

Introduktion

- Velkommen til 2. del af kurset "Introduktion til Matematiske Metoder i Økonomi", efterår 2012. 1. del var fælles for MAT og MAT-ØK studerende.
- Nærværende 2. del er kun for MAT-ØK studerende, og den vil omhandle det basale matematiske grundlag for *adfærdsøkonomi*, dvs. grundlæggende mikroøkonomisk teori.
- Litteraturgrundlag
 - Nærværende plancher tager udgangspunkt i bogen: Hal Varian: Intermediate Microeconomics, 7th edition, W.W.Norton New York.
 - Pensum er disse og de følgende plancher
- Ansvarlig for denne del
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1

Unifying Framework

- Economic agents (individuals, firms etc.) don't change their preferences of goods or services (allocations) within the period of study
- There are constraints (physical and financial) placed on the feasible allocation (e.g. I can't afford flying to the moon)
- However, given the constraints people choose the best (we say they optimize).
- Changes in behavior is thus due to changes in constraints (e.g. prices go down on a moon trip, so I buy it)
- Equilibrium. Agents adjust their behavior until they are satisfied, where the economy are at equilibrium
- Economist use this framework to build models of reality.

2

Economists Use Models

- Models are simplified and analytical depictions of reality (Models can't be reality, neither can a theory since that is a contradiction)
- Help us understand complex realities by focusing on what we think is important
- Analytical in the sense of breaking down a whole into small pieces, examining them and then putting some pieces together
- Goal: Sharpen intuition - learn "what is important and why"
- Give us testable predictions which can be rejected, if so go back to the assumptions and start over again. (Compare with Popper's criterion of science as falsifiable).
- Now it is hopefully clear why applied math is important in economics.

3

Chapter One

The Market

4

Economic Modeling

- What causes what in economic systems?
- At what level of detail shall we model an economic phenomenon?
- Which variables are determined outside the model (exogenous) and which are to be determined by the model (endogenous)?

5

Modeling the Apartment Market

- How are apartment rents determined?
- Suppose
 - apartments are close or distant, but otherwise identical
 - distant apartments rents are exogenous and known
 - many potential renters and landlords

6

Modeling the Apartment Market

- Who will rent close apartments?
- At what price?
- Will the allocation of apartments be desirable in any sense?
- How can we construct an insightful model to answer these questions?

7

Modeling Apartment Demand

- Demand: Suppose the most any one person is willing to pay to rent a close apartment is \$500/month. Then

$$p = \$500 \Rightarrow Q^D = 1.$$

- Suppose the price has to drop to \$490 before a 2nd person would rent. Then

$$p = \$490 \Rightarrow Q^D = 2.$$

8

Modeling Apartment Demand

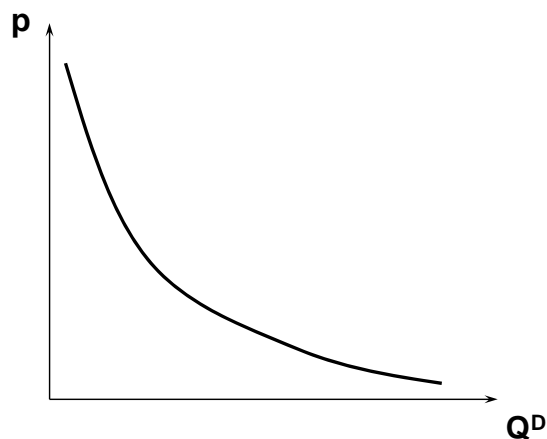
- The lower is the rental rate p , the larger is the quantity of close apartments demanded

$$p \downarrow \Rightarrow Q^D \uparrow.$$

- The quantity demanded vs. price graph is the market demand curve for close apartments.

9

Market Demand Curve for Apartments



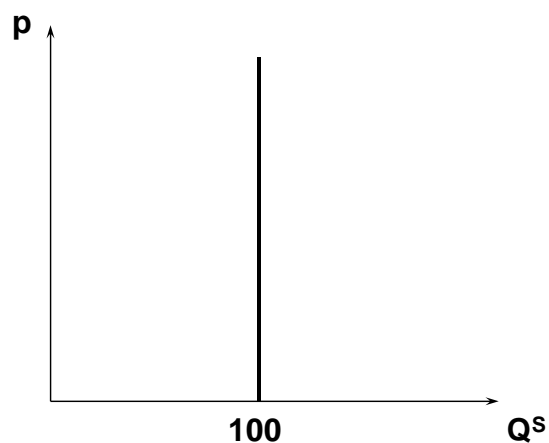
10

Modeling Apartment Supply

- Supply: It takes time to build more close apartments so in this short-run the quantity available is fixed (at say 100).
- Is this reasonable in the long run?

11

Market Supply Curve for Apartments



12

Competitive Market Equilibrium

- “low” rental price \Rightarrow quantity demanded of close apartments exceeds quantity available \Rightarrow price will rise.
- “high” rental price \Rightarrow quantity demanded less than quantity available \Rightarrow price will fall.

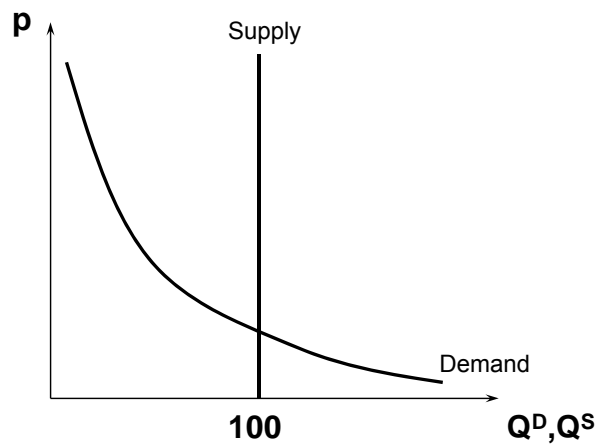
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Competitive Market Equilibrium

- Quantity demanded = quantity available
 \Rightarrow price will neither rise nor fall
- so the market is at a competitive equilibrium.

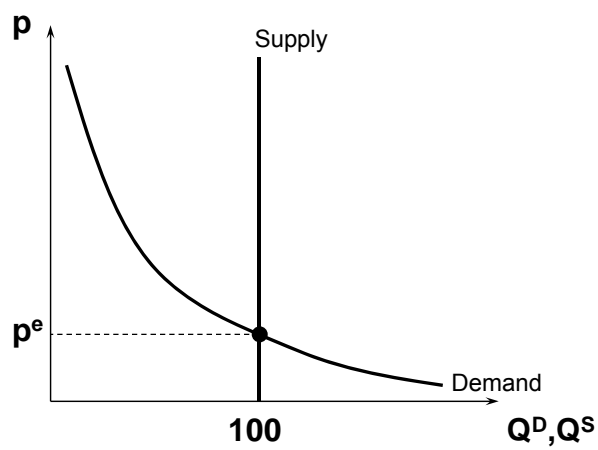
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Competitive Market Equilibrium



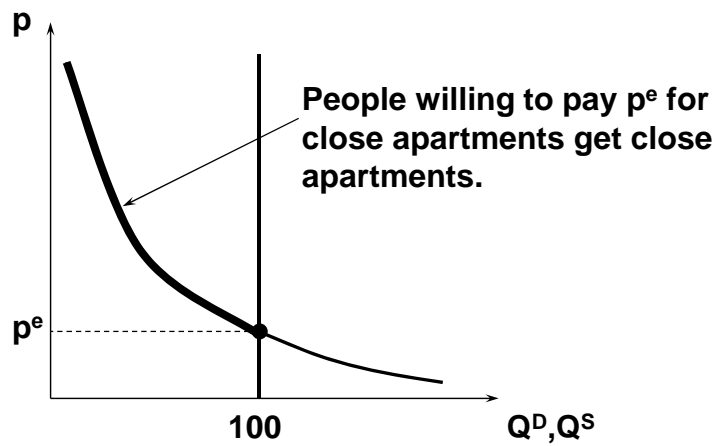
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Competitive Market Equilibrium



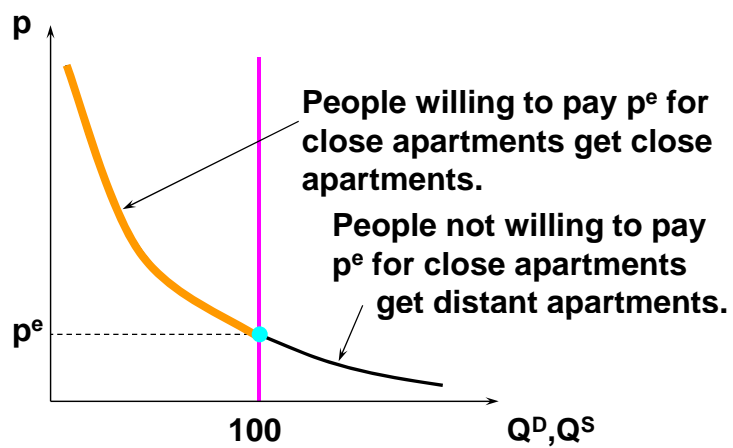
16

Competitive Market Equilibrium



17

Competitive Market Equilibrium



18

Competitive Market Equilibrium

- Q: Who rents the close apartments?
- A: Those most willing to pay.
- Q: Who rents the distant apartments?
- A: Those least willing to pay.
- So the competitive market allocation is by “willingness-to-pay”.

19

Comparative Statics

- What is exogenous in the model?
 - price of distant apartments
 - quantity of close apartments
 - incomes of potential renters.
- What happens if these exogenous variables change?
 - Hint are these variables depicted on the axis? No, thus always a shift!

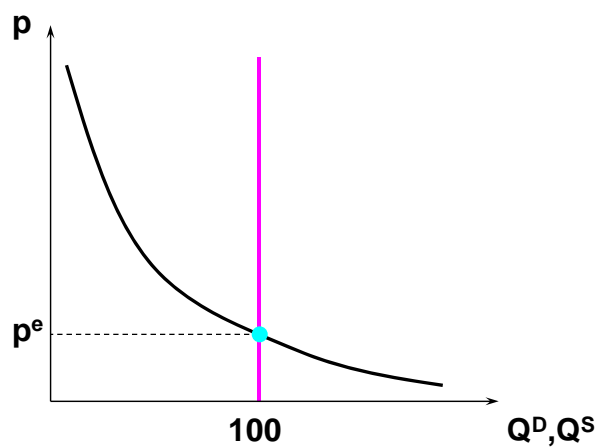
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Comparative Statics

- Suppose the price of distant apartment rises.
- Demand for close apartments increases (rightward shift), causing
- a higher price for close apartments.

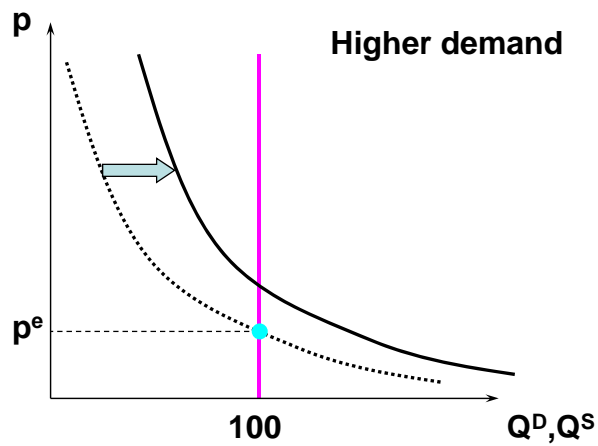
21

Market Equilibrium



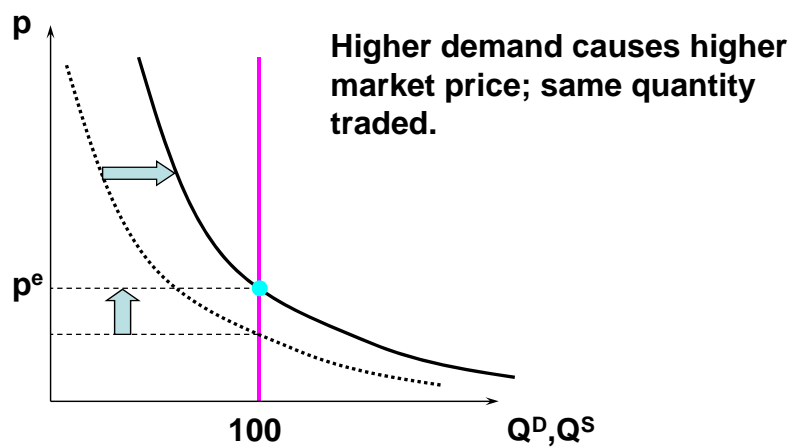
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Market Equilibrium



23

Market Equilibrium



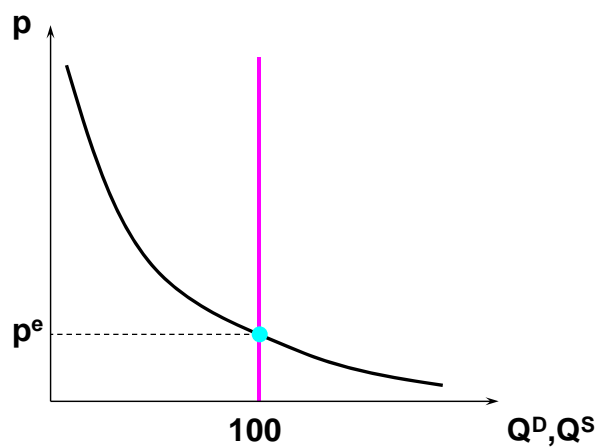
24

Comparative Statics

- Suppose there were more close apartments.
- Supply is greater, so
- the price for close apartments falls.

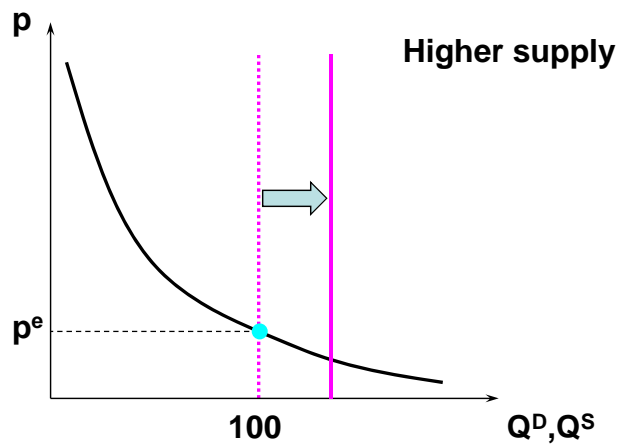
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Market Equilibrium



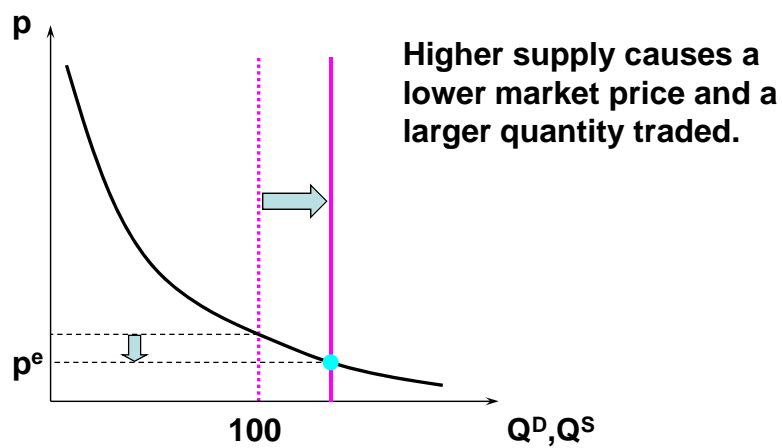
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Market Equilibrium



27

Market Equilibrium



28

Taxation Policy Analysis

- Local government taxes apartment owners.
- What happens to
 - price
 - quantity of close apartments rented?
- Is any of the tax “passed” to renters?

29

Taxation Policy Analysis

- Market supply is unaffected.
- Market demand is unaffected.
- So the competitive market equilibrium is unaffected by the tax.
- Price and the quantity of close apartments rented are not changed.
- Landlords pay all of the tax.
- Why is that? (Hint the supply curve)
- This is a very special case!

30

Imperfectly Competitive Markets

- Amongst many possibilities are:
 - a monopolistic landlord
 - a perfectly discriminatory monopolistic landlord
 - a competitive market subject to rent control.

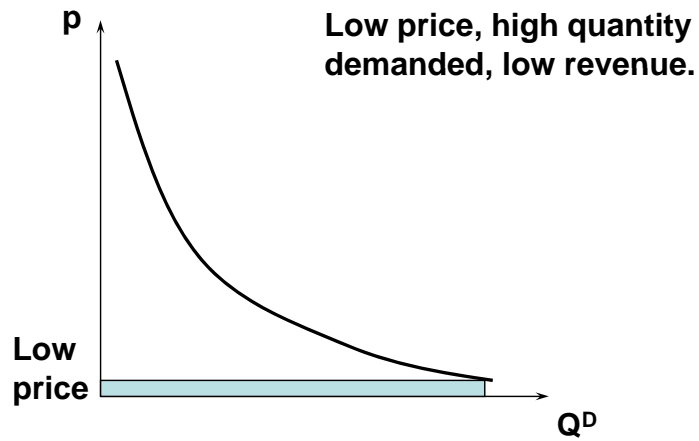
31

A Monopolistic Landlord

- When the landlord sets a rental price p he rents $D(p)$ apartments.
- What is $D(p)$?
- Revenue = $pD(p)$.
- Revenue is low if $p \approx 0$
- Revenue is low if p is so high that $D(p) \approx 0$.
- An intermediate value for p maximizes revenue.

32

Monopolistic Market Equilibrium



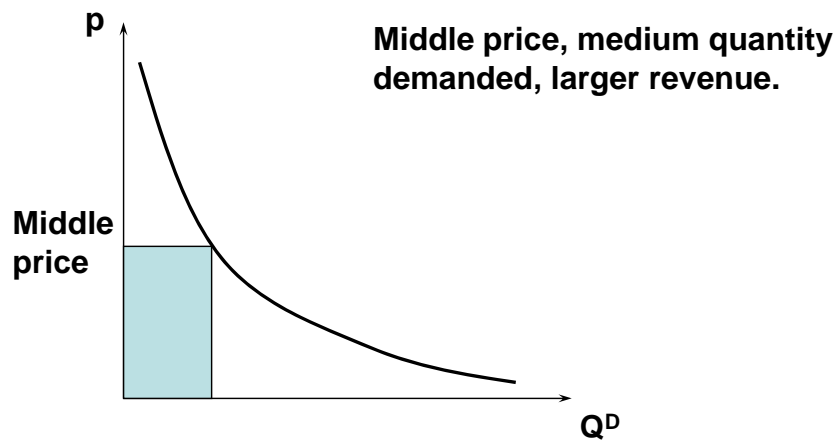
33

Monopolistic Market Equilibrium



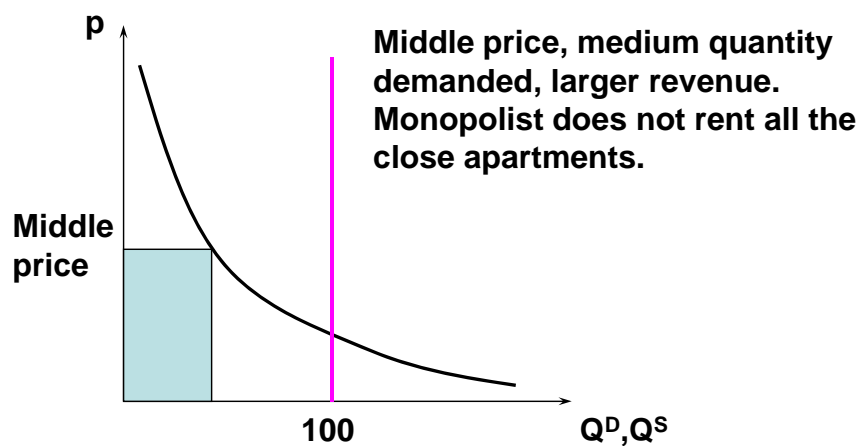
34

Monopolistic Market Equilibrium



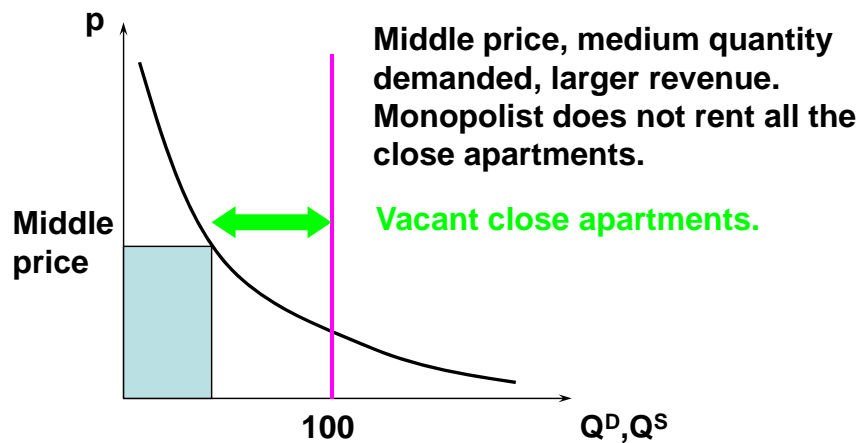
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Monopolistic Market Equilibrium



36

Monopolistic Market Equilibrium



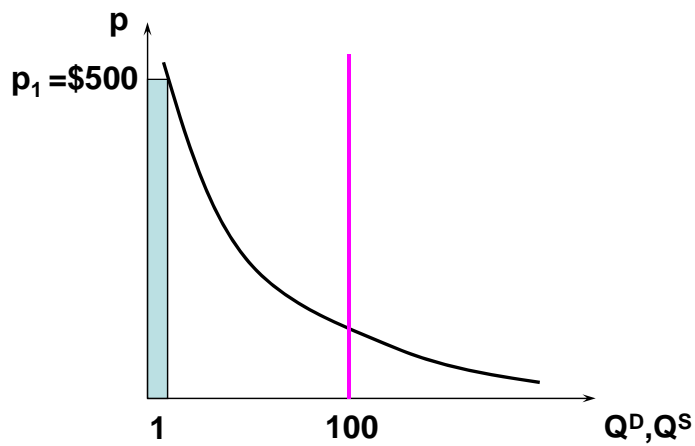
37

Perfectly Discriminatory Monopolistic Landlord

- Imagine the monopolist knew everyone's willingness-to-pay.
- Charge \$500 to the most willing-to-pay,
- Charge \$490 to the 2nd most willing-to-pay, etc.

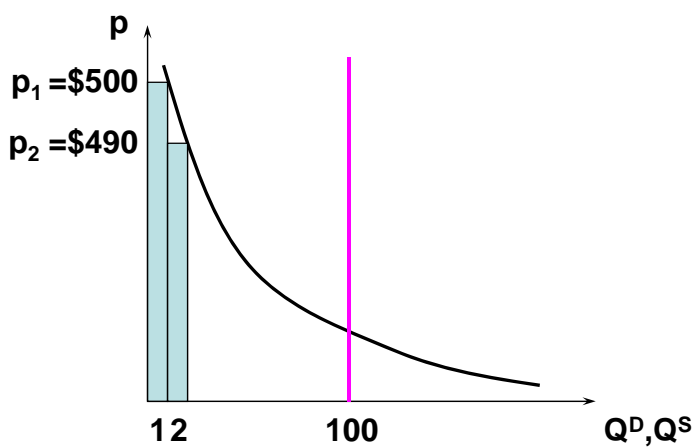
38

Discriminatory Monopolistic Market Equilibrium



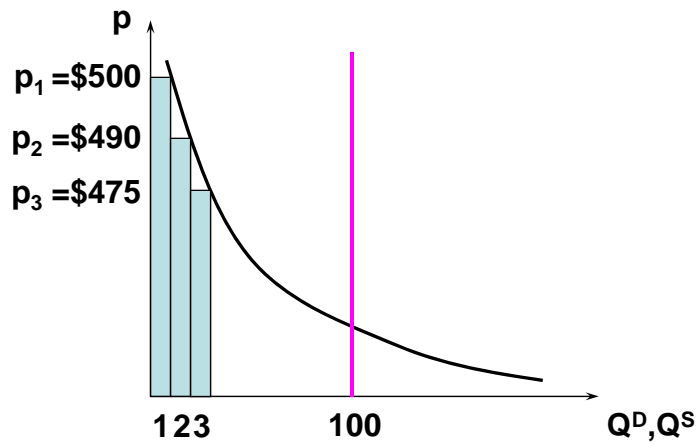
39

Discriminatory Monopolistic Market Equilibrium



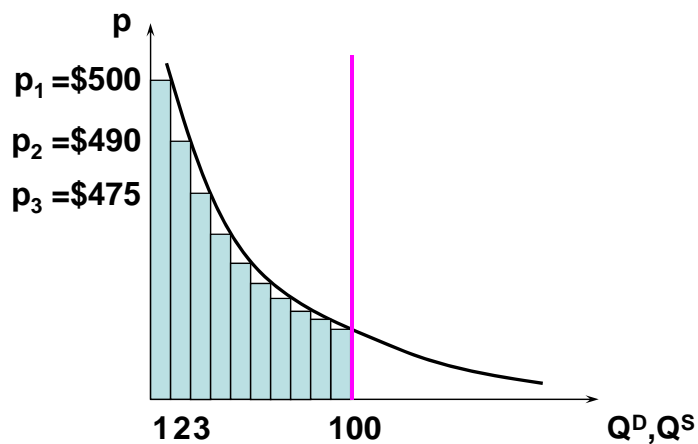
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Discriminatory Monopolistic Market Equilibrium



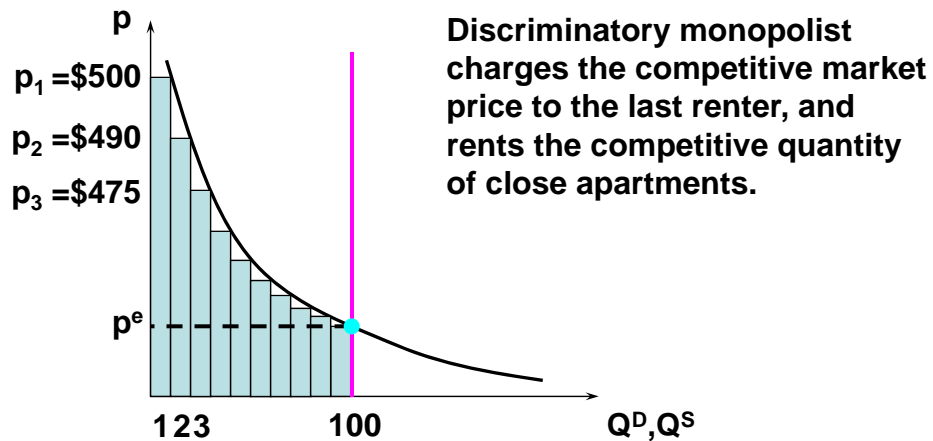
41

Discriminatory Monopolistic Market Equilibrium



42

Discriminatory Monopolistic Market Equilibrium



43

Which Market Outcomes Are Desirable?

- Which is better?
 - Perfect competition
 - Monopoly
 - Discriminatory monopoly

44

Pareto Efficiency

- Vilfredo Pareto; 1848-1923.
- A Pareto outcome allows no “wasted welfare”;
- i.e. the only way one person’s welfare can be improved is to lower another person’s welfare.
- A pareto efficient outcome is such that no one can get it better without someone else getting it worse

45

Pareto Efficiency

- Jill has an apartment; Jack does not.
- Jill values the apartment at \$200; Jack would pay \$400 for it.
- Jill could sublet the apartment to Jack for \$300.
- Both gain, so it was Pareto inefficient for Jill to have the apartment.

46

Pareto Efficiency

- A Pareto *inefficient* outcome means there remain unrealized mutual gains-to-trade.
- Any market outcome that achieves all possible gains-to-trade must be Pareto efficient.

47

Pareto Efficiency

- Competitive equilibrium:
 - all close apartment renters value them at the market price p^e or more
 - all others value close apartments at less than p^e
 - so no mutually beneficial trades remain
 - so the outcome is Pareto efficient.

48

Pareto Efficiency

- Discriminatory Monopoly:
 - assignment of apartments is the same as with the perfectly competitive market
 - so the discriminatory monopoly outcome is also Pareto efficient.

49

Pareto Efficiency

- Monopoly:
 - not all apartments are occupied
 - so a distant apartment renter could be assigned a close apartment and have higher welfare without lowering anybody else's welfare.
 - so the monopoly outcome is Pareto inefficient.

50

Harder Questions

- So far we have made the analysis by looking at the short run where the supply curve was fixed.
- What will happen in the long run?
- Usually a more complicated question since interactions within and between markets?
- Next time we start by more explicitly building our model

51