

Introduction to Vaccine Economics

Presented by Dr. David Bishai



TVEE
TEACHING VACCINE
ECONOMICS EVERYWHERE

Outline

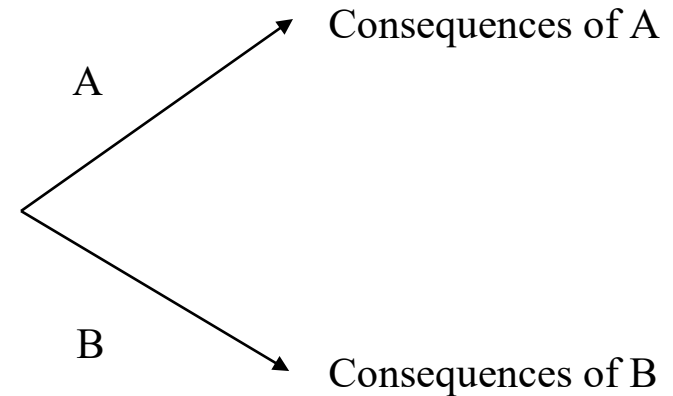
- Section A: What is health economics?
- Section B: How economics makes vaccine systems stronger?
- Section C: Demand and supply
- Section D
: Health as (a shared) Investment

Section A

What is Health Economics?

Basic Concept of Health Economics

- Health economics is *the study of the **choices** that improve the health of individuals and population*
- A **choice** requires
 - A goal
 - Foreseen consequences



Tradeoffs : Costs and Consequences

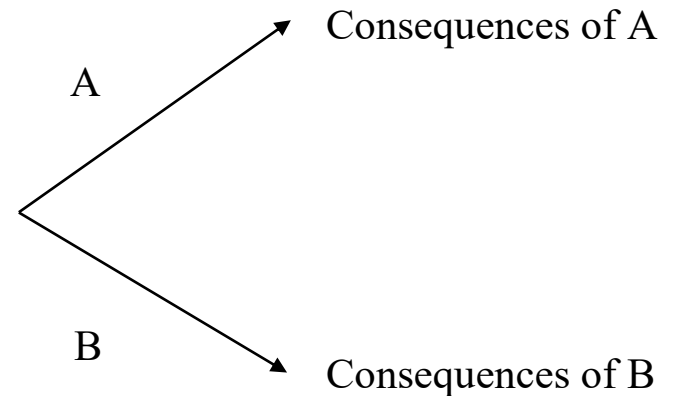
Limited COVID Vaccine
Supply

A) Use a lottery

- Costs
- Consequences

B) Health workers first

- Costs
- Consequences



COVID-19 Vaccine Tradeoffs

Introduce COVID vaccine vs. Maintain other vaccine coverage

Resources needed

- CHWs
- Nurses
- Cold Chain
- Warehouses
- Communication
- Outreach

Problems arise

- Consequences of a choice affect others
 - Unvaccinated person infects other people
 - Workers who vaccinate could be treating the sick
 - Resources to do A cannot be used to do B
- Goals are not agreed on
 - Safety of services vs. Wide distribution
 - Preventing disease or Curing disease

Role of Economics

- Reveal the optimal choice
- Resolve conflicts

- Make explicit statements about goals
- Make explicit statements about consequences

- Conflicts easier to resolve if goals are agreed on and consequences are agreed on

- Consensus FOR Action FOR Results

Health Economist and Power

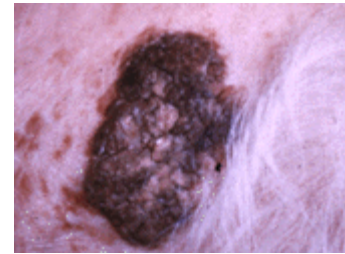
- Don't try to understand people's goals
 - Use your own goals or the goals of the powerful
- Don't try to understand and reveal who will bear the consequences of a choice
 - Let those with power use power to shift costs
- Don't try to share your results widely to create shared consensus
 - Only share with powerful people

Three Distinguishing Features of Health

1. Uncertainty
2. Asymmetric Information
3. Externalities

These three things make it hard to reach consensus about the best choice.

Uncertainty: Is it cancer?



Asymmetric Knowledge

- Providers usually know more about the services than the patient
- Patients know more about their bodies and their goals than providers



Externalities

- Transactions occur between seller and buyer
- Externality happens to neither buyer nor seller
- An Economic Externality
 - *When a person or group “external” to a transaction derives benefit or harm from the transaction*
- Can you think of examples?

Applying what we have learned

Summary so far

- Health economics tries to achieve consensus about consequences of choices
- Health has
 - Uncertainty
 - Asymmetric knowledge
 - Externalities

Consider vaccines

- Give an example of a role in vaccine policy for
 - Uncertainty
 - Asymmetric knowledge
 - Externalities
- Say why these features will make it difficult to achieve consensus about consequences of a vaccination policy

Section B
**How economics makes vaccine
systems stronger**

Solving Coherence Problems

- Building blocks: service delivery, financing, quality, logistics, innovation, and household behavior
- Coherence is difficult
- Subsystems don't share goals
- Subsystems can shift costs to others
- They are constantly adjusting their behavior to the behavior of others.

Actions and Reactions



Economics Approach

- Talk to the players
- Observe how they play

- Ask: What are they trying to maximize?
 - Money? Social status? Health? Approval?
 - Life is seldom just about money.

- Ask: What are their “tradeoffs”?
 - Money vs. outcomes
 - My money vs. Your money
 - Health for group A vs. Health for group B

Add Knowledge For Coherence

- Where is there a lack of agreement about the goals?
 - Is something blocking consensus about goals?
 - *“Asymmetric knowledge”*
- Where is there a lack of agreement about the consequences of choices?
 - Complex chains of events before and after illness
 - *“Uncertainty”*
- Where is there a lack of agreement about the tradeoffs?
 - Who has to pay for which consequence?
 - *“Externalities”*

Models of Choices

- Economists study all choices.
- Favorite is a choice in a market.
 - Choice to buy
 - Choice to sell
- Favorite because buy and sell choices generate numbers when money is exchanged

Summary

- Economics is the study of choices
- Choices in health have uncertainty, asymmetric knowledge, and externalities
- Health occurs in systems where multiple units pursue multiple objectives guided by institutions
- Health systems fail due to lack of coherence
- Coherence can be increased by spreading information about the goals and consequences of policy

Section C

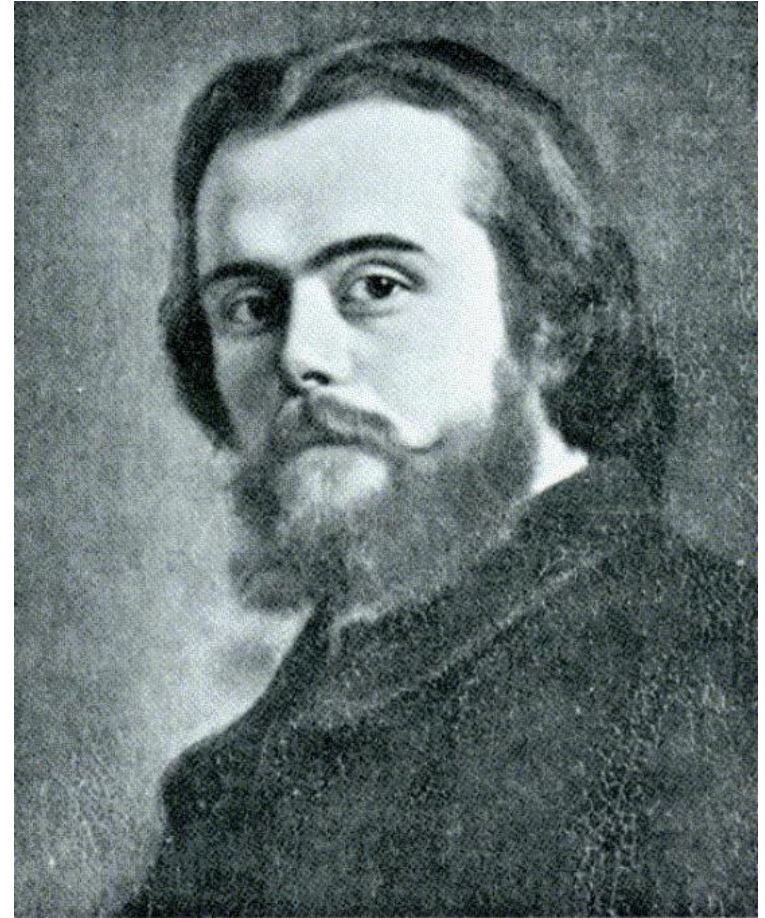
Demand and Supply

Why Demand and Supply Matter for Vaccines

- Demand for vaccines often falls short of herd immunity
- Supply can fall short too
- Subsidies can be used to address low demand, low supply

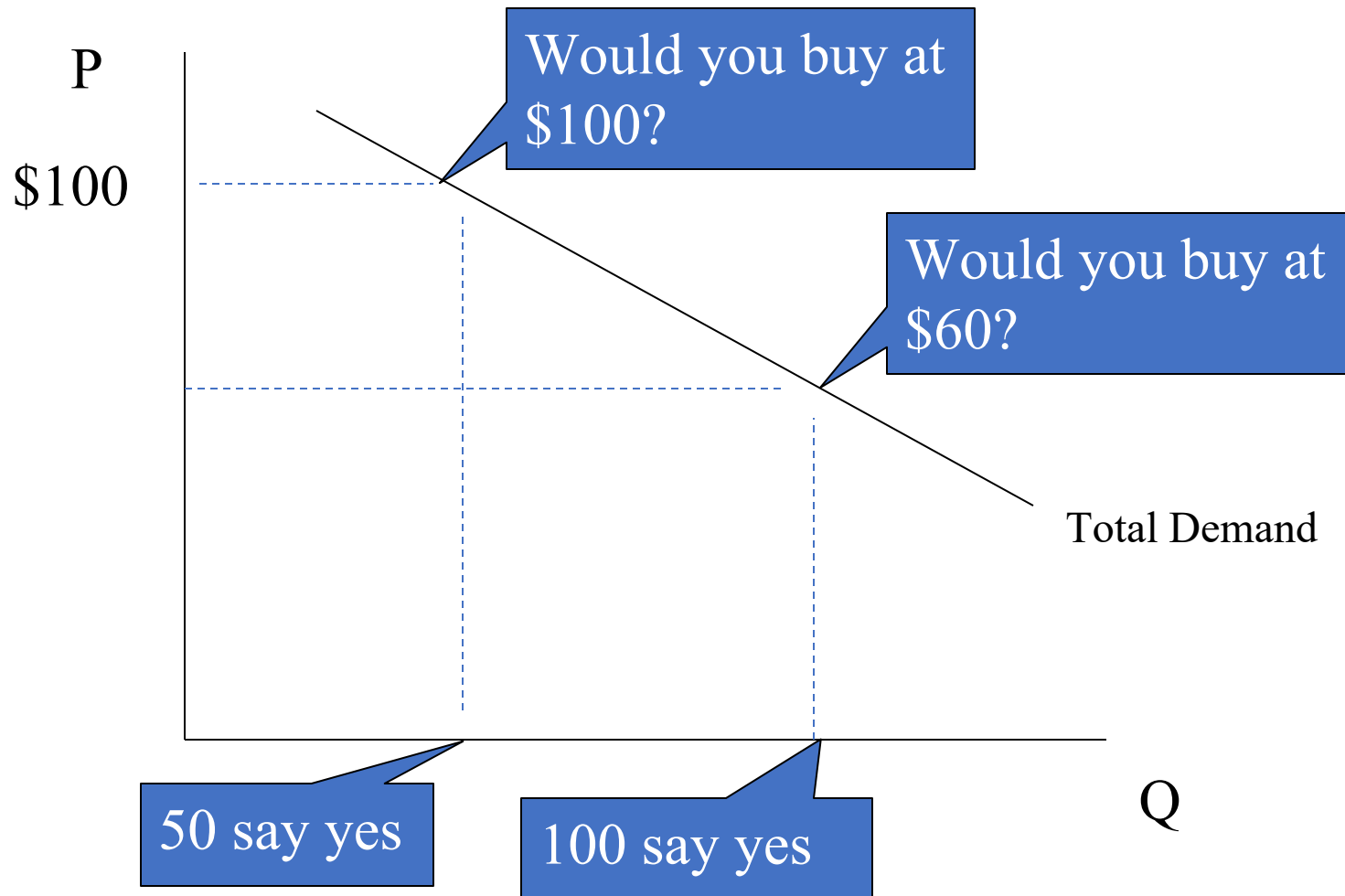
A Walrasian Auction

- One auctioneer standing in the town hall
- Audience of 100 “buyers” or “sellers”
- Call out prices and chart the response.

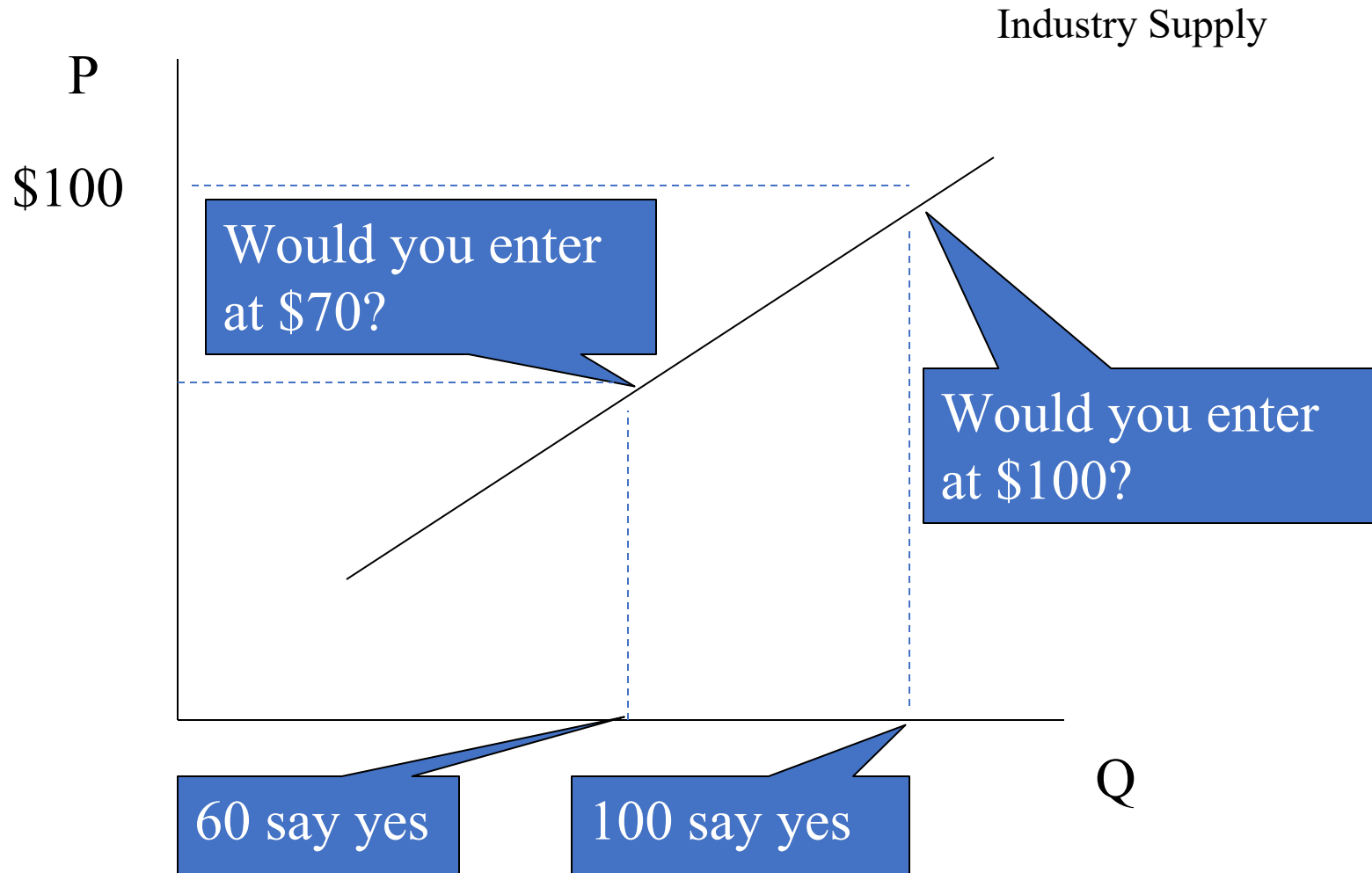


Leon Walras 1834-1910

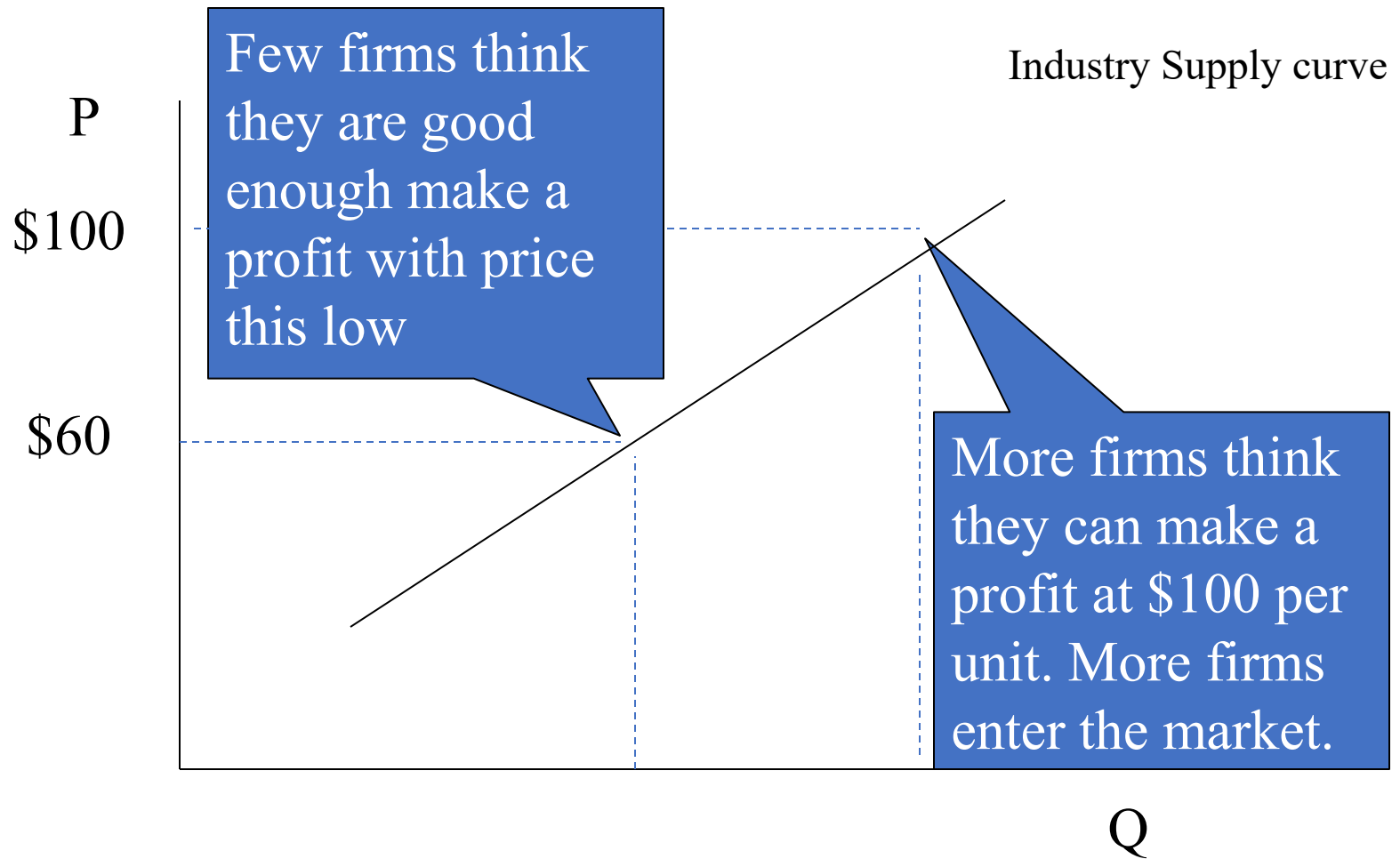
Demand curves as auctions



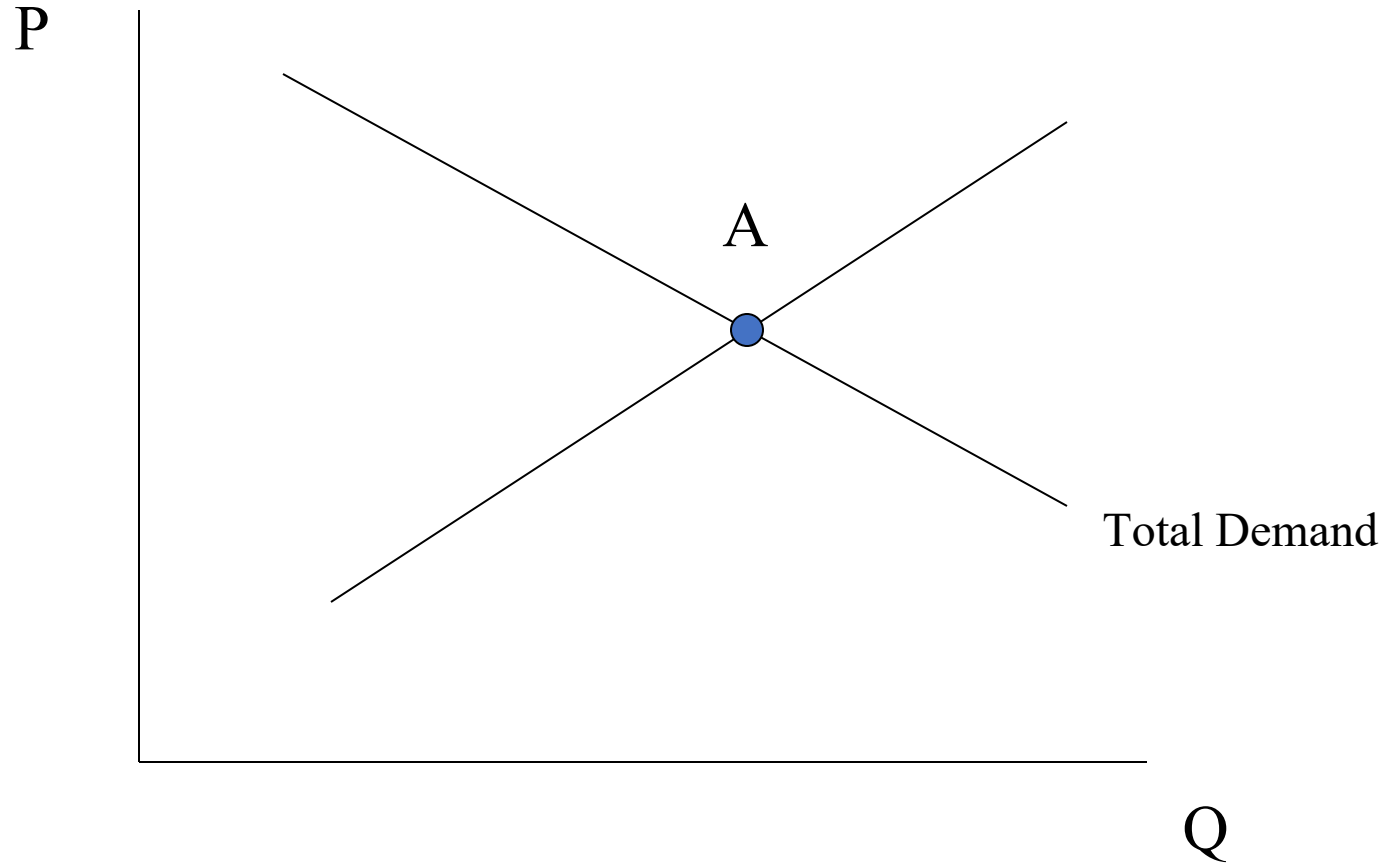
Supply curves as auctions



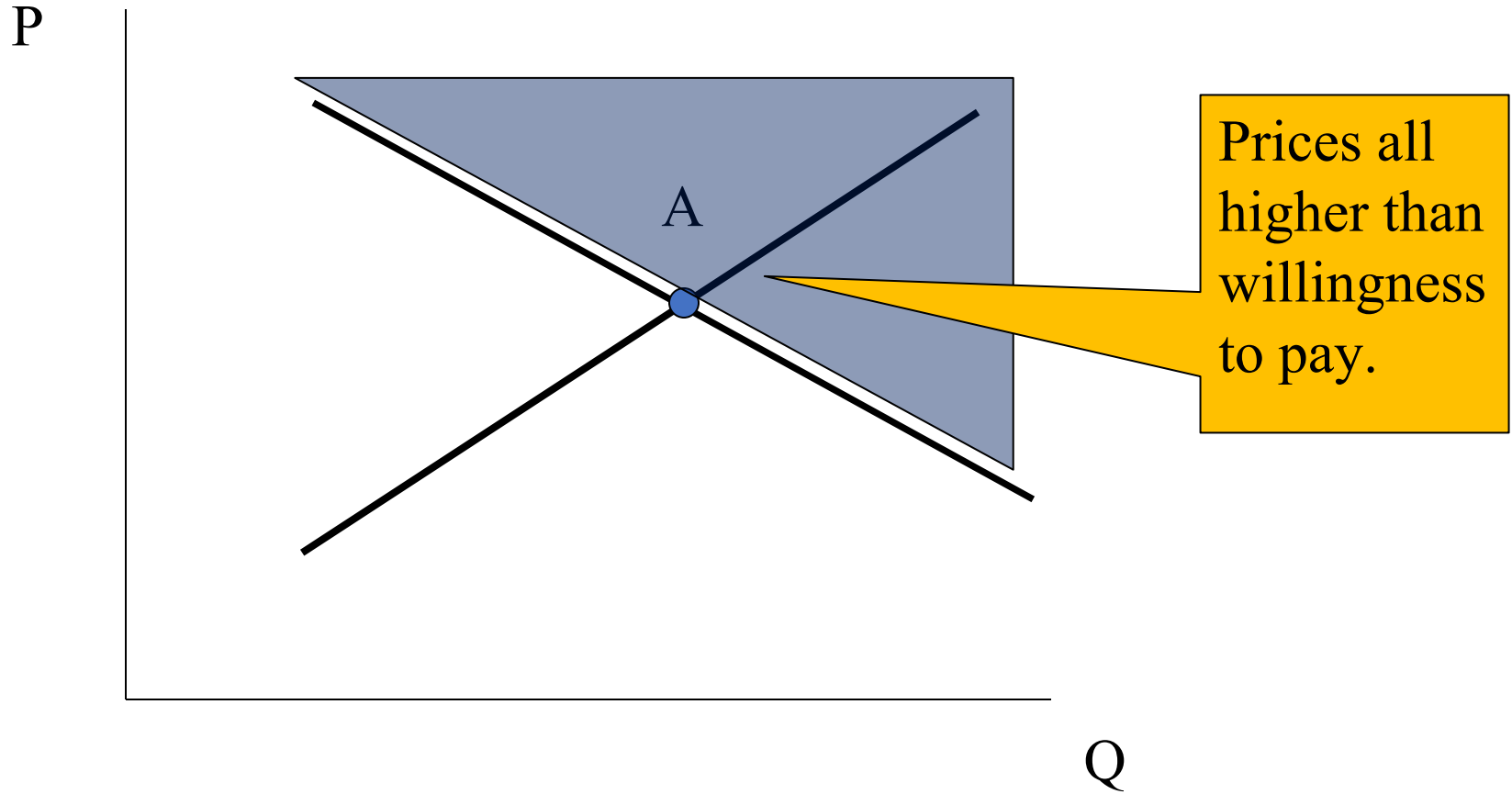
Supply curves as cost of production



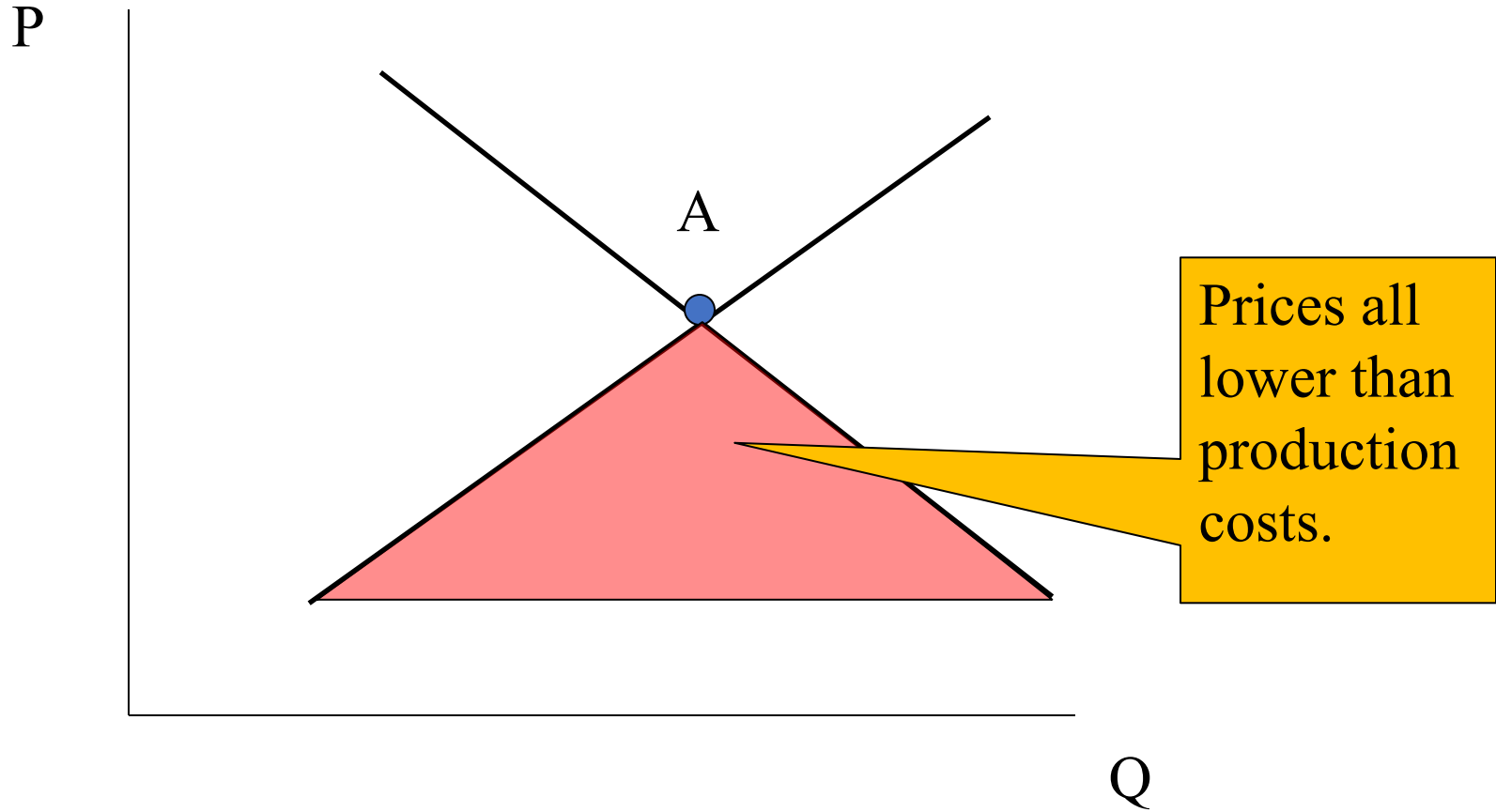
A is the market equilibrium



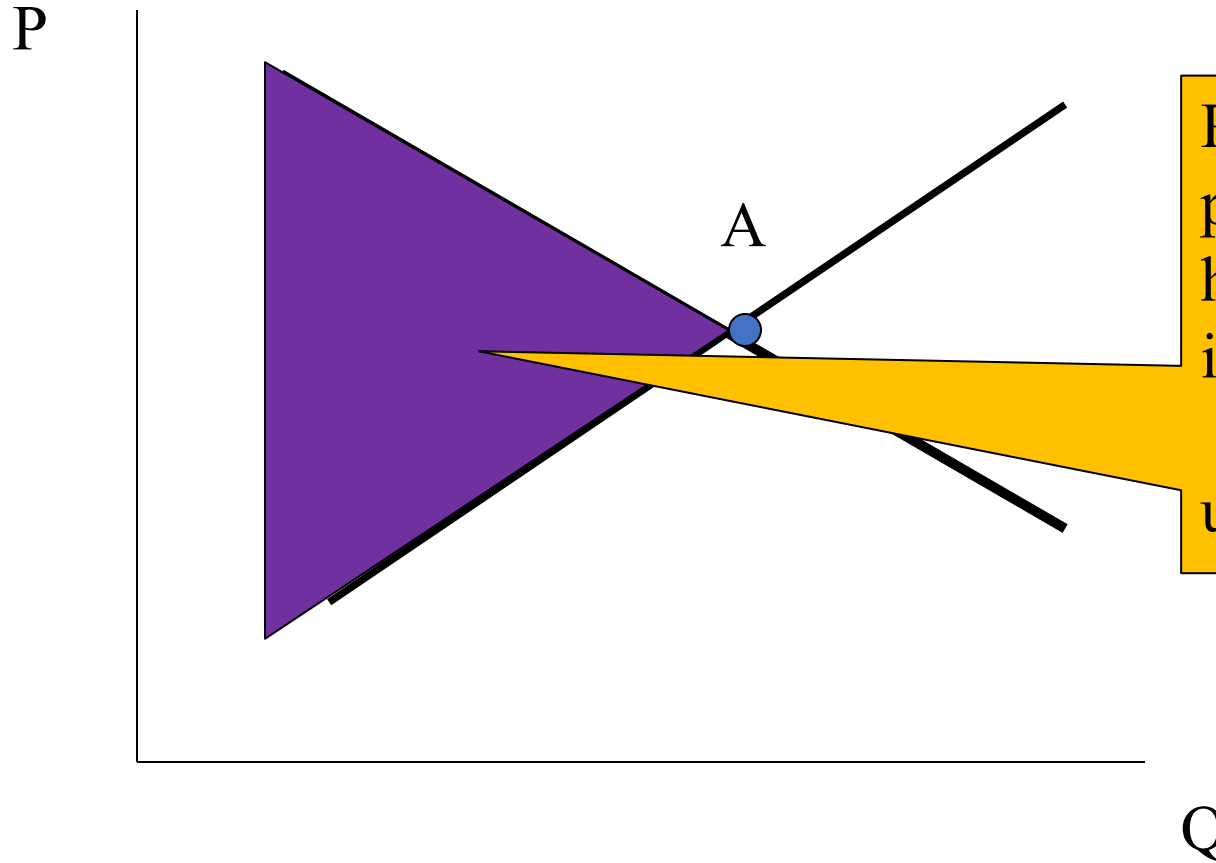
Impossible points above demand curve



Impossible points below supply curve

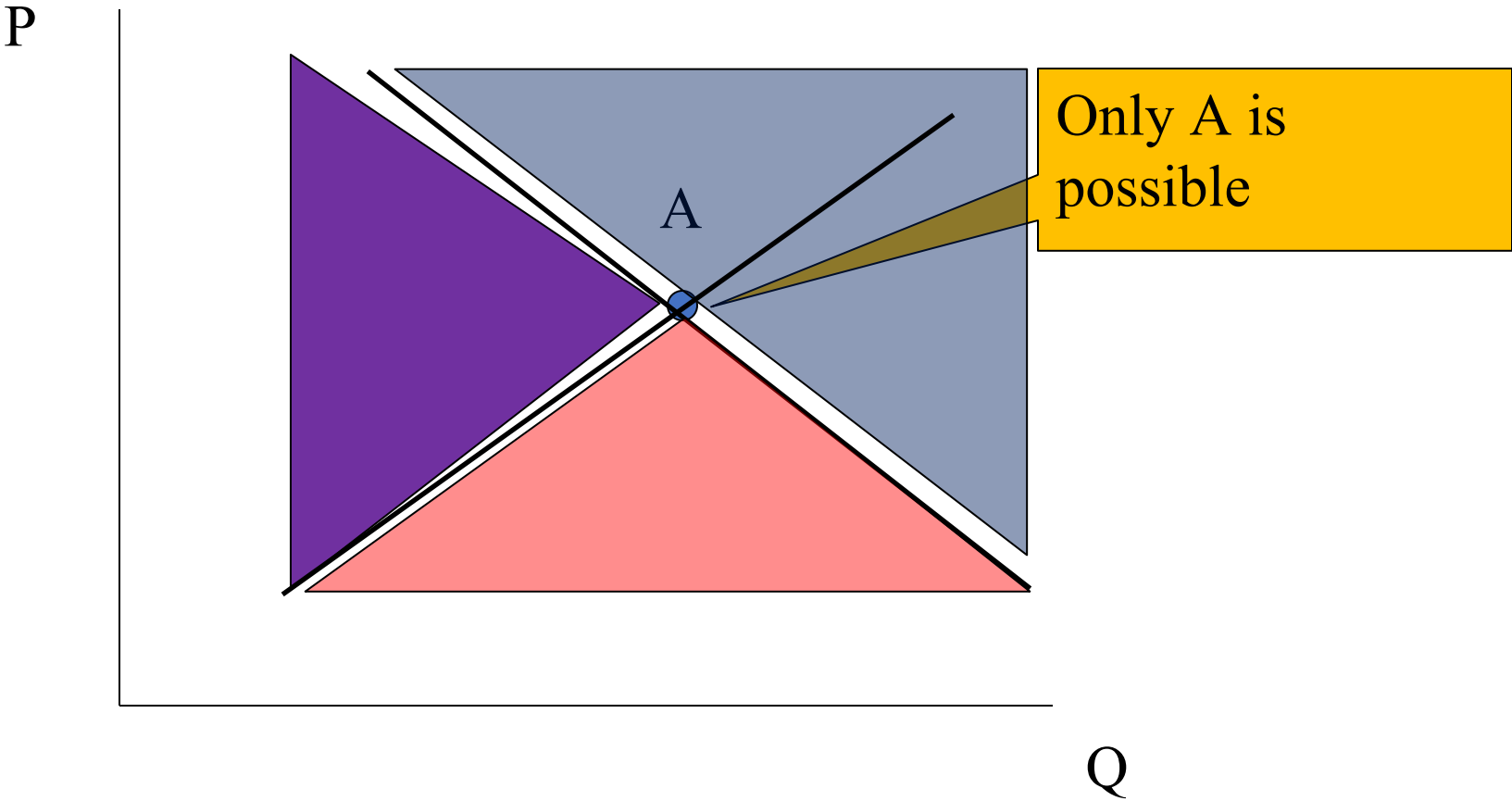


Growing the market

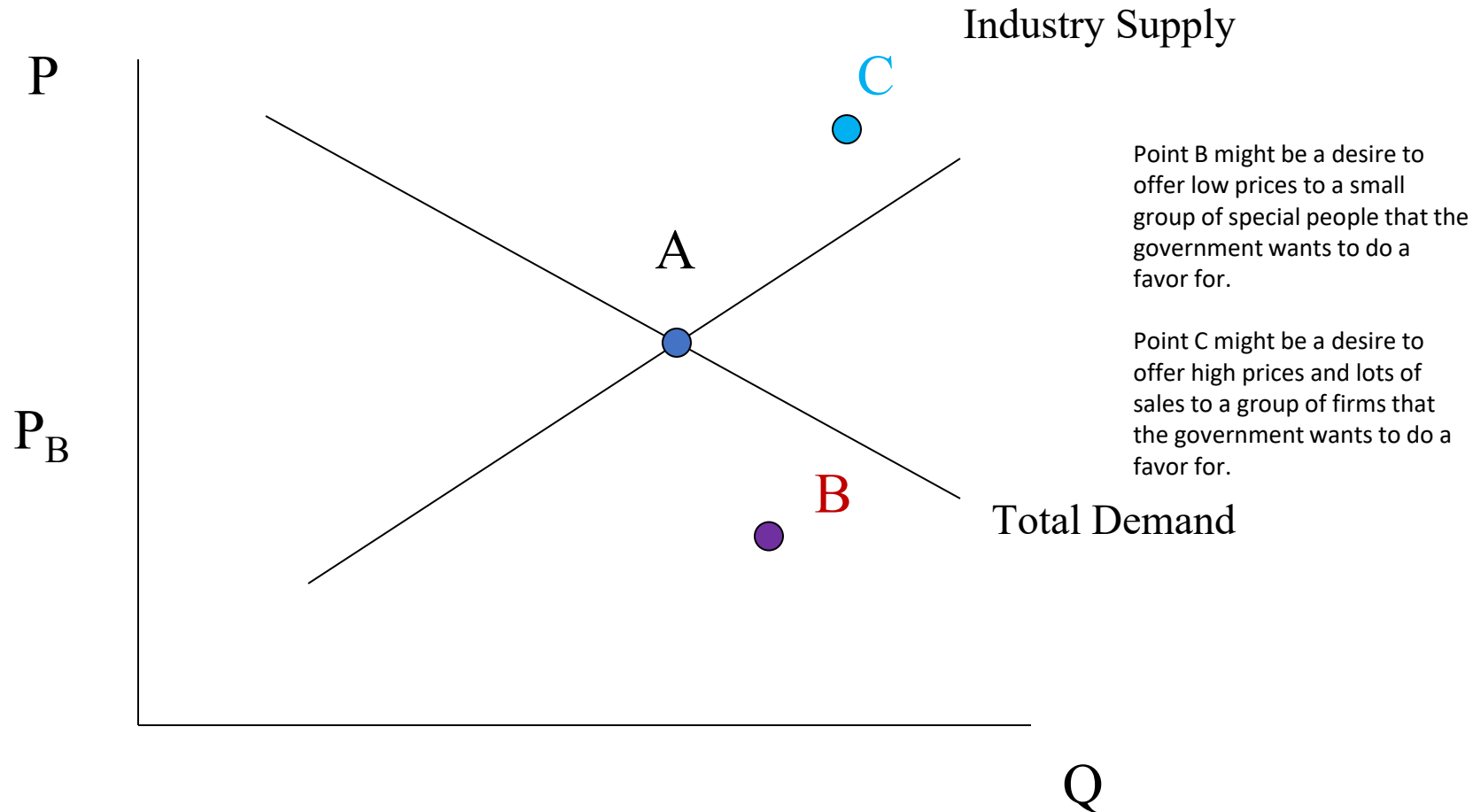


People want to pay prices that are higher than what it costs.
Supply will grow until point A

A is the market equilibrium

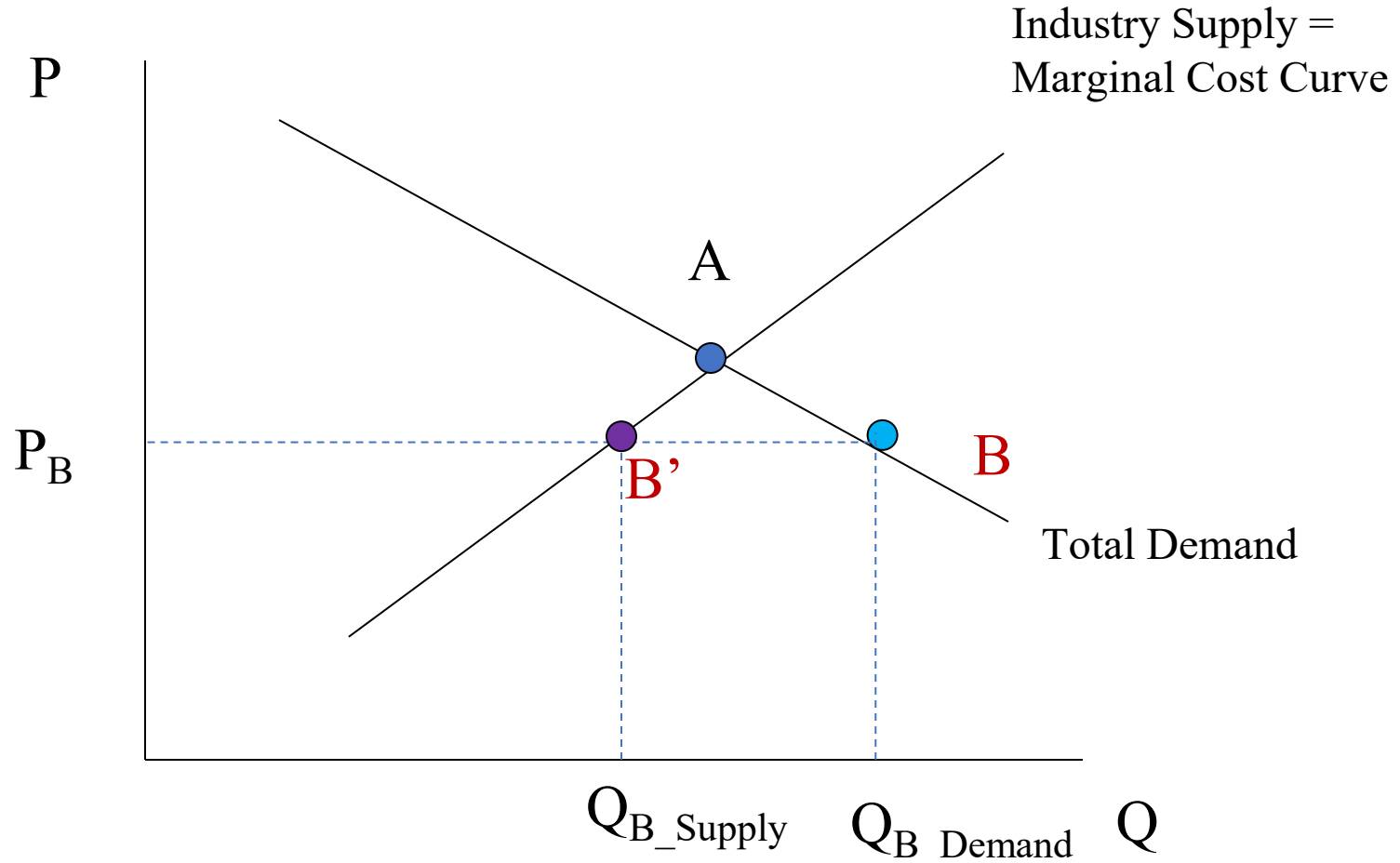


Sometimes governments want something other than point A



Point B and Point C are not possible without intervention

What if government insists on a price ceiling at P_B ?

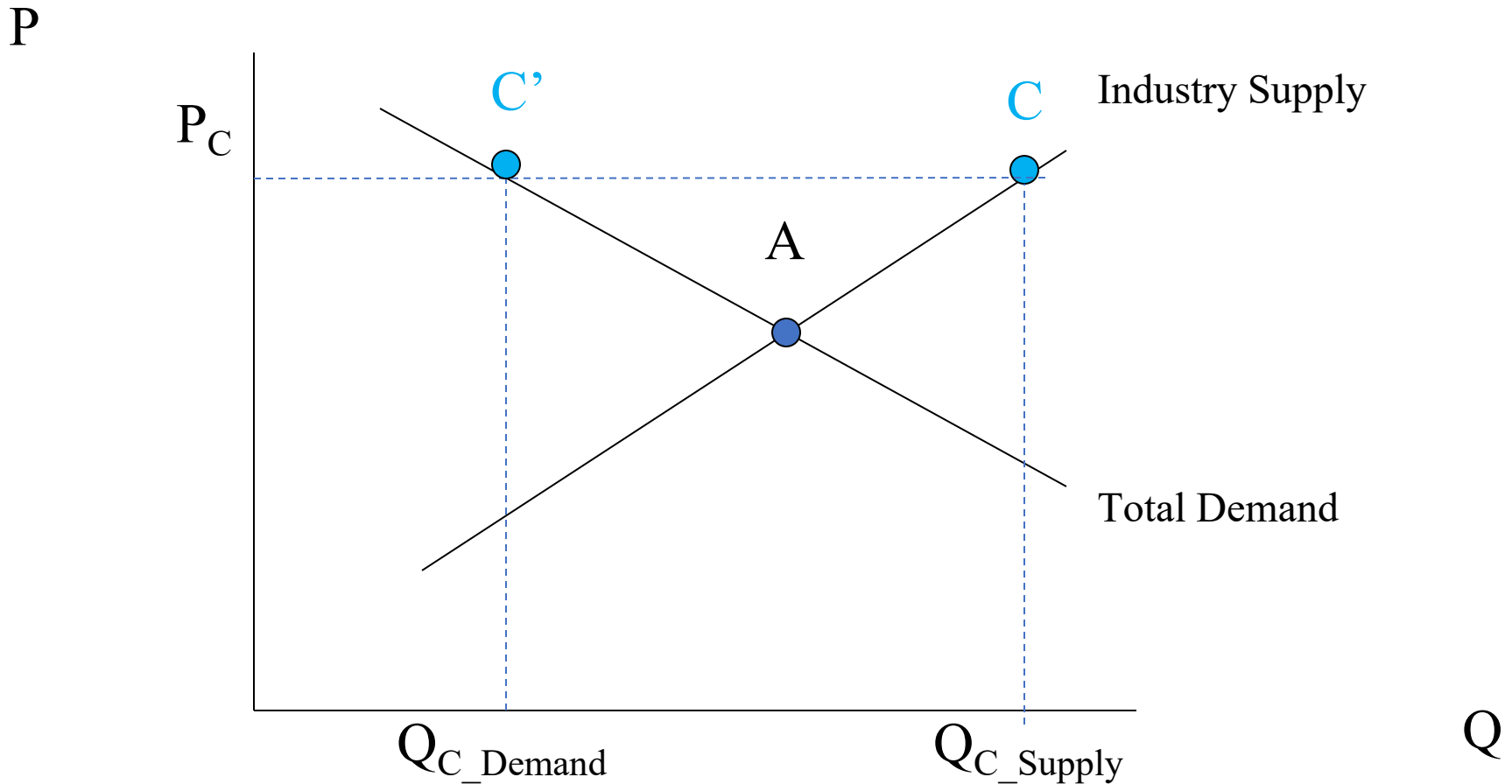


P_B offers a price so low that the side would want to supply Q_{B_Supply} units. It offers a price so low that demand side would want to buy Q_{B_Demand} units. If the government tried to conspire to achieve an equilibrium at Price P_B there would be shortage. At price P_B demand would be to the right of B and because of supply constraints we would expect to see B' as the new equilibrium. The supply simply cannot happen to the right of the supply curve.

Examples of Price Ceilings

- Rent control
- Public college fees
- Drug price schedules
- **Price of COVID-19 Vaccine** – will be highly regulated to ensure all countries can afford it

What if government insists on price floor P_C ?



Price C offers a price so high that the supply side would want to supply Q_{C_Supply} units. It offers a price so high that demand side would want to buy Q_{C_Demand} units. If the government tried to conspire to achieve an equilibrium at Price P_C there would be a glut. At price P_C demand would be to the left of C and we would expect to see C' as the new quantity demanded and purchased while C would mark the amount supplied. The purchased demand simply cannot happen to the right of the demand curve.

Examples of Price Floors

- Minimum wage laws
 - Note that the economic model clearly implies that there will be fewer employed people in a place with a minimum wage
 - What do you think?

Application to Vaccines

- Economics says that as the price goes down, more people want to buy that thing and as the price goes up more people want to sell that thing
- Since vaccines are already “free” how can these models help us with vaccine policy?
 - *Think about transaction costs: Are vaccines really free to the consumer?*

COVID-19 Vaccine

Supply side--Are prices high enough to generate supply?

Suppliers need development financing for

Vaccine trials (that might fail)

Plant capacity (that might not be needed)

Liability claims (if vaccine safety questionable)

Price Ceilings
for Suppliers

Demand side--Are prices low enough to generate demand?

From an individual's perspective risk varies

High risk groups, old with co-morbidities have high demand

Younger low risk groups and children have much lower demand

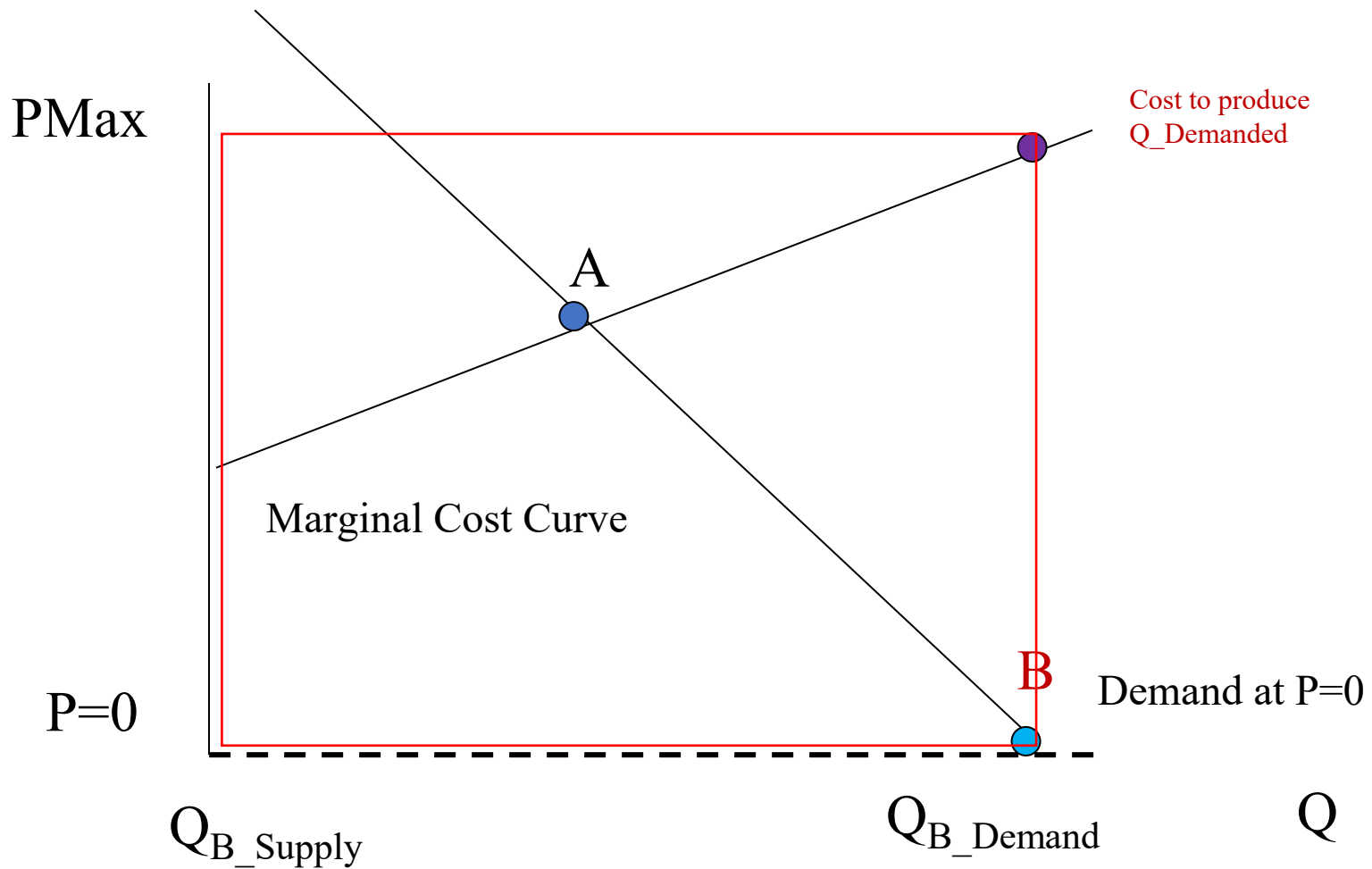
Price Floors for
Consumers

The rationale for COVID-19 Subsidies

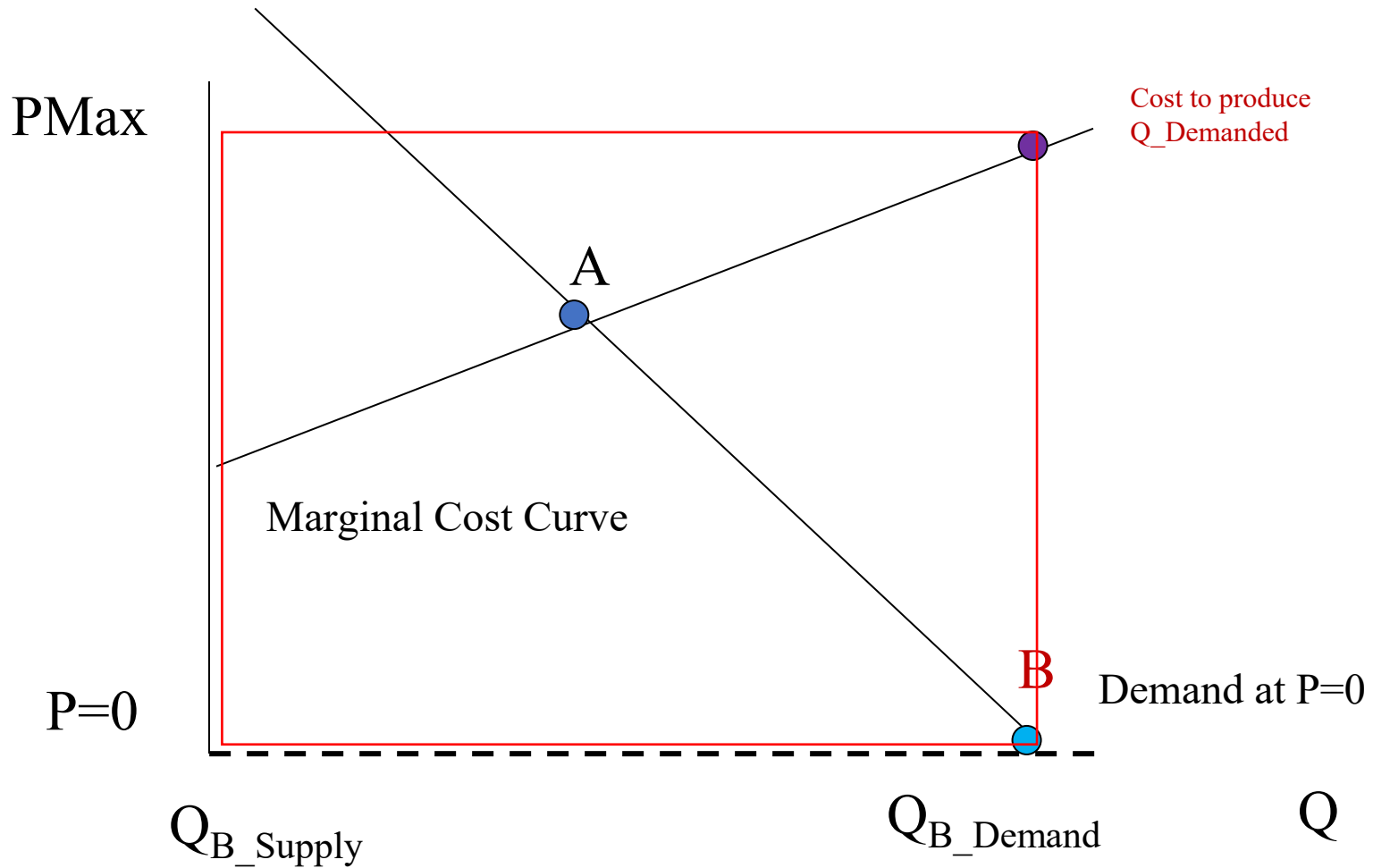
(Why Spend Taxpayer Money to Support Floors and Ceilings)

- Herd immunity is a combination of the immunity of young and old, rich and poor
 - Many subgroups do not have personal willingness to pay to demand vaccine
- Suppliers face uncertainty and risks of failure and liability
 - Their ability to attract risky private capital is limited
- A safe and effective COVID-19 vaccine is worth a lot to taxpayers because
- COVID's economic externalities amount to 5 to 10% of a country's GDP

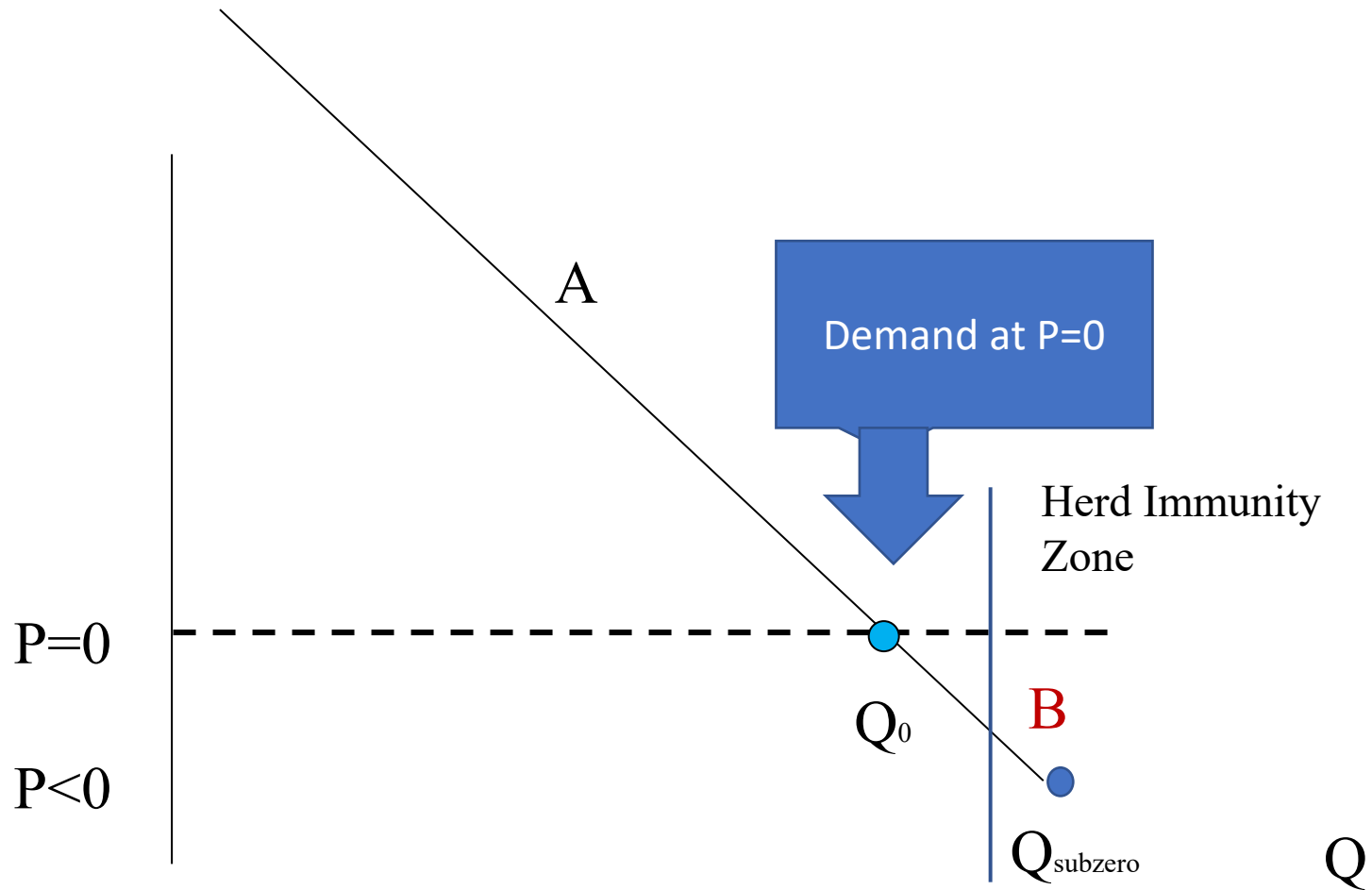
Price Subsidy to Achieve $P=0$



Need to Finance P_{Max} x Q_{Demanded}



What if Demand at $P=0$ Not Enough?



Below Zero Prices?

- Conditional cash transfers
- Subsidized time and travel costs/Outreach/Door to Door
- Social approval and social status
- Penalties/obstacles if not vaccinated--slower to be hired or allowed access to social functions

Summary of Section C

- Markets reach an equilibrium where the value of a product to an individual consumer equals the cost of the product to the producer
 - This is great when there is no uncertainty and no externalities, but...
- Externalities of COVID-19 imply that too few individuals will pay out of pocket to get vaccinated so no herd immunity
- Uncertainty of COVID-19 Vaccine development implies that too few firms will attract enough capital to take the risks to develop a vaccine and build factories to produce enough vaccine
- The market for COVID-19 vaccine needs governments to help it

Section D

Health as (a shared) Investment

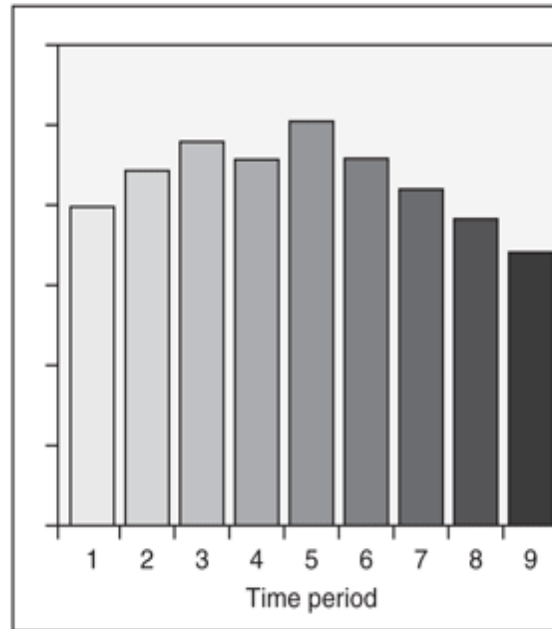
Investing in Health Care

Health inputs

Health care
Diet
Exercise
Environment
Income
Time



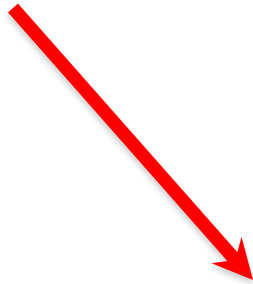
Health capital stock over time



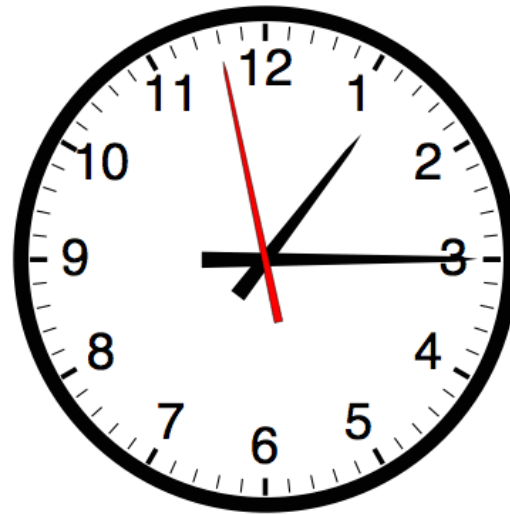
Health outputs each year

Healthy days:
Physical health
Mental health
Activity limitation

A Model for Money Spent Producing Health



A Model for Time Spent Producing Health



Issues that emerge:

- Time spent producing health, reduces time spent on other activities.
- Time costs mean that even free services like vaccines have a cost
- Choice to spend time getting vaccinated implies that the time spent is rewarded by health benefits and more earnings

In the case of COVID-19

- Human behaviour has large externalities on others in the society
- One person's immunity from COVID-19 offers is human capital
Pays back in ability to work and freedom from worry

- The value of COVID immunity, like any capital depends on context
 - Older households value this more for survival
 - Younger households value COVID immunity for work opportunities

Rationale for government involvement

- To ensure that health care services are available to the poor regardless of their ability to pay for services.
- Minimizing negative externalities
- To provide public goods like herd immunity

What is a public good?

Private Goods

- Possible to exclude some people from consuming
- If one person consumes, another cannot (*rival*)
- *Example-Sandwich*



Public Goods

- Impossible to exclude anyone
- George consumes, no impact on Elizabeth (*non-rival*)
 - *Example Air Quality*



Are vaccines public goods?

As injections

- Are they excludable?
- Are they rival?

- Is this excludable?
- Is this rival?



Herd immunity and smaller rich poor gaps

Duality

- A single vaccine is a private good
- A thousand vaccines confers a public good

Summary

- Health is produced from inputs, but people have to spend time to get inputs and make themselves healthy
 - Time is not free
- Public goods are non-excludable, non-rival
- Vaccines are dually an individual private good with private costs and a public good on a social scale
- The variability in demand for COVID-19 vaccine justifies subsidies to offer zero or below zero prices to get herd immunity.
- Subsidies require financing Price X Quantity of Vaccine