillips curve at natural rate
    - No long-run tradeoff between unemployment and inflation
  - Short-run Phillips curve slopes downward through $\left(u_n, \pi^e\right)$
- Consider effects of sustained aggregate demand growth (over-stimulative policy)
  - In short run, economy moves up along Phillips curve to lower u and somewhat higher π
  - Eventually, expectations catch up and π^e increases, which shifts PC upward
  - In long run, economy is back at natural rate (on long-run PC) with much higher inflation
  - This is a simple story that fits the quantitative and qualitative data from the 1960s pretty well: repeated policy stimulation (Vietnam War, monetary expansion) led to high inflation

Phillips curve and aggregate supply

- Phillips curve is drawn in (u, π) space, but can do the same diagram in (Y, π) space or, given last period's price level, in (Y, P) space
- This is simple graphical representation of modern theory of aggregate supply:
  - SRAS curve slopes upward through $\left(\bar{Y}, P^e\right)$ or $\left(\bar{Y}, \pi^e\right)$
  - LRAS curve is vertical at $\bar{Y}$
- Expansion of AD leads to increase in Y and P in short run, but as expected price level catches up, Y goes back to $\bar{Y}$ in long run and only P is affected
- Long-run equilibrium with inflation:
  - Steady growth in M causes AD to shift up year after year
  - Growth in AD is expected, so P^e goes up by same amount
  - Rising P^e shifts SRAS upward along with AD, so equilibrium (ignoring growth) shifts up along LRAS with no increase in Y but steady inflation at rate of monetary expansion
  - Note consistency with LM curve here: if M and P rise by same proportion $(\pi = \mu)$ then M/P is constant and LM curve stays put
- We now turn to the microeconomic underpinnings of theories of aggregate supply
  - All of the theories that we examine will have a result that more or less mirrors the simple theory above: SRAS slopes upward and LRAS is vertical