Price Discrimination

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Lecture 10
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Introduction

Key assumption of last lecture was uniform pricing

- Everyone pays same for ever unit of the good
- Drawn from competitive market, where it makes sense
  - Same marginal cost of production, so competition drives
- Much less obvious with a monopoly

$\Longrightarrow$ Today we'll explore many alternative ways of pricing

1. Perfect or first-degree price discrimination
2. Second-degree or quantity-based price discrimination
   - Also, related, quality-based price discrimination
3. Third degree or identity-based price discrimination
4. Other common forms of price discrimination
5. Policy applications and implications
   - When is price discrimination beneficial and when harmful?
   - Price discrimination in taxation and social policy

The idea of first-degree price discrimination

First-degree price discrimination is ideal?

1. Charge every person personalized price
2. Different price for each unit sold
3. Match everything exactly to willingness-to-pay
    - Capture full surplus consumers gain

Rarely observed in real world (theoretical benchmark), but

1. Bargaining institution with very competent bargainer
2. Personalized pricing systems on the internet
3. CVS coupon systems

Best possible thing for monopolist, gets everything

- Therefore companies are always looking for better ways
- But terrible for consumers, gain no surplus
- But what about total social value?
    - Very attractive in many dimensions

Graphical illustration of 1st degree discrimination

Efficiency of first-degree price discrimination

First-degree price discrimination is highly efficient

- In fact, as efficient as perfect competition
- Every consumer willing to pay above cost served
  1. Can't make anyone pay more than worth to them
  2. So charge them exactly that, for each unit
  3. Anytime willing-to-pay above cost, profit available
  4. Thus monopoly sells efficiently
- Why does 1st degree discrimination do so well?
  1. Selling more doesn't require lowering price
  2. Seller can capture full value created
  3. Thus tries to maximize value created
- However, seller captures all value
  - Consumers gain no surplus

$\Longrightarrow$ Distributive issues important objection

Distributive objections and (partial) solutions

Thus perfect price discrimination often unpopular

- But more efficient...so should be possible to redistribute
- Economists advocate pairing with redistributive method
  1. Bidding for right to monopoly (franchise)
     - Government auction, captures all profits for other things
  2. Profit taxes
     - Government taxes away profits, distributes as pleases
  3. Labor unions
     - Unions extract profits as higher wages
- None of these solutions as perfect as it sounds
  - Redistributive authority, competitor needs to know profits
- Also may be benefits not to redistributing
  - Allows firm to capture full value created (Lecture 13)
- Lessons apply to broader price discrimination

Information and barriers to perfect discrimination

Whatever its merits, first-degree discrimination difficult

- This is why we rarely see it in practice
- Barriers to implement include?
  1. Administrative and "menu" costs
     - Requires quoting different price to consumers
     - Could they even process this? Predict? Plan?
  2. Fairness constraints
     - Many people think that price discrimination is unfair
     - Can alienate consumers
  3. Arbitrage and keeping track of consumers
     - If one consumer can easily resell, undermines system
  4. Information about willingness to pay
     - Most important, how to know what to charge each?
     - Fundamentally, distortion because monopolist *uniformed*

Examples of impracticality of perfect discrimination

To see why these are problems, consider some cases:

1. Prescription drugs, books and arbitrage?
   - Drug companies, publishers charge less in poor countries
   - Proved very problematic: reimportation (legal or illegal)
   - Also resentment leads to price controls in rich world
   - Think of how much worse if you tried to slice up countries!
2. Credit card surcharges and fairness?
   - Merchants charged for accepting credit cards
   - Would like to pass on to consumers, but resented
   - Legal restrictions too, but how much worse personalized!
3. Haggling and information?
   - Anyone in a bazaar knows it doesn't always work
   - Because no one knows other's value strategic postures

$\Longrightarrow$ Even with face-to-face, first-degree very hard

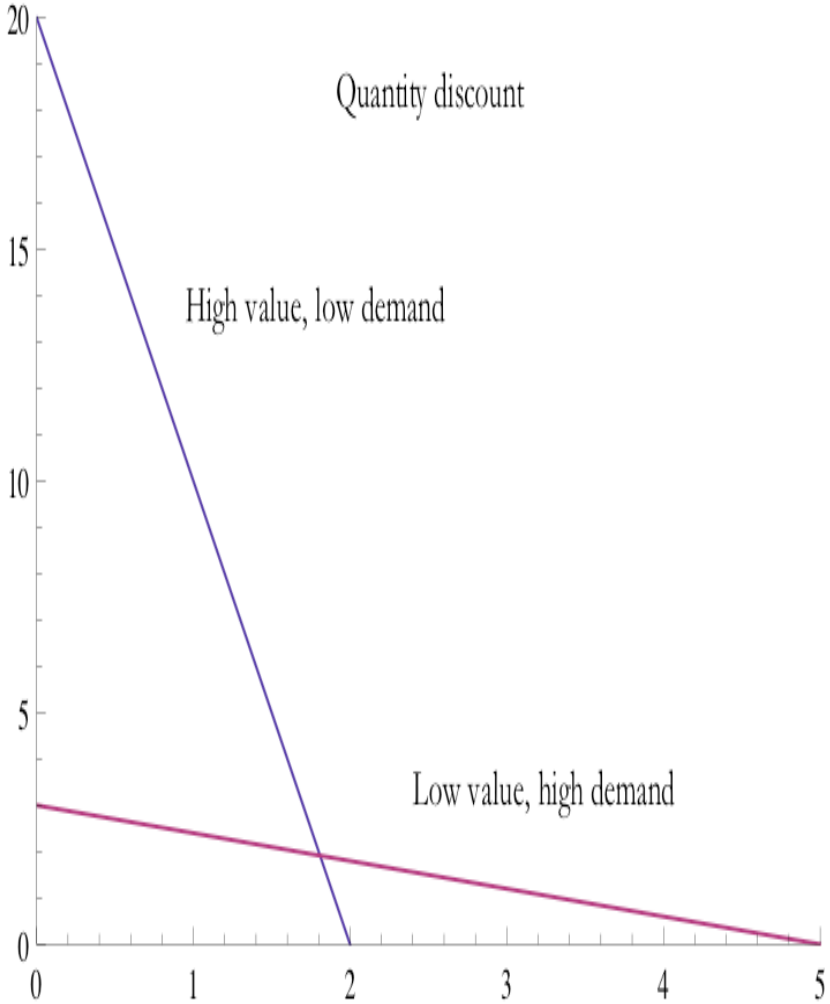
Non-linear pricing and quantity discounts (surcharges)

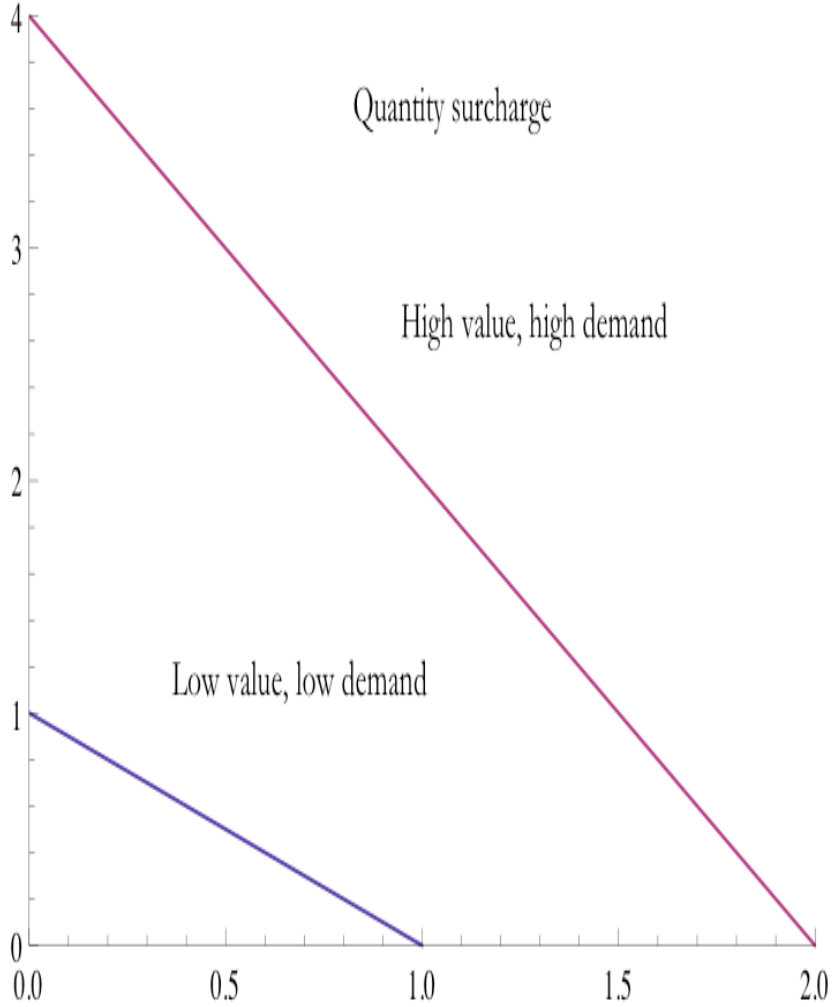
Thus, in practice, price discrimination much less perfect

- One way firms commonly do this is *non-linear tariffs*
  - Different prices for different numbers of units
  - Often choice of different discrete bundles
- Examples of this (typically discount) abound?
  1. Bulk discounts in commercial goods
  2. Punch cards for loyal customers
  3. New York Times: free for 20 articles, charge after that
  4. Pricing of cloud file-sharing services
  5. Income taxes: rates vary depending on income level
- Goal: consumers *self-select* into right price
  - Lower price if they don't mind storing, keeping track of card
  - Lower price to those who don't value enough to use often

$\Longrightarrow$ Not as effective, as must incentivize limited cheating

Graphical illustration of non-linear pricing



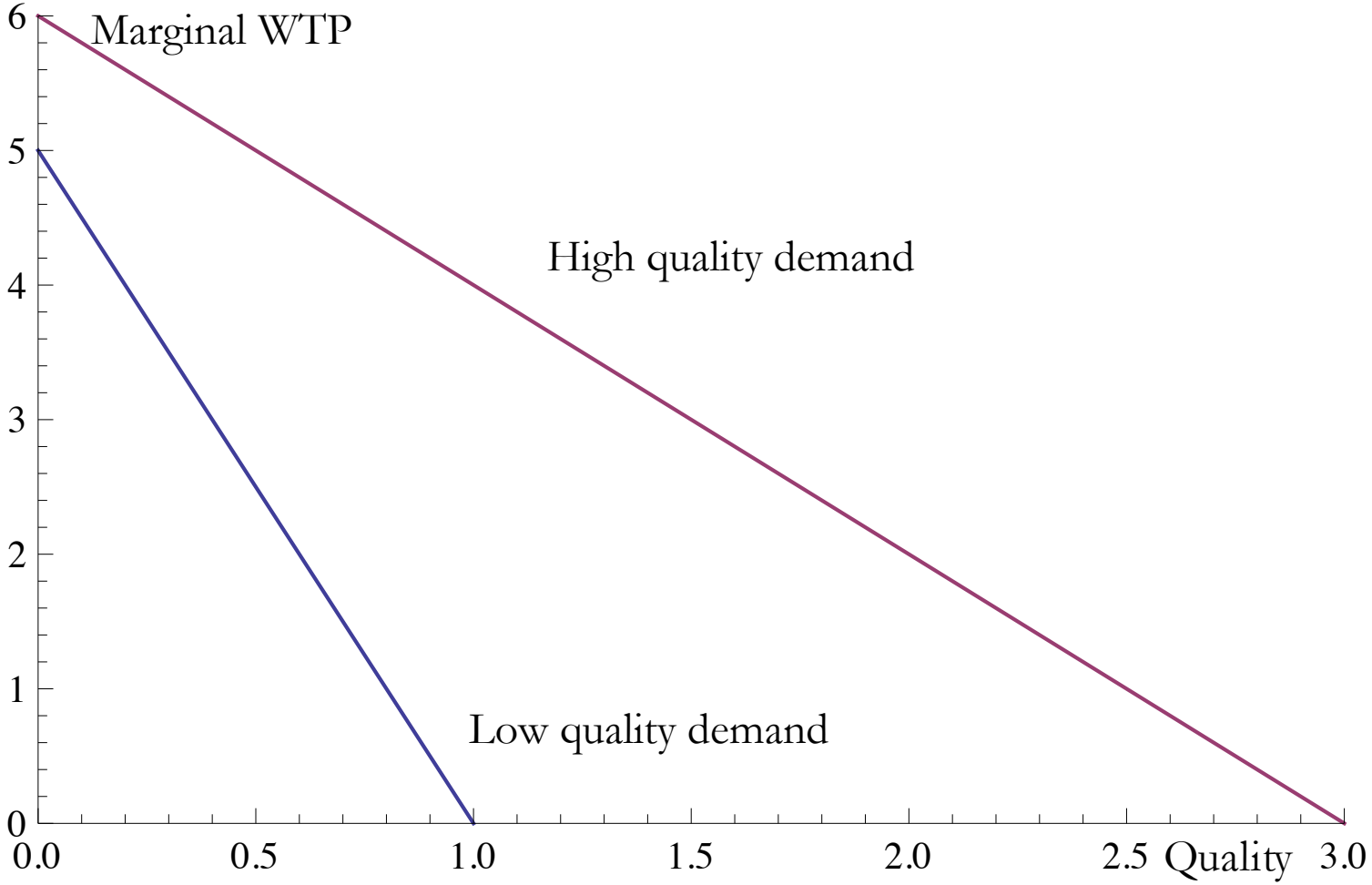


Qualities of service and multiple products

Can offer not just different *quantities* but also *qualities*

- This is very common strategy?
  1. Classes of service in airlines
  2. Qualities of rooms at a hotel
  3. Different levels of American Express card
  4. Tiers of cable and internet service
- Common observation: low-quality deliberately degraded
  - Not that the airline can't offer better service
  - Deliberately makes Coach experience bad
  - This forces those who can to pay for business, first
  - Thus monopolist distorts *quality* as well as *quantity*
    - Particularly large for low-end customers
    - Less reason to make first-class worse
  - We'll return to these issues in Lecture 14

Graphical illustration of quality-based discrimination



Bundling, two-part tariffs and efficiency

Price discrimination takes related (more specific) forms

- Some of these achieve efficiency just like perfect
- Also transfer all value to the monopolist

1. Bundling: two products cheaper together than apart
   - Two pieces of software free to produce: Excel and Word
   - Some people like Excel better, some Word
   - Values for the package much more homogeneous
   - Then monopolist can capture much more value in package

   $\Longrightarrow$ Packaging/bundling clarifies information
2. Extreme form is "two-part tariff"
   - Extreme form of bundling; charge for right to buy
   - Low pricing for various services, near (or below) cost
   - Rides at Disneyland, Costco, Rhapsody, etc.
   - Achieves efficiency, but takes all from consumers

   $\Longrightarrow$ Just like perfect price discrimination (information perfect)

Loyalty, sales and add-ons

Other forms of discrimination less perfect, efficient

1. Loyalty and personalized discounts
   - CVS and others track your purchasing
   - Offer targeted discounts based on purchasing behavior
   - Helps get closer to perfect, but incentives to manipulate
2. Inter-temporal (sales)
   - Department, outlet stores' periodic sales/discounts
   - Those whose demand is time-sensitive willing to pay a lot
   - Thus discriminate by offering less to those willing to wait
   - Airline ticket and hotel room pricing similar
3. Add-ons and obfuscation
   - Hotels, printers, banks and others cheap to get into
   - But soak you for lots of extras once you are on board

   $\Longrightarrow$ Discriminate against those who don't read small print

Master of the House

One of my favorite examples is from *Les Miserables*:

- Inn keeper Thenardier describes his pricing policies

Reasonable charges
Plus some little extras on the side!
Charge 'em for the lice, extra for the mice
Two percent for looking in the mirror twice
Here a little slice, there a little cut
Three percent for sleeping with the window shut
When it comes to fixing prices
There are a lot of tricks he knows
How it all increases, all them bits and pieces
Jesus! It's amazing how it grows!

When are prices discriminatory?

Some of these practices can be explained by costs

1. Peak-load pricing leads to variation across time
   - Little marginal cost of movie tickets when not full
   - Very valuable during rush times
2. May be cheaper to sell goods in bundles
   - Most of cost of software is the CD; cheaper to put together
3. Some populations cheaper to serve than others
   - Different prices for different insurance risks
   - Senior citizens less disruptive to other movie watchers

Then what makes something price discrimination?

1. Different prices reflect *demand* not *cost conditions*
   - This would never happen in competitive market
   - Efficiency variation even more likely in competitive
2. *Lack* of variation when costs vary just as discriminatory

Explicit price discrimination

Another, imperfect, approach is to group people

- Use some objective characteristic
- Charge different prices to people with these characteristics

  $\Longrightarrow$ Charge higher prices to those with more elastic demand
- Most commonly used in entertainment, transportation?
  1. Senior, student and other discounts
  2. Library surcharges for journals
  3. Educator and public servant discounts
  4. Prescription drug pricing in developing world
  5. Home and office software licensing
  6. Unemployment insurance, height tax and other tagging
     - More on this below
  7. Resident and tourist pricing in public services
  8. Discounting menus in foreign languages (Chinese)

A mathematical example of explicit price discrimination

Demand $Q^H(p) = 1 - \frac{p}{2}$ "High" market, $Q^L(p) = 1 - p$ "Low"

- Assume 0 marginal cost of production
- Discriminatory prices half of maximum: $p^{H\star} = 1, p^{L\star} = \frac{1}{2}$
- Pooled demand kinked?
  - For $p < 1, 2 - \frac{3p}{2}$, for $p > 1, 1 - \frac{p}{2}$
- Optimal from first segment is half way up: $\overline{p}^\star = \frac{2}{3}$
- Compare profits from two points?
  - $1 \cdot \frac{2}{3} = \frac{2}{3}$ v. $1 \cdot \frac{1}{2} = \frac{1}{2} \implies \overline{p}^\star = \frac{2}{3}$
- Is discrimination good or bad?
  - Output is same: 1 in either case
  - But SS without is $\frac{2}{3} \cdot 1 \cdot \frac{1}{2} + \frac{2}{3} = 1$, with is $1 \cdot \frac{1}{2} \cdot \frac{1}{2} + \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} + \frac{1}{2} + \frac{1}{2} \cdot \frac{1}{2} = \frac{15}{16} < 1$; why?
    - High market values more, lose more of that than gain in low

Possible effects of third-degree discrimination

So we found output unaffected, welfare and CS down

- Obviously very special: both demands linear
- Properties hold generally for linear if both markets served
- More broadly:
  1. If both markets served, output may go up or down
  2. Welfare may go up or down
  3. CS may go up or down
  4. If High served without discrimination, pure benefit
- Everything depends on pass-through rates:
  - The bigger PT is in Low v. High, better is discrimination
  - Threshold smallest for output, then welfare, then CS
    - Mark-up higher in High, profits rise so CS harder

$\Longrightarrow$ In principle, discrimination can be good or bad

- Only consistent is redistribution from High to Low

Likely effect of third-degree discrimination

This paints a bit of a complicated picture

- But results are a bit puzzling
- Everything seems ambiguous, depends on details
- But we know perfect price discrimination...
  1. Produces more and is more socially efficient
  2. Reduces consumer surplus
- We can also get to perfect by many 3rd-degree
  - Slice up market once, then slice up submarkets, etc.

$\Longrightarrow$ Any given 3rd-degree ambiguous, eventually clear

- Suggests that "typical" slicing of demand falls in right way
- Simple example:
  - Segment for everyone willing-to-pay above/below x
  - If $x < \overline{p}$ don't change in high, serve low, good for all
  - If $x > \overline{p}$ serve all in high, drop price in low

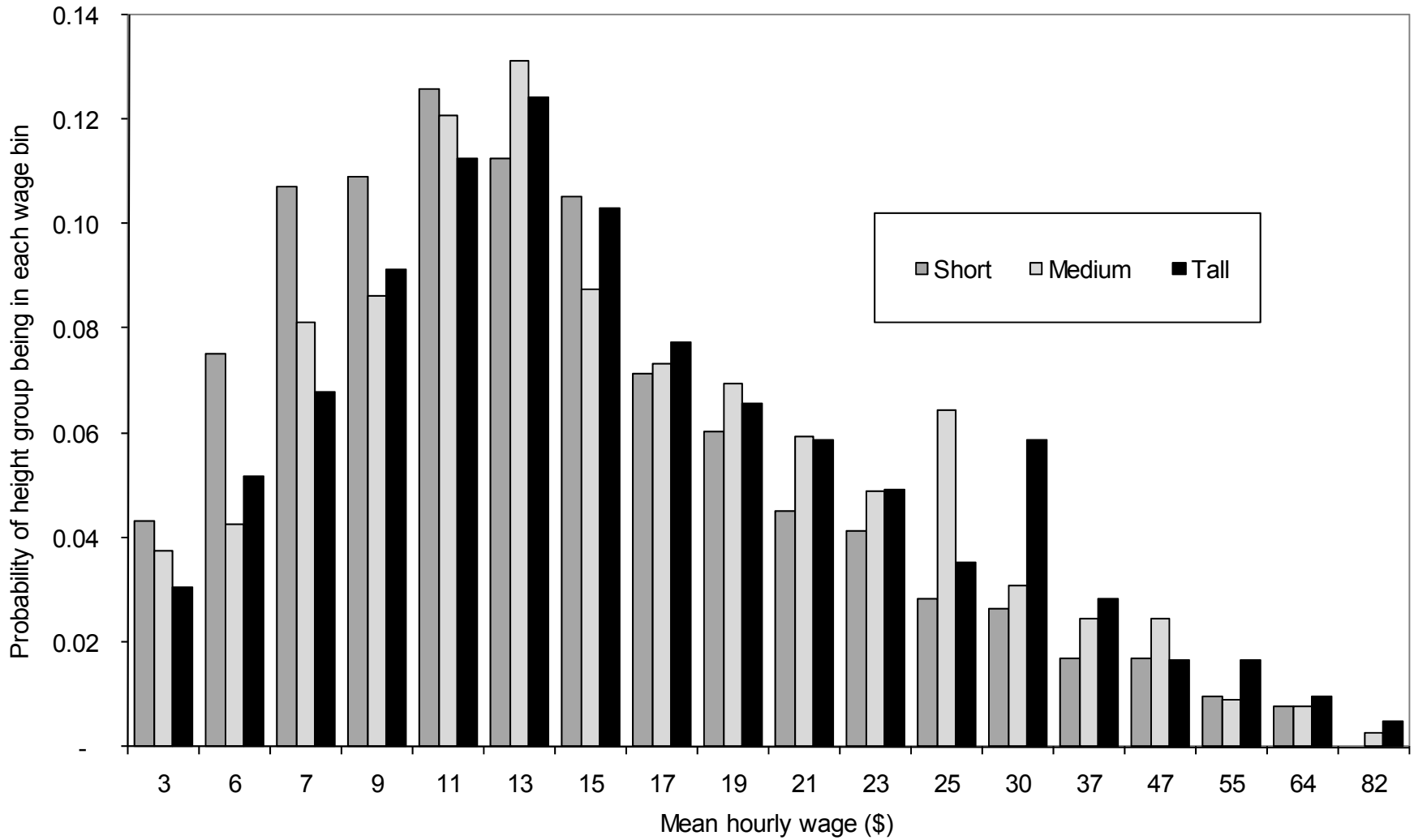
$\Longrightarrow$ Welfare increases every step, likely more accurate

Ideal lump sum taxes and height tax proxy

On Tuesday, we'll talk lots about redistributive taxation

- But basic goal is much like monopoly:
  1. Want to raise revenue to redistribute
     - From each according to ability...
  2. But tax on everyone discourages work, lowers revenue
- Could solve if you knew everyone's ability to earn
  - Just charge them this, don't worry about discouraging work
  - Equivalent of perfect price discrimination
- Absent this, use imperfect forms of price discrimination
  1. Find categories to put people
  2. Charge higher taxes to those with greater earning potential
  3. Allows more redistribution without high taxes on margin
  4. Exactly the same logic as 3rd-degree discrimination!
- Obvious category height: easy to observe, hard to change
  - Data shows tall earn more! Should we be taxing height?

Mankiw and Weinzierl's case for taxation of height



Broader forms of tagging

More broadly (and seriously) trade-off key in policy

- One hand: don't want to distort decisions, tax directly
- Other: if clear, price discriminations tells us to use
- Many areas of public policy can be interpreted in this way
  1. Affirmative action and racial preferences
     - Basing too much on income may discourage parental work
     - Cannot change their race, minorities poorer on average

     $\Longrightarrow$ Price discrimination suggests favorable treatment
  2. Complicated tagging and deductions in taxes
     - Aid to handicapped, single mothers, unemployed, etc.
     - If people cannot easily adjust, useful "tag" for discrimination

$\Longrightarrow$ Economists should not instinctively oppose

- While seems to violate equity, 2nd welfare theorem...
- Actually just follow from logic of price discrimination