



Econ 201: Introduction to Economic Analysis

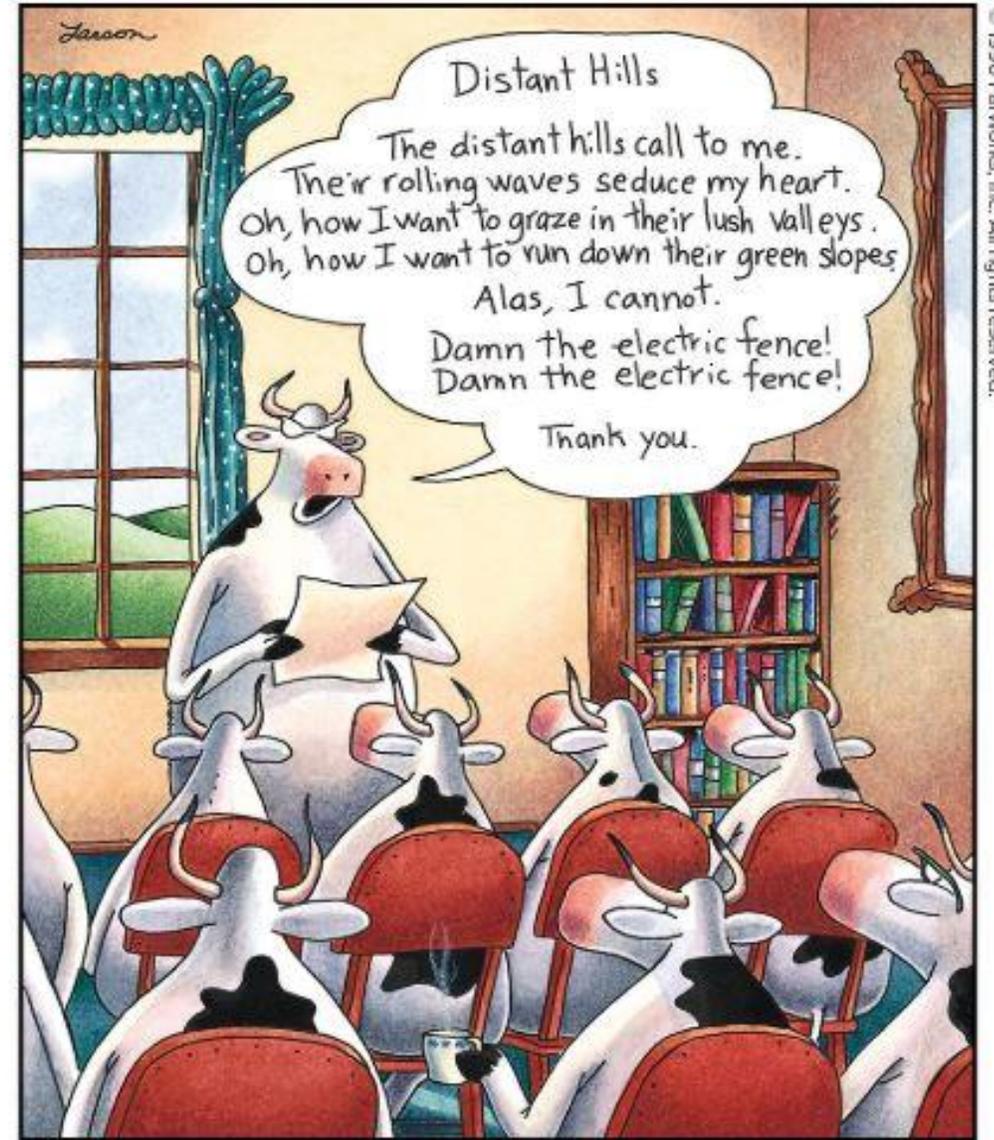
**November 20 Lecture: Aggregate Demand
and Aggregate Supply**



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Daily dose of The Far Side

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Preview of this class session

- Modern macroeconomic theories are often expressed in terms of aggregate demand and supply
- In classical macroeconomics, only aggregate supply was assumed to matter for real output; Keynes focused mostly on aggregate demand
- The aggregate-demand curve slopes downward, but not for the same reasons as micro demand curves
- The aggregate-supply curve is vertical in the long run, but slopes upward in the short run
- Shocks to aggregate demand affect output in the short run, but only affect prices in the long run



Classical macroeconomics



Classical macroeconomics: Markets clear

- **Classical** (pre-1935) macro is extension of micro general-equilibrium model
 - Relative prices and real wages adjust quickly to equate demand with supply in each market
 - Production and employment are aggregates of levels determined by equilibrium for each good and industry
 - **Aggregate-supply curve is vertical**; we are at natural output regardless of the price level
- Real interest rate balances loanable-funds market
 - Nominal rate is real rate plus inflation rate
- Exchange rates adjust currency values to equate general price level across countries



How is aggregate price level determined?

- This is the one unanswered question from micro model
- We determined all *relative* prices, but not the *nominal* price level that converts them all to dollars
 - Micro tells us that the equilibrium price of asparagus is, say, twice as high as the prices of Brussels sprouts
 - It does not tell us how many *dollars* are required to buy either one
- No role for money in micro model
 - Unclear how exchange actually happens
 - People don't seem to need money and no theory of how much is held
- Needed some way to model the demand and supply of money in addition to “goods”
- **Quantity theory of money** provided missing piece



Quantity theory of money: Assumptions

- **Equation of exchange:** $M \times V = P \times Y$
 - Money stock \times velocity of circulation = total nominal expenditures
 - Price level \times real goods purchased = total nominal expenditures
- Output assumed to be at market-clearing “natural” level from micro equilibrium of individual markets
 - Aggregate-supply curve: $Y = Y_n$ does not depend on M , V , or P
- Velocity depends on demand for money: $M = (1/V) \times PY$
 - Hold more money in relation to expenditures \rightarrow lower V
 - Classical economists assumed it depended only on institutions of monetary sector, not on P , M , or Y
- Aggregate-demand curve: $P = MV / Y$ or $Y = MV / P$



Quantity theory of money: Conclusions

- **Monetary neutrality**: With V and Y fixed, P is proportional to M
 - Higher money growth implies higher inflation with no real effects
- Economy will be at (or at least tend toward) **full employment**
- What about business cycles and fluctuations in output and unemployment?
 - Short-run transitional phenomena that won't last long
- Modern conclusions about classical model
 - It probably applies fairly well in long run: We move back to the output trend and unemployment tends back to natural rate
 - The short-run transitions are very important in their own right



Business cycles and shocks

- **Shocks** upset long-run equilibrium of macroeconomy, leading to business-cycle fluctuations in output, employment, etc.
- **Aggregate-demand shocks**
 - Changes in desired spending: $C + I + G + NX$
 - Examples: Sub-prime loans lead to boom in housing investment, government stimulus spending, growth abroad leads to export boom
- **Aggregate-supply shocks**
 - Changes in incentives or technologies for production
 - Examples: Oil-price increase raises real costs of production, improvements to technology boost natural output, immigration provides more labor input



Aggregate demand and supply



Why does AD slope downward?

- **NOT** for same reason as micro demand curves!
 - Different variable on vertical axis: aggregate price, not relative price
 - Nothing (in closed economy) to substitute for “goods”
- (At least) three possible reasons
 - **Interest-rate effect:** $P \downarrow \Rightarrow M/P \uparrow \Rightarrow$ people are holding more real money than they want to give their spending, interest rates, etc. \Rightarrow people will try to buy bonds with their excess money holdings \Rightarrow equilibrium interest rate on bonds $\downarrow \Rightarrow I \uparrow$
 - **Wealth effect:** $P \downarrow \Rightarrow M/P \uparrow \Rightarrow$ real wealth $\uparrow \Rightarrow C \uparrow$
 - **Exchange-rate effect:** $P \downarrow \Rightarrow$ (if nominal exchange rate doesn't change) U.S. goods are cheaper in world markets $\Rightarrow NX \uparrow$



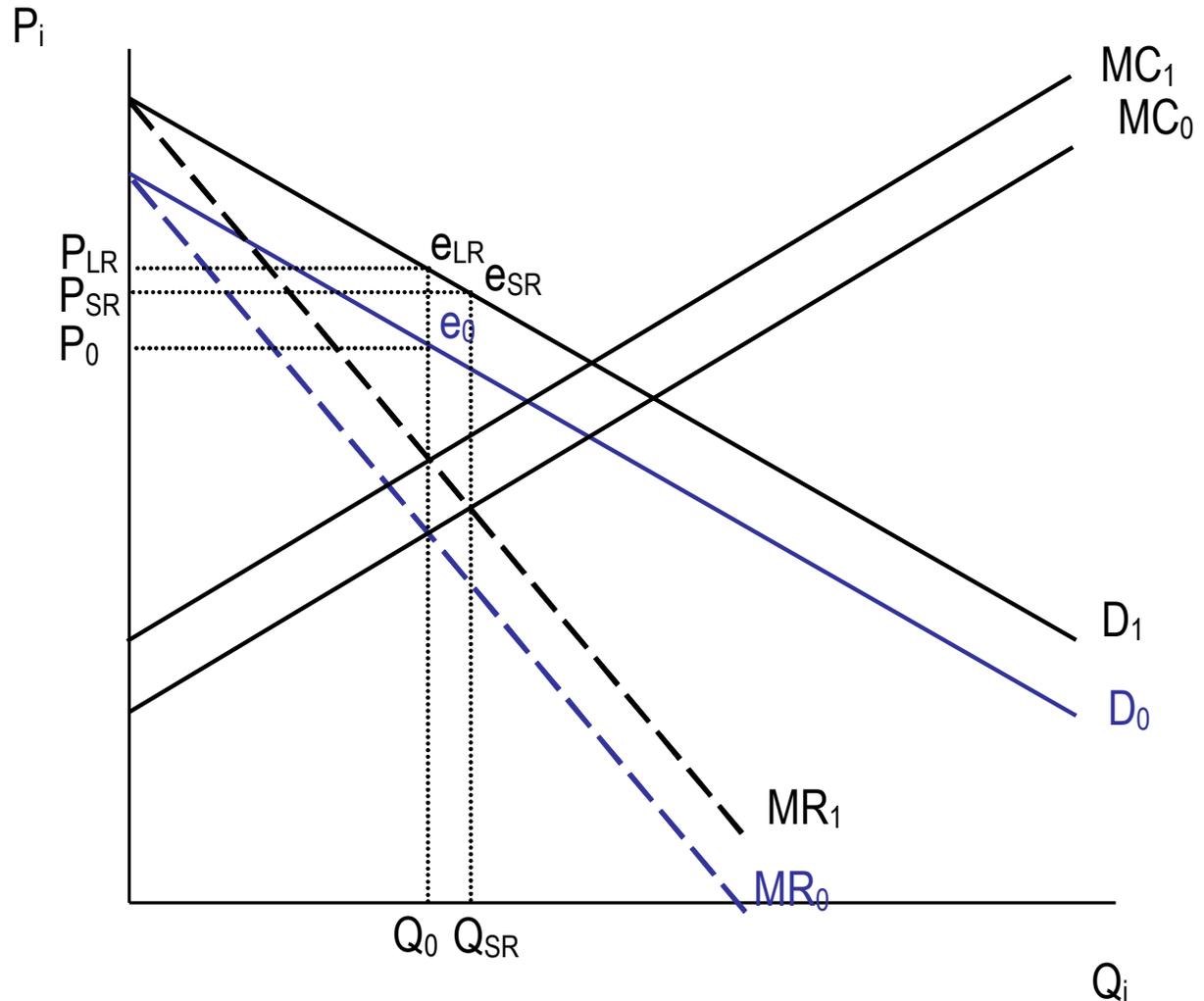
AD shocks

- Shocks to consumption
 - Changes in wealth (*e.g.*, asset prices)
 - Changes in (lifetime) tax burden
 - Optimism or pessimism, expectations, length of life and retirement
 - Access to credit including real interest rate
- Shocks to investment
 - Changes in expectations about marginal product of capital
 - Changes in cost of capital, access to credit, tax provisions
- Changes in government spending
- Changes in net exports
 - “Real exchange rates” affect relative prices
 - Foreign incomes affect our exports



Micro foundations of aggregate supply

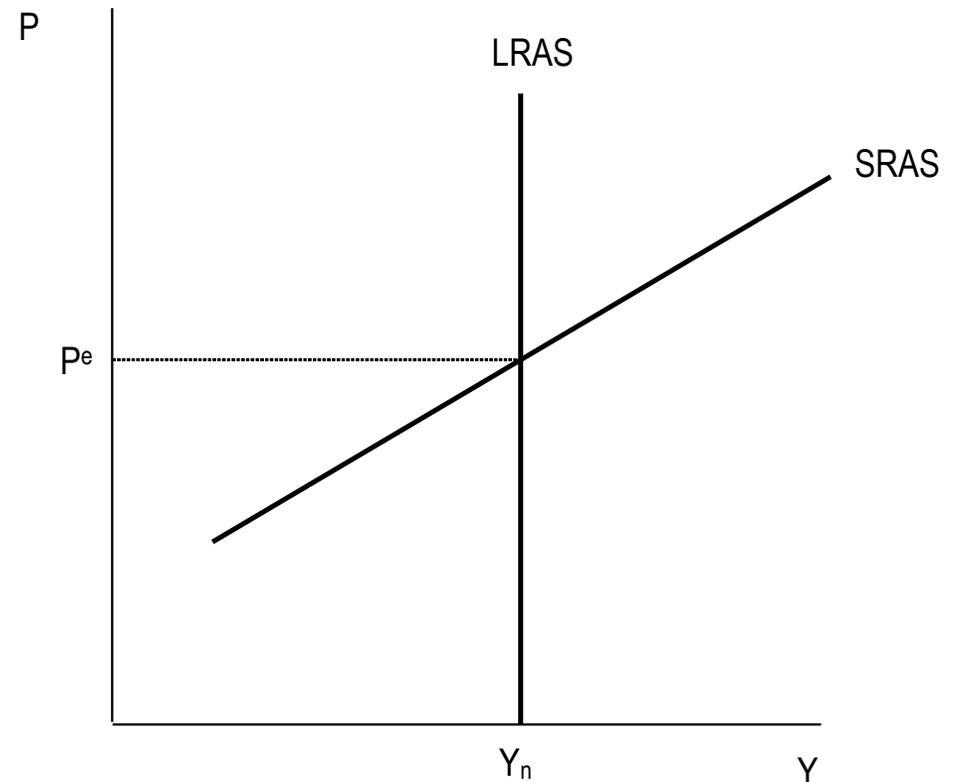
- Does an increase in aggregate demand affect output?
 - Each firm's (nominal) demand rises
 - If *all* prices and wages go up together, then D , MR , MC all rise by same proportion: e_{LR}
 - Optimal output stays same
 - Price rises by amount of increase
- What if MC doesn't adjust?
 - New equilibrium at e_{SR}
 - Optimal output goes up to Q_{SR}
 - Price rises, but by less





Long-run and short-run aggregate supply

- In long run, all prices and wages adjust: **LRAS is vertical** at natural level of output
 - Natural output determined by growth factors: labor force, capital, technology
- In short run, some prices or wages may be sticky: MC doesn't adjust and **SRAS slopes upward**
 - If price is what firms expected, then we should be in long-run equilibrium
 - SRAS passes through LRAS at $P = P^e$





Three theories of short-run aggregate supply

- Why doesn't MC shift up with D and MR?
- **Wage stickiness**
 - Contracts keep nominal wage fixed, so labor costs don't rise
 - Eventually contracts expire and wage adjusts, so MC shifts up and LRAS is vertical
- **Imperfect information about costs**
 - Firms monitor output demand closely, but may not realize MC has risen even if it has
 - Increase output until they discover that MC is up, then LRAS is vertical
- **Price stickiness**
 - Menu costs prevent firms from fully adjusting to change
 - Temporarily increase output on new demand curve at former price
 - Menus wear out and prices adjust, so LRAS is vertical

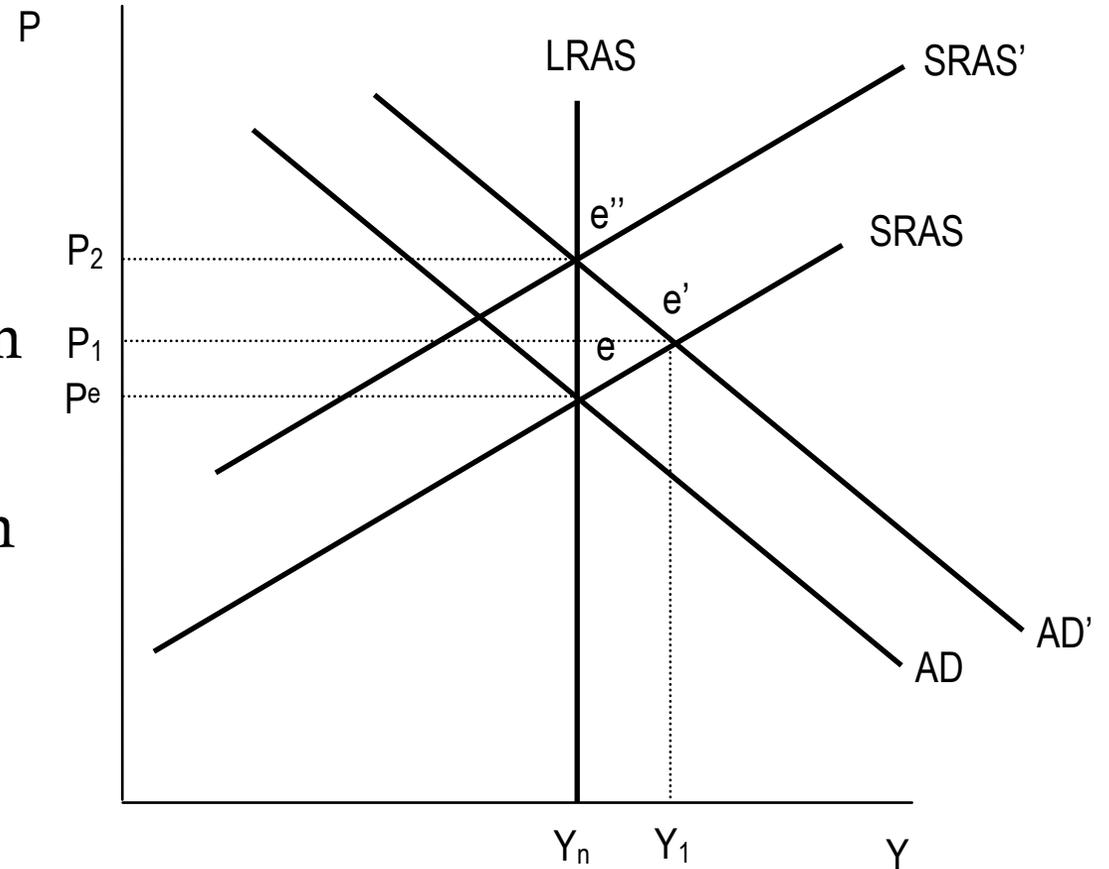


Using model to analyze shocks



Aggregate-demand shocks

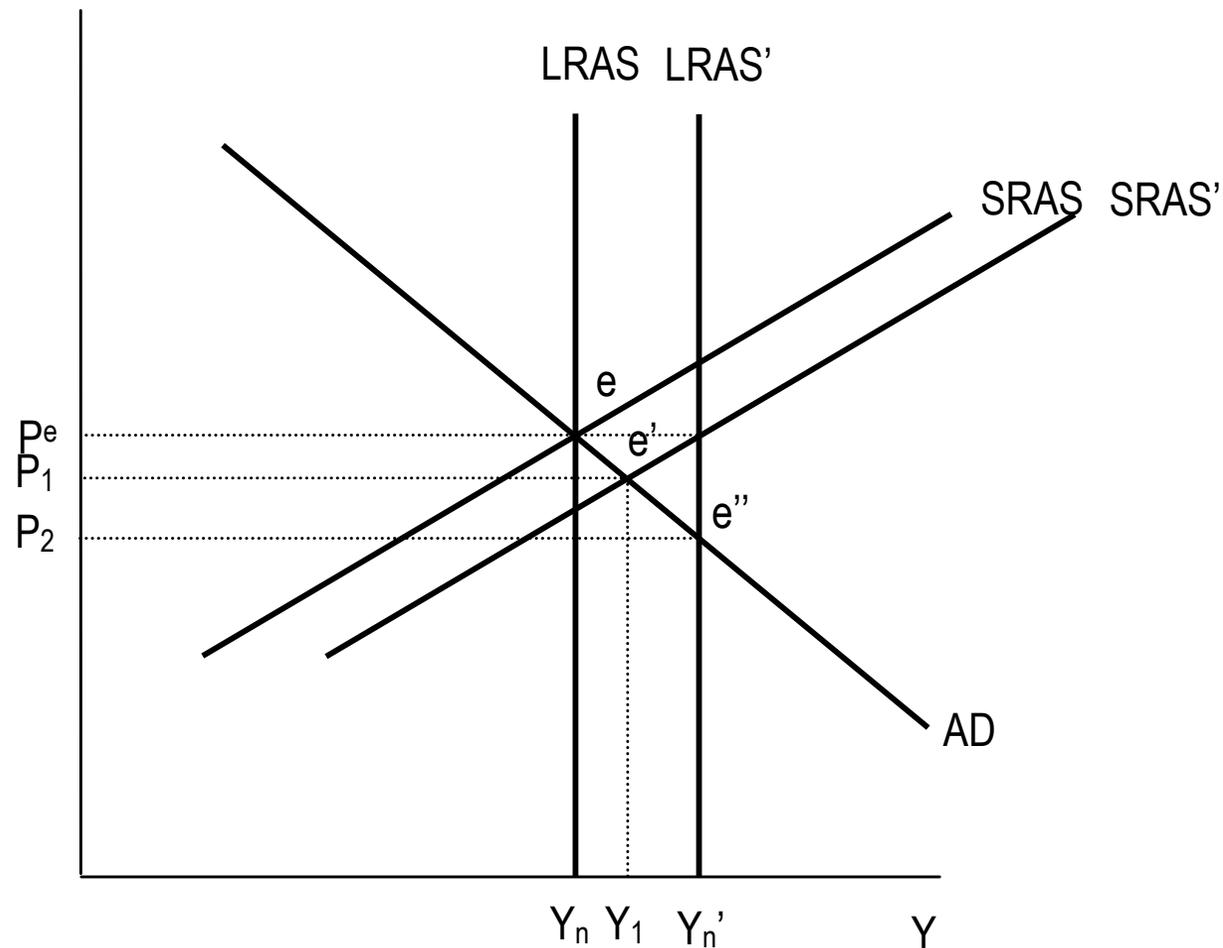
- Increase in aggregate demand raises AD curve
- In short run
 - With price expectations at P_e output rises to Y_1 and price increases to P_1 in short run
- In long run
 - Stickiness in wages, prices, or information goes away and firms fully adjust prices to P_2 and output returns to Y_n
 - Employment follows output with $u \rightarrow u_n$
- AD shocks (including monetary and fiscal policy) are neutral in long run





Shocks to aggregate supply

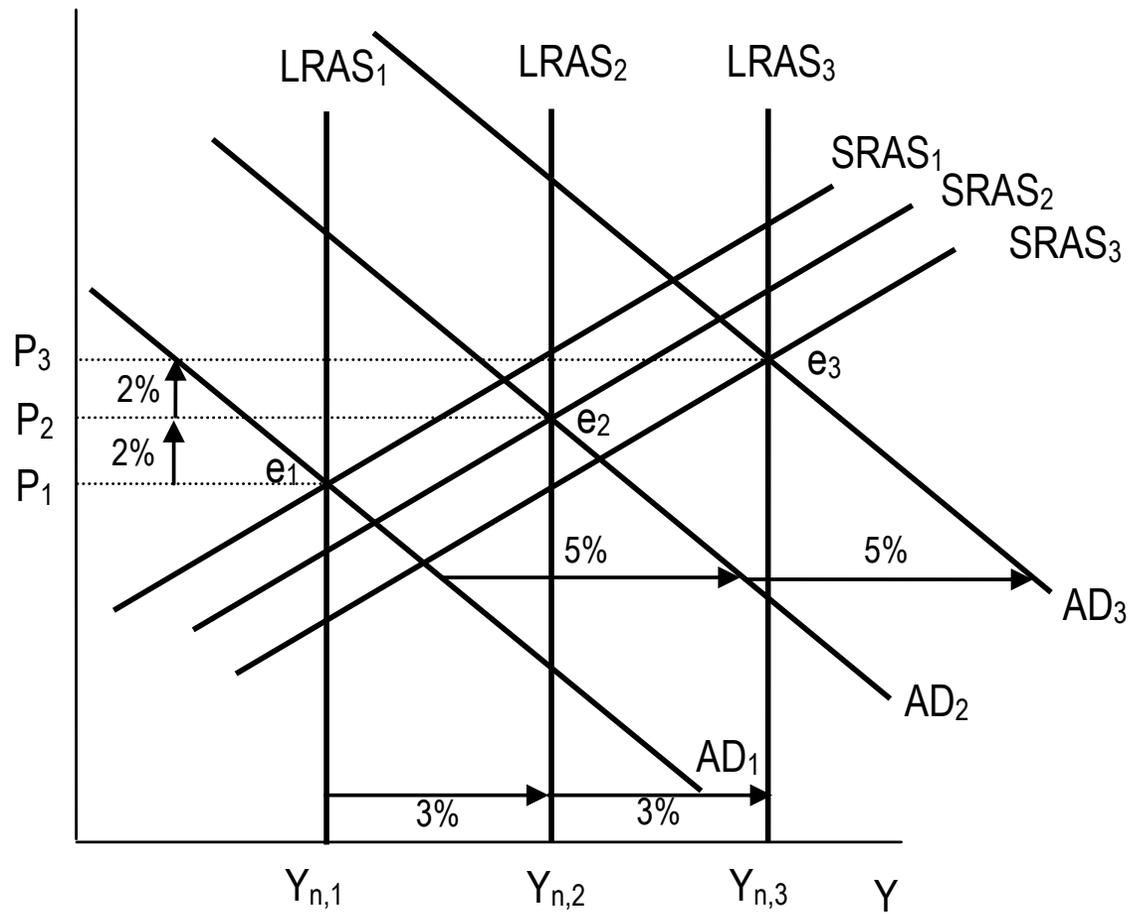
- LRAS and SRAS shift outward unexpectedly
 - P_e stays same but Y_n increases
 - Output expands some and prices fall some in short run (e')
- Once expectations adjust, output increases to new Y_n and prices fall to e''
- Temporary AS shock such as oil price increase shifts curves left, but often only in short run





Growth and inflation in long run

- Money growth pushes AD up and out by 5% each year
- Natural output grows at 3% each year
- Equilibrium moves on a path up and to the right over time
- Inflation rate is growth in AD minus growth in AS = $5\% - 3\% = 2\%$
- Increase in money growth would just raise inflation in long run





Fundamental macroeconomic principles

- Real output tends to return to its natural level in the long run
 - Natural output is governed by growth trend and shifts due to increases in labor force, capital stock (including human), and technology
- Changes in aggregate demand, including “demand-side” policies, affect real output in the short run but not in the long run
 - Changes in aggregate supply affect natural output, so they have permanent effects on real output
- Inflation tends toward the difference between AD growth and AS growth in the long run
 - Other things equal, long-run inflation rate = monetary growth rate – real output growth rate



Review

- Classical macroeconomics assumed that all micro markets cleared
 - Prices determined by money supply according to quantity theory
- Aggregate demand and aggregate supply are used to explain modern macroeconomies
- AD curve slopes downward; AS curve is vertical at natural output in the long run but slopes upward in the short run
- Changes in aggregate demand (including monetary and fiscal policy) have only temporary effects on real output and employment



Daily diversion

From the *Devil's Dictionary*:

Day, n., A period of 24 hours, mostly misspent. This period is divided into two parts, the day proper and the night, or day improper—the former devoted to the sins of business, the latter consecrated to the other sort. These two kinds of social activity overlap.



What comes next?

- Thanksgiving break!
- Two more classes to finish basic macro theory after break
 - Monetary and fiscal policy on Monday
 - Short-run tradeoffs between unemployment and inflation on Wednesday
- Case for Monday is historical discussion of U.S. monetary policy after 1979
- Problem Set #8 is due on Wednesday