Demand for Health Insurance

Health Economics Lecture 3b

Overview

1. The underlying purpose of insurance
2. Insurance basic concepts
   - Premium, Co-Pay, Actuarial fair premium, Load,
   - Experience rating, Group rating
3. Moral hazard
4. Role of groups in insurance

Purpose of Insurance

Non-Economists View of Insurance

- A fund to put money in, take money out
- Shopping club (e.g. Costco) to arrange discounts on health inputs

Political Aspects that Trigger People

- Insurance moves money from the healthy to the sick
- Moves money from the rich to the poor

Economists View of Insurance

- A product to help people make regular predictable payments instead of random, unpredictable, devastatingly large payments

A "triggered" view of insurance

- Walt from Indiana on CSPAN 9/22/09
  - My mom and dad came from old school. If you want something you have to do it. Throw your shoulders back and be responsible. Eliminate insurance companies, if you do not have money to got to the doctor, you cannot go. If you're an illegal immigrant, you cannot go. If you want a doctor's help, you have to pay from your pocket, or you cannot go. We cannot be spreading the wealth. I have lived—worked twjobs and I own everything that I have, A hardworking American. Who are you to tell me that the government can find me, can take money from me. Are out of your mind? It is mind-boggling to think that we have to pay for people who are not in this country legally popping out kids. And we have to pay for it. If you do not have money to pay for the doctor you will be turned away. The strong will survive in the end. The weak will fall by the wayside. It sounds terrible, but it is a reality. I am tired of paying for everybody else's free ride. No one has handed me anything for free. If you do not have any, you do not get any.

Multiple beliefs about the purpose:

RIGHT WING SEES
- Robin Hood: Paying for someone else's free ride
  – A transfer from the rich to the poor
  – A transfer from the healthy to the sick

LEFT WING SEES
- Merit good promotion
- A way to make health goods appear "free" so people will use more of them

ECONOMISTS SEE
- All people need a way to send money from self when healthy (and richer) to self when sick (and poorer)
- Insurance is that product
- Markets flawed*. Fix them.

Utility functions come from biology

- Starving and sickness face all life forms
- Starving and sickness are unpleasant

Biological problem for all organisms

- Transfer resources from fat times to lean times
- Self-reliant strategies
  - Intracorporeal
    - Starch stores
    - Fat stores
  - Extracorporeal
    - Food caches
  - Social…

Insurance in Social Mammals

- Success is variable
- Evolution of neural capacity for reciprocity
  - Recognize members of network
  - Help kin→They help you.
  - Enforce cooperation
- Spreads risk to a group of organisms

Two related reasons for risk aversion

- Diminishing marginal utility of income

- Disutility of income variance

- Suppose there was a lottery
    - 50% chance earn C^H =$500
    - 50% chance earn C^L= $100

Quiz

- Suppose there was a lottery with a 50% chance of winning $500 and 50% chance of winning $100. What is the best estimate of how much money you would have after you played 1000 times?
- A) $500,000
- B) $100,000
- C) $300,000
- D) $250,000

- Suppose there were an auction for one ticket to this lottery and it would go to the highest bidder. What is the most you would bid for a ticket to play?

- A) $100
- B) $200
- C) $250
- D) $300
- E) $310

- Expected value of playing the lottery is:
  - 0.5×$500 + 0.5×$100=$300
- John and Mary are given a choice of whether to play the lottery or just take a $250 "sure thing".
  - Mary plays the lottery
  - John takes the sure thing $250
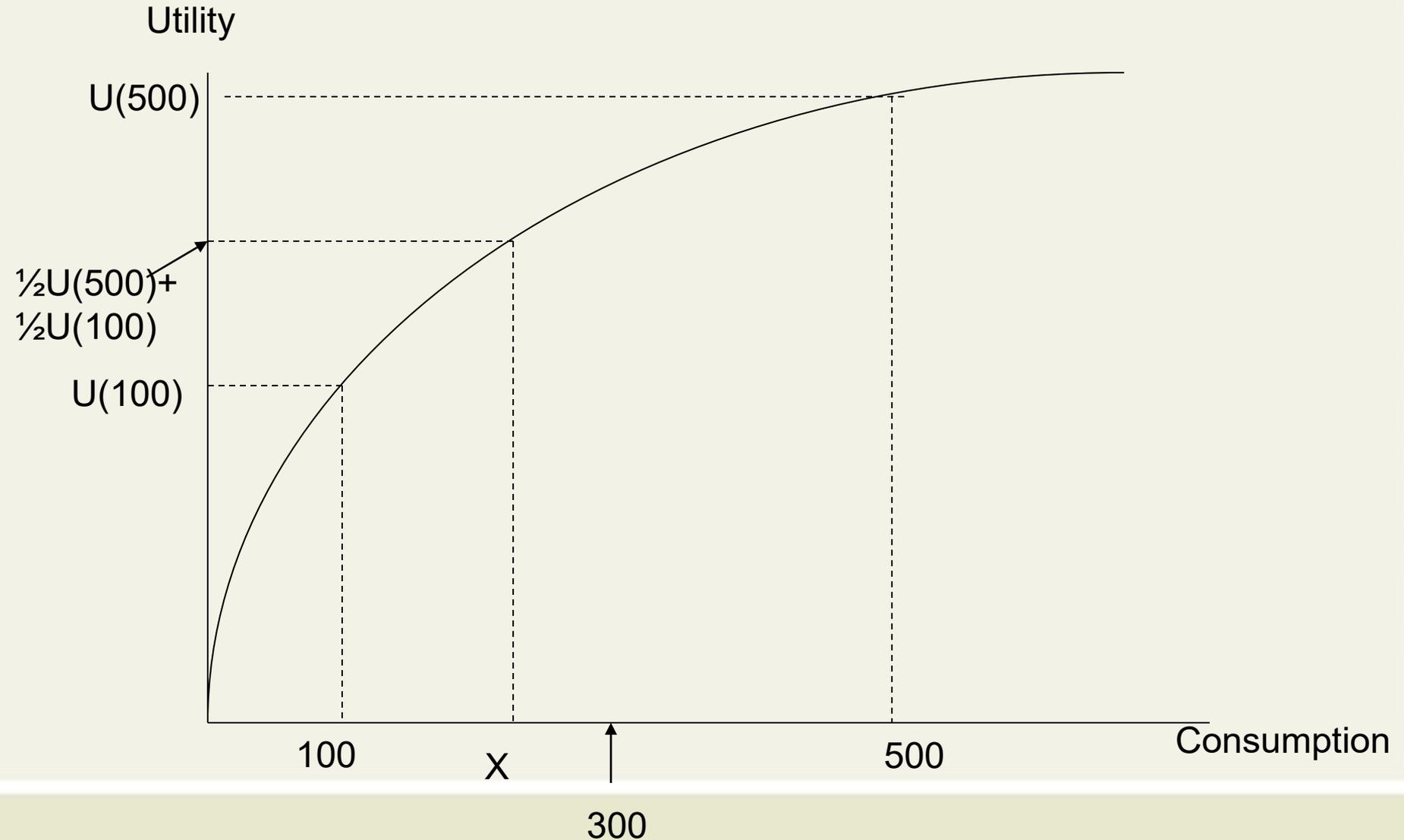- What have we learned about John and Mary?

Suppose governor says: "All citizens must pay $300 and play the lottery!"

- Joe assembles a group of 1000 people

- Joe is a selfless do-gooder

- Joe says give me $300 and I will play lottery for you

  - Joe "plays" the lottery 1000 times

  - He should earn $300,000

  - He pays each person their $300 back

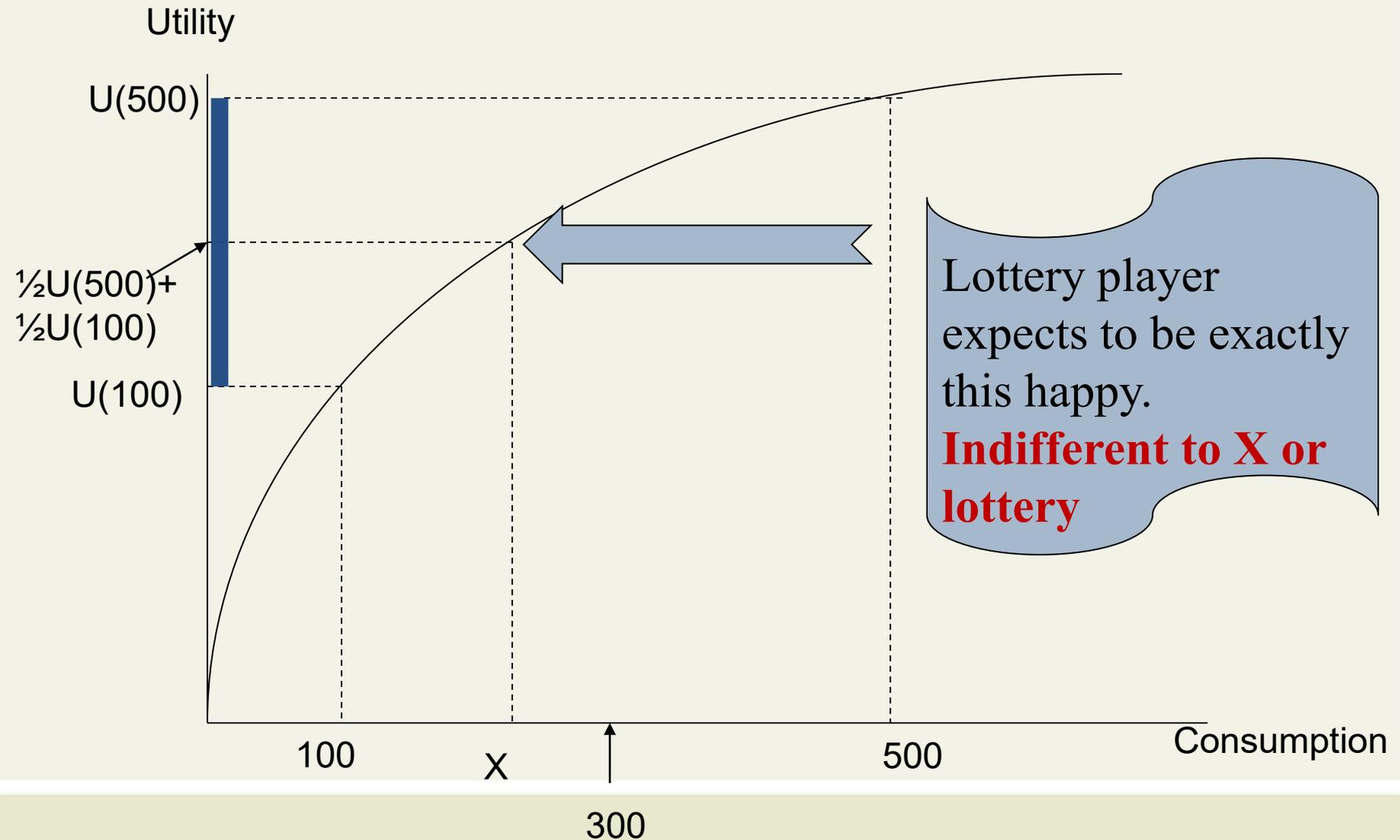- Why would anybody prefer to go to Joe instead of playing the lottery on their own?

Joe can make a profit!

- He can actually pay everybody X where X<$300

- His profit will be 1000*X

- X will equal the "risk premium" in his town

- DEFINITION : A *risk premium* is the amount of money a risk aversive person would pay to substitute a sure thing for a risky proposition

Expected Utility is 50% of Each Possible Utility for Risk Averse Consumers

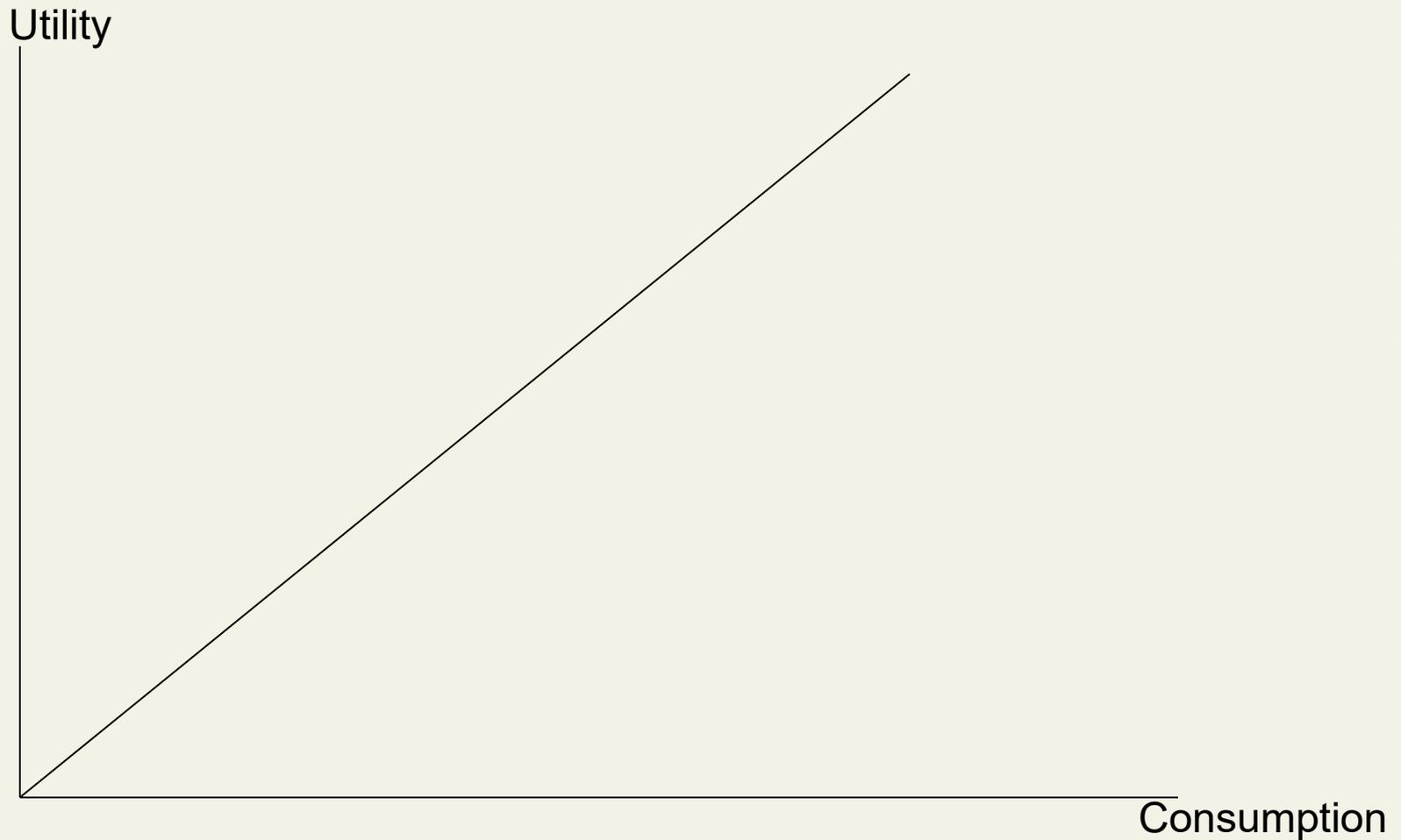# Expected Utility is 50% of Each Possible Utility for Risk Averse Consumers

Utility

U(500)

½U(500)+
½U(100)

U(100)

Lottery player expects to be exactly this happy.
Indifferent to X or lottery

100

X

500

Consumption

300

Risk premium is the difference between the expected payout and money it would take to give the expected utility
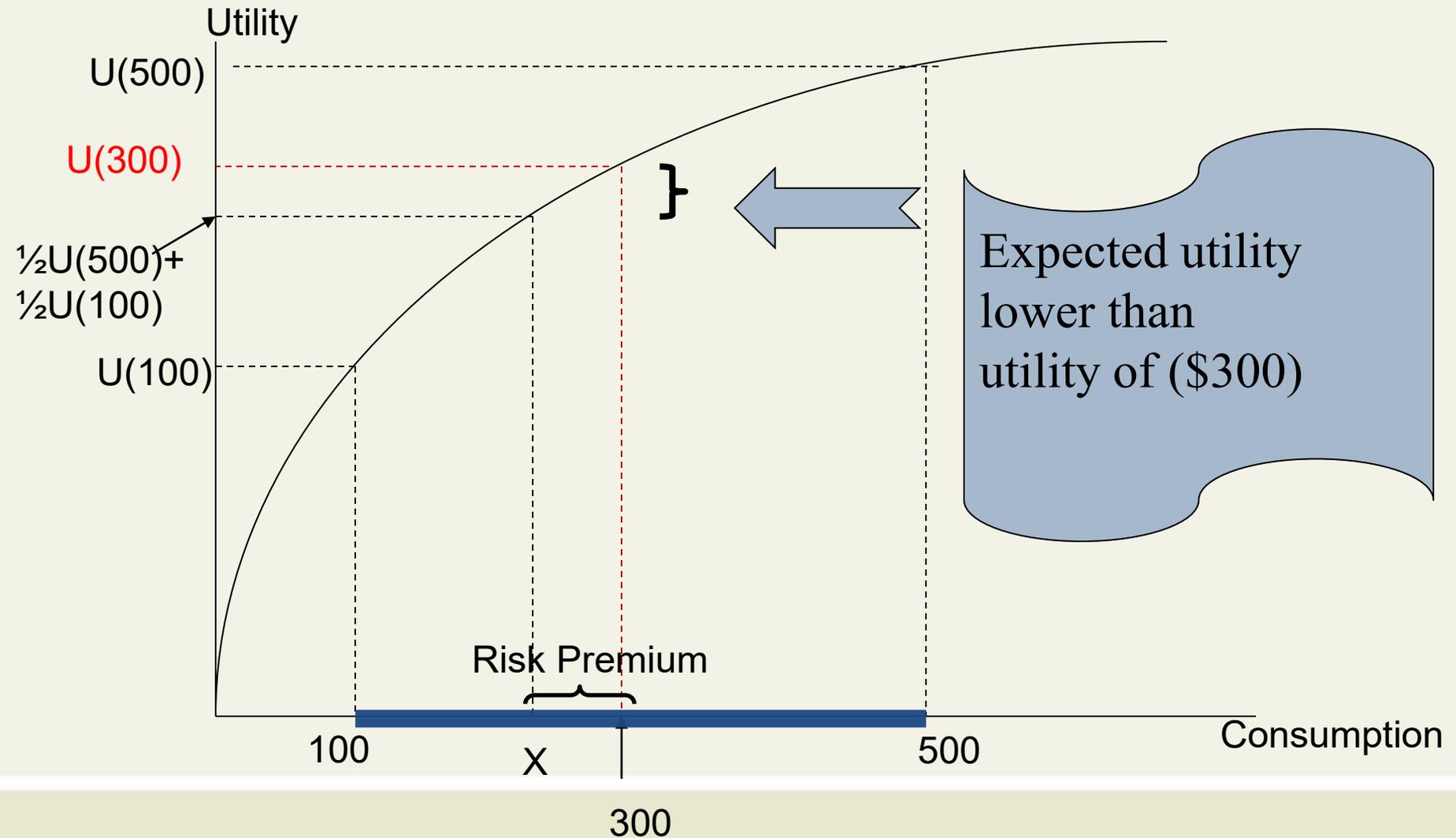
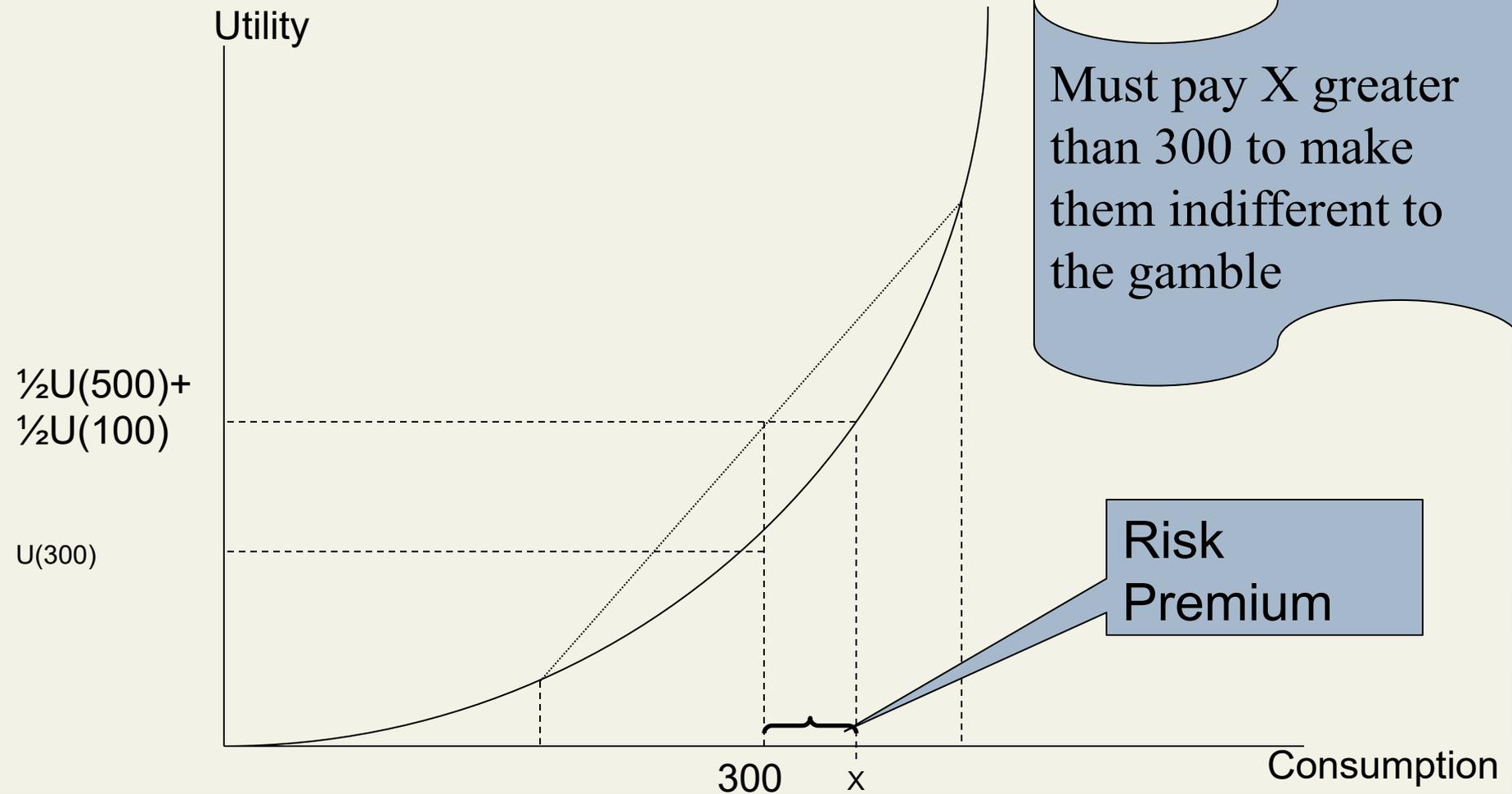# Risk Neutral Consumers
Risk Premium=0

Definition of Risk Premium

- A *risk premium* is the amount of money a risk aversive person would pay to substitute a sure thing for a risky proposition

- Proportional to the concavity of the utility curve
  - Positive if risk averse
  - Negative if risk loving
  - Zero if neutral

Biological Rationale for Risk Aversion

- Consider two income streams: A and B
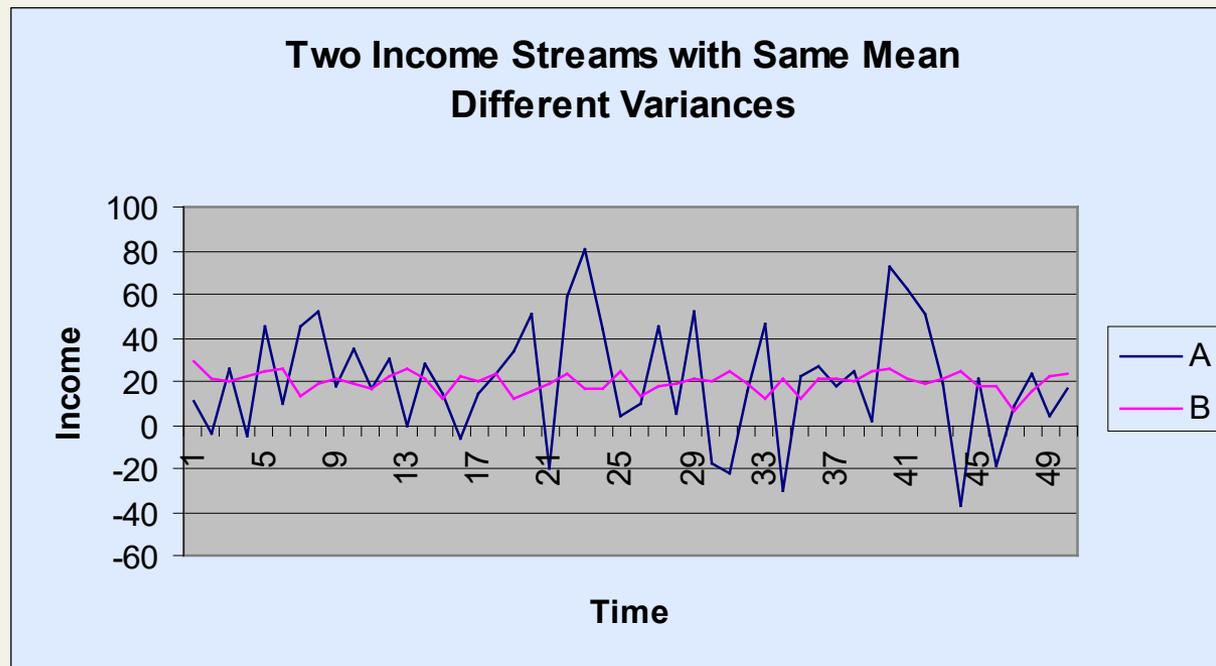
- Risk Aversion Means U(B) > U(A) even if $Y_B = Y_A$

- Insurance exists because
    - A) People are risk averse
        - Diminishing marginal utility of income and
        - Prefer smooth flow of resources
    - B) Nature offers variations in timing of resources and setbacks
    - C) Insurance is a way for your richer self to send money to your poorer self

Part 2: Basic Insurance Concepts

How to start an insurance company

- Step 1) <u>Pay marketer</u> to form a group (trickiest part)
- Step 2) <u>Pay retailer</u> to Collect premiums
- Step 3) Issue secure ID cards to group
  - Cards say: <NAME> paid $ premium and insurance will pay (1-Copay) percent of qualified expenses
- Step 4) <u>Pay financial wiz</u> to invest premiums in stock
- Step 5) Wait for claims
- Step 6) <u>Pay billing wiz</u> to challenge claims
- Step 7) Pay claims

- Insurance is a contract, a piece of paper that offers the following promise:
  - "In exchange for *Premium,* the insurance company will pay (1-C)% of qualified medical expenses (X_i)"

Definitions

- *Premium*--The money paid by the customer to the insurance company to purchase the contract is called the *premium (P)*

- *Indemnity*—The amount that the insurance company has to pay out in claims
    - $(1-C)X$
- *Co-Pay*—When there is a claim, the proportion of the claim paid by the patient is the co-payment
    - (C)
- *Deductible*—The amount the insured is required to pay out of pocket before the insurance coverage begins. A per-event deductible is the same as a co-pay. There can also be an annual deductible.

Total Revenue=Total Expenses

Total Revenue $= \sum P_i$

Total Revenue $= N\ \overline{P}$

for N people paying $\overline{P}$

Total Expenses=

$\sum(1-C)X_i + (\text{ Total Load})$

Total Load=

$\lambda(\sum(1-C)X_i$

Total Expenses=

$(1+ \lambda)\ (1-C)N\overline{X}$

for N people claiming $\overline{X}$

Revenue= Medical Expenses + Total Load

Revenue > Medical Expenses

$$\sum P_i > \textcolor{red}{\sum(1-C)X_i} \quad \textit{If you divide by N to average} \rightarrow$$

$$(\sum P_i/N) > (\sum(1-C)X_i/N) \rightarrow$$

$$\overline{P} \qquad > \qquad (1-C)\ \overline{X}$$

Otherwise firm goes bankrupt

- Need to predict $\overline{X}$

- $\overline{X}$ is the average amount of medical expenses in the company's insured population

- $\overline{X}$ = Average Prob(Sick) * (AverageCost if Sick)

Actuarial Fairness

- <u>Definition:</u> "*actuarially fair premium*" is the average value of indemnity payment

- For a population of "N" insured people

$$\text{Actuarially Fair Premium} = \frac{\sum (1-C)X_i}{N} = (1-C)\,\overline{X}$$

- Insurance that charges actuarially fair premium pays all its revenue out and has no money to pay its own staff

  - Insurance company charges a "load" on top of actuarially fair premium

Insurance Load

- Pays for
  - Marketer
  - Retailer
  - Financial planner
  - Billing specialist
- Load expenses are proportional to indemnity
- Average Load Expense=$\lambda(1-C)\ \bar{X}$
  - λ is the loading factor

- Observed Premium=$(1 + \lambda)$ × Actuarially Fair Premium
- Actuarially fair premium=Premium that would be charged if load were $0.
  - This never happens
  - There has to be a load
- Load is the "cost of insurance"
  - Insurance means money has to move from payers to claimers
  - Moving money is costly

- Skyscrapers full of
  - Claims analysts pushing paper back and forth in billing arms race
  - Fraud detectors
  - Cost controllers
  - Marketing reps
  - Financial investors who park unspent funds in stock market

Hartford Connecticut Skyline 2005

Suppose 2000 people have a 1/5 chance of a hospitalization . Each hospitalization costs $5,000. Co pay is 20%. Load is 30%

1. How many hospitalizations are there going to be?

2. What is ΣX?

3. What is $\Sigma X/N$

4. What is $(1-C)(\Sigma X/N)$?

5. What is actuarially fair premium?

6. What is the loaded premium?

7. Can the policy sell?

Company A has 2000 people with a 1/5 chance of a hospitalization . Each hospitalization costs $5,000. Co pay is 20%. Load is 30%

1. How many hospitalizations are there going to be?

2. What is ΣX?

3. What is $\Sigma X/N$

4. What is $(1-C)(\Sigma X/N)$?

5. What is actuarially fair premium?

6. What is the loaded premium?

7. Can the policy sell?

Company B has 300 people with a 1/3 chance of a hospitalization . Each hospitalization costs $5,000. Co pay is 20%. Load is 30%.

1. How many hospitalizations are there going to be?

2. What is ΣX?

3. What is $\Sigma X/N$

4. What is $(1-C)(\Sigma X/N)$?

5. What is actuarially fair premium?

6. What is the loaded premium

7. Will a policy like this sell?

- Company A and Company B merge to form company C which has 2000 people who used to pay $1040 and 300 people used to pay $1733
- What should the premium be?

Experience vs. Community Rating

- "Experience-rated" insurance sets premiums based on each individual's previous claims history

- "Community rated" insurance sets premiums based on universe of all individuals or subgroups

- Pros and Cons?

Individual or Group Insurance

- Individual insurance: Contracts are sold one at a time to individuals

- Group insurance: Contracts are sold one group at a time

  – Insurance for Johns Hopkins employees

  – Insurance for Baltimore County Farmer's Assoc.

  – Insurance for employees of Joe's Pizza

- Pooling of people with different health status

- Lower administrative costs (as size increases):
  - Fixed costs of administration spread over many people
  - Purchaser's bargaining power
  - Fewer "underwriting" costs as group becomes "average"

- Easier "shopping" ("informational economies")

- But why should a group be a set of *workers*?
  - Random collection of people with varying health?
  - Concerned about the health of their workers?
  - Anecdotally, the effect of WWII's wage freezes
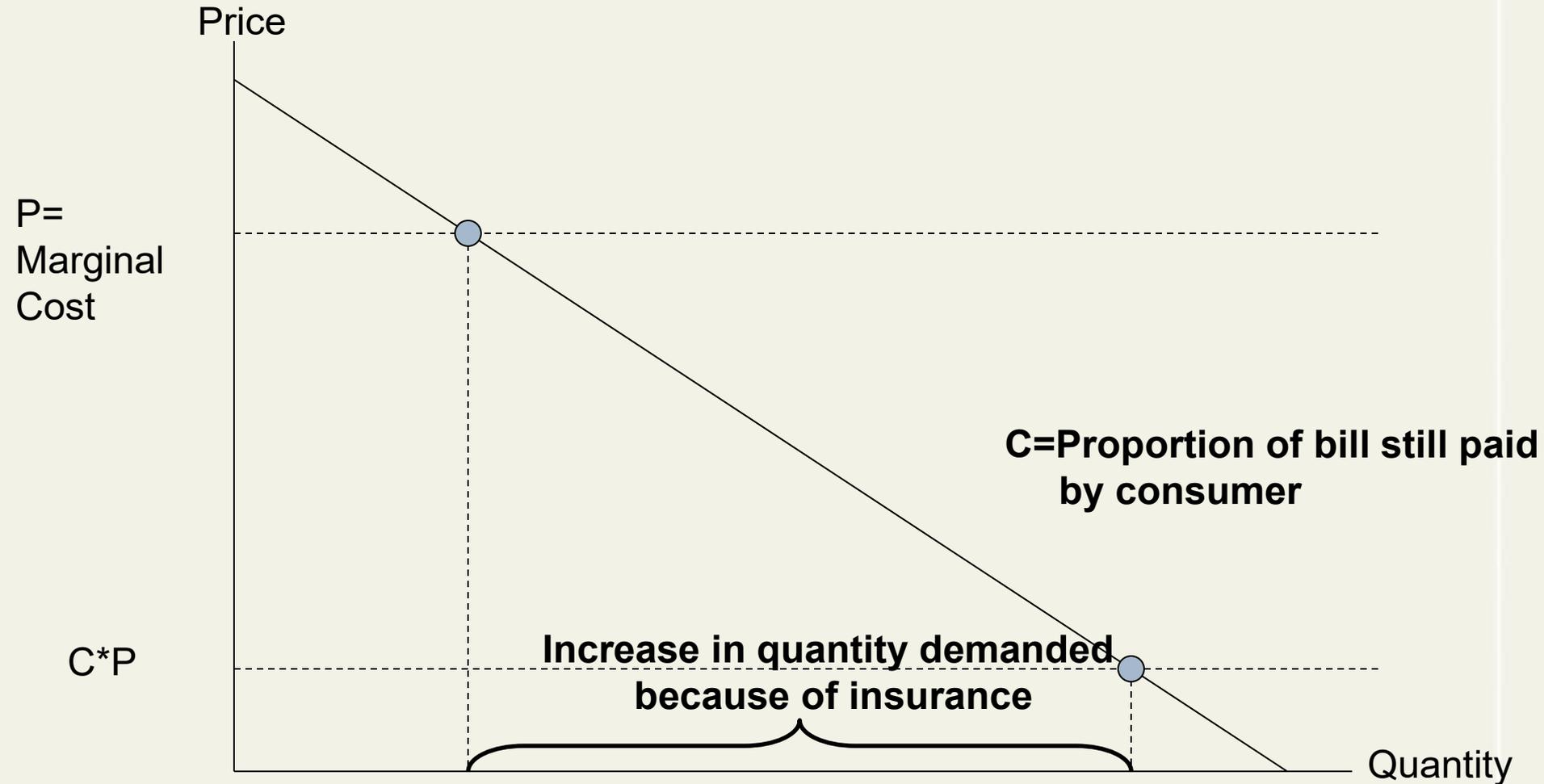
Part 3 Moral Hazard

Moral Hazard

- *Moral hazard* occurs when a person's behavior regarding risks and utilization is affected by their insurance coverage
    - Example: Using generics if no prescription benefits but name brand drugs if prescriptions are insured
    - Example: Bankers' investment decisions if bank bailouts are a sure thing
    - There is nothing "immoral" about it
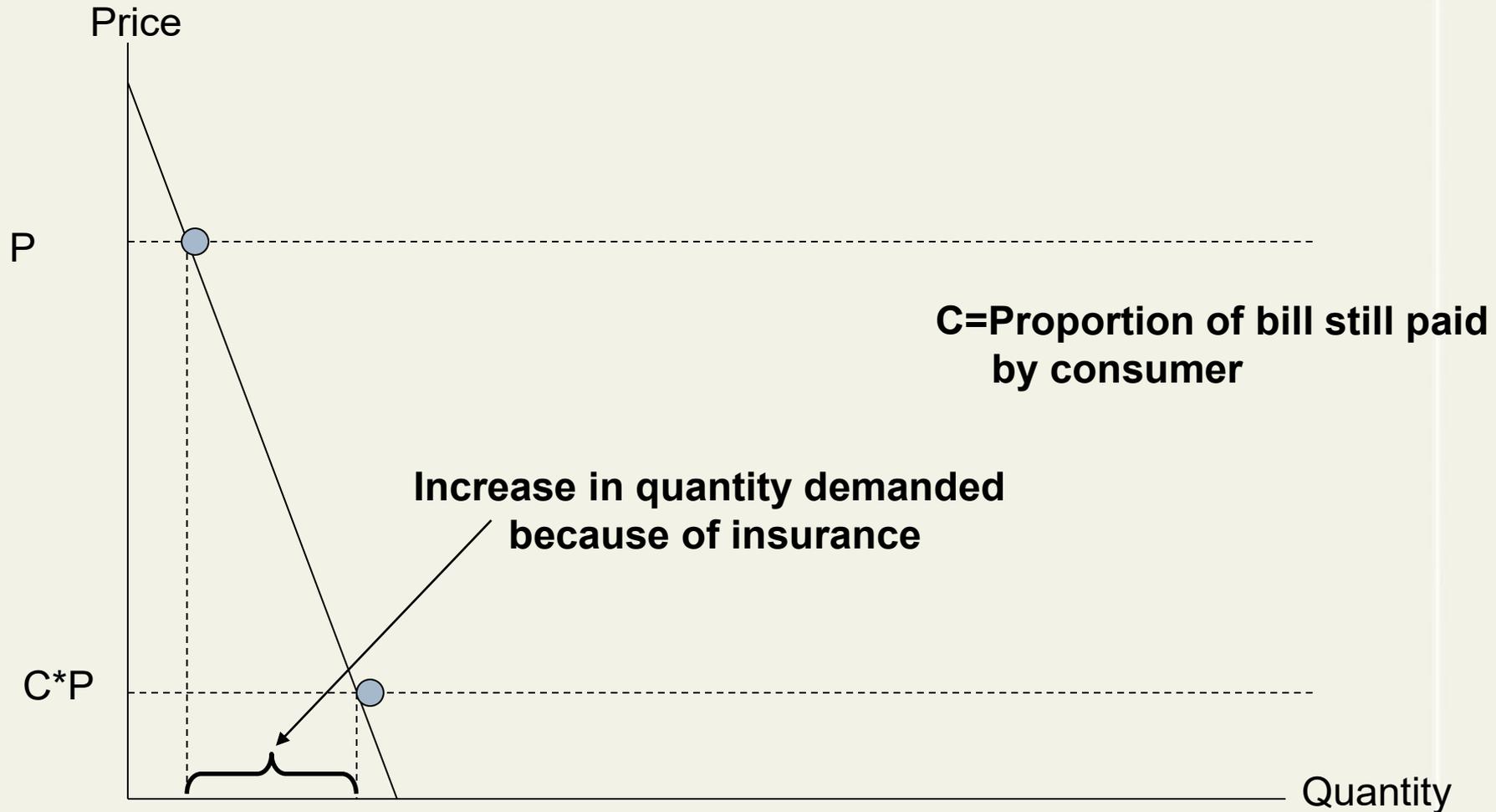   - It is simply a perfectly rational response to incentives

How Does Insurance Affect the Demand for Medical Care?

- Is the demand for health care price responsive?

  - Yes

  - Offer insurance and claims increase

- What drives the higher claims?

  - Care that produces more "health"
  - Care that reduces uncertainty
    - More tests
    - More second opinions
  - Care that provider thinks a patient might want if it were "free", but not at full cost
  - Higher quality health care

Relatively Elastic
Demand with Coinsurance

Price

P=
Marginal
Cost

**C=Proportion of bill still paid
by consumer**

C*P

**Increase in quantity demanded
because of insurance**

Quantity

Price

P

C=Proportion of bill still paid by consumer

Increase in quantity demanded because of insurance

C*P

Quantity

Should toothpaste be insured?

- If insurance is only intended to send money from healthy self to sick self. Should insurance cover?

    – Emergency services

    – Non-discretionary services

    – *Discretionary services*

    – *Preventive services*

- Buying things with "insurance dollars" is always more expensive for society because of the load.

- Money illusion makes "insurance reimbursed toothpaste" look cheap and you may brush more

    – But you pay the load in your premium or in your taxes

Welfare losses from "excess" insurance

- Answer depends on cost minus benefits
    - Benefits is the utility gained because of reduced uncertainty in the variability of expenses
    - Cost is the insurance administrative cost PLUS the overutilization of unnecessary care that insurance induces
- It is possible to be an "overinsured" population
    - The cure is to introduce higher co-pays and to reduce administrative costs of insurance companies
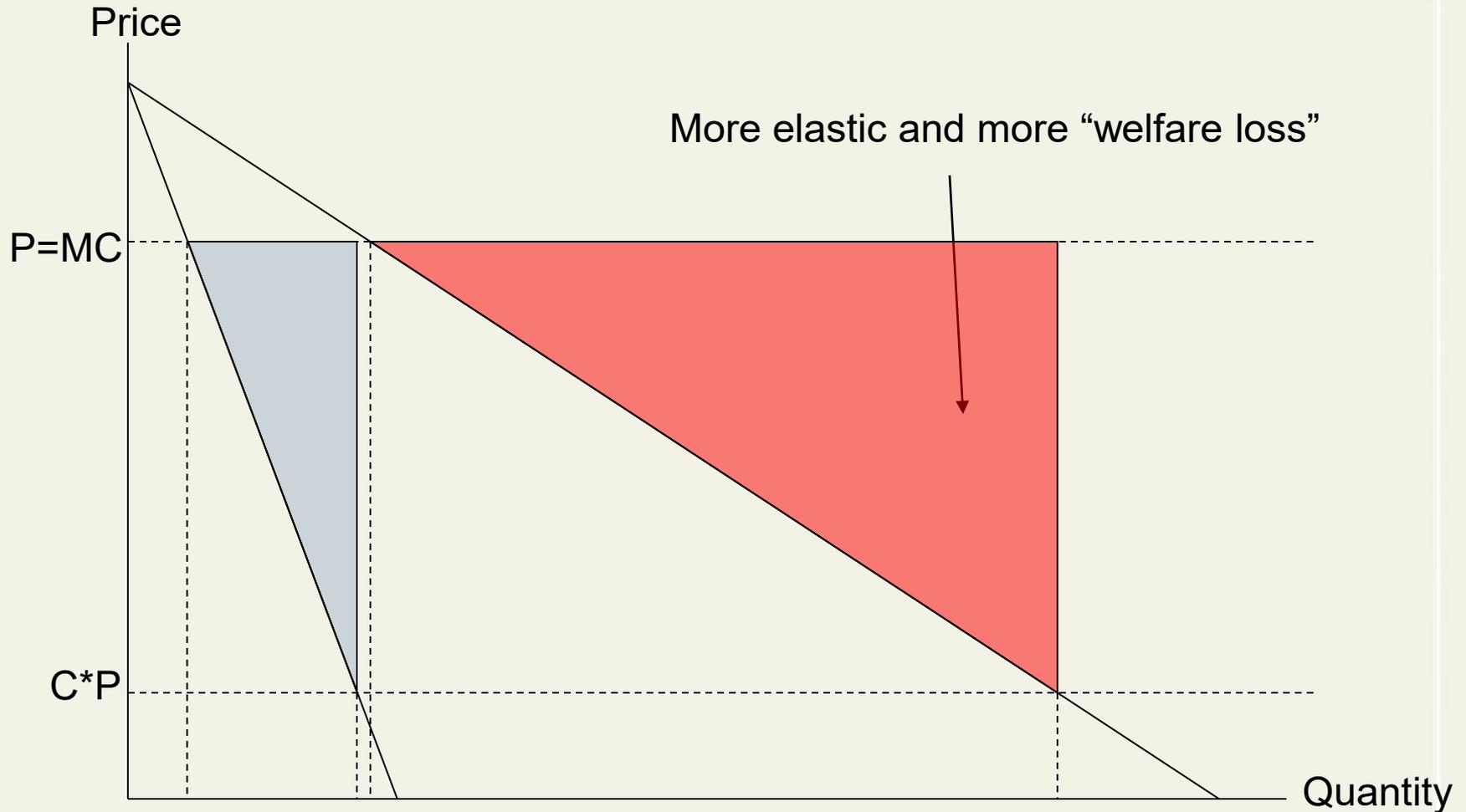
Deadweight Loss

- The difference between the total cost of supplying quantity Q and the total benefit of consuming quantity Q

Moral Hazard Control Strategies

- To alleviate the incentive to consume more, insurers use deductibles, coinsurance, and/or copayments.

- Evidence: The RAND Health Insurance Experiment
  - Why was this randomized control trial done?
- RAND Health Insurance Experiment suggests that people forego both less and more valuable care

TABLE 3—VARIOUS MEASURES OF PREDICTED MEAN ANNUAL USE OF MEDICAL SERVICES, BY PLAN

Plan	Likelihood of Any Use (%)	One or More Admissions (%)	Medical Expenses (1984 $)
Free	86.7	10.37	777
	(0.67)	(0.420)	(32.8)
Family Pay			
25 Percent	78.8	8.83	630
	(0.99)	(0.379)	(29.0)
50 Percent	74.3	8.31	583
	(1.86)	(0.400)	(32.6)
95 Percent	68.0	7.75	534
	(1.48)	(0.354)	(27.4)
Individual	72.6	9.52	623
Deductible	(1.14)	(0.529)	(34.6)

Source: Manning, W., et al., 1987, "Health Insurance and the Demand for Medical Care," *American Economic Review* 77.3, 251-277.

Part 4 Role of Grouping in Insurance

Grouping is the key to insurance

Employer-based groups

- Employer gathers the group of employees

Individual markets

- Individuals apply one at a time

Government groups

- Medicaid for low income
- Medicare for seniors

Groups Offer Returns to Scale

- Accurately predicting indemnity payouts is very important
  - Allows companies to invest the surplus in financial markets
  - If actual payout>predicted payout: company faces bankruptcy
  - If predicted>actual: company wastes investment income opportunities
- Large numbers of insureds make prediction more precise
- Scale larger than 10,000 necessary to be competitive

Administrative Costs as a Percent of Incurred Claims, by Firm Size (number of workers), 1988
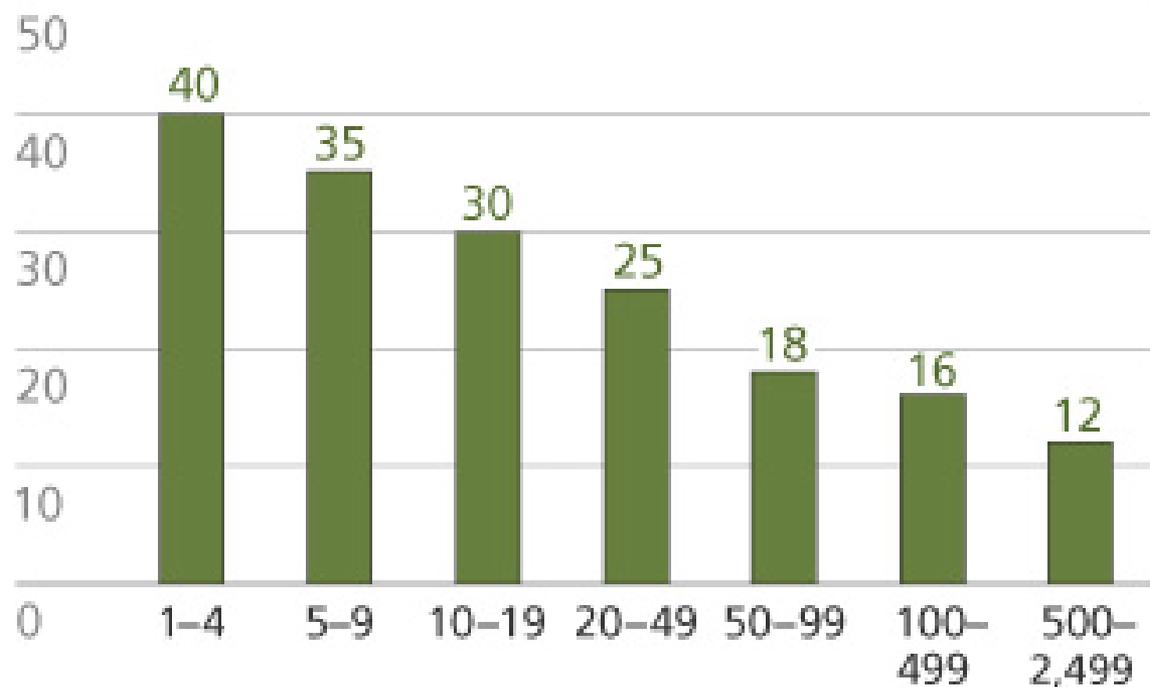
The Synthesis Project: New Insights from Research Results
Policy Brief No.2 September 2002

Why premiums are lower for groups

- 1) Returns to scale in marketing
- 2) Adverse selection controlled
- 3) Indemnities more predictable due to law of large numbers

Insurance outside of Groups

- Prior to ACA, individual insurers engaged in "medical underwriting"
- Applicants for individual insurance had to disclose pre-existing conditions
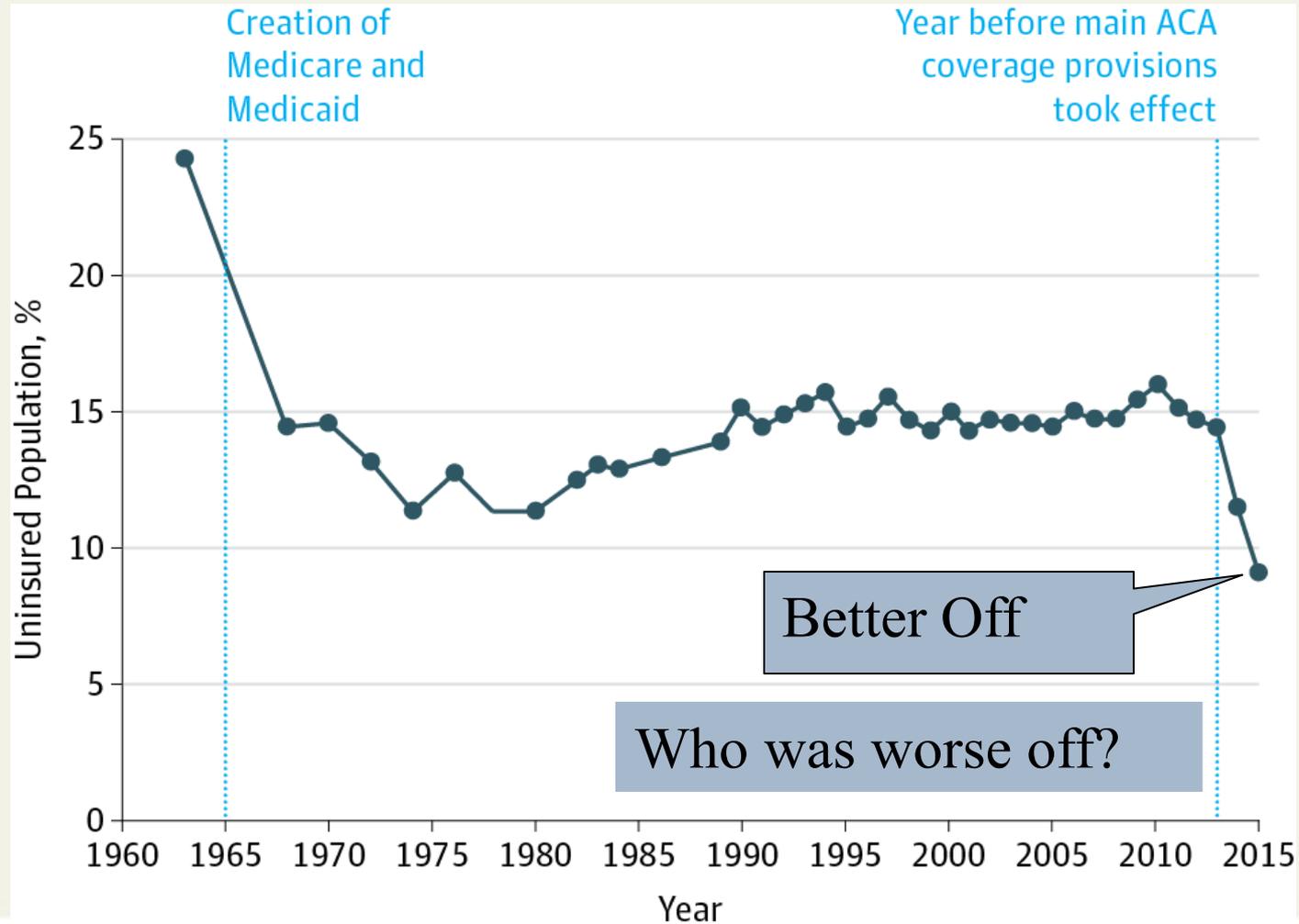
Declinable Conditions Prior to ACA

Condition	Condition
AIDS/HIV	Lupus
Alcohol abuse	Mental disorders
Arthritis	Multiple Sclerosis
Cancer	Muscular dystrophy
Cerebral palsy	Organ transplant
Coronary artery disease	Paralysis
Diabetes	Pregnancy
Hepatitis C	Sleep apnea
Epilepsy	Obesity, severe

How common are these?

- Roughly 27% of Americans under 65 have a condition that makes them uninsurable.
- Prior to ACA 18% of applications on individual market were declined.
  - Many other applications approved, but with surcharges or exclusions for the pre-existing conditions

- Which conditions for competitive equilibrium does this violate?

Was ACA a Pareto Optimal Policy?

- Demand for insurance is based on willingness to pay to have less variation in income
- Insurance means moving money from our healthy selves to our sick selves
  - It is a service that we have to pay for
  - It is a service that we <u>want</u>
  - It is a service that is cheaper when bought by groups
  - Forming a group can be a Pareto Optimal policy
- Like any service, it is possible to have too much or too little—it all depends on
  - Marginal Benefit=Marginal Cost of More Insurance