Econ 314

Wednesday, April 1, 2020

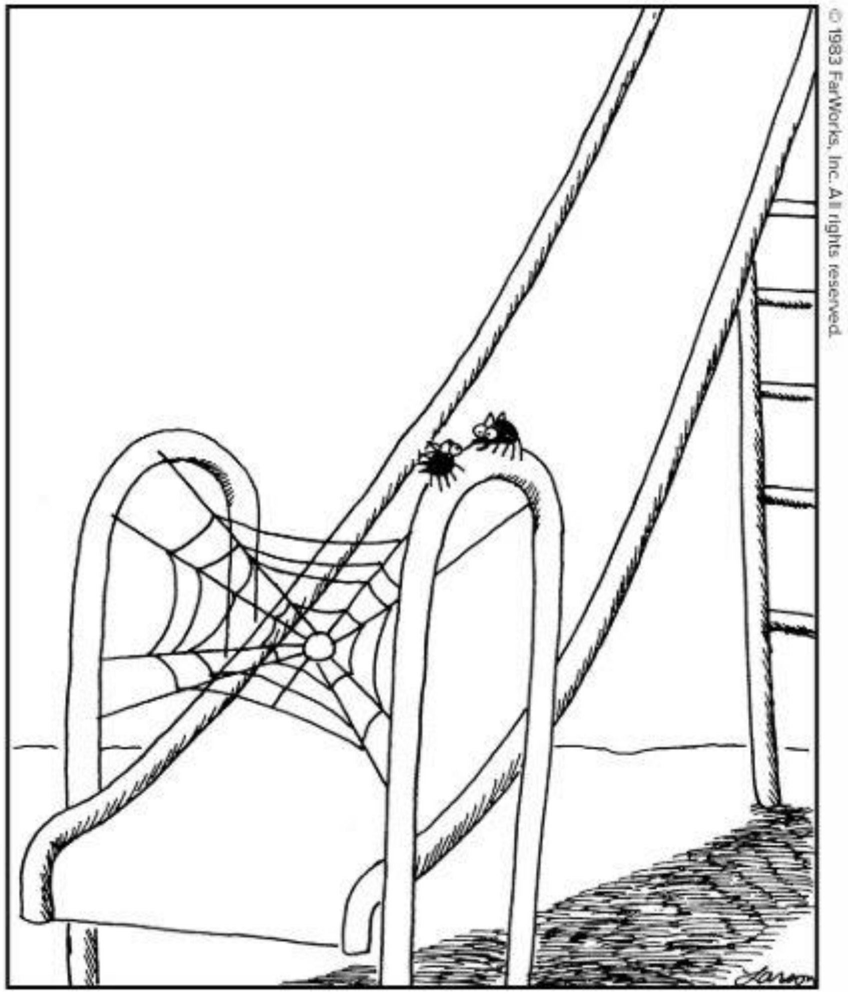
Coordination Failures

Reading: Cooper and John, “Coordinating Coordination Failures in Keynesian Models”

Class notes: Pages 106 to 111

Daily problem: #27

Today’s Far Side offering



“If we pull this off, we’ll eat like kings.”

Context and overview

- **Last class**: In the March 30 class, we finished assessing the equilibrium in a model in which firms are imperfectly competitive
- **Today**: We investigate the phenomenon of **coordination failures**, which we will then apply to failures of firms to coordinate price setting

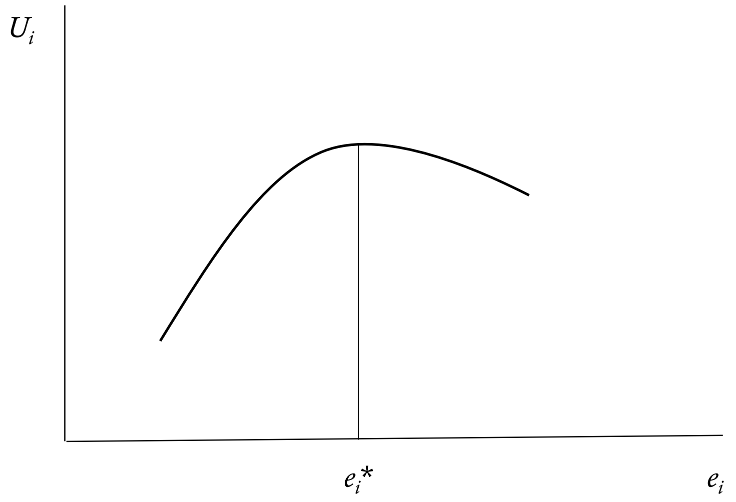
Cooper and John's setup

- Many individuals with utility $U_i = V(e_i, \bar{e})$
  - e is an action or decision made by agents
  - e_i is the action of the ith agent
  - $\bar{e}$ is the average action of all agents

- Utility of agent i depends on her own action and the average action of the group

Utility as a function of own action

- We assume that $V_{11}\left(e_i, \overline{e}\right) \equiv \dfrac{\partial^2 V}{\partial e_i^2} < 0$
- This means that utility is concave downward in own action:



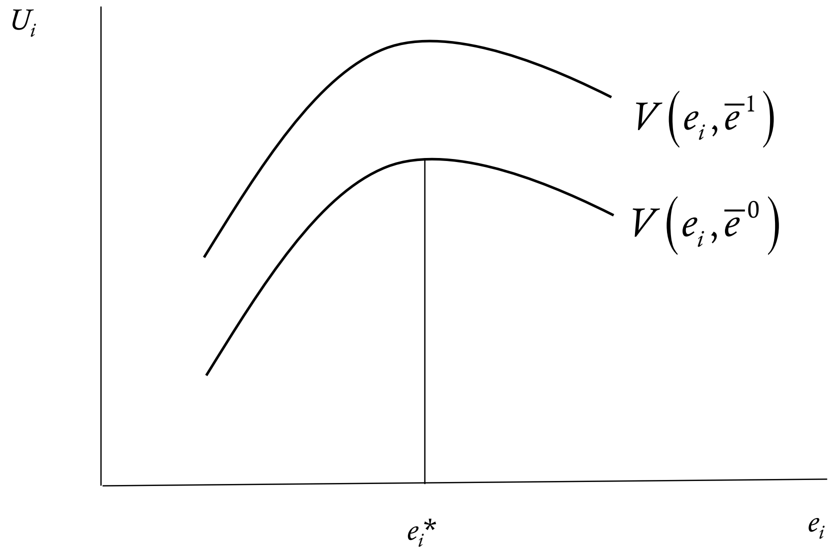
- We will apply this to firms' pricing decisions

Spillovers

- Important element of model is **spillovers** (externalities): how *i*'s utility is affected by decisions of others
- This is measured by the derivative of utility with respect to the average action: $V_2(e_i, \bar{e}) \equiv \frac{\partial V}{\partial \bar{e}}$
- If $V_2 > 0$, then we say there are **positive spillovers** because an increase in others' actions increases *i*'s utility
- If $V_2 < 0$, then we say there are **negative spillovers** because an increase in others' actions decreases *i*'s utility

Graph of positive spillover

Increase in $\overline{e}$ shifts utility function upward



Utility maximization

- Choosing e_i to maximize U_i means setting $\frac{\partial U_i}{\partial e_i} = V_1\left(e_i, \overline{e}\right) = 0$
- This is peak of utility function we have graphed
- Solving this equation for e_i gives us agent *i*'s **reaction function**:

$$e_i^* = e_i^*\left(\overline{e}\right)$$

- What is the sign of its derivative? How does an increase in the average action affect *i*'s optimal action?

Slope of reaction function

- Reaction function $e_i^*\left(\overline{e}\right)$ is defined by first-order condition:

$$V_1\left(e_i^*,\overline{e}\right)=0$$

- Taking total derivative of this condition with respect to $\overline{e}$ yields

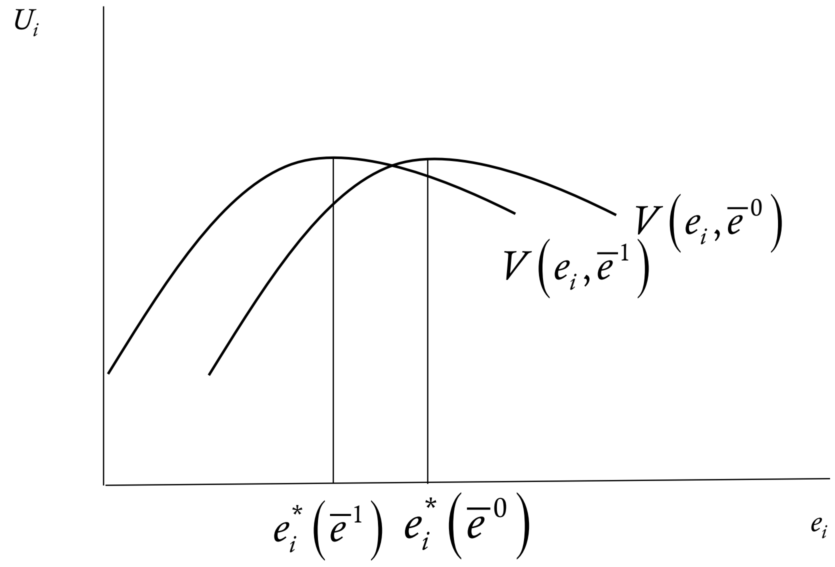
$$V_{11}\left(e_i^*,\overline{e}\right)\frac{\partial e_i^*}{\partial \overline{e}}+V_{12}\left(e_i^*,\overline{e}\right)=0$$

$$\frac{\partial e_i^*}{\partial \overline{e}}=-\frac{V_{12}\left(e_i^*,\overline{e}\right)}{V_{11}\left(e_i^*,\overline{e}\right)}$$

- We know that $V_{11} < 0$, so sign of derivative is sign of V_{12}

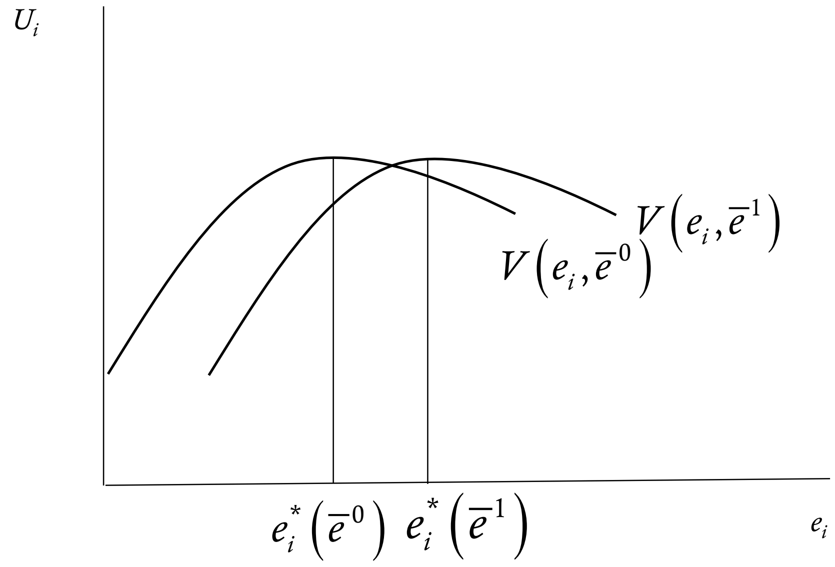
Strategic substitutability

Strategic substitutability: $V_{12}\left(e_i^*, \bar{e}\right) < 0$ and $\dfrac{\partial e_i^*}{\partial \bar{e}} < 0$

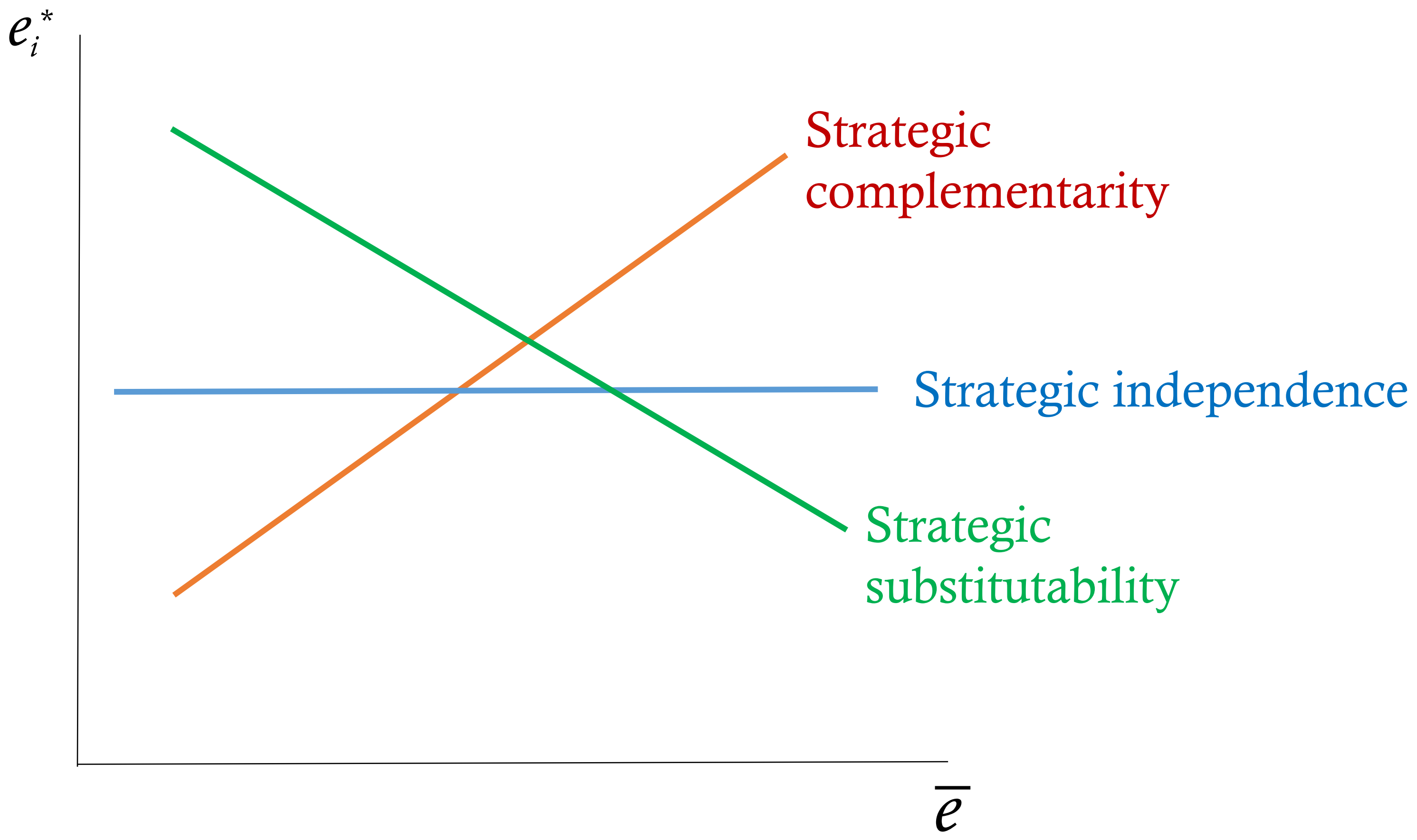


Strategic complementarity

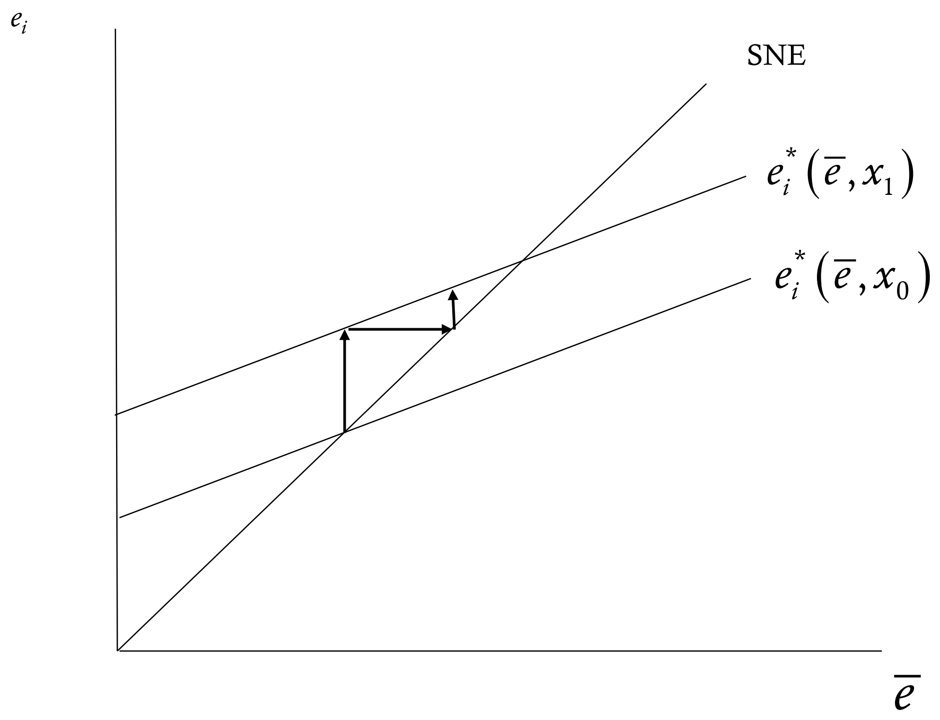
Strategic complementarity: $V_{12}\left(e_i^*, \overline{e}\right) > 0$ and $\frac{\partial e_i^*}{\partial \overline{e}} < 0$



Graphing the reaction function

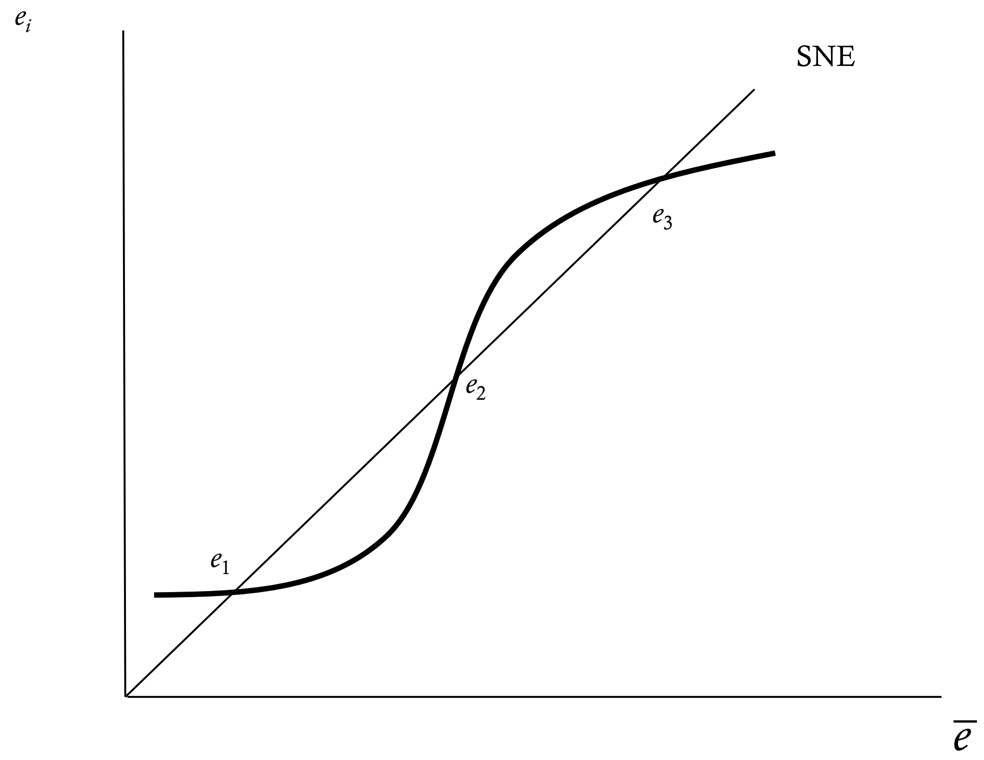


Strategic complementarity and multipliers



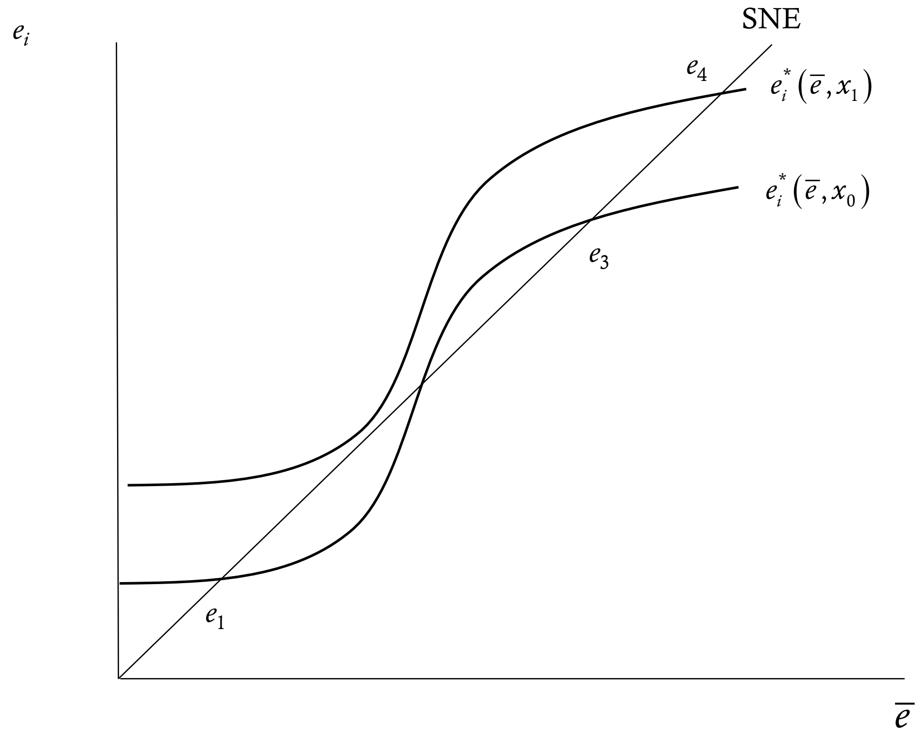
Multiple equilibria?

- **Three equilibria**
  - e_1 and e_3 are stable
  - e_2 is unstable
- Pareto ranked
  - More e is better, so e_3 is best
- Poverty traps
  - Can we move from e_1 to e_3?



Multiplier effect of small changes

- Suppose that x is policy that affects choice of e
  - Small increase in policy x
  - Small rise in curve to be above SNE line
  - Converge from e_1 to e_4
  - Once at e_4, can reverse policy and economy goes to e_3
- With multiple equilibrium, small policy changes can "prime the pump"



Review and summary

- The have discussed the **coordination failure** model of Cooper and John
- Key elements to remember
  - **Spillovers** are externalities when others' actions affect our utility
  - **Strategic interaction** is when others' actions affect our actions
  - **Strategic complementarity** can lead to self-reinforcing changes and **multipliers**
  - **Multiple equilibria** are possible with strategic complementarity, where a small exogenous (policy?) change can have large effects, even if later reversed

From *The Devil's Dictionary*

Grammar, *n*. A system of pitfalls thoughtfully prepared for the feet of the self-made [person], along the path by which he [or she] advances to distinction.

[I love arcane applications of grammar, such as "data" always being plural, the proper use of "that" and "which" for introducing subordinate clauses, and avoiding dangling prepositions and split infinitives. Future generations of thesis students will celebrate my passing from the ranks of first-draft readers.]

What’s next?

- In the next class, we lay the groundwork for applying coordination failures to firms’ **price-setting decisions**
- We will discuss **nominal rigidities** in price setting
  - Menu costs cause firms to keep nominal price fixed
- By contrast, **real rigidities** cause firms to want to keep relative prices constant
  - They want to keep their prices the same as those of rival firms
- Nominal and real rigidities can interact to cause considerable price stickiness even if menu costs are small