The two models we studied had very similar assumptions, but very different conclusions.

The Cournot model predicted a duopoly prices were lower than monopoly prices but higher than under perfect competition.

The Bertrand predicted duopolies would drive prices down to marginal costs, as is the case with perfect competition.

Which leads to asking 1)why the outcomes are so different and 2)which model is more realistic.

If we view firms as making two decision- capacity and pricing, we can shed some light on the differences in the two models.
Cournot and Bertrand Models

- The relative timing of each decision is crucial for predicting equilibrium outcomes.
- Games with two strategic decisions can be modeled as two stage games.
- Long-run decisions are made in the first stage, and short run decisions are made in the second stage given the values of the first stage decisions.
- So suppose capacity is a long run decision relative to prices, by which I mean it is more difficult to adjust capacity than prices.
- Then the correct model is the Cournot model, where firms first set capacity and then prices are set.
On the other hand, if output is a short-run decision with respect to prices, so it is easier to adjust output, then the right model is where prices are set in the first stage.

This is effectively the Bertrand Model, where output adjusted to quantity demanded at the price initially set by the firms.

Most real world industries are closer to the case where capacity is difficult to adjust vis-a-vis prices, so output decisions are the long run variable, as in Cournot.

However, in other cases (like e.g. software) output levels are adjusted more rapidly than prices, pointing in favor of the Bertrand Model.
We can use these models to predict how market variables change if we change exogenous conditions, such as costs.

This is what we call(ed) comparative statics.

Suppose, for example costs rise for firms in a duopoly with identical marginal costs.

Suppose also that both firms compete in a Cournot model.

From what we saw last class (graphically and algebraically), each firm’s reaction function depended on marginal costs.
Comparative Statics

- So with the new costs, we would just compute the new reaction functions.
- This can be done by seeing how the extreme points (monopoly, perfect competition) change.
- It can be shown that an increase in marginal costs results in a downward shift in the reaction curve.
- By symmetry, both firms will experience the same shift in their respective reaction curves.
- We have everything we need to solve for the new equilibrium, which will be the point at which the two new reaction curves intersect.
Comparative Statics

- Comparing the two equilibria, we find that each firm’s output is now lower, and prices are higher.
- This can be shown algebraically.
- As we saw last class,

\[ q^N = \frac{a - c}{3b} \]

- So total output is:

\[ Q^N = 2 \frac{a - c}{3b} \]

- From which we can read off the market demand curve to conclude that

\[ p^N = \frac{a + 2c}{3} \]
A slightly more complicated setting will be the case when firms have different marginal costs, because, say, an exchange rate change.

Algebra gets messier, but basic ideas are the same.

The two reaction curves are given by:

\[ q_1^*(q_2) = \frac{a - c_1}{2b} - \frac{q_2}{2} \]
\[ q_2^*(q_1) = \frac{a - c_2}{2b} - \frac{q_2}{2} \]

Imposing equilibrium conditions we get:

\[ q_1^N = \frac{a - 2c_1 + c_2}{3b} \]
\[ q_2^N = \frac{a + c_1 - 2c_2}{3b} \]