A Supplementary Lecture
for game theory

History, Expectation and Development

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Why history matters

- Some implications of the classical theories are not borne out by data
  - Convergence across countries from the Solow model
- The reason is that the classical models assume that the parameters are exogenous
- What if such characteristics themselves depend on history and expectation?

Why history matters (cont'd)

- History: the past may have persistent effects
- Expectation: what you think of future may really self-fulfilling
- They interact through two channels:
  - Complementarities
  - Increasing return to scale

Complementarities

- A motivating case: QWERTY vs. Dvora
  - why inefficient technology persist?
  - why inefficient institutions persist?
  - why development are path-dependent or locked-in?

Case of complementary technology

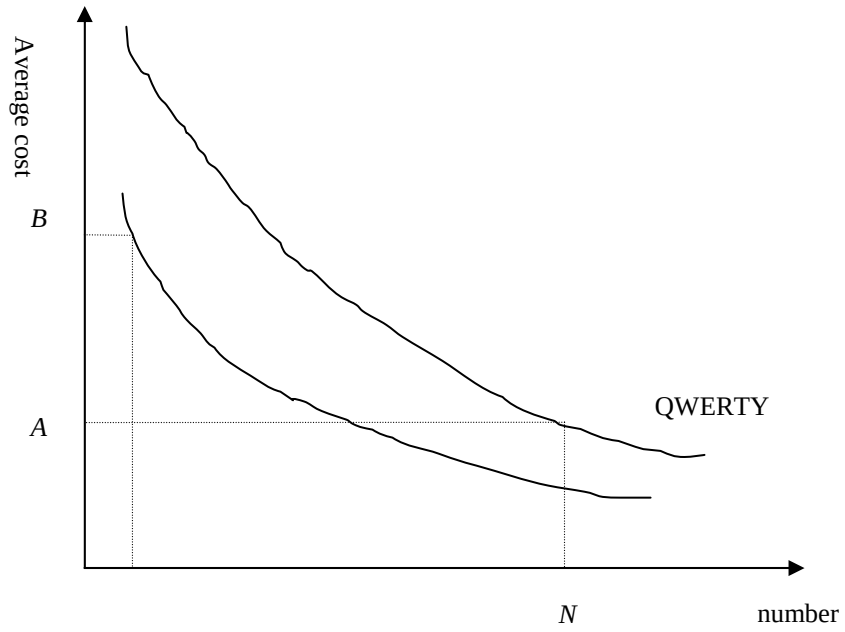


Figure 1 Cost curves with complementarities in adoption

Case of congestion effects

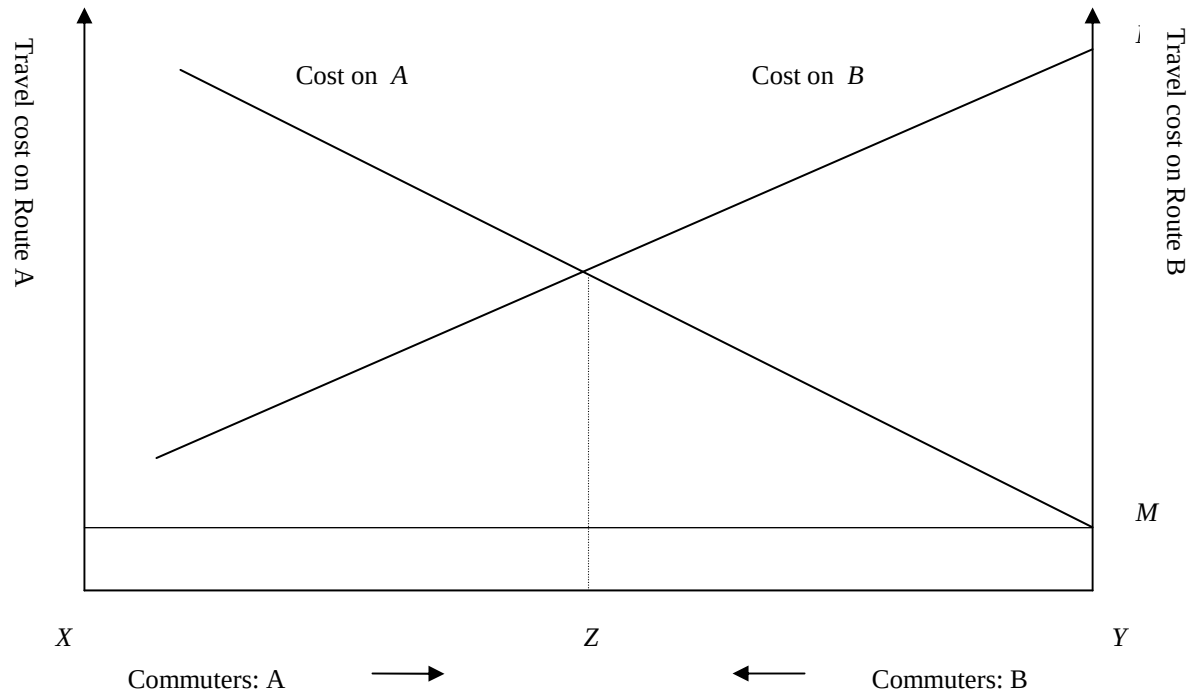


Figure 2 A case of Anti-complementarities

Three things learnt

- In case of complementarities, there may be multiple equilibria
  - e.g. either QWERTY or Dvorak may be the actual equilibrium
- The particular equilibrium may depends on history.
- Externalities create possible multiple equilibria, and historical lock-in occurs **only** when externalities take the form of complementarities.

Coordination Failure

- Game of “battle of sexes”
- Rosenstein-Rodan(1943)
  - economic underdevelopment results from massive coordination failure
  - Some investments do not occur simply because other complementary ones are not made, and these latter are not forthcoming simply because the former are missing!

Coordination Failure (cont'd)

- Sound circular, but actually not
- A potential explanation of why similar economies behave so differently, depending on what has happened in their history
- The shoe factory story from Rosenstein-Rodan

  suppose a giant shoe factory producing millions dollars worth of shoes (income in wage, rents, profits), which must be sold locally (analog to a closed economy)
- Can the factory survive?

Coordination Failure (cont'd)

- Not viable except that all the income is spent on shoes, which is impossible!
- A different thought experiment: suppose people spend 50:30:20 on food/clothing/shoes; then setting up ***three*** enterprises in the same ratio.
- Now these three enterprises are jointly viable.

Coordination Failure (cont'd)

- Here we see the importance of coordination: suppose no entrepreneur is rich enough to invest in more than one enterprise.
- Then each will invest *if he were to believe that the other would invest as well*; otherwise he will make no investment at all.
- **Two** possible equilibria: no investment versus all three investing in the right proportions.

Coordination Failure (cont'd)

- Moral from the "shoe story"
  - Formation of expectations is driven by history, it may be that a region that is historically stagnant continue to be so, whereas another region that has been historically active may continue to flourish.
  - Even though they are the same in all other aspects!
  - The same logic as QWERTY versus Dvorak.
- More generally, socioeconomic interactions as **coordination games**.

Technological Linkage

- Generalize the shoe story to **many industries** (see figure 3)
  - one industry might facilitate the development of another.
- **Two** possible states
  - all activity is depressed
  - the links are active.
- The **problem**:
  - if all industries are simultaneously in a depressed state, it is hard to “lift” the entire network to a more active state.

Technological Linkage (con’d)

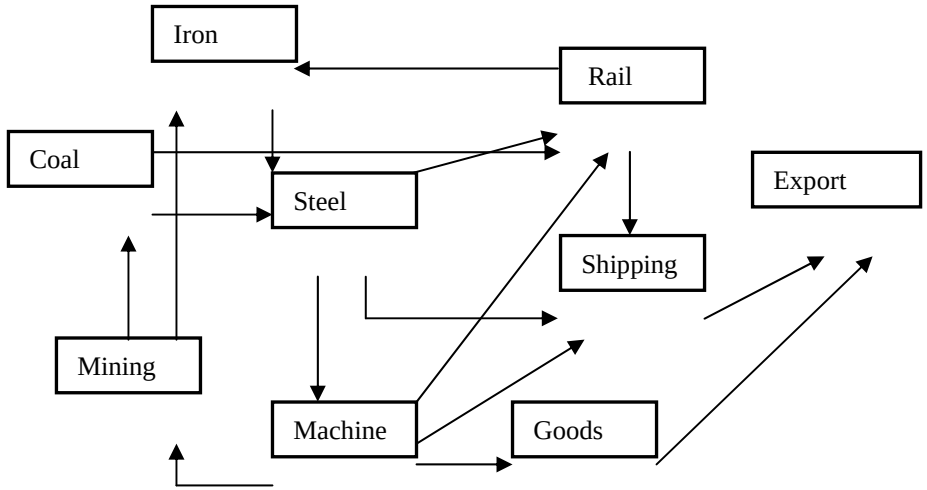


Figure 3 Linkages and Coordination

Technological Linkage (con'd)

- The structure of linkages:
  - *forward* and *backward* linkages (Hirschman,1958).
- Forward linkage
  - one that ease the *supply* of another product.
- Backward linkage
  - one that raise the *demand* for the another.
- Backward linkages like "*pulls*" and forward linkages like "*pushes*".

Technological Linkage (con’d)

- Policy question: getting out of a depressed equilibrium.
- Idea of “**big push**”(Rosenstein-Rodan)
  - a policy that simultaneously creates a coordinated investment in many different sectors.
- Two important features
  - it requires a **massive** investment in many sectors at once;
  - **quantitative** allocation of the investment.

Technological Linkage (con'd)

- Criticisms of the "**big push**" for LDCs:
  - Investment is way too large (the Marshall plan)
  - Informational requirement for the government
  - More fundamentally, the policy does not exploit the fact that the desirable outcome is also an equilibrium.
  - it may be achieved if incentives are right! by designing other indirect mechanisms)

Technological Linkage (con’d)

- Hirschman’s simple profound alternative
  - instead of following a **balanced** growth policy, deliberately follow a **unbalanced** growth one.
- The idea
  - selectively promote the development of certain **leading sectors**, which will induce other sectors by the linkages generated.

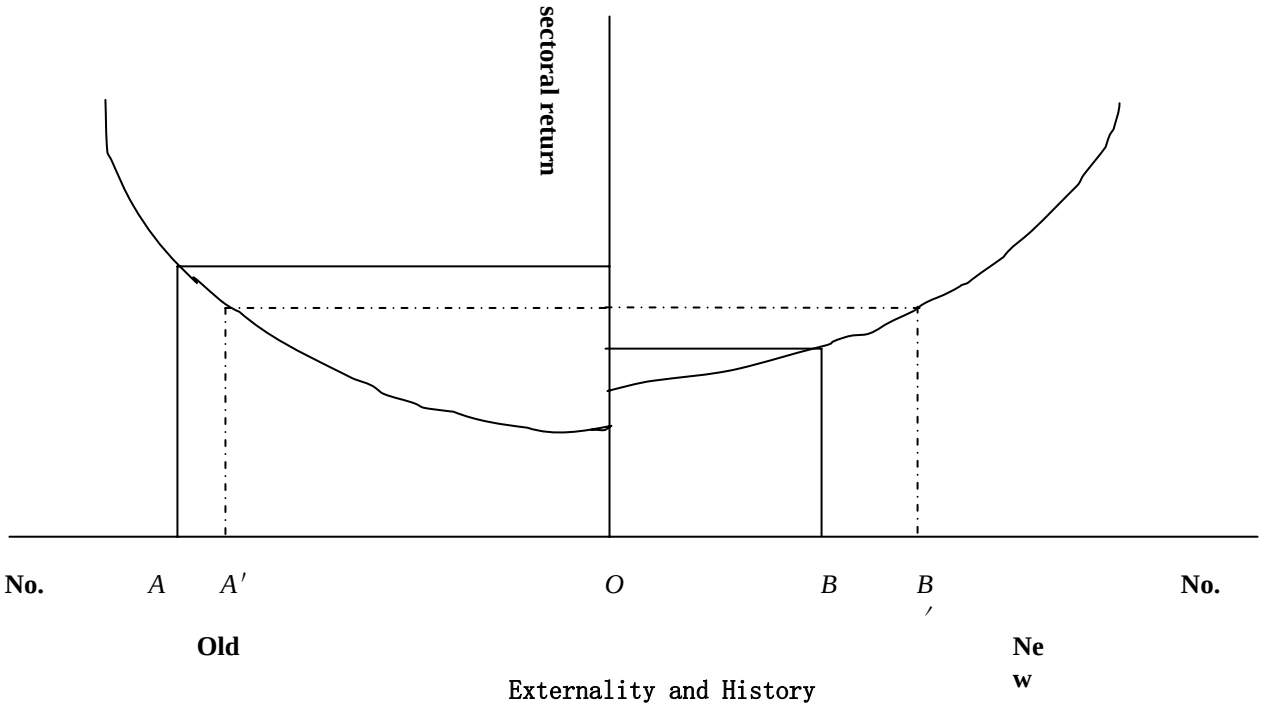
Technological Linkage (con’d)

- How to choose leading sectors
  - The number of linkages that a sector process
    - to see the largest numbers of other sectors that will be affected.
  - The strength of each linkage matters as well.
  - The “intrinsic profitability” of each sector.
- Some possible candidates
  - heavy industry, export, tourism, transportation, and agriculture.

History versus Expectation

- A **recap**: history pins down the equilibrium, while expectation may change it for better or worse.
- Why we observe that some low equilibrium trap?
- An example of export sector electronic components-human capital investment.
- Externalities and History (figure 4)
- The figure can be taken as of two sectors, regions, or countries.

History versus Expectation(con’d)



History versus Expectation(con'd)

- Moral from the figure:
  - Some time history dominate, some time expectation dominate, depending on how people coordinate.
  - Various coordination mechanisms; whether people want to go first (fashion).
  - The importance of entrepreneur and information.
- Evidence from China: governments always change people's expectation through propaganda.

Increasing Returns

- IR: an activity displays increasing return to scale if increasing the scale lowers average cost
- Examples abound.
- Increasing return and development (Young, 1928):
  - Ability to realize the gains from increasing return depends on the size of the market for the product;
  - the size of market may itself depends on the ability to exploit increasing returns, expand production and pay out income to employees.

IR and market entry

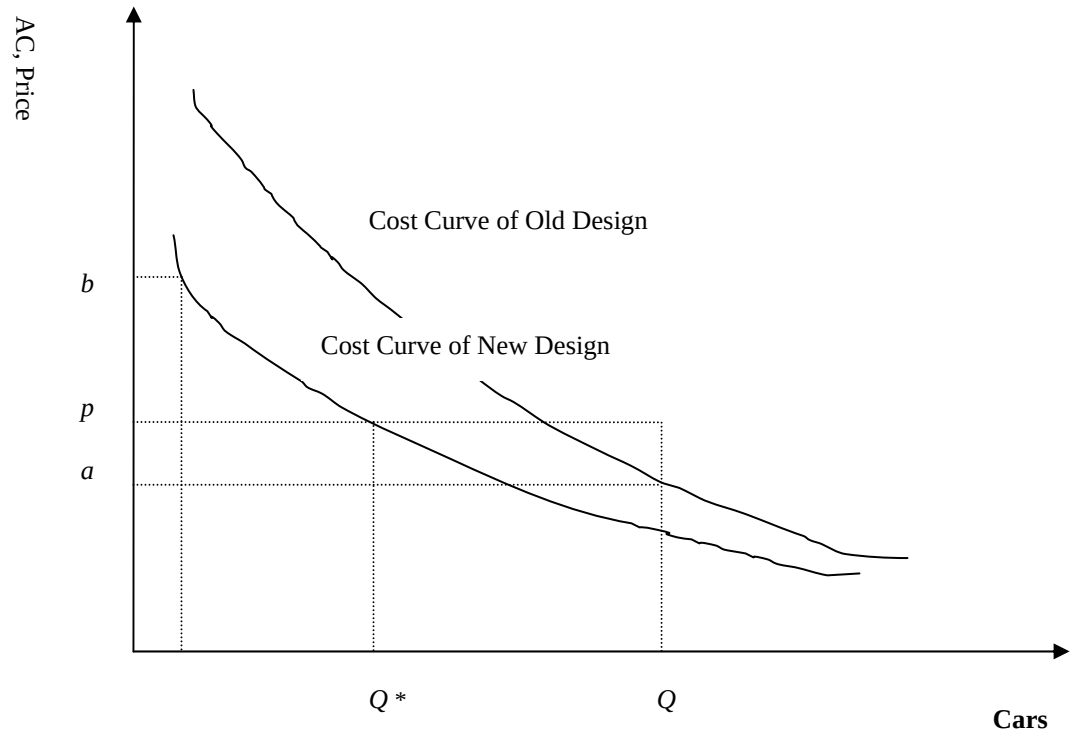


Figure 5 IRTS and History

IR and market entry (con’d)

- IR give the incumbent an head-start due to switching cost;
- The dilemma of gradual transition:
  - during transition period where customers are progressively switching to the new product, the entrant must function at a loss.
- Role of capital markets and the long-purse story.

IR and market entry (con’d)

- Putting the pictures together:
  - Positive externality at the society level **and** IR at the individual level imply:
    - If it is known that new technologies cannot invade existing markets for one or more of these reasons, and if such technologies can be developed only at a cost, the incentives to develop them are crippled.
- What is the optimal policy design?
  - capital market imperfections,
  - slow-changing royalties

Increasing returns and market size

- The above argument takes market size as given: how market restricts entry and production; did not concern how the lack of production feed back on market size
- IR and market size: interaction
  - Roundabout production (intermediate inputs)
  - Their productive consequences (*scale* and *variety*)
  - Multiple-equilibrium: vicious versus good cycle

Increasing returns and market size(con't)

- Increasing return is historical; decreasing return is ahistorical.
- Parallel between IR and complementarities:
  - IR: individual level
  - Complementarities: positive externality (social level)
- Some cases:
  - The importance of opening (the rise of west world)

Competition, multiplicity, and international trade

- An interesting alternative to see externality:
  - Missing markets or market imperfections
- New trade theory and development
  - Paul Krugman
  - Industrial Policy
  - Country size

Other roles for history

- Social norm
  - Why social norm (conformism)
    - Overoptimistic entrepreneurs
    - Norm entrepreneurs (Confucius)
  - The role of social norms
  - Social norms and history
- Defining the Status Quo
  - Winners-loser
  - Difficulty of credible commitment
    - Tiananmen Square event reconsidered

Some applications

- Great divergence (East vs. West world)
  - Market Size
  - Entrepreneurship
- Africa and Latin America
- EU
- The East Asian Miracle
- The French Case (Left versus Right)

Conclusion

- Coordination is the core concept for society and social sciences.
- History vs. Expectation
- Technology vs. Institution
- History vs. Policy Design

A question for you!

- **Cities:**
  - Think of emergence of cities as an outcome of coordination games. What would we mean by multiple equilibria in this context? Discuss this answer with respect to the concentration of certain types of industries in certain locations
    - for example, computer companies in Silicon Valley.