Econ 314

Wednesday, April 3, 2020

Nominal Rigidities, Real Rigidities, and Coordination Failures in Price Setting

Reading: Romer, Sections 6.6 to 6.8

Class notes: Pages 112 to 116

Daily problem: #29

Today's Far Side offering

"C'mon! Keep those stomachs over the handles! Let the fat do the work! Let the fat do the work! ... That's it!"

Finally! An occupation well-suited to my body type! ☺

Context and overview

- **Last class**: In the April 1 class, we discussed the model of coordination failures presented in the paper by Cooper and John
- **Today**: We apply that model to firms' **price-setting decision**
  - When there are **nominal rigidities**, firms may lose more by changing to the optimal price than if they keep nominal prices constant
  - **Real rigidities** arise because firms care about how their prices compare to those of their rivals: they don't want their relative prices to be misaligned. This creates a **strategic complementarity**.
  - Real rigidities can **increase the price stickiness** arising from nominal rigidities because firms are less likely to change prices if they think that their rivals are likely to keep prices fixed
  - **Multiple equilibria** are possible: no adjustment or full adjustment

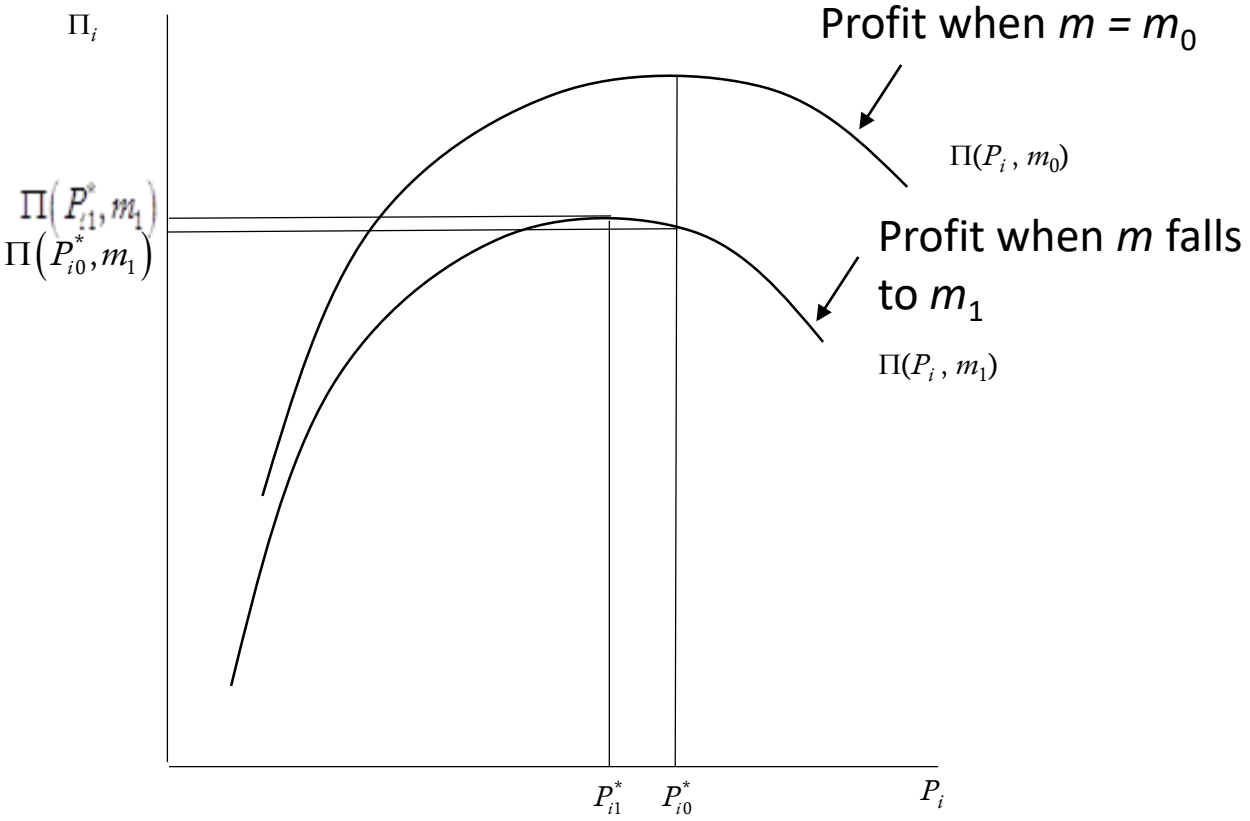
Nominal rigidities and real rigidities

- **Nominal rigidities** encourage firms to keep nominal (dollar) prices P_i fixed
  - Menu costs as classic example
  - Cost of changing price tags on items (or on shelves)

- **Real rigidities** encourage firms to keep relative prices P_i/P fixed
  - Important if firms are close rivals (large η) so that a too-high price would cause large decrease in quantity demanded
  - Example of strategic complementarity: if rivals increase P each firm also wants to increase P_i to keep relative price stable

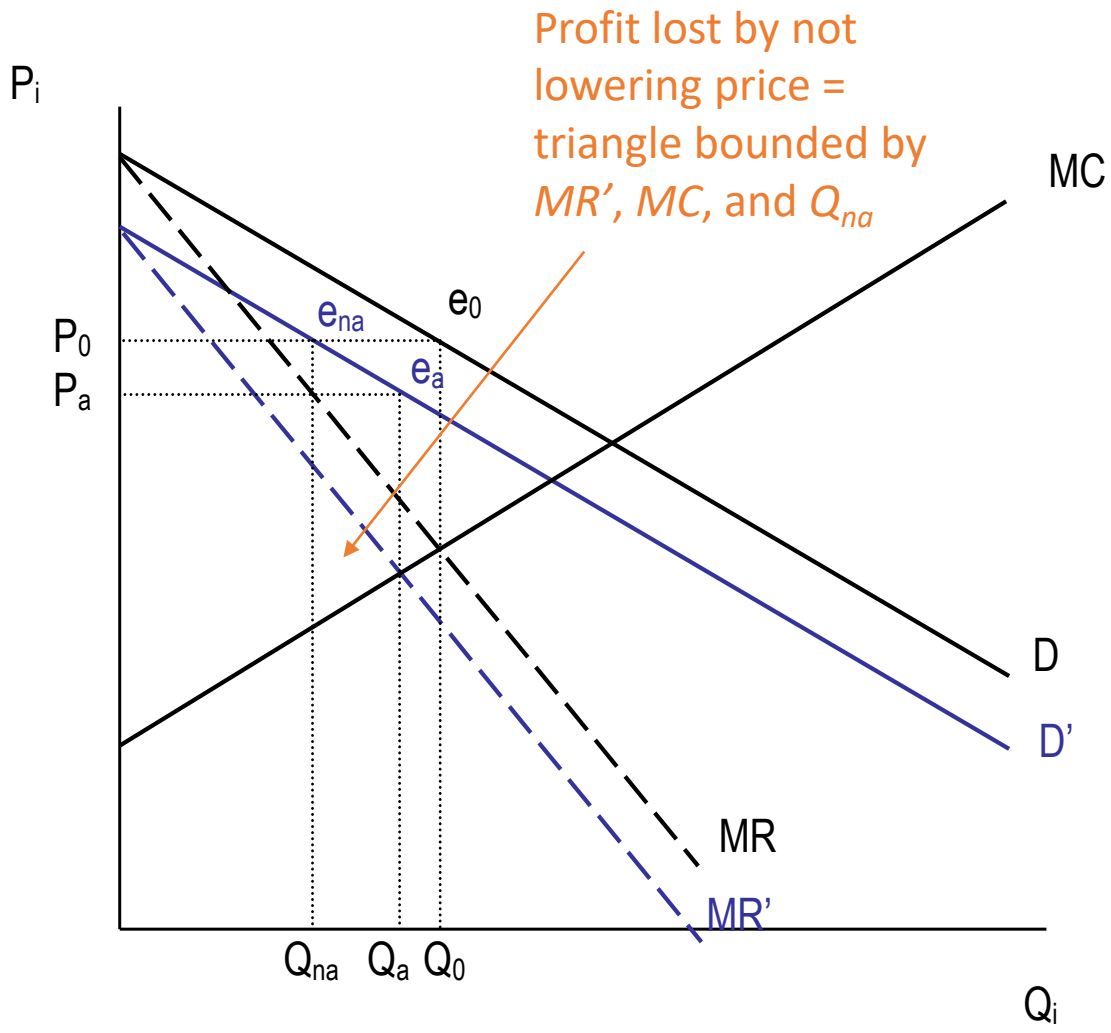
Profits and price stickiness

- Profit Π as function of price **is flat at the top**
  - At max, $\partial\Pi / \partial P_i = 0$
  - Losses due to small deviation from optimal price are small
  - Small menu cost Z might make price stickiness desirable
  - Aggregate demand decreases from m_0 to m_1, lost profit at m_1 is small gap $\Pi\left(P_{i1}^*, m_1\right) - \Pi\left(P_{i0}^*, m_1\right)$
  - Firm keeps price constant if $Z > \Pi\left(P_{i1}^*, m_1\right) - \Pi\left(P_{i0}^*, m_1\right)$



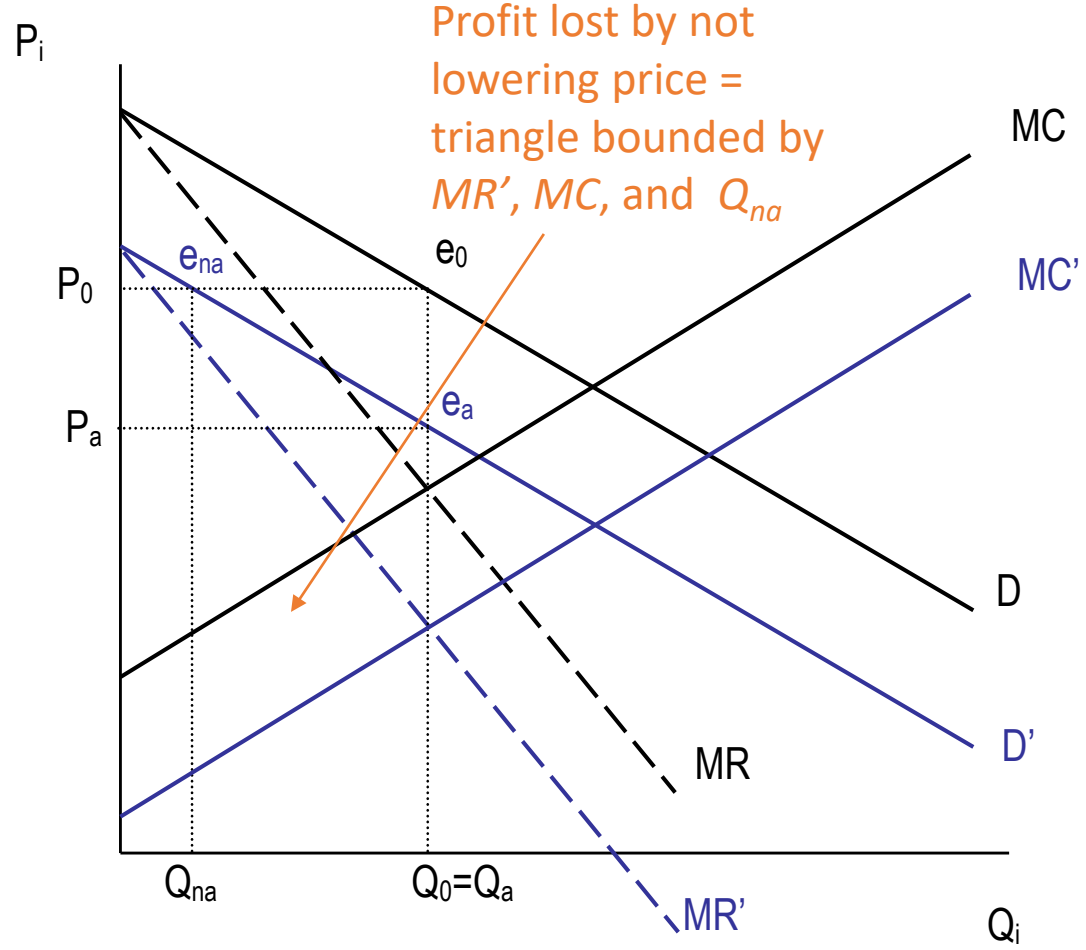
Lost profit if other firms do not lower prices

- Fall in AD → small fall in D
  - Small because rivals do not ΔP
- MR falls; MC constant because suppliers don't lower prices
- **Choice #1: Keep price at P_0**
  - Sell Q_{na} at e_{na}
  - Profit is trapezoid bounded by *MR′*, vert. axis, *MC*, and vert. line at Q_{na}
- **Choice #2: Lower to P_a**
  - Sell Q_a at e_a
  - Profit is whole triangle bounded by *MR′*, *MC*, and vertical axis



What's different if others do lower prices?

- Demand and *MR* fall further because relative price is now too high if don't adjust
- *MC* falls because suppliers lower prices
- Lost profit from non-adjustment is now **much larger triangle**
- **Strategic complementarity** in price adjustment: Others lowering price raises cost to me of not lowering price



Coordination failures in price setting

- Profit function for our firm: $\Pi(P_i, P; \Delta M)$ (ΔM is AD shock)
- Other firms **do not adjust** → we do not adjust price if

$$\Pi(P^*, P_0; \Delta M) - \Pi(P_0, P_0; \Delta M) < Z$$

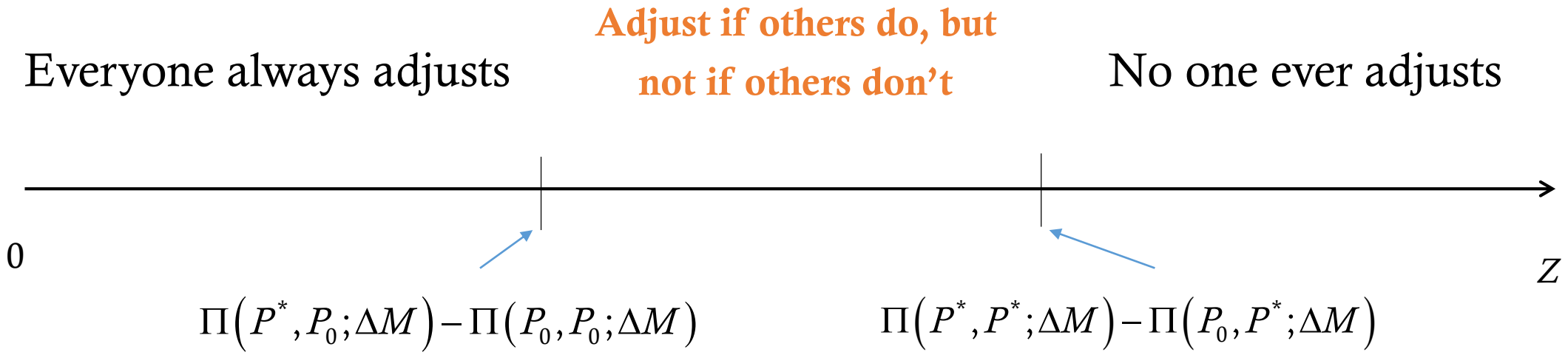
- Other firms **do adjust** → we do not adjust price if

$$\Pi(P^*, P^*; \Delta M) - \Pi(P_0, P^*; \Delta M) < Z$$

- **Lower difference is larger** than upper difference: it costs us more to keep prices sticky if others change theirs

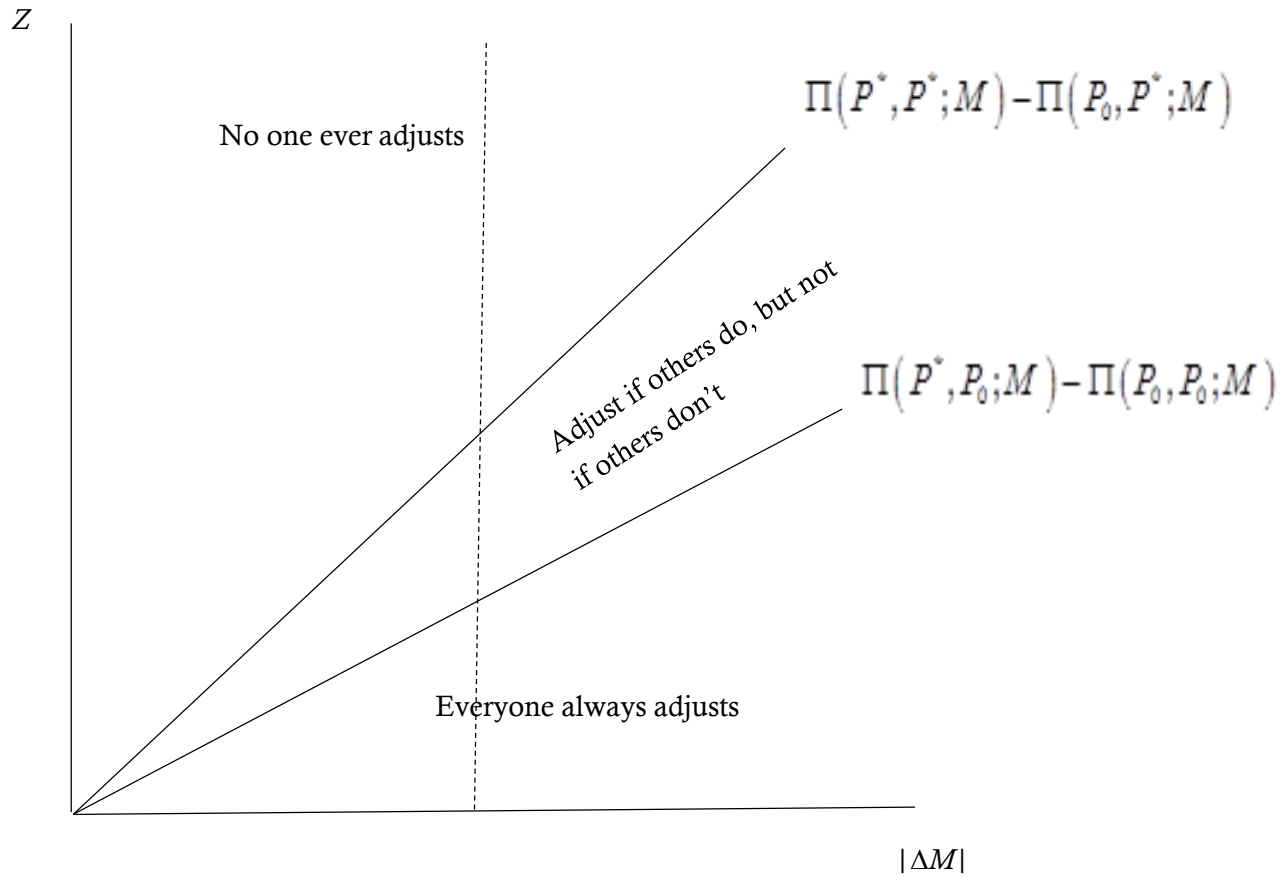
Multiple equilibria in price setting

- Tiny menu costs → all adjust; huge menu cost → no one adjusts
- Menu cost in the middle range → **multiple equilibria**



Size of shocks vs. size of menu costs

- Vertical dashed line is horizontal line from previous slide
- Larger shock increases both threshold values
- If AD shock is small, more likely that no one adjusts
- If menu cost is small, more likely that all adjust
- **Intermediate range has two equilibria**: full adjustment or complete price stickiness



Externalities and social cost

- Firm receives **positive spillover** (externality) from other firms if they adjust price
  - Our firm earns more profit (if we adjust price) if others do
- Firm has **strategic complementary** with other firms' decisions
  - Our firm has more incentive to adjust price if others do
- Strategic complementarities plus positive spillover can lead to:
  - **Low private cost** of price stickiness
  - **High social cost** of price stickiness
- Coordination failure in price adjustment can lead to **socially inefficient equilibrium**

Review and summary

- **Nominal and real rigidities** exist in price adjustment
- Because $\partial \Pi / \partial P_i = 0$ at maximum, **private losses are small** from being away from optimal price
- Losses from price non-adjustment **are smaller if other firms also do not adjust** → **strategic complementarity** in price adjustment
- Strategic complementarity can lead to **multiple equilibria**, where either full price adjustment or complete stickiness is equilibrium
- Because price adjustment is desirable, an economy can get stuck at a **sub-optimal equilibrium** due to stickiness

From *The Devil's Dictionary*

Riot, *n*. A popular entertainment given to the military by innocent bystanders.

What's next?

- The next class (April 6) covers two basic topics:
- First, we discuss Romer's two "**quantitative examples**" to assess the empirical importance of the social losses from price stickiness
  - These are based on an important paper by Ball and Romer that is an optional reading on the reading list
- Second, we introduce **dynamic price setting models**, where we take into account not only the optimal price to set today, but the fact that the price we set today because the baseline (sticky) price for next period's price setting