COMPETITION, EQUILIBRIUM AND EFFICIENCY

Overview

- Context: markets where firm entry is relatively easy
- Concepts: perfect competition, efficiency, comparative statics
- Economic principle: competition tends to eliminate above-average profits and is socially efficient

Outline

- Perfect competition
- Changing market conditions: comparative statics
- Short-run and long-run analysis
- Applications

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Perfect competition

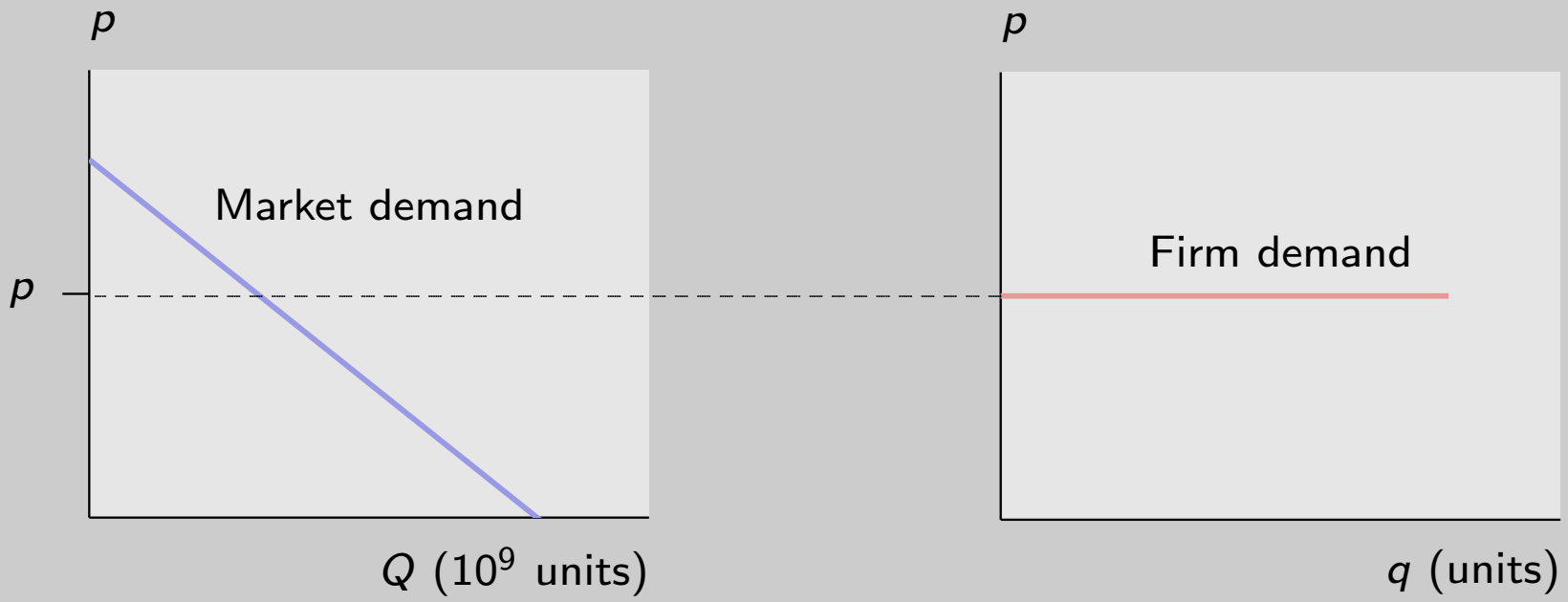
- Homogeneous product and lots of competitors, none of them large enough to affect the market price on its own
- Perfect information about price and quality
- Free entry and free access to production methods

Why study perfect competition?

- Perfect competition is not a general statement about he world
- Perfect competition is not a goal for a firm
- Some industries behave in a way that is similar to perfect competition (e.g., some agricultural, labor and financial markets)
- Perfect competition provides a convenient benchmark to study the effects of competitive forces

Demand under perfect competition

In a competitive market, firms are small relative to the market and face (from their point of view) infinitely-elastic demand curves; they behave as *price takers:*



Firm supply under perfect competition

- Each firm is a price taker, i.e., faces a flat demand curve. Demand elasticity is therefore $-\infty$
- Marginal revenue is $MR = p\,(1 + 1/\epsilon) = p$
- Profit maximization, $MR = MC$, leads to $p = MC$
- Conclusion: under perfect competition, each firms supply curve is given by MC so long as price is greater than minimum of average cost (if not, leave)

T-shirt factory (reprise)

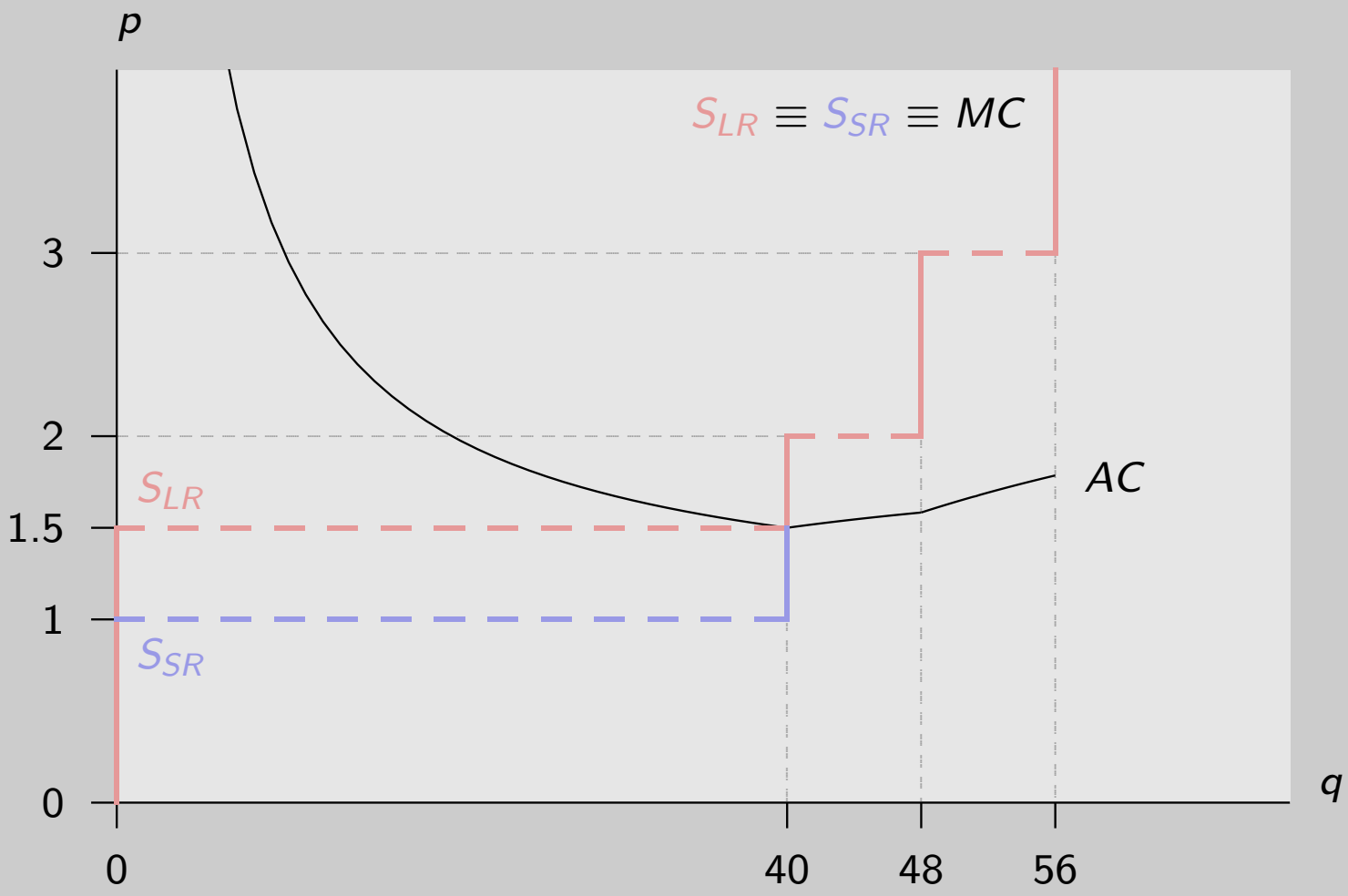
To produce T-shirts:

- Lease one machine at \$20/week
- Machine requires one worker, produces one T-shirt per hour
- Worker is paid \$1/hour on weekdays (up to 40 hours), \$2/hour on Saturdays (up to 8 hours), \$3 on Sundays (up to 8 hours)

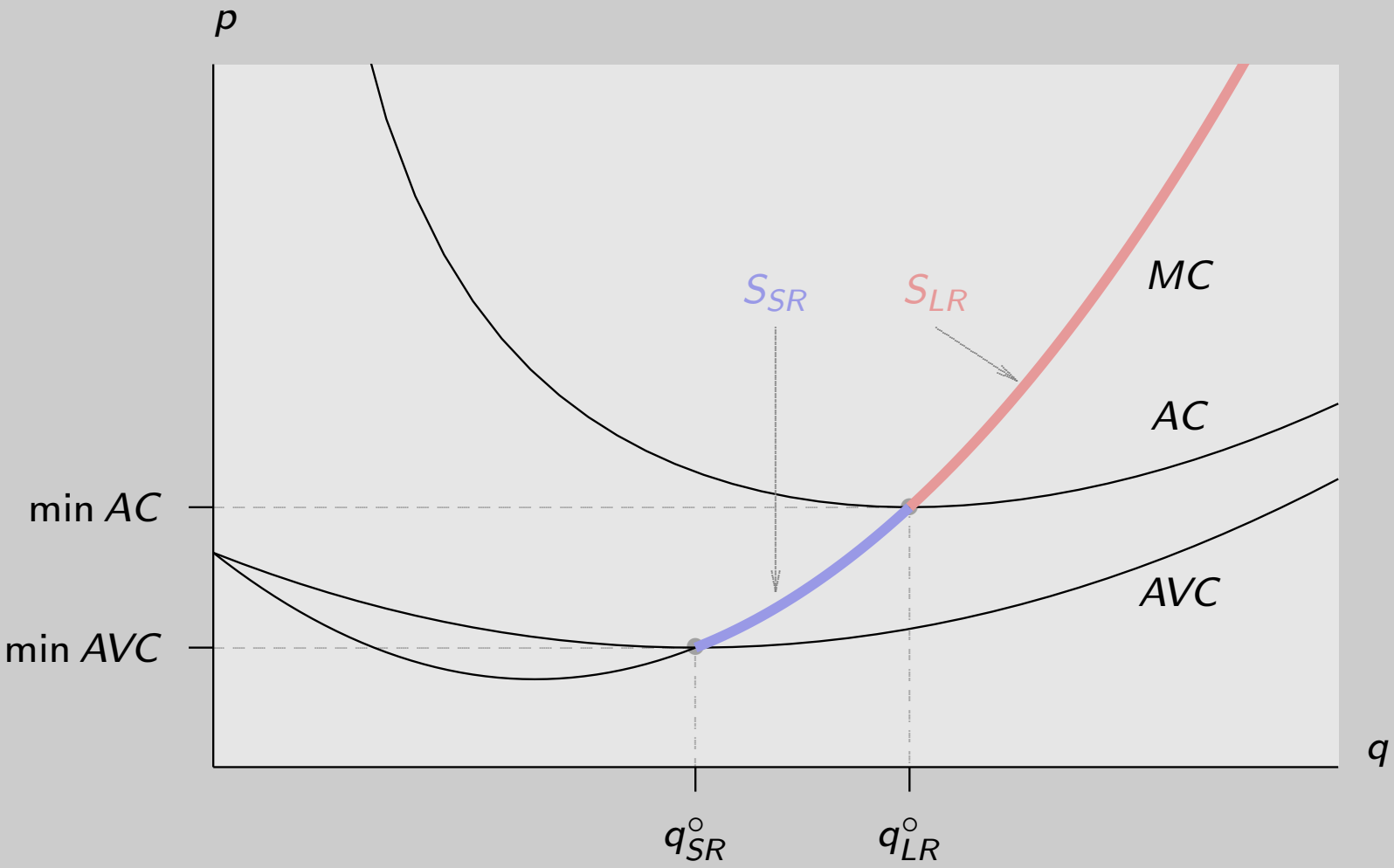
Optimal output policy

- Increase output up to the point where MC equals (or exceeds) p
- If lease has already been paid, shut down if $p < 1$
- If lease has not yet been paid, shut down if $p < 1.5$
- Together, these optimality conditions lead to the short-run and long-run supply curves:
  - Short-run (fixed costs has been paid, i.e., is sunk): supply curve corresponds to portion of MC lying above 1
  - Long-run (fixed costs has not been paid, i.e., is not sunk): supply curve corresponds to portion of MC lying above 1.5

T-shirt factory supply curve



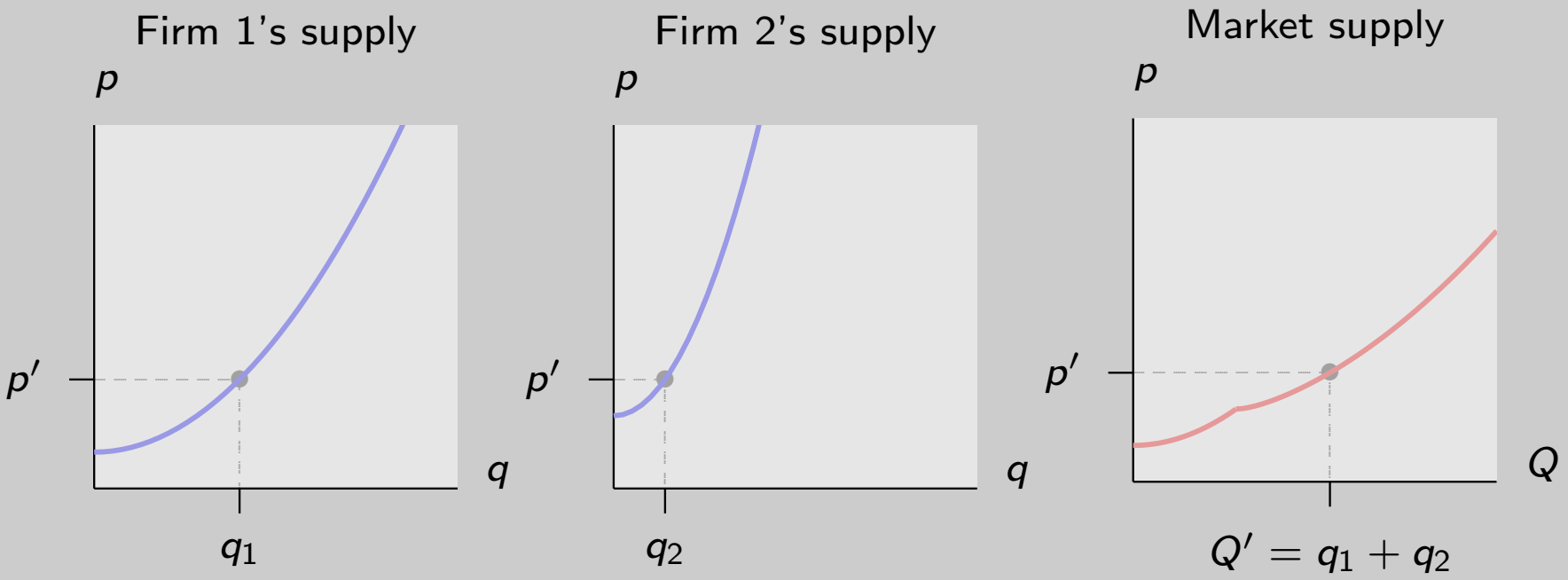
Supply function under perfect competition



AVC: Average Variable Cost = Variable Cost / output level.

Market supply

Market supply curve: horizontal sum of each firm's supply curve (add quantities at each price).



Example: California electricity

- There are dozens of power generators in California
- Technologies include hydroelectric, nuclear, thermal
- Each generator has a certain capacity and a certain combination of fixed and variable costs
- Assuming that each generator takes market price as given, derive the electricity supply curve

Supply curve estimation

		Variable Costs			Fixed Costs	
Unit name	Capacity (MW)	Fuel cost ($/MWH)	Var O&M ($/MWH)	Total ($/MWH)	O&M ($/Day)	Start cost ($)
ALAMITOS 3-6	1900	48.00	1.50	49.50	20,000	34,000
ALAMITOS 7	250	83.00	1.50	84.50	0	8,000
BIG CREEK	1000	0.00	0.00	0.00	40,000	0
CONTRA COSTA 4&5	150	58.00	0.50	58.50	8,000	16,000
CONTRA COSTA 6&7	700	54.00	0.50	54.50	8,000	16,000
COOLWATER	650	58.00	0.50	58.50	4,000	12,000
DIABLO CANYON 1	1000	7.50	4.00	11.50	75,000	15,000
EL SEGUNDO 1&2	400	60.00	1.50	61.50	2,000	8,000
EL SEGUNDO 3&4	650	54.00	1.50	55.50	4,000	12,000
ELLWOOD	300	96.00	0.50	96.50	0	0
ENCINA	950	56.00	0.50	56.50	4,000	18,000
ETIWANDA 1-4	850	56.00	1.50	57.50	16,000	20,000
ETIWANDA 5	150	85.00	1.50	86.50	16,000	20,000
HELMS	800	0.00	0.50	0.50	40,000	0
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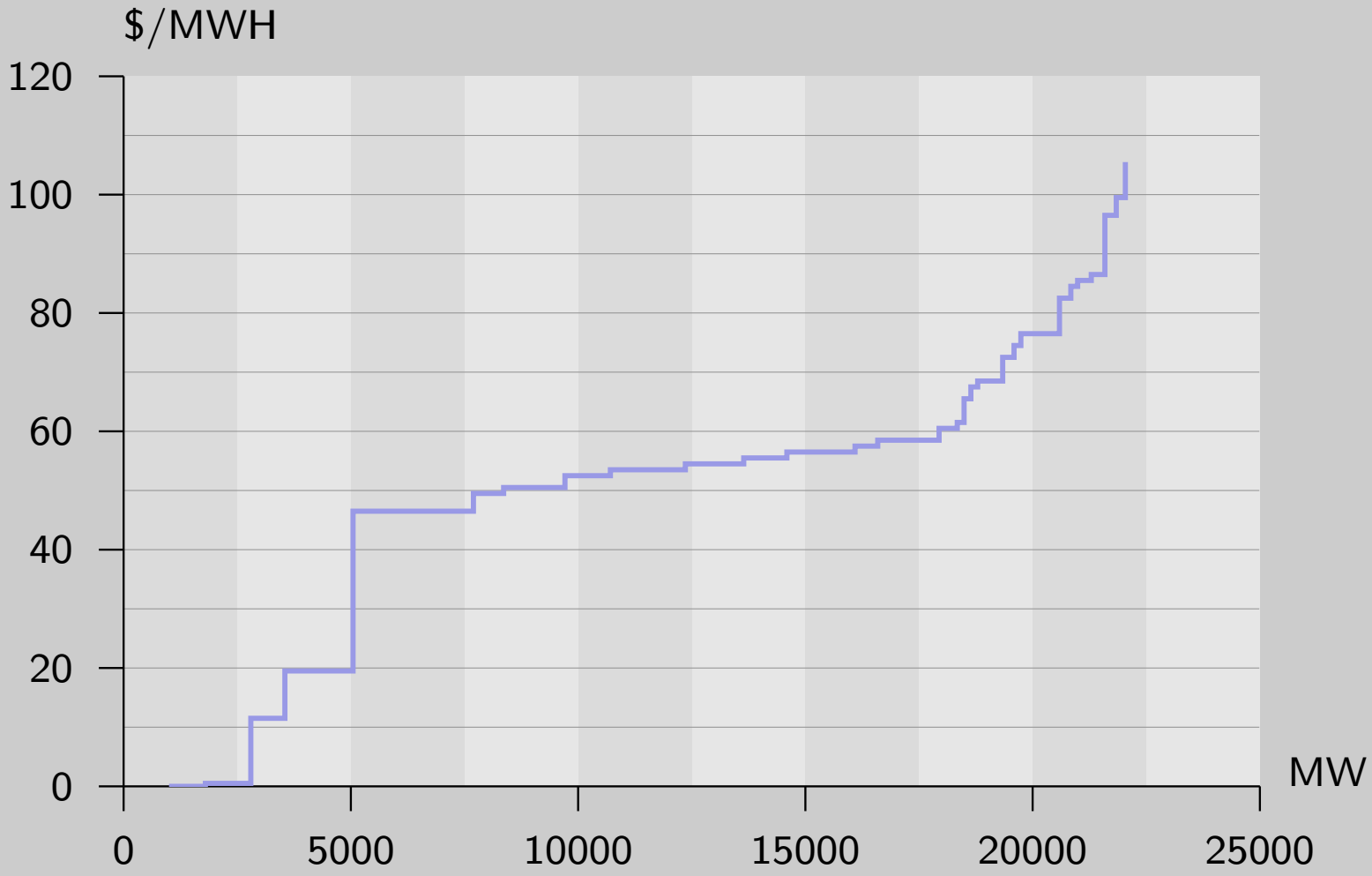
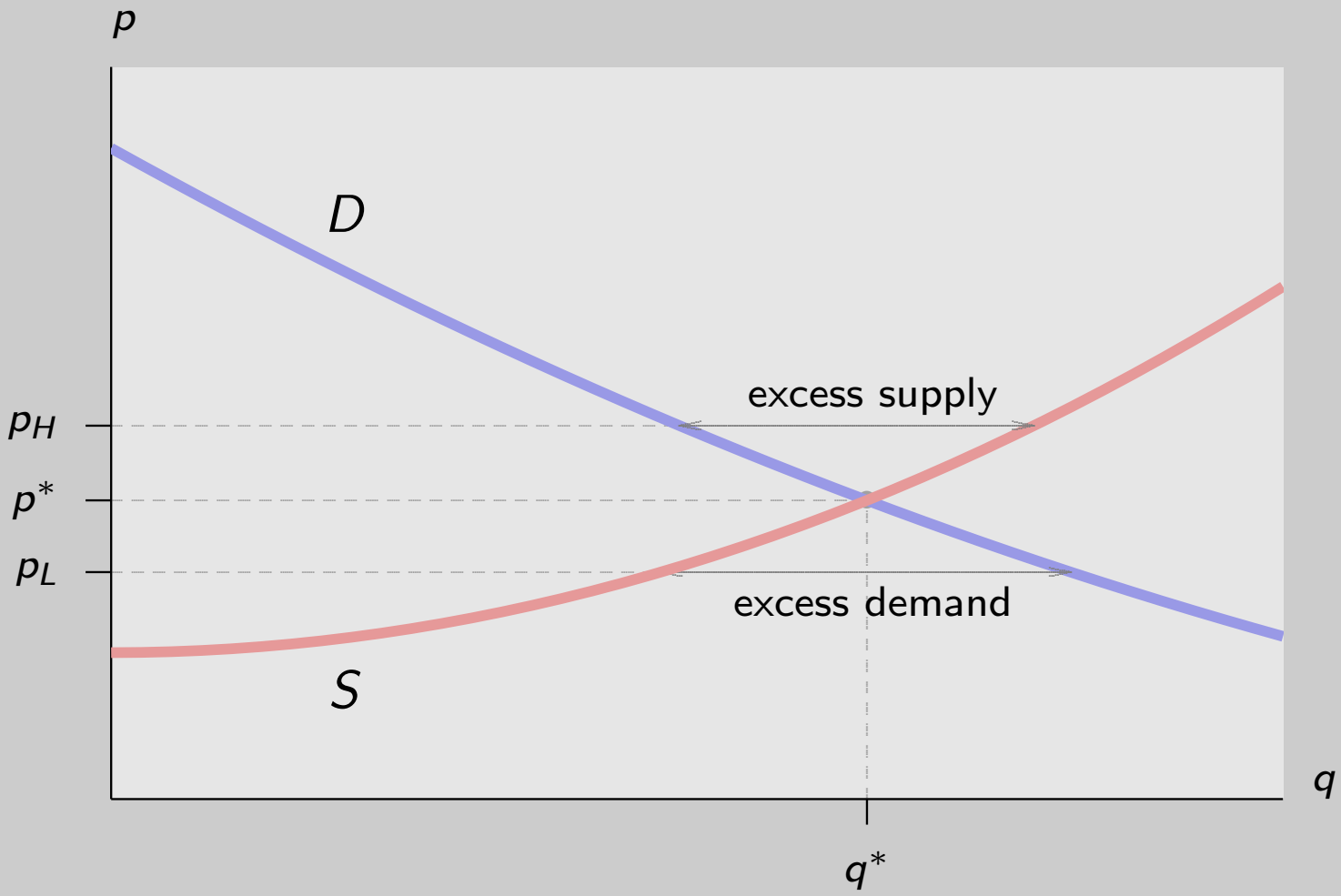
California electricity supply



Market equilibrium

- If $p > p^*$, supply $>$ demand and price will tend to fall
- If $p < p^*$, supply $<$ demand and price will tend to rise
- Equilibrium: At $p = p^*$, supply $=$ demand, and there are no forces pushing the price in either direction
- The Law of Supply and Demand

Supply, demand and equilibrium



Outline

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- Changing market conditions: comparative statics
- Short-run and long-run analysis
- Applications

Changes in market conditions

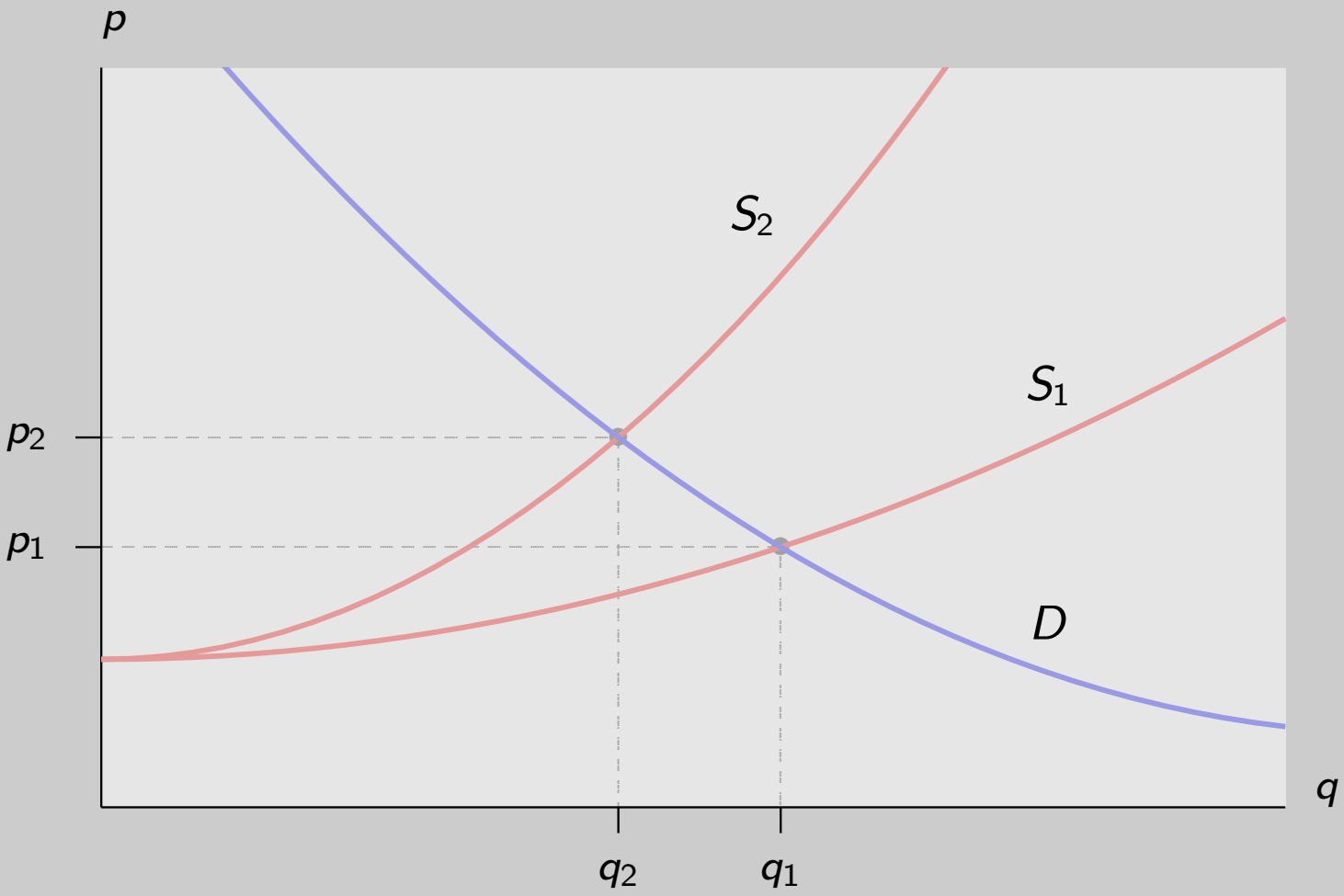
- Also known as *comparative statics*
- What is the impact of changes in "other factors" on price and output?
- Answer: Compute new equilibrium after one or both curves shift
- Reminder: important to distinguish between:
  - Shifts in demand and supply
  - Movements along demand and supply

Examples

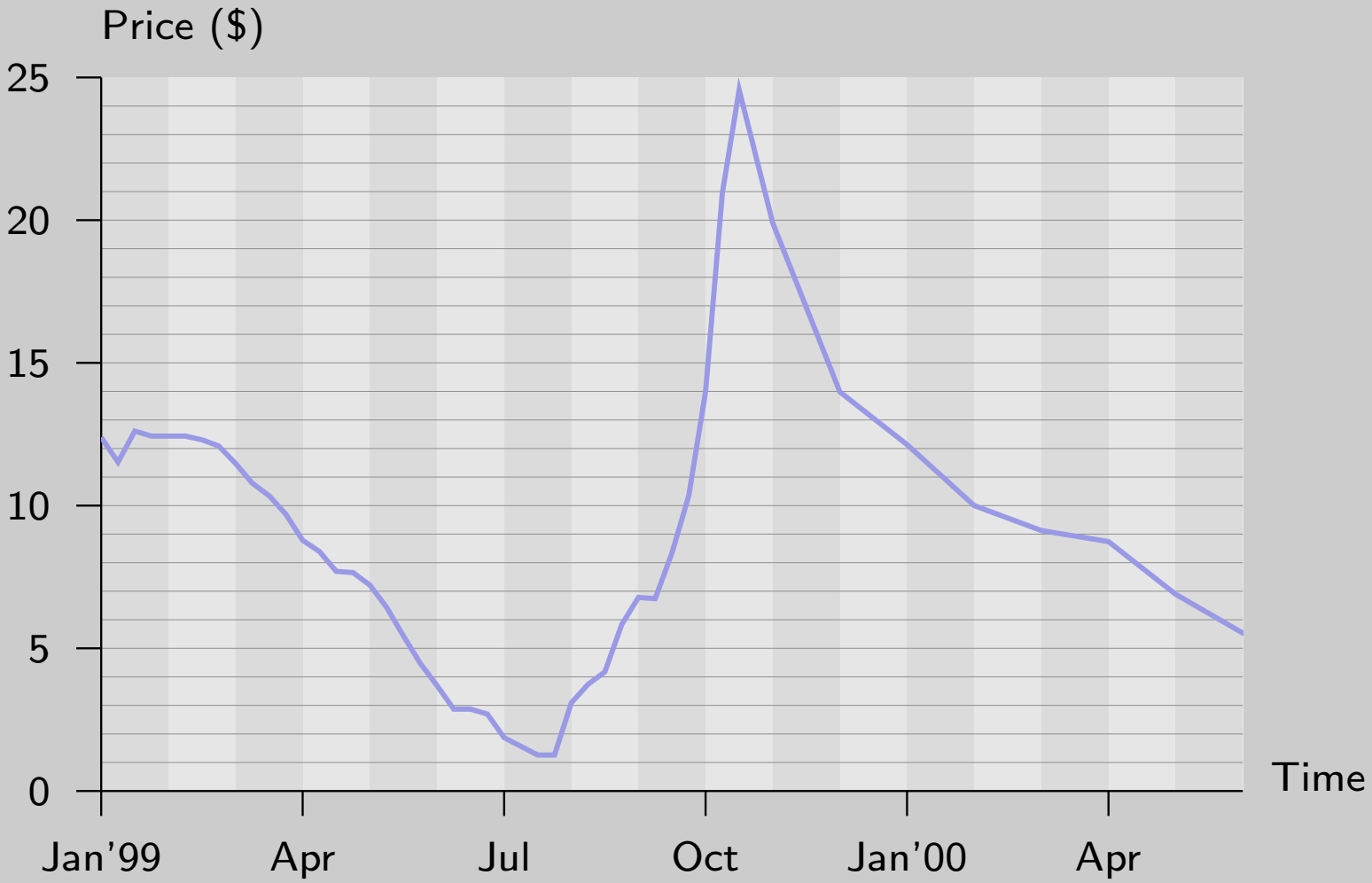
Determine impact of following events in the following [markets], both sign and magnitude of effects

- Taiwan earthquake [DRAMs]
- Diffusion of wireless phones [fixed long distance]
- Fall in NASDAQ [Palo Alto housing]

Taiwan earthquake



DRAM prices

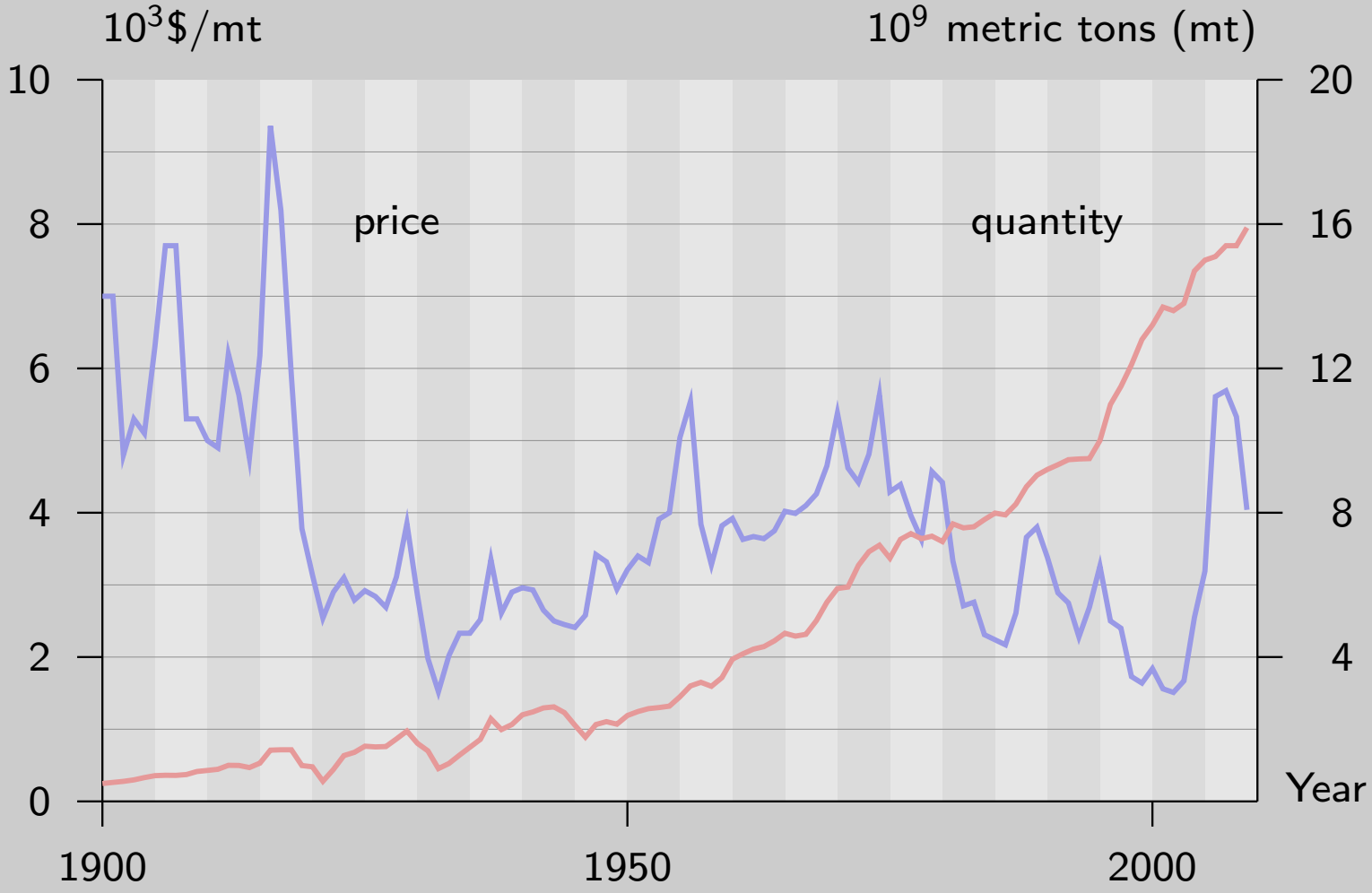


Source: *Financial Times* and author's calculations.

Taiwan earthquake (cont.)

- In September 1999, Taiwan accounted for less than 10% of global DRAM output
- By December 1999, prices were back at the pre-earthquake levels
- How would you change your answer based on this additional information?

Copper: price and output, 1900–2010

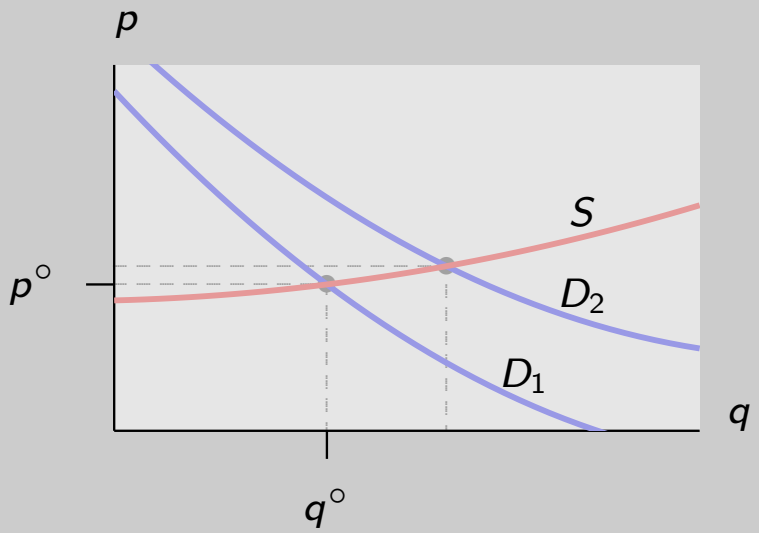


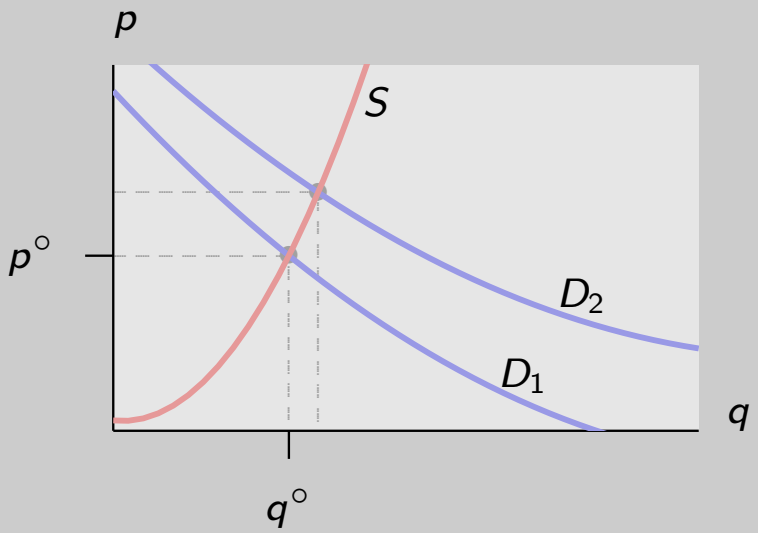
Source: U.S. Geological Survey.

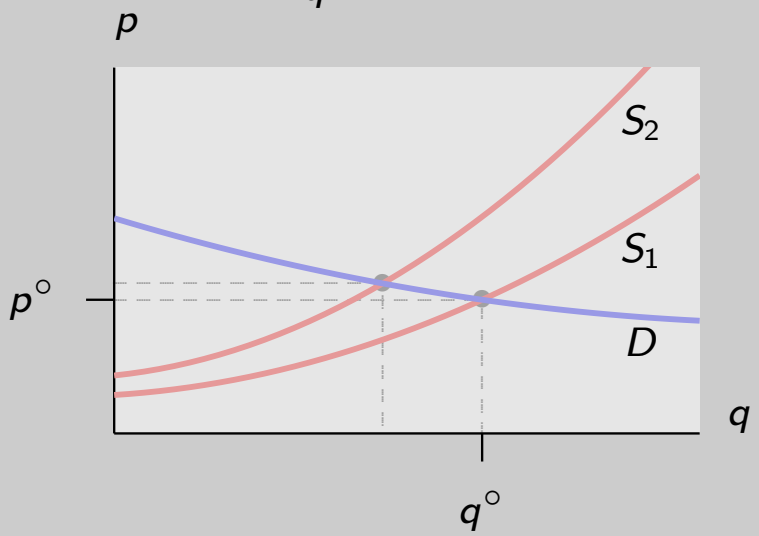
Price vs. output effect

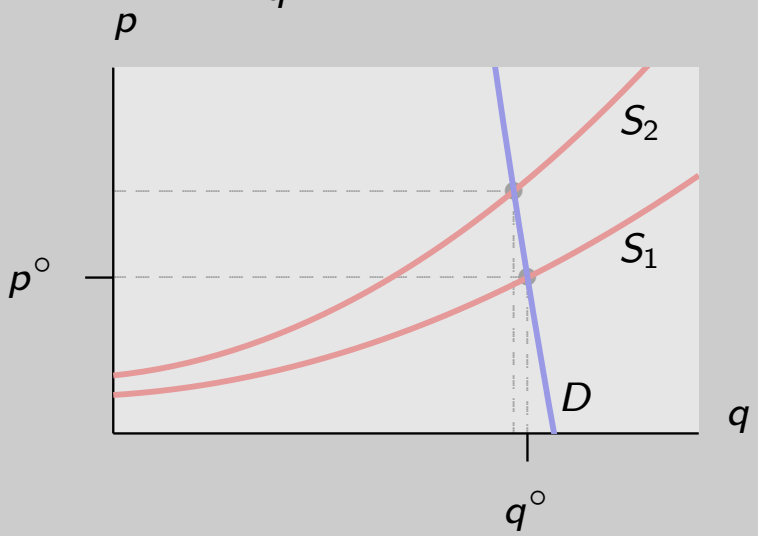
- The relative impact of a change on price and output depends on the slope of the relevant curve.
- Supply shift:
  - Impact on price greater the "steeper" the demand curve
  - Impact on output greater the "flatter" the demand curve
- Demand shift:
  - Impact on price greater the "steeper" the supply curve
  - Impact on output greater the "flatter" the supply curve

Price effect and output effect





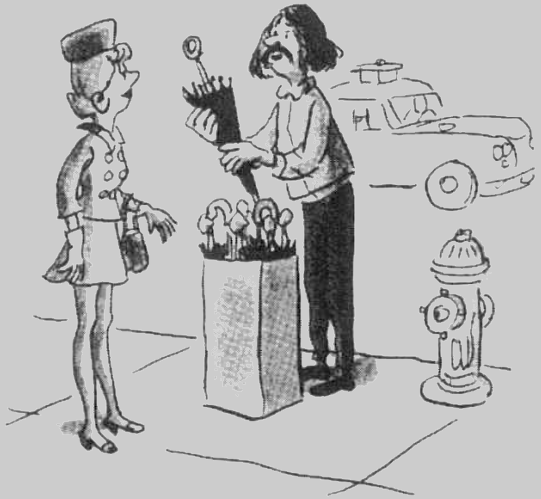




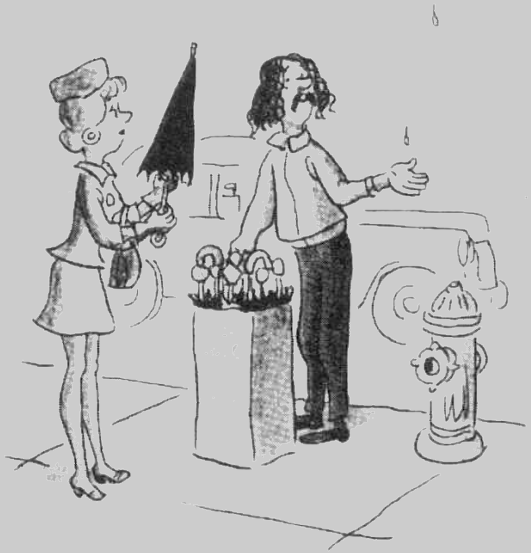
Examples

- Consider following four events [and markets]:
  - OPEC increases oil output [world oil price]
  - Unusually rainy winter in New York City [umbrellas in NYC]
  - Champions League final in Madrid [hotels in Madrid]
  - Unusually high catch of sole fish [sole fish]
- Which example corresponds to each case considered before?

Comparative statics illustrated



"Two dollars."



"—and seventy-five cents."

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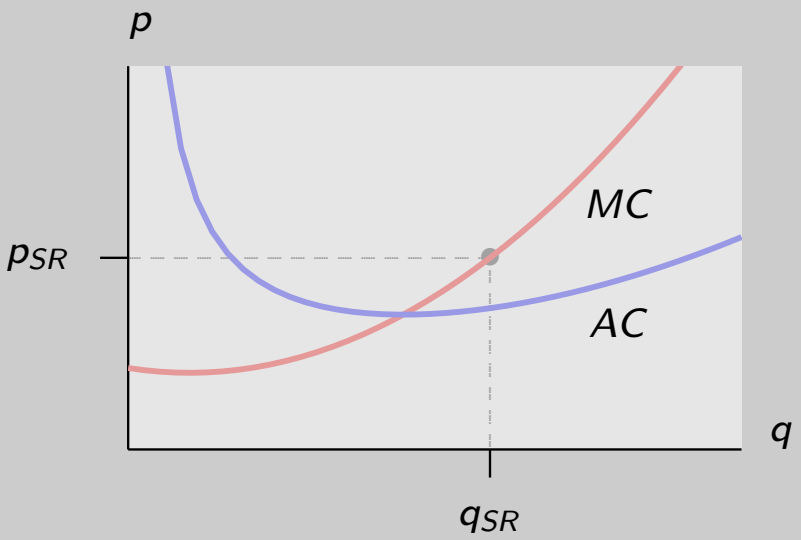
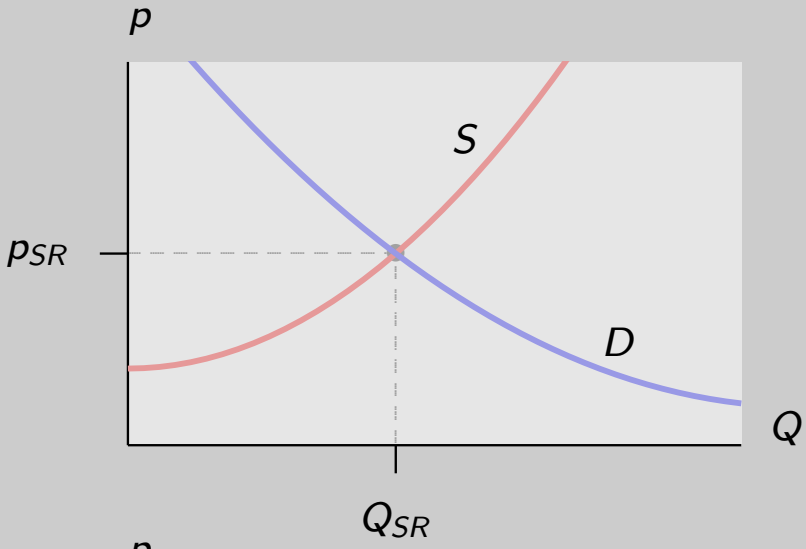
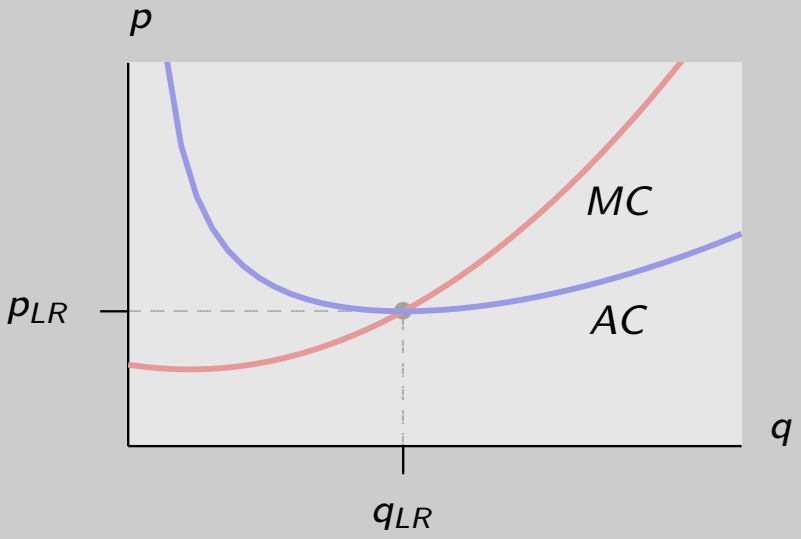
Short run and long run

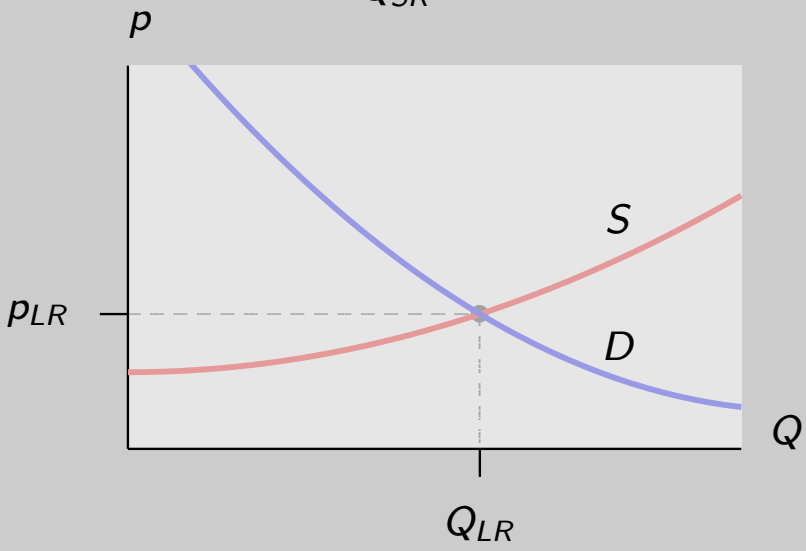
- Short run:
  - The number of firms is fixed
  - Firms use min AVC as shut-down threshold
- Long run:
  - Firms can enter or exit the market
  - Firms use min AC as entry/exit threshold
- Actual time length depends on particular industry technology. Examples.

Supply function under perfect competition









Competition in the long run

- Case A: all firms have access to the same technology
  - Economic profits are "zero:" each firm earns the normal market return
- Case B: not all firms have access to the same technology
  - Economic profits are "zero" for the marginal firm
  - Some firms may earn *rents* (payment to factor in excess of opportunity cost)
  - Sources of rents: patents, worker or manager ability, location

Agility

It's more important to be agile, and be able to respond quickly, than it is to predict. Being agile [allows you to] capitalize on change. That's what it's all about.

—Jack Welch, remarks at NYU Stern, May 2, 2002

In other words, if profit opportunities are short-lived, it's important to be able to respond quickly when they arise, and to abandon mistakes when they happen

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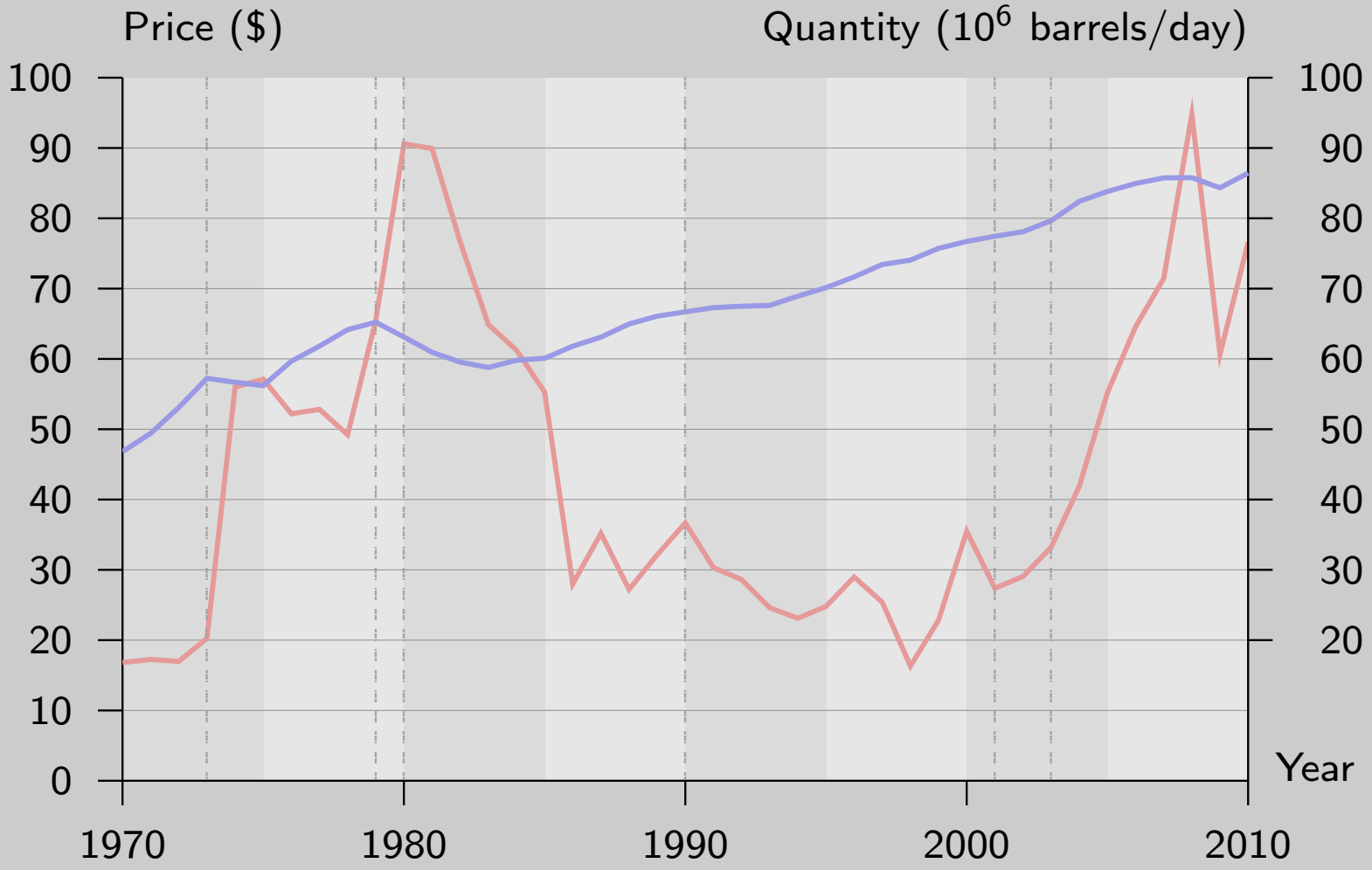
Selected events affecting the oil market

Date	Event
October 1973	Yom Kippur war
January 1979	Iranian revolution
September 1980	Iraq invades Iran
August 1990	Iraq invades Kuwait
September 2001	Terrorist attacks in U.S.
March 2003	U.S. invades Iraq

Oil price


Price ($)
Quantity (10^6 barrels/day)
100
90
80
70
60
50
40
30
20
10
0
Year
1970
1980
1990
2000
2010

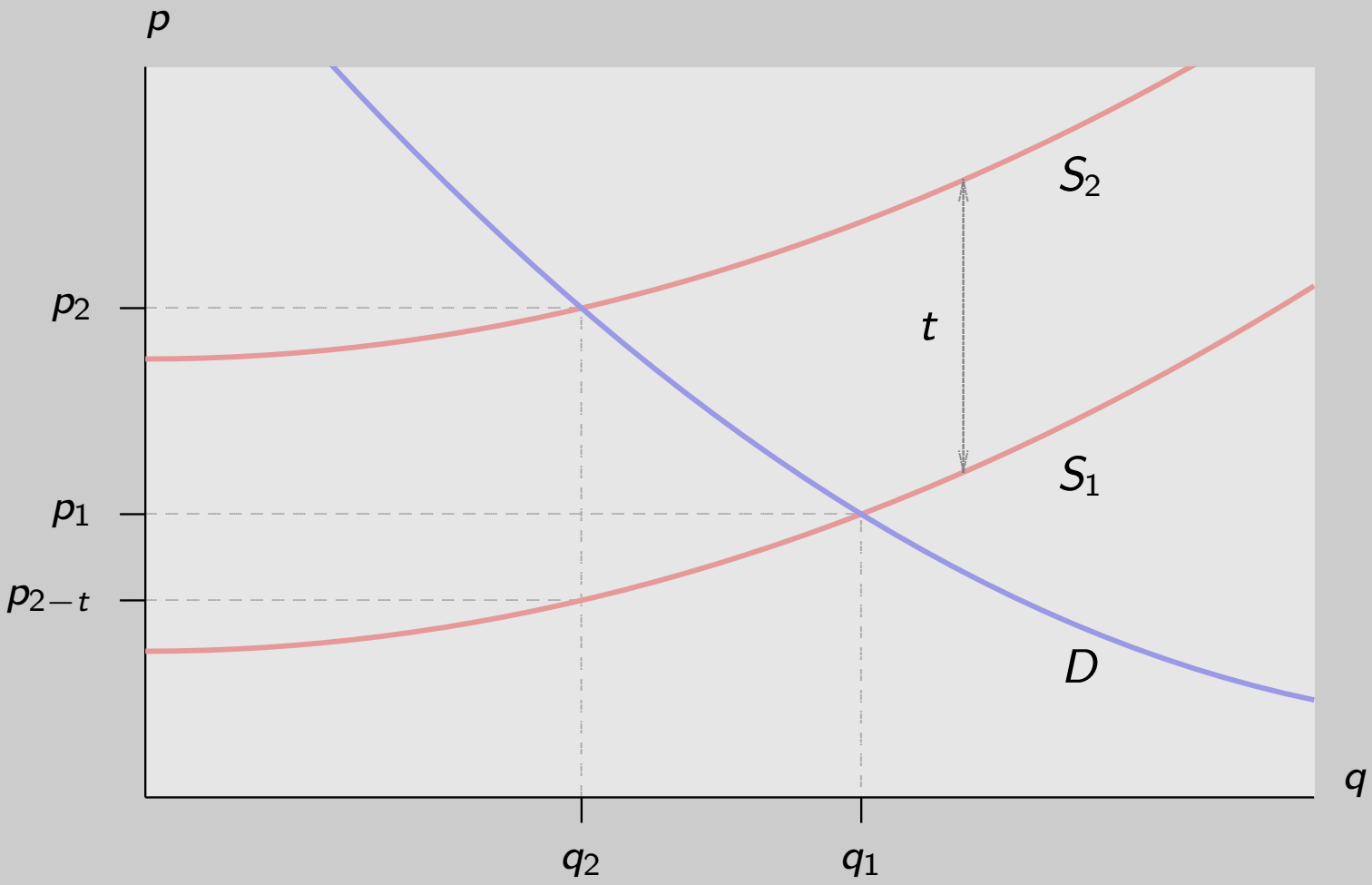
Oil market

(a) Explain how each of the above events affected the world market for oil. Specifically, use a supply and demand diagram to explain changes in price and output.

(b) Based on your knowledge of current events, what can you say about the recent evolution of the oil market (since the period covered by the case).

(c) The data suggests that oil price is more volatile than output. Why? Can you think of other markets with a similar pattern, as well as markets where the opposite pattern holds?

Taxes and market equilibrium



Buying a car in Europe

- Car taxes in Europe vary from 0% to 180%
- In which countries are consumer prices the highest?
- In which countries are pre-tax consumer prices the highest?
- Where does it pay to purchase a car, knowing that if you buy it in country A and take it to country B you pay country B's tax?

Source: European Parliamant, "Car taxes: the less I pollute, the less I pay," 27-06-2006.

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- The evidence

Highest car taxes in Europe:	Denmark
Highest list prices in Europe:	Denmark
Lowest pre-tax prices in Europe:	Denmark

Source: European Parliamant, "Car taxes: the less I pollute, the less I pay," 27-06-2006.

Tax incidence

- Who ends up *really* paying the tax: the seller or the buyer?
  - Elastic demand: seller
  - Inelastic demand: buyer

Takeaways

- The forces of supply and demand tend to push price towards its equilibrium value
- Trade generates value (surplus); not a zero-sum game
- Competition leads to an efficient allocation of resources
- Key ingredients for above results:
  - No market power; free entry and exit; level playing field
  - Well defined property rights (including externalities, IP)
  - Perfect information