Lecture 10

SCP case study:
The American agriculture industry

Introduction

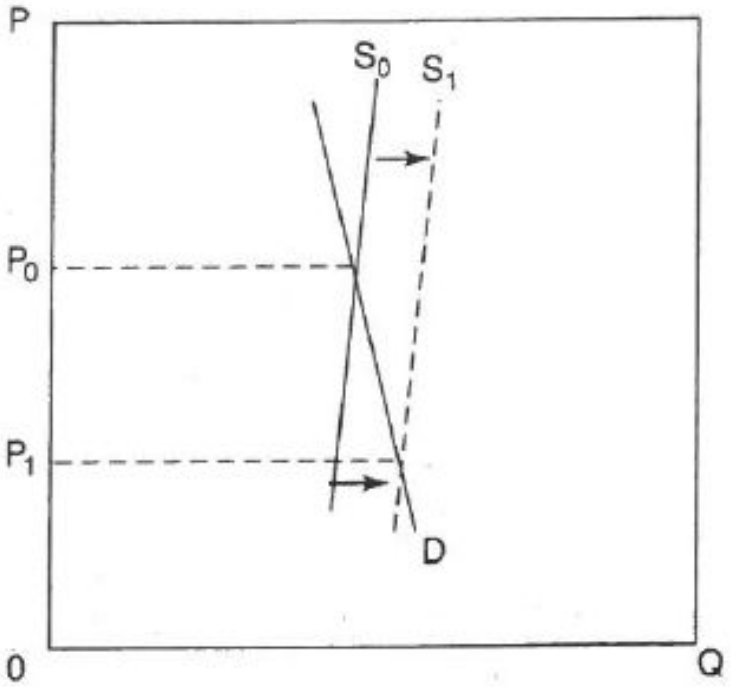
- High correlation between the fraction of labor force engaged in agriculture and GDP per capita.
  - In poor nations, 50-80% work in agriculture
  - In rich countries, 2-4% work in agriculture
- Unique organization: Farms are mostly family-owned, rather than publicly listed firms.
- Farms typically operate as price takers.
- Productivity growth in US agriculture has exceeded that in the rest of the economy

Structure – Supply and demand

- Farmers must make substantial investments before production starts [sunk costs]
- Investments cannot be adjusted in the short run → inelastic short-run supply
- Supply can shift unexpectedly due to weather and disease conditions

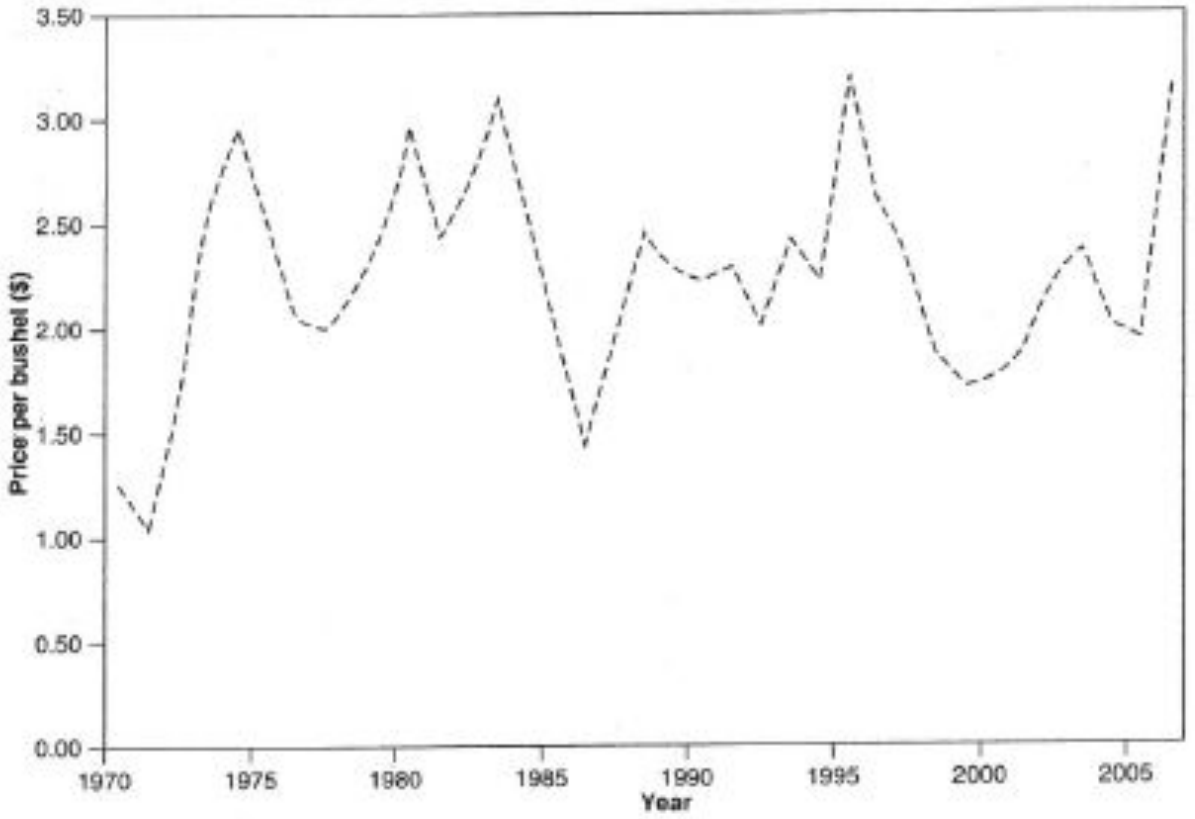
Structure – Supply and demand

- Demand for most farm commodities is price-inelastic: food is a necessity
- Unexpected supply or demand shocks lead to sharp price fluctuations
- Farmers face price risks in addition to yield risks



Structure

FIGURE 1-2 Annual Corn Prices Received by Iowa Farmers, 1970–2006



Source: USDA-NASS

Structure

- Short-run supply is inelastic, but easy entry makes long-term supply curves elastic
- Rapid productivity growth → supply curves have shifted to the right
- Demand growth has been limited by low population growth
- As a consequence:
  1. Real prices for agricultural commodities have been decreasing
  2. Export markets have become increasingly important
- With the rise of exports, farmers face additional risk: exchange-rate risk, foreign macroeconomic risks, etc.

Structure

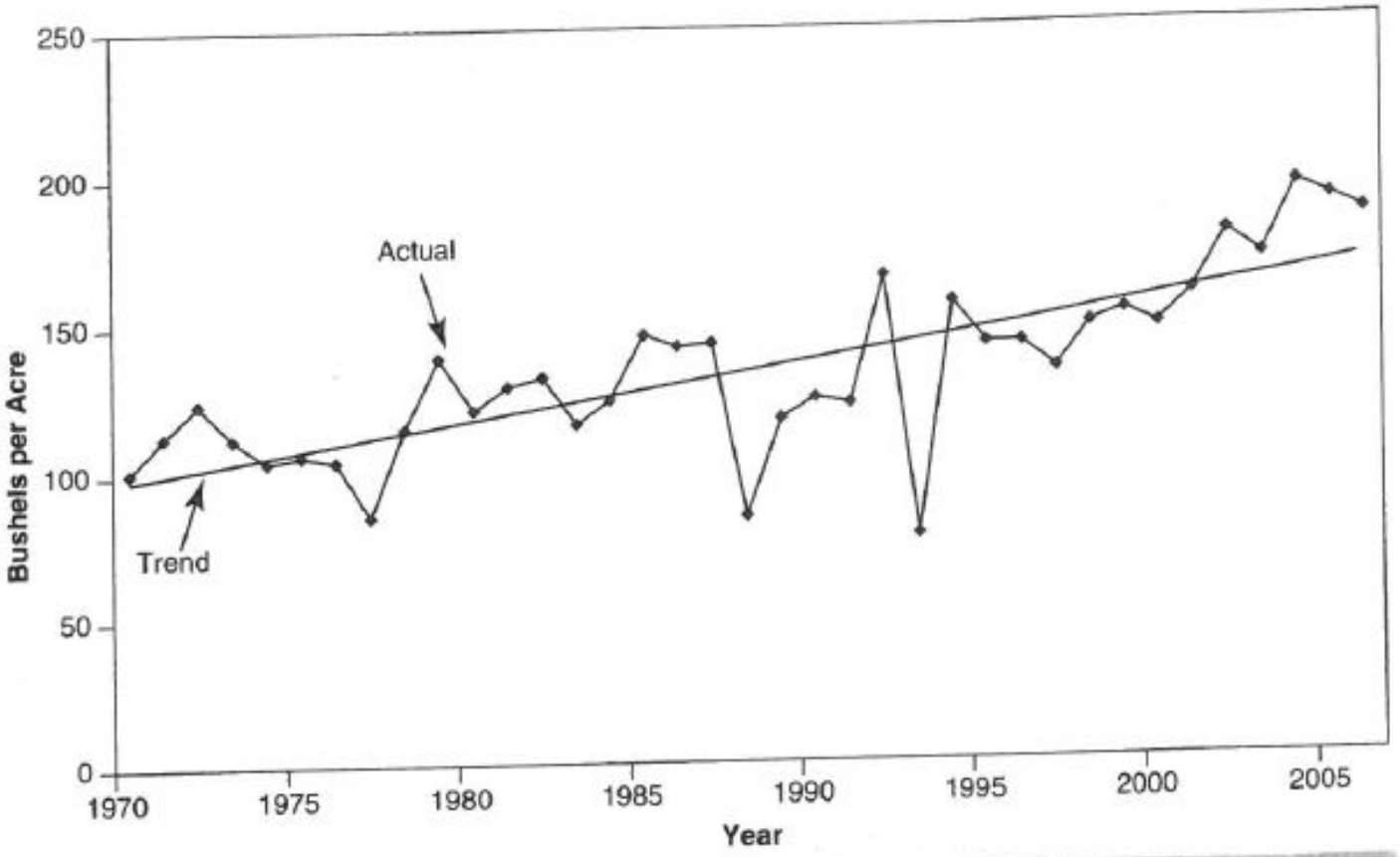
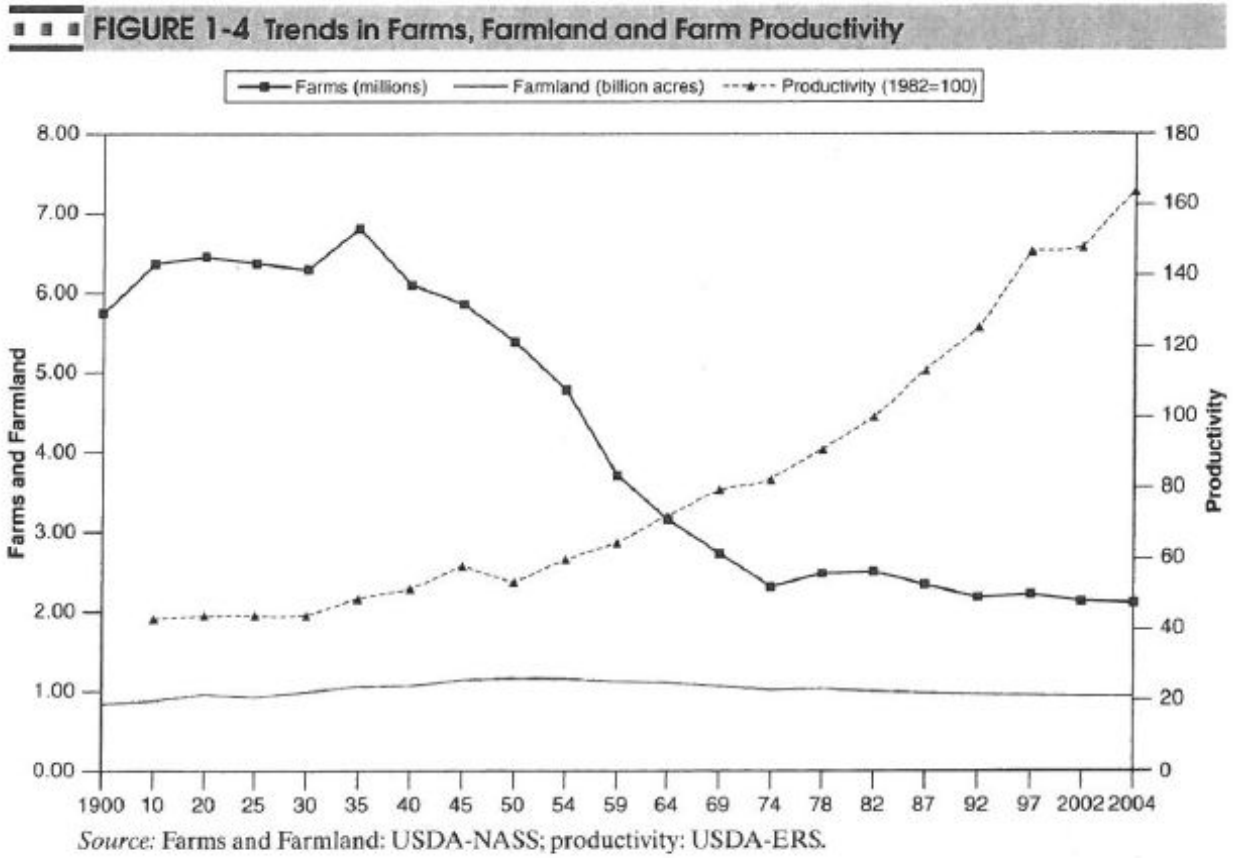


FIGURE 1-3 Corn Yields in Hardin County, Iowa, 1970–2006

Trends in US farm structure

- The number of farms peaked at 6.8 million in 1935, and declined to 2.3 million in 1974 and 2.1 million in 2002



Trends in US farm structure

- Sharp restructuring of agriculture towards larger operations
- The median farm size has increased

TABLE 1-2 Changes in Enterprise Size, by Commodity, 1987–2002.

Commodity	*1987*	*2002*
	Typical Acres Harvested[a]	
Field crops:		
Corn	200	450
Soybeans	243	480
Wheat	404	784
Cotton	450	920
Vegetables:		
Asparagus	160	236
Lettuce	949	2,225
Potatoes	350	810
Sweet corn	100	222
Tomatoes	400	700
Tree Crops:		
Apples	83	129
Almonds	203	361
Oranges	450	1,015
	Typical Annual Sales[b]	
Poultry/Livestock		
Broilers	300,000	520,000
Hogs	1,200	23,400
Fattened cattle	17,532	34,494
	Typical Herd Size[c]	
Dairy Cows	80	275

Family farms, profits and household income, 2003

	Family farms, by sales class ($000)			
	<10	10-250	250-500	500+
Profit margin	-98.0	-13.3	10.5	18.0
% of farms showing loss	42.7	33.1	18.2	16.7
% of farms showing margin > 10%	21.6	30.3	50.6	60.1
Farm household income				
Mean household income ($000)	61	64	106	222
Median household income ($000)	45	49	83	119
Farm earnings ($000)	-4	8	64	175
Non-farm earnings ($000)	65	56	41	47

Large farms are more profitable than small farms

- Driving increase in farm size

Variation in profitability

- Considerable variation in profitability, many small farms remain profitable:
  1. Risk variability (climate, natural disasters, price shocks)
  2. Skill disparities
  3. Product innovation by small farms → niche markets through marketing, special products (kiwi fruit, tofu-variety soybeans etc.) and/or special product attributes (free-range chicken, organic vegetables etc.)

Structure: commodity markets

- Farmers are price takers in almost all commodity markets
- The same is not true of buyers: processors, packers and retailers → monopsony power tendencies
- Sources of monopsony power:
  1. High nationwide concentration (e.g. packers of fed cattle CR4 = 80%)
  2. High transport costs (e.g. fed cattle are shipped less than 160 km → regional monopsony even if there are several national buyers)
  3. Perishability (e.g. livestock lose value when they are stored beyond their optimal weight → time-constrained search for better deals)
  4. Specialization (e.g. a buyer's demand causes a farm to plant a highly specific variety tailored to the buyer's request → asset specificity)
  5. Asymmetric information (buyers make hundreds of deals per day; sellers make a few deals per year)

Vertical linkages

- A large share of farmers rely on long-term contracts with a specific buyer, ranging from 10% for wheat to 91% for poultry and eggs
- Long-term contracts are more common when farmers face perishability and transport cost problems ($\rightarrow$ fewer potential buyers)
- Prices may be set by the contract, and shift the risk price fluctuations

Conduct: Farmer cooperatives

- Farmers are price takers, but they buy from and sell to firms with growing market power.
- Inputs: machinery, seed, petroleum, pesticide…
- Industries processing farm commodities are increasingly concentrated.

Conduct: Farmer cooperatives

- Farmers seek pricing power by organizing cooperatives → attainment of market power is difficult as entry costs are low.
- Cooperatives have little market power over consumers, but are sometimes effective in countering the monopoly power suppliers and the monopsony of buyers.
- Because farmers are price takers, they are allowed to sell through cooperatives, violating the Sherman Act.
- Most cooperatives do not differentiate their products.

Performance

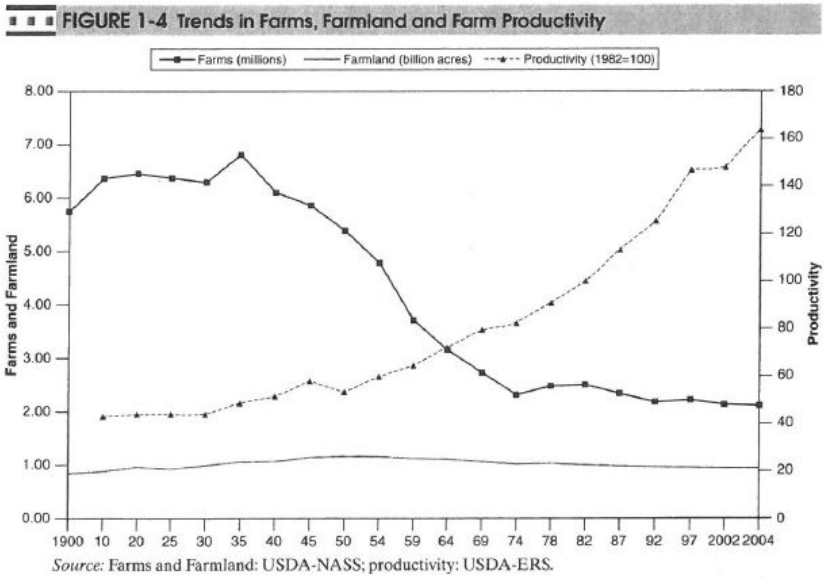
- High rates of agricultural productivity growth over a long period.
- 100 years ago, an American cow yielded 3,840 pounds of milk, while in 2006 it yielded 20,000 pounds!

TABLE 1-4 Yields in U.S. Agriculture, 1910–2005

Crop	*Measure*	*1910–1914*	*1945–1949*	*1965–1969*	*1982–1986*	*2001–2005*
Corn	bu/acre	26.0	36.1	48.7	109.3	143.4
Wheat	bu/acre	14.4	16.9	25.9	37.1	40.8
Potatoes	cwt/acre	59.8	117.8	205.2	283.9	373.6
Sugar Beets	tons/acre	10.6	13.6	17.4	20.4	21.8
Cotton	lbs/acre	201.0	273.0	505.0	581.0	747.4
Soybeans	bu/acre	n.a.	19.6	24.2	30.7	39.4
Milk	lbs/cow	3,840	4,990	8,260	12,730	18,810

Performance

- Total factor productivity accounts for the quantity of all inputs that is used to produce a specific output
  - TFP growth per year in agriculture 1950-2004: 2.10%
  - TFP growth per year in private non-farm businesses 1950-2004: 1.15%
- Because of high TPF growth in agriculture:
  - Nominal farm product price increase 1980-2005: 15%
  - Overall price increase 1980-2005: 122%



Sources of technological change/innovations in agriculture

1. Equipment: mechanical power replaced human/animal power; machines became faster and more reliable; IT allows better monitoring of production…
2. Chemicals: Chemical fertilizers replaced pesticides, herbicides and fungicides improved the control of weeds and diseases …
3. Genetics: Plant breeding research created higher-yielding plants with better survival traits; livestock and poultry genetics have caused increased meat yields per animal …

Sources of technological change/innovations in agriculture

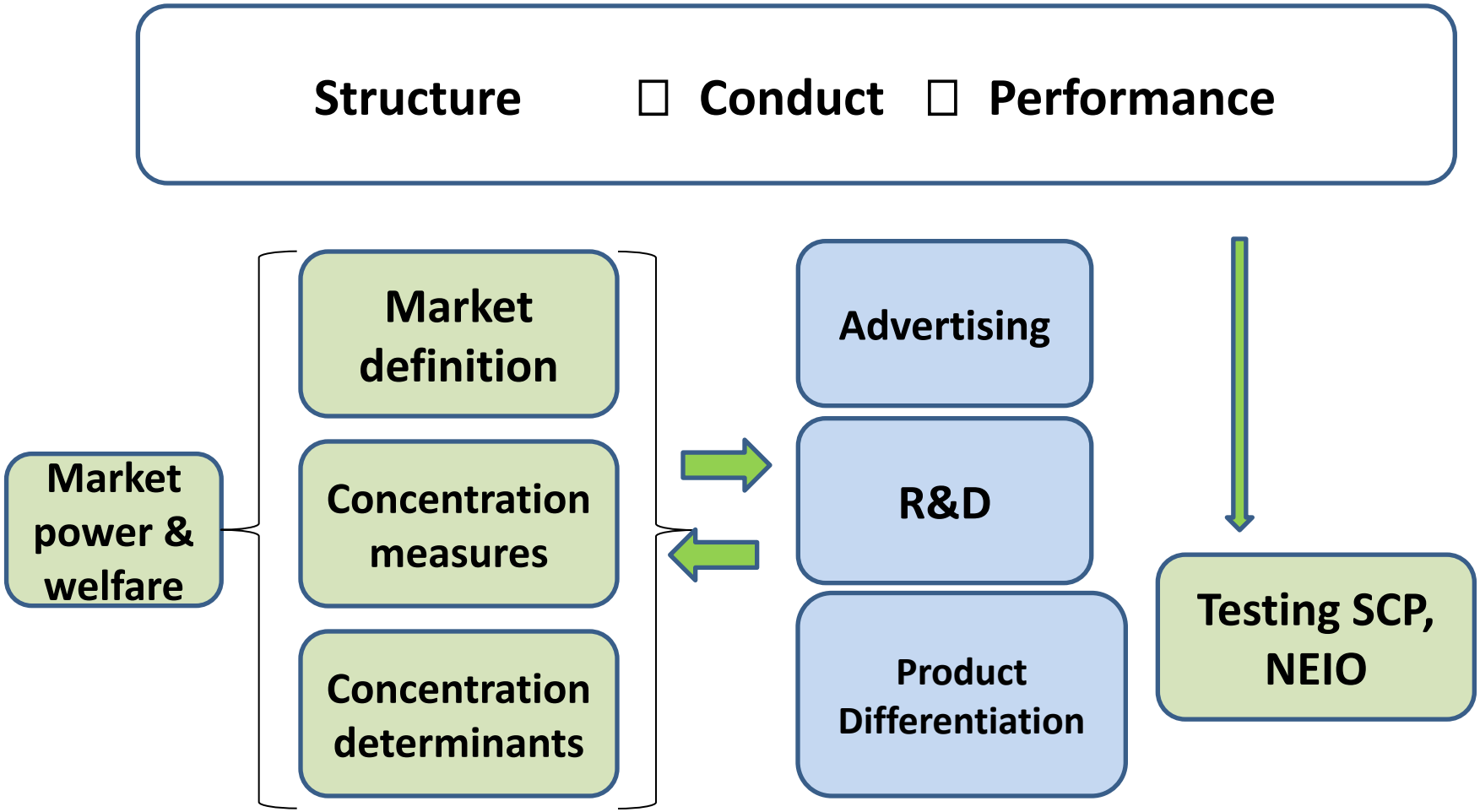
- Farmers rarely develop the innovations themselves. Most are developed by researchers in the nonprofit sector.
- Early adopters of a technology derive only temporary benefits. Cost reductions increase supply, driving down prices.

Overall performance over time

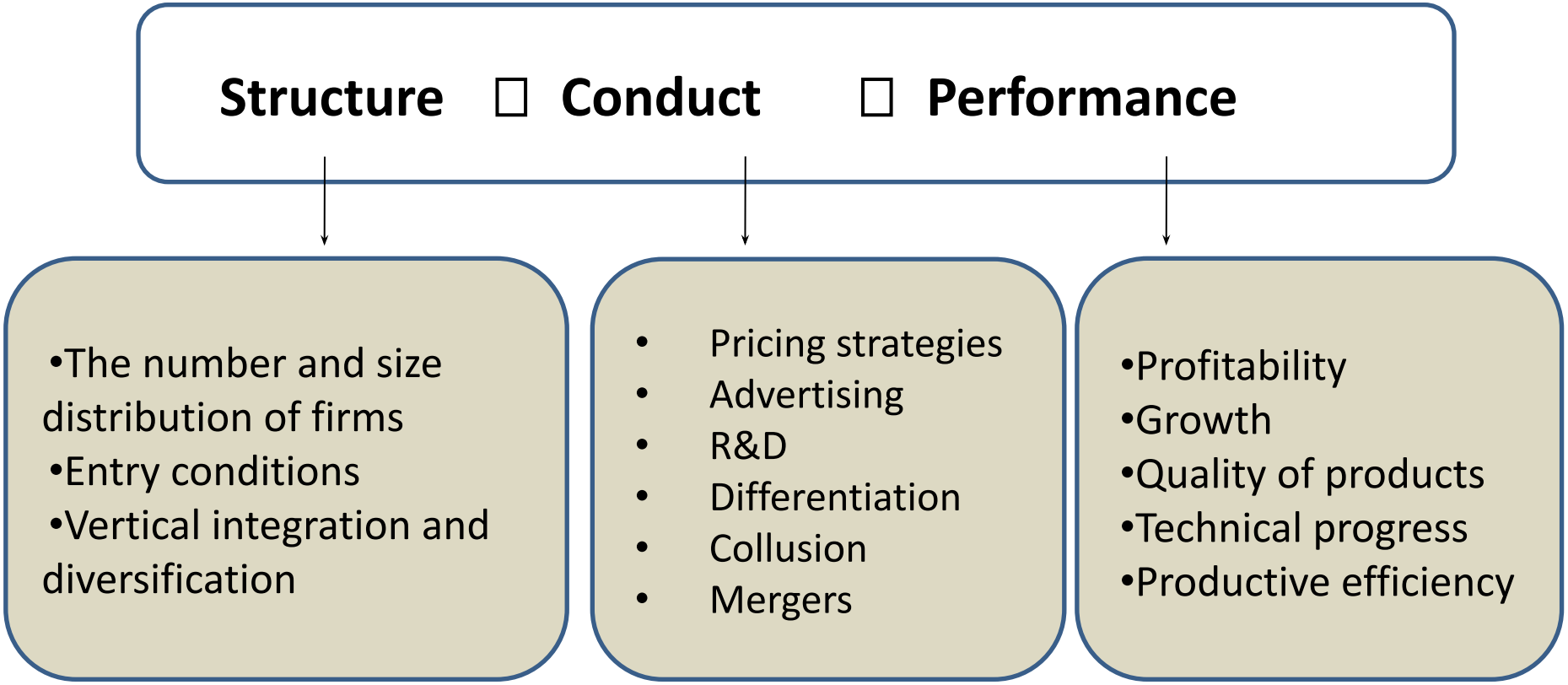
- More efficient production over time.
- Larger farms have tended to be more efficient → gradual increase in concentration, but farming is still relatively decentralized in the US
- The real prices of most food products have decreased over time, which is partly due to process innovation in farming

Revision

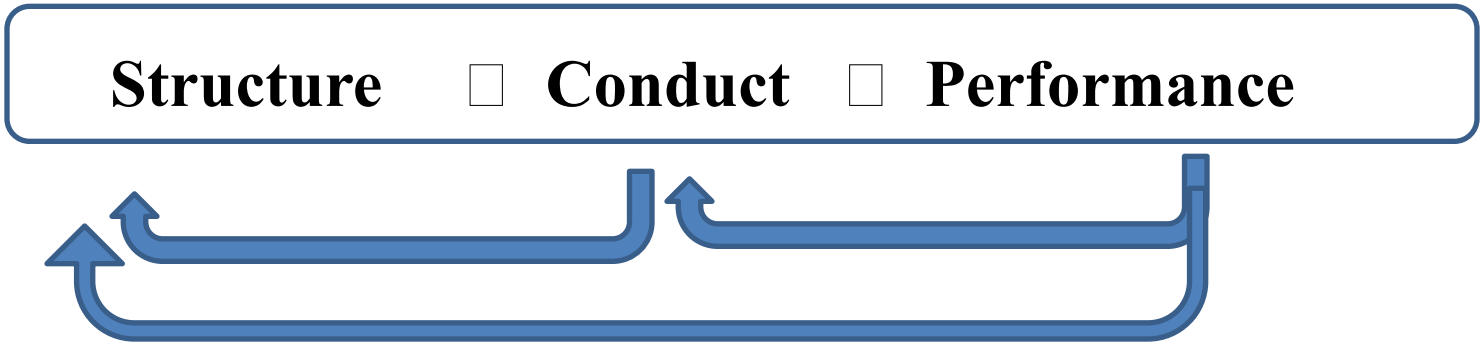
Module structure



The SCP paradigm

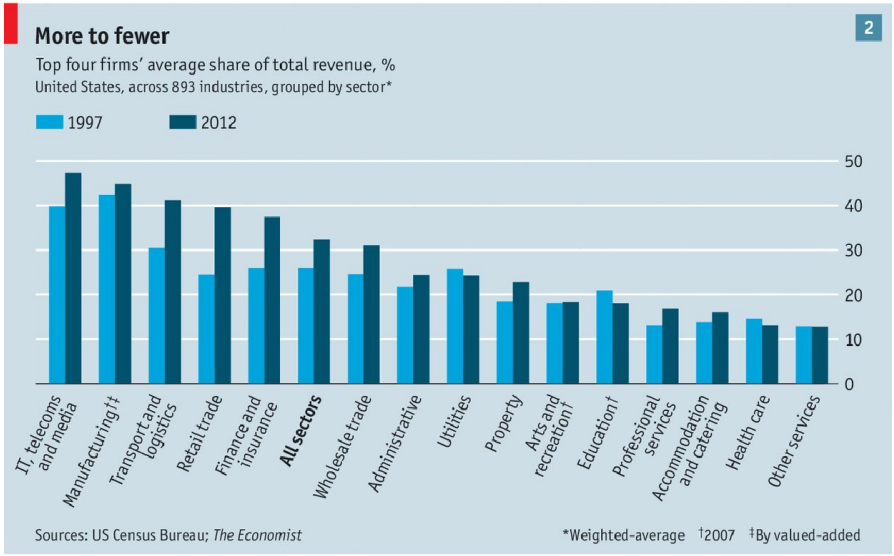


SCP: Endogenous relationship?



- Conduct to structure? R&D, advertising, differentiation
- Performance to structure? Growth and changing market shares
- Performance to conduct? Profitability and capacity to invest in R&D, or cut prices

Concentration and profits in America



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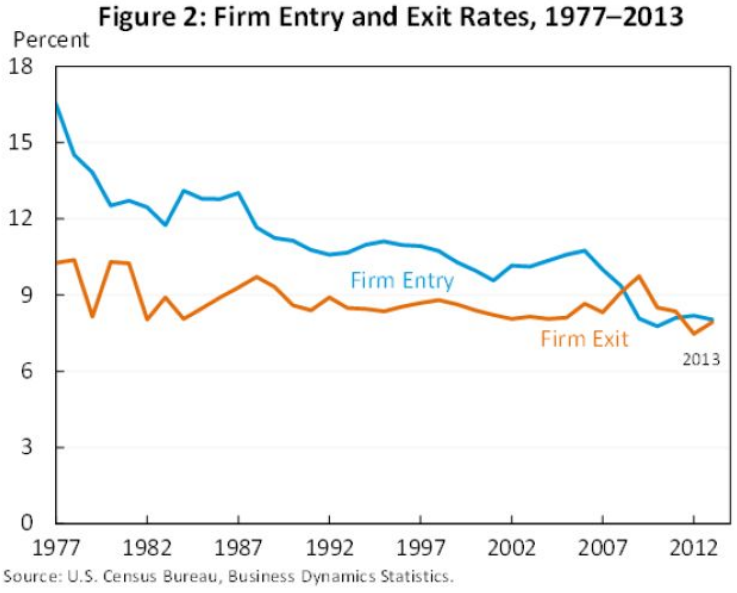
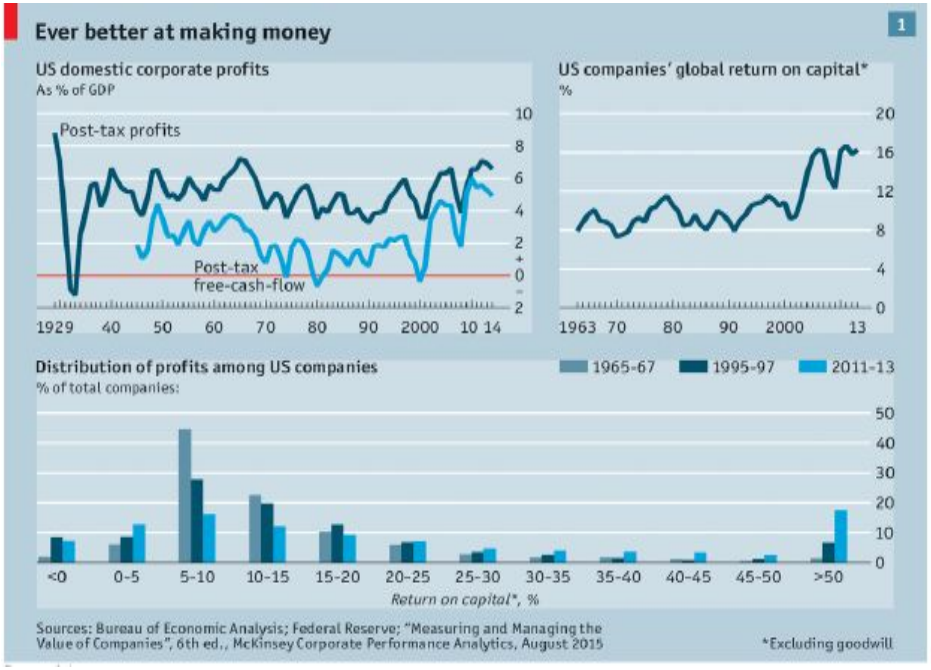




Market power and welfare

Effect of market power	**Cause**	**Consequence**
Low quantity	Profit maximization	DWL (wrt allocative efficiency)
X-inefficiency	Complacent monopolist	Higher costs, TS loss
Natural monopoly	Economies of scale	Lower costs, larger TS
Rent seeking	Effort to maintain/acquire market power	Waste of resources, rent dissipation

Market power and welfare

- Application to **internet monopolies**
- Does the internet favour such quasi-monopolies?
- Are digital monopolies less harmful than traditional monopolies?

Market definition

- Relevant product market

CES\CED	+	0	-
-	Same market	Same market	Same market
0	Same market	Different markets	Different markets

$$CED = \frac{\Delta Q_1^D}{\Delta P_2} \frac{P_2}{Q_1^D} \qquad CES = \frac{\Delta Q^S{}_1}{\Delta P_2} \frac{P_2}{Q^S{}_1}$$

Market definition

- Relevant geographic market
  - CED and CES analysis
- Limitations of market definition
  - Market definition remains arbitrary
  - Critical values of CED, CES?
- Importance of market definition

Measures of concentration

Hannah –Kay criteria

- CRn
- HH
- HK
- Gini

- Advantages?
- Specific Limitations?
- General Limitations?

Determinants of concentration

More concentration

Less concentration

Gibrat's law

Entry barriers:
Economies of scale
Absolute cost advantages
Product differentiation
Switching costs
Network effects
Regulations

Sunk costs: endogenous or exogenous

Industry life cycle

Determinants of concentration

Age\size	5-19	20-49	50-99	100-
1-5	61%	30%	19%	13%
6-10	34%	14%	7	1%
11-15	31%	6%	-1%	

Table 11.1 Economies of scale as a barrier to entry

Industry	Increase in average co operating at 50% of N
Motor vehicles	6–9%
Chemicals	2.5–15%
Metals	> 6%
Office machinery	3–6%
Mechanical engineering	3–10%
Electrical engineering	5–15%
Instrument engineering	5–15%
Paper, printing and publishing	8–36%
Rubber and plastics	3–6%
Drink and tobacco	1–6%
Food	3.5–21%
Footwear and clothing	1%

Source: Adapted from Pratten (1988), Table 5.5, pp. 88–92, © European Union, 1995–2012.

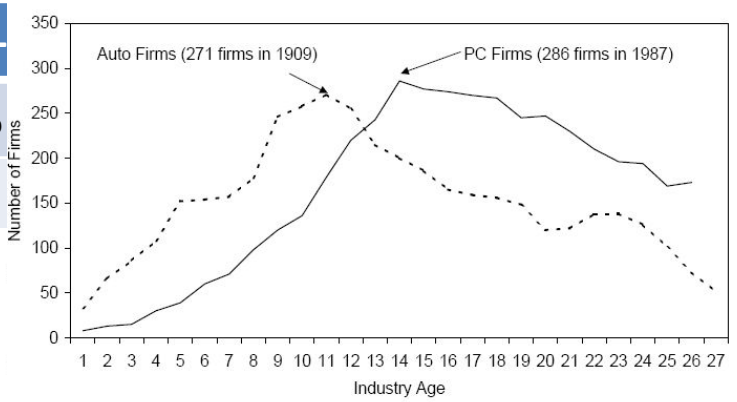


FIG. 1. Number of firms and industry age.

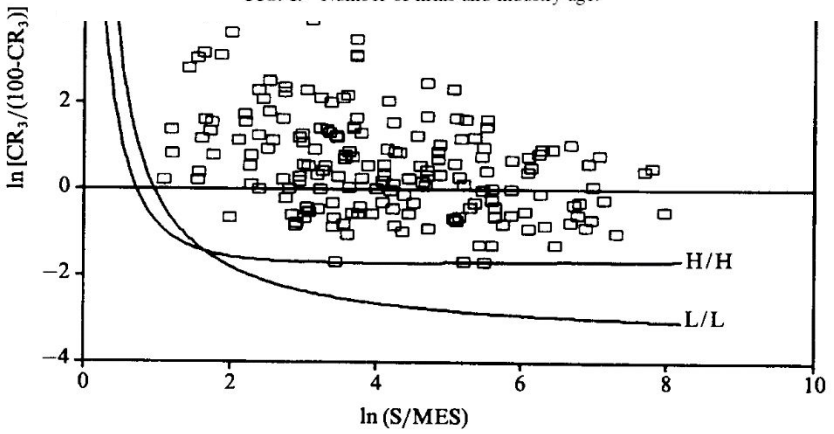


Figure 5
High Advertising and High R&D Markets

Views on SCP

SCP: Concentration → Abuse of market power → Profits

Chicago school: Efficiency → Profitability → Firm Growth → Concentration

Issue 1: Measurement of profitability

Tobin's Q, ARP, price-cost margin

Issue 2: Testing the two paradigms

Structure and profitability

	relationship	Collusion	Efficiency
Concentration and profits	+	V	
	0		V
Firm size and profits	+		V
	0	V	
Firms effect minus industry effect	+		V
	-	V	
POP firm level			V
POP industry level		V	

NEIO

Revenue test (Rosse Panzar)

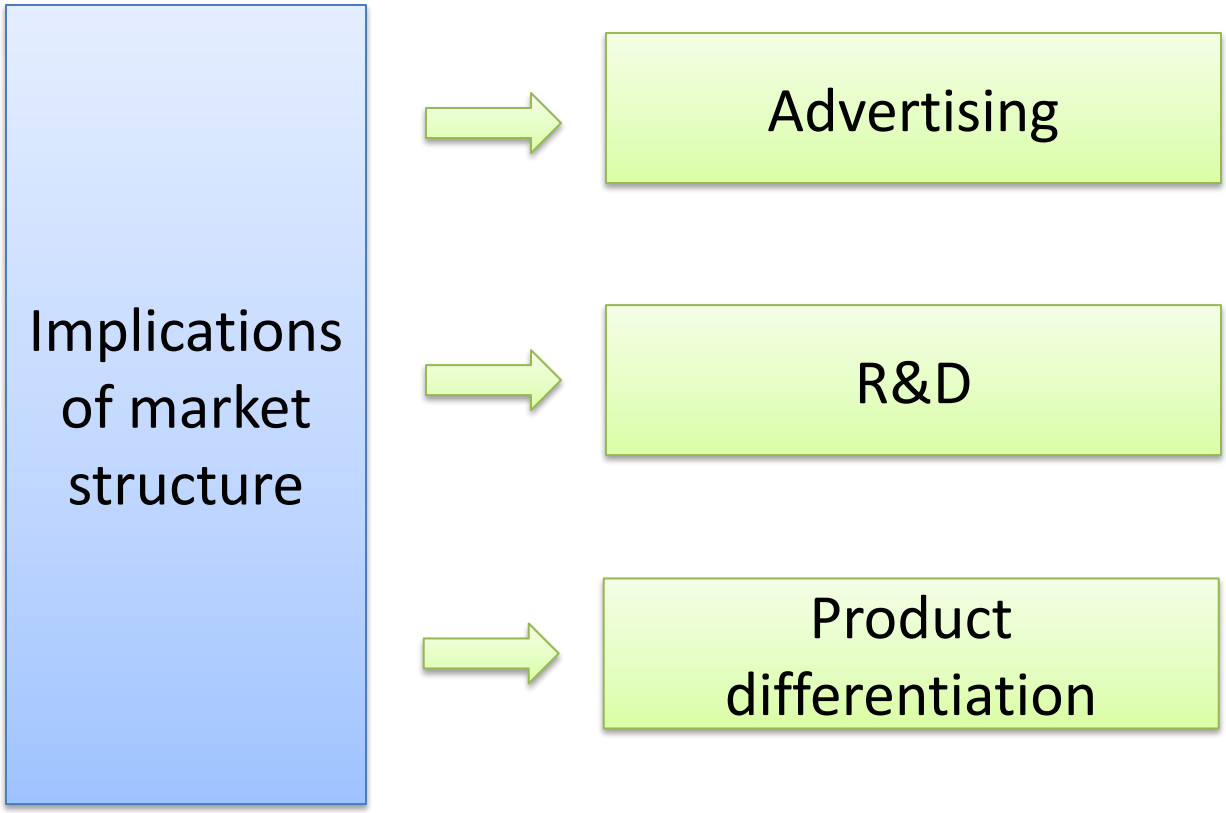
Effect of costs on revenue

Monopoly: H<0
Perfect competition: H=1

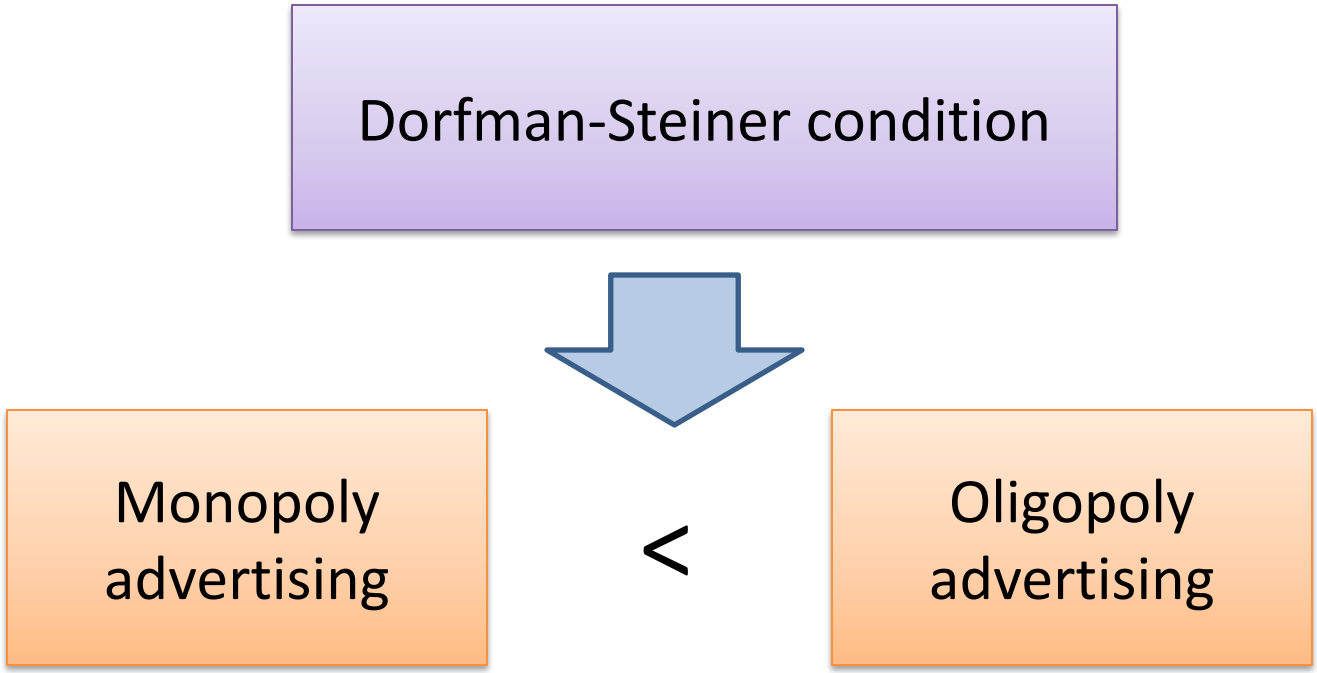
Structural approach

Effect of q(i) on industry output

Conduct


Implications of market structure
Advertising
R&D
Product differentiation

Market structure and advertising

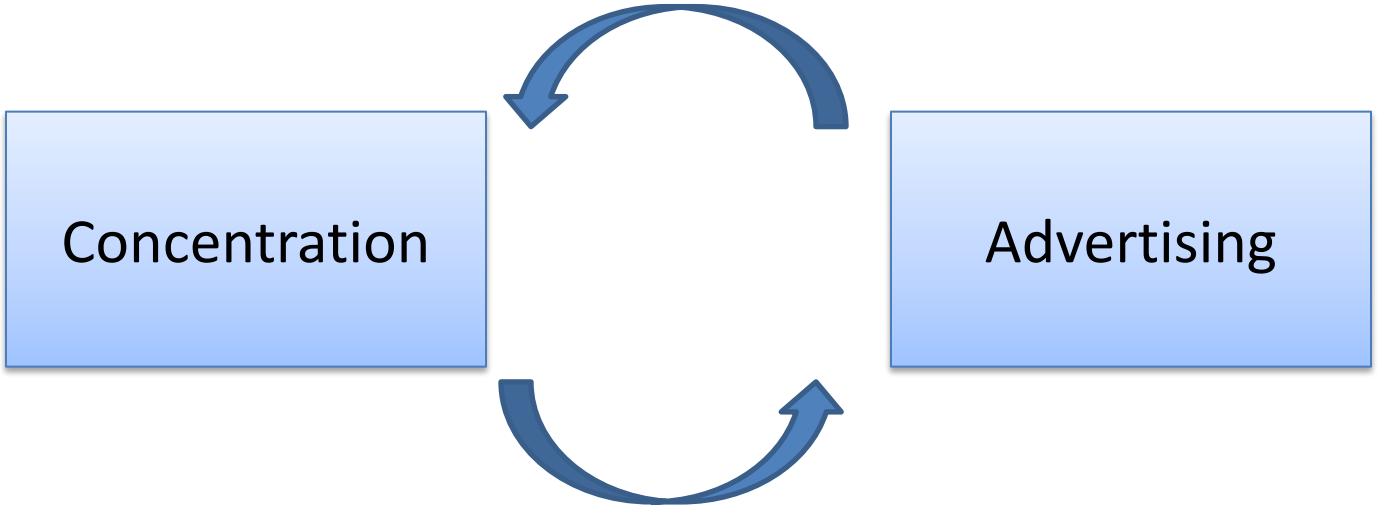


Keywords: AED/PED, impact of advertising on market shares

Empirical evidence: inverted U-shaped relationship between advertising and concentration

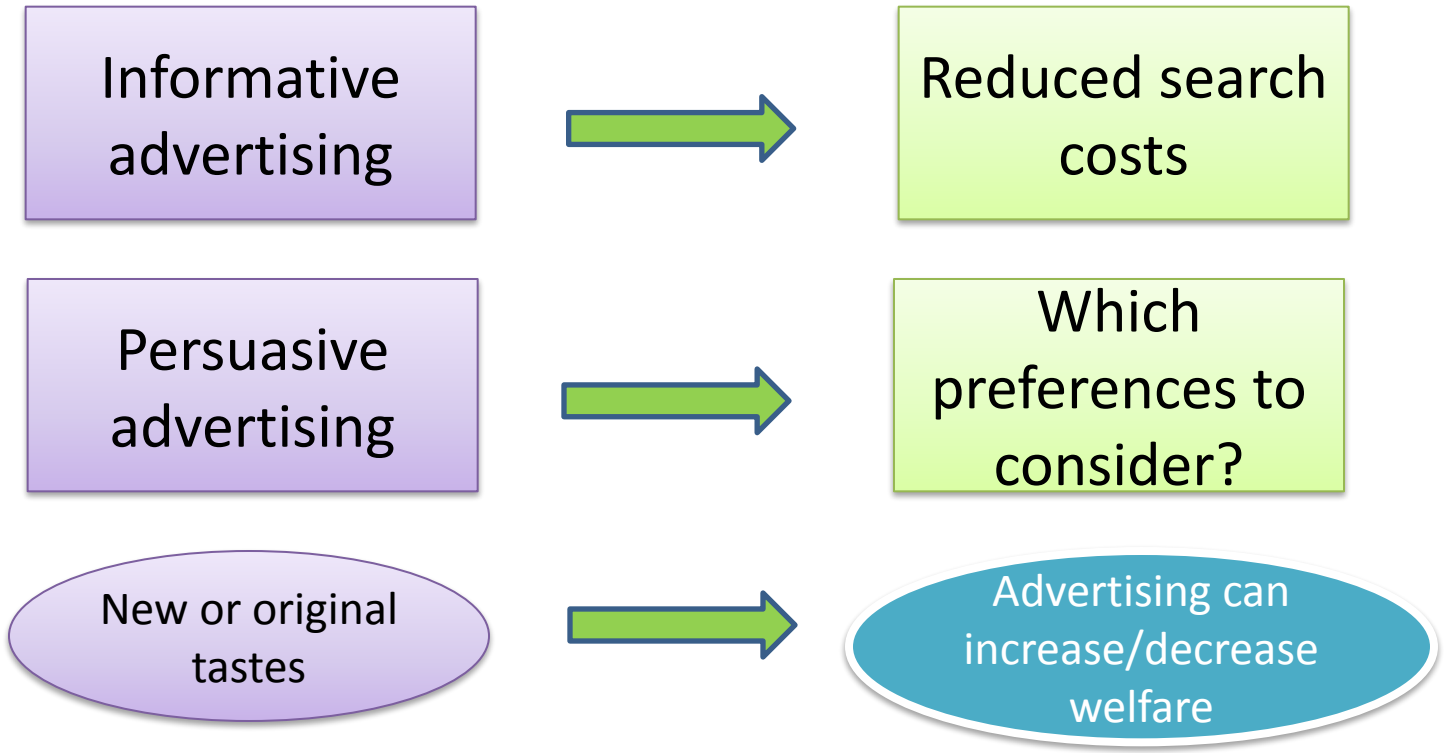
Market structure and advertising

Entry barriers, sunk costs,
Informative vs. persuasive advertising

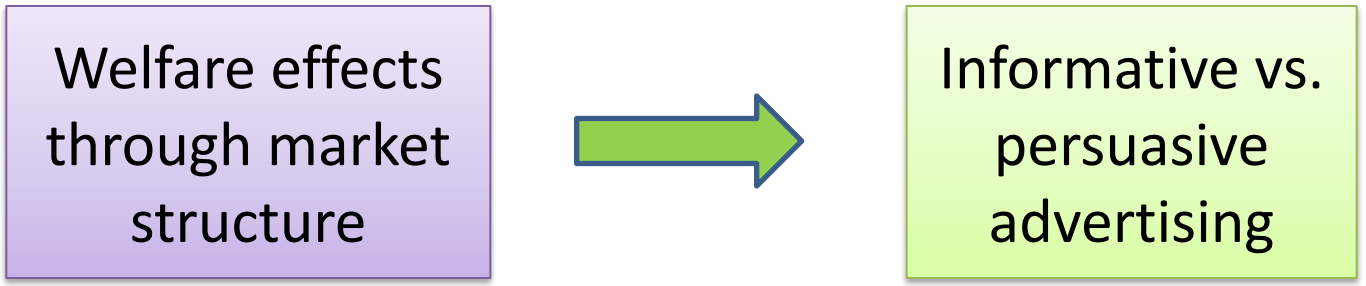


Dorfman-Steiner

Welfare and advertising



Most cases: higher quantity, lower consumer surplus, higher producer surplus



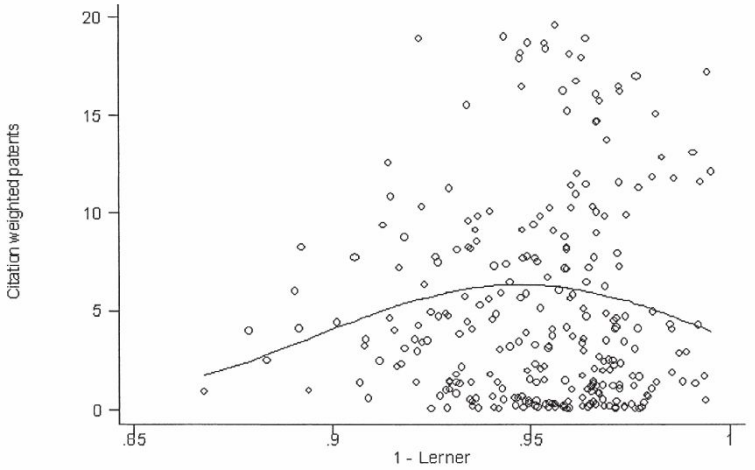
R&D and market structure

Schumpeter hypothesis	Prospect of monopoly power	High concentration
Arrow	Replacement effect	Perfect competition
Potential entrant model	Efficiency effect	Monopoly

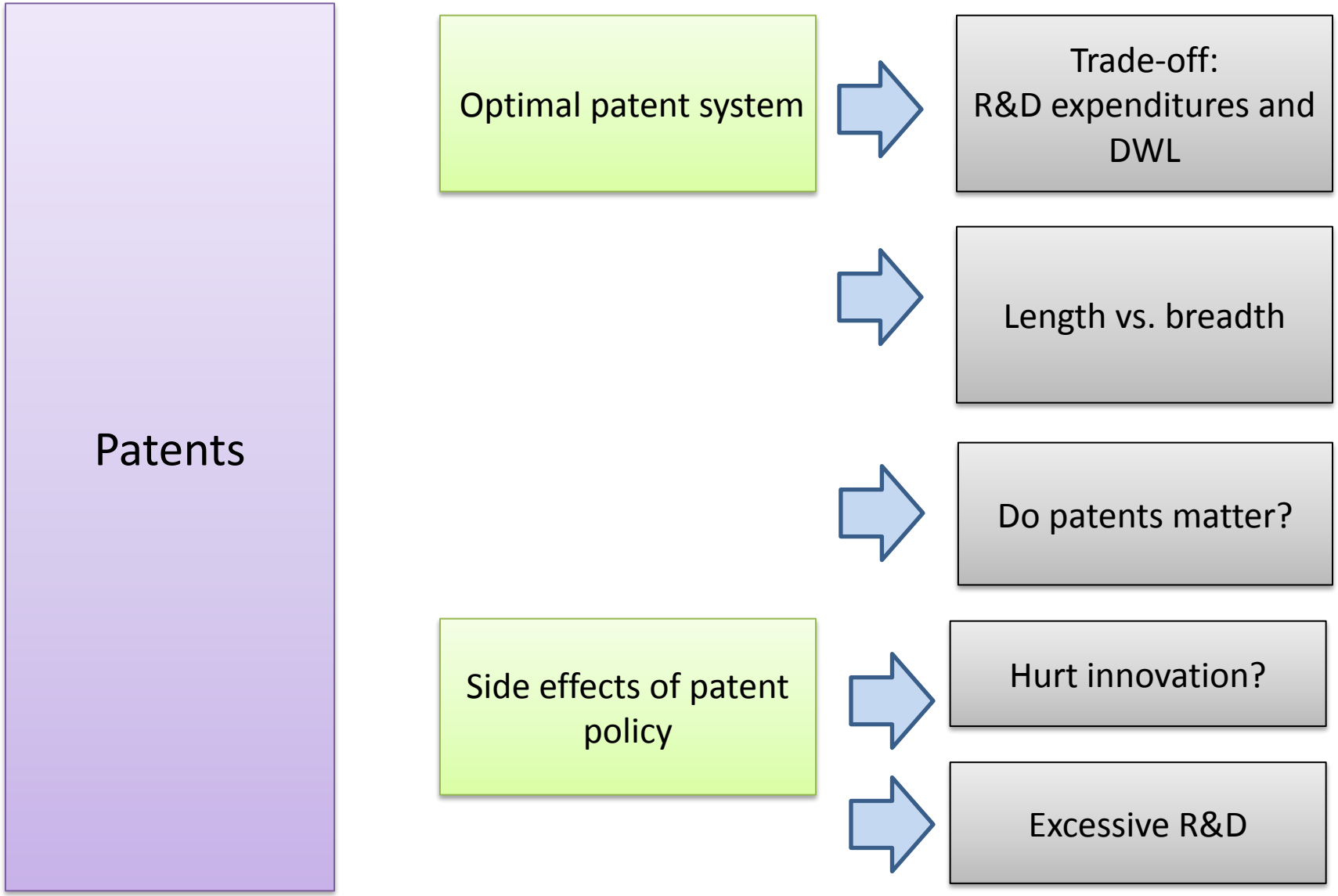
R&D and market structure

Development time	Incentive to accelerate innovation	Oligopoly?
Dasgupta & Stiglitz	Aggregate R&D	Monopoly

- Importance of the industry context
- Empirical evidence: Aghion et al 2005



Innovation protection



Product differentiation

Sources of differentiation

- Geography
- Technology
- Brand
- Preferences
- Services

Factors influencing differentiation

Monopolistic competition

- Elasticity of substitution
- Economies of scale

Hotelling's model

- Price flexibility

Strategic behavior

- Entry threats

Exam structure

- 1.5 hour
- Secton A: Answer ONE question from TWO. Two essay questions
- Section B: Answer ONE question from THREE. Two essay questions + one conceptual question
- All questions carry equal marks.
- Broad questions
  - Theoretical explanations
  - Empirical evidence to support your claims
- Poor answers
  - No intuition provided for the theory
  - No empirical evidence or example

Before you answer…

- Choose to answer only those questions you fully

Do not reproduce prepared essays without regard to what the question asks

Your Answer…

- Should have a clear structure
- The Introduction should act as a signpost to the reader
- The Main Body of argument should follow, with evidence, examples etc used to support statements
- A (brief) conclusion should end the essay

Good Practice

- **Define technical terms as you introduce them, especially any such terms that are specified in the question**
- **Use examples whenever possible to support arguments**
- **Credit is usually given for examples and evidence that goes beyond lecture notes**
- **Use equations, graphs, figures etc where relevant**

More Good Practice

- **Explain diagrammes or figures**
- **Label graph axes etc.**
- **Equations/figures etc that are merely reproduced without comment do not improve answers**
- **There is no need to do a list of references**

Bullet Points Answers?

- **Reproducing bullet points does not constitute a good answer, even if the points are relevant**

- **Try to write a coherent explanation**

- **If you really run out of time on the last question, brief notes indicating how the answer should have**

Final Considerations

- **Where contradictory arguments exist, it may be useful to indicate their respective strengths.**

- **Personal opinions are fine, but cover the received**