Outline – Swanson Module

- The Demand for Health Care, Information, and Insurance
  - What is health economics?
  - Who are the players?
  - Principles of health economics
  - Application: insurance
  - Application: supplier-induced demand

- Value and Innovation in Health Care
  - Innovation, competition, and regulated monopolies
  - Coverage and cost-sharing
  - Physician gatekeeping and pay-for-performance

What is health economics?

- Basic economic concepts
  - Supply
  - Demand
  - Elasticity
  - Competition (or lack thereof)
  - Equilibrium
Why is health care special?

- Uncertainty
- Agency
- Role for insurance
- Moral imperative for expanded access
- Not just a consumption good but a good that allows consumption
- Complexity
- Not-for-profit delivery

→ Arrow (1963) outlined the key features that make health care delivery unique: information

What is health economics?

- Study of
  - Incentives
  - Allocation of scarce resources
  - Technology
  - Policy
- Applied to
  - Health
  - Health care delivery
  - Insurance

Supply and Demand in Health Care Markets

![Graph showing supply and demand in health care markets.](image-url)
Supply, demand, and welfare

- Under some assumptions:
  - Sellers and buyers can assess the relevant dimensions of the goods
  - Sellers and buyers are price takers (no market power)
  - All relevant prices known to all participants
- >> Perfect competition: price = MC and competitive equilibrium is socially (Pareto) optimal
  - Cannot make anyone better off without making someone worse off
- Does this hold in health care?

Supply and demand in health care markets

Supply
- Regulated prices
- Insurer incentives (e.g. FFS)
- Highly skilled and scarce physicians
- Rapid technological and scientific change

Demand
- Insurance
- Asymmetric information
- Physician agency
- High stakes and uncertain
- Difficult to measure quality
Iron Triangle: Key trade-offs in health care

- Cost
- Quality
- Access

We’re from Latin America, why bother talking about the U.S.?

- Many examples from the U.S.
  - Most of the literature
  - A little bit of everything (good, bad and ugly)
- Approach: Identify key economic concepts, use (mostly) U.S. examples and evidence, apply to another setting
- Also important examples from other countries (Financing and Paying for Health Care)

Role of information in health care

- Most important economic issue: information
  - Asymmetric information between patient and insurer
    - Moral hazard
    - Adverse selection
  - Asymmetric information between provider and patient
    - Supplier-induced demand
    - Quality measurement
  - Undermines concept of the demand curve
Are people better off with health insurance?

- Depends on risk aversion
- Risk averse consumers prefer to make a smaller guaranteed payment rather than a large payment with low probability
- The larger the loss and the lower the probability of loss in the population (higher the variance is) the greater the value of insuring
- Risk aversion depends on diminishing marginal utility of wealth

How does it work?

- Insurance works by pooling risks
- Relies on the statistical Law of Large numbers
  - As the number of pool members increases, the variance of the expected loss goes to zero
  - Requires predictable loss probabilities
  - Requires uncorrelated losses

A Very Simple Insurance Pool

- Imagine 10 people each facing a loss of $100 with a probability of 0.1
  - \( E(\text{loss}) = 0.1(100) + 0.9(0) = 10 \)

- Each individual agrees to pay $10 and the ‘loser’ will get the $100
  - Actuarially fair premium is $10 (expected loss)
  - Each individual ends up with a certain $90
Why People Buy Insurance

- Assume probability of loss is 0.4 and loss is $10K
- Diminishing MU of wealth says that U(EV) > EU (length of CB)
- → prefer to pay the $4,000 for certain than risk the gamble
- Would be willing to pay an additional risk premium up to AB

Structure of Indemnity Insurance

- Figure 3: Cost Sharing Under Indemnity Insurance

Moral Hazard

- “…the problem of ‘moral hazard’ in insurance has, in fact, little to do with morality, but can be analyzed with orthodox economic tools”
- Two types of moral hazard:
  - Ex ante: Behave differently because you are insured against a bad outcome
  - Ex post: Behave differently because you face different prices at the margin
### Coinsurance

<table>
<thead>
<tr>
<th>m1</th>
<th>m2</th>
<th>m</th>
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<tbody>
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### Additional Expenditure

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### Welfare Gain

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<tr>
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</table>
**Coinsurance**

- Concept is to avoid insuring 'small' losses
- The effects on demand depend on illness
- Mild illness: Consume as if no insurance
- Severe illness: Consume as with coinsurance
- Moderate illness: Depends on the size of A vs. B

**Deductibles**

**Application – Choosing among treatment alternatives**

- Humira (adalimumab)
  - Anti-inflammatory biologic (TNF inhibitor)
  - Indications
    - Rheumatoid arthritis
    - Ankylosing spondylitis
    - Psoriatic arthritis
    - Crohn's disease, ulcerative colitis
    - etc.
- Pros and cons?
Application – Choosing among treatment alternatives

- Economic issue – heterogeneity in effectiveness
  - For some patients, B>C
  - For others, C>B

- Demand-side incentives (managed care)

UnitedHealthcare Prescription Benefit Management

For future, our Pharmacy & Therapeutics Committees determined that several other drugs should be used as alternatives to Humira for treating various conditions. These alternatives were designated Step 1 medications.

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Step 1 Medication</th>
<th>Step 2</th>
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<tr>
<td>Adalimumab</td>
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<td>Antagonist</td>
<td>Golimumab, Infliximab</td>
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</table>

© UnitedHealthcare
Relating Insurance to Payments

- Supply side incentives might mitigate problems of moral hazard
  - Managed care options: prospective payments, capitations, and cost sharing contracts
  - Potential downsides: rationing, risk selection

- Design of insurance schemes cannot focus either solely on demand for care or on supply of care

Fundamental Trade-off

- Moral hazard means that more insurance leads to greater low value expenditures
- Reducing insurance coverage exposes individuals to greater risk

Adverse selection: modeling a used car market

Model set up:
- Cars are of varying quality
  - Indexed by z between 0 and 2 (in ¼)
- 10 sellers who know the value of their cars
  - Value each .25 z at $1250
- 10 buyers who don’t know the value of any given car but do know the distribution
  - Value each .25 z at $1875
- Auctioneer shouts out a price and each person decides whether they are willing to buy or sell
For buyer, \( EV = \text{Prob Seller } \times Z_i \)

\( = 7,500 \)
The Auction

Round 1 $10,000

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<td>2500</td>
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<tr>
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<td>Y</td>
<td>3750</td>
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<td>Seller 5</td>
<td>1</td>
<td>Y</td>
<td>5000</td>
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<tr>
<td>Seller 6</td>
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<td>6250</td>
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<td>8750</td>
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<tr>
<td>Seller 9</td>
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For buyer, \( E[V] = \text{Prob Seller } P \times Zi \) = $7,500

No transactions, move to next round.

Round 2 $6,000

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For buyer, \( E[V] = \text{Prob Seller } P \times Zi \) = $3,750

The Auction

Round 2 $6,000

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The Auction

- **Round 2 $6,000**

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</table>

  For buyer,
  \[ \text{EV} = \text{Prob Seller } F \times z \]
  \[ = 3750 \]

  No transactions, move to next round

- **Round 3 $1,000**

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</table>

  For buyer,
  \[ \text{EV} = \text{Prob Seller } F \times z \]
  \[ = 3750 \]
The Auction

Round 3 $1,000

For buyer, \( E[V] = \text{Prob Seller } i \times Z_i \) = 0

No transactions, move to next round.
The “Lemons” Problem

- Akerlof (1960)
- Demonstrates that asymmetric information (as opposed to imperfect information) leads to undersupply
  - Welfare enhancing transactions do not occur
  - Difficult because markets may not exist (as opposed to observably performing poorly)

Generalizing adverse selection

- Cost (quality) is correlated with willingness to pay (accept)
- What is the analog in insurance markets?

- Sick people are “lemons”!
The Harvard University case

- In 1992 Harvard offered a generous PPO plan and a number of HMOs to its 10,000 employees
- Premiums for the PPO and HMOs converged to within $100 of each other by 1993
- In 1995 the University undertook vigorous negotiations to reduce premiums on the HMO options
- A death spiral resulted with healthier patients moving towards the HMO and subsequent increases in premiums for the PPO

Implications for insurance markets

- Competition is not over plan attributes or price in the conventional way
  - Offering more plans to employees may not improve things [Harvard example]
- Health insurers prefer not to offer goods that relatively worse risk (less-healthy people prefer)
  - Prefer not to offer tools that improve health for chronically ill
  - Instead offer gym memberships
- Competition need not enhance welfare
  - Tradeoff losses from competition over selection against gains from plan innovation

Policy tools to counter adverse selection

- Mandate
- Risk adjustment
- Limits on prior conditions (can’t insure against becoming a “bad type”)
- Community rating (need mandate)
- Reinsurance
- Single payer
- Pooling mechanisms uncorrelated with health → employers

Very difficult to get exactly right

- Example: Risk selection + community rating in Medicare Part D
  - Each insurance plan charges same price to all comers
    - Not exactly “asymmetric” information, but “unpriced” information
  - The government pays insurers on the basis of enrollee diagnoses
    - Payments calibrated at a point in time, but technology changes
Very difficult to get exactly right

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- Each insurance plan charges same price to all comers
  - Not exactly "asymmetric" information, but "unpriced" information
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  - Payments calibrated at a point in time, but technology changes
  - New molecule introduction (direction?)
  - Generic entry (direction?)
- Some diagnoses were profitable: P>C
- Some diagnoses were profitable: P<C

Very difficult to get exactly right

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- Insurers must cover all drugs in 6 “protected” classes: antiretrovirals, antineoplastics, antidepressants, antipsychotics, anticonvulsants, immune suppressants
- Plans must cover two drugs in each “therapeutic class”
  - Competition
    - Which drugs to cover?
    - How high are copays?
### Example: multiple sclerosis

- As of 2009, beneficiaries with MS cost Part D plans $1,241
- But insurers only received about one-third of that amount in diagnosis-specific payments
- Culprit: introduction and expansion of several expensive immunological drugs (e.g., natalizumab) (Miller 2011)
- Impact across all diagnoses: $10 higher risk-adjustment implies higher coverage rates, lower ($5-$8) copays (Carey 2014)
- Transfer from unprofitable patients to profitable patients
- Higher uninsurance

### Information problems more broadly

- How to measure quality?
- Health = latent health + treatment quality + behavior
- Providers are experts – agency

### Introduction: consumer choice in health care

- Choice in health care is not a standard process
  - Information
  - Agency
  - Supplier incentives
- Demand side questions:
  - Do consumers choose high quality doctors?
  - How does a physician-agent alter choice?
  - What role does physician-provider matching play in outcomes?
  - How does formal reporting alter these effects?
- Supply side questions:
  - What objectives do physicians have?
  - How do suppliers respond to information on quality?
Categorizing care

- Dartmouth researchers classify the variations in care into three categories
- **Underuse** of effective care
- **Misuse** of preference-sensitive care
- **Overuse** of supply-sensitive care

Underuse of Effective Care

- Services that are of proven value and have no significant trade-offs
- **Example:** Eye exams for diabetics
- McGlynn: 55 percent get recommended care
- Receipt of recommended care in Medicare is inversely correlated with spending
- Possible explanations
  - Too many docs with none clearly in charge and responsible for care
  - Financial incentives are lacking
Misuse of preference-sensitive care

- Care that involves trade-offs affecting quality and/or length of life
  - Hip and knee replacements
  - Variation in breast cancer treatments

- Possible explanations
  - Practice style hypothesis: local medical opinion has a strong influence on treatment choice (lack of consensus)
  - Imperfect information
  - NOT driven by supply

Overuse of supply-sensitive care

- Care whose frequency of use is not determined by well-articulated medical theory
  - Examples: hospitalizations, physician visits, and diagnostic tests esp. for chronic illnesses
  - Variation in this care explains most of the variation in Medicare per capita spending
  - High spending regions not associated with better outcomes
  - Are these variations evidence of inappropriate or inefficient care?
Explaining the variations

- Supply and demand factors
  - Explain between 40 and 75 percent of variation according to several multivariate analyses
- Imperfect information and physician uncertainty
- Practice styles
Information, quality, and price

- How does quality information impact price?
  - Jin and Sorensen (2006) find price response increased when quality information became available
    - What could explain this?
    - What if demand sloped upward?

Provider choice

- Specialist choice differs from primary care choice (focus on latter)
  - Process:
    - Choose a primary care physician (word of mouth, insurer network constraints, availability, etc.)
    - Conditional on requiring specialized care choose specialist
    - Physician guides choice but insurer also impacts choice set and individual consumers can go against advice or seek second opinions

Measuring provider quality

- Most common measures are outcome and process
  - CMS published hospital level mortality rates beginning in 1987
  - Oldest and most widely studied, CABG in New York and Pennsylvania
  - CABG reporting now in NJ, CA, MA, UK, etc.
- Market based information
  - U.S. News and World Report
  - Online physician ratings (Angie’s List)
Risk adjustment and selection

- When patients vary in “difficulty” and providers are rewarded for outcomes there are incentives to select against worse risk
- Risk adjustment:
  - Model the probability of a bad outcome based on observable patient attributes
  - Predict the likelihood that a provider would have been successful given the patients characteristics
  - Adjust outcomes for the relative difficulty of patients treated

Individual surgeon report card


Most Efficient Health Care Countries

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Efficiency</th>
<th>Life Expectancy</th>
<th>Healthcare Costs</th>
<th>GDP per Capita</th>
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<td>83.4</td>
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Health Care “Efficiency”, U.S. and Selected Countries, 2013

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Notes: Each country was ranked on three criteria: life expectancy (weighted 60%), relative per capita cost of health care (30%); and absolute per capita cost of health care (10%). Countries were scored on each criterion and the scores were weighted and summed to obtain their efficiency scores. Total health expenditure covers preventive and curative health services, family planning, nutrition activities and emergency care.


Cumulative Changes in Health Insurance Premiums, Inflation, and Workers’ Earnings, 1999-2008

Note: Due to a change in methods, the cumulative changes in the average family premium are somewhat different from those reported in previous versions of the Kaiser/HRET Survey of Employer-Sponsored Health Benefits. See the Survey Design and Methods Section for more information, available at http://www.kff.org/insurance/7790/index.cfm.

Technology and health spending

- Cost increases over the past 30–40 years are largely driven by technology.
- The major issue in U.S. health policy and public policy more generally.
  - Most of the current “fiscal cliff” debate is driven by the growth in public spending on Medicare and Medicaid.
  - Variation in spending across locations with little difference in outcomes (Miami vs. Minneapolis).
- Major issue for all developed health systems and, increasingly for developing health systems.
- Is it “worth” it?
  - What is the “right” level of expenditure?
  - Key criterion for assessment: marginal benefits = marginal cost.

A framework for efficiency


So is the US (and the rest of the world) spending too much?

Your Money or Your Life (Cutler) addresses this issue:
1) Cost has grown but it has produced an output of improved health.
2) Health improvements are generally greater than the cost increases that produced them.
   - Two treatment technologies alone, neonatal and cardiac care, have made the entire growth in spending since the 1960’s worth it.
   - Most of the technologies studied had and ROI of at least 6:1. May be able to spend more and still get a good deal.
### New technologies and health care delivery

- Cutler and McClellan (1997) describe the way in which new technologies impact treatments
- “Treatment substitution effect” – New technologies replace older ones, raising the cost of treatment for a particular condition and improving outcomes
- “Treatment expansions effect” – New technologies expand the treatments available and treat new patients (e.g. depression)

### The “Medical Arms Race” model

- Luft and Robinson (1985)
- Competition can lead to increased cost beyond the social optimum
- Two main problems:
  - Coordination of investments (occurs in other markets → free entry leads to excessive fixed cost)
  - Induced demand to cover fixed costs
  - Driven by information asymmetries

### Investment coordination game

- Two hospitals deciding whether to invest in a new cardiac surgical unit
- Model using Game Theory
- Relevant concept for equilibrium is Nash
  - Each hospital knows the other hospitals best response to each action
  - Solution is the situation in which each hospital optimizes given their opponents best response
Solving the Game

- Write down a matrix of payoff for each hospital in each situation

<table>
<thead>
<tr>
<th>Hospital 2</th>
<th>Invest</th>
<th>Don't Invest</th>
</tr>
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<tbody>
<tr>
<td>Hospital 1 Invest</td>
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Profits from Different Strategies
(in millions)

Hospital 2

Hospital 1

Invest

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## Solving the Game

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Both parties invest even though they both do best by not investing.

## MAR contd.

- Prisoners dilemma model is not MAR specifically.
- Could occur in any industry:
  - Firms cannot coordinate large investments (entry costs, large K outlays, etc.)
  - Excessive investment
- Health care adds another element → information asymmetries.
- If you can induce demand to cover fixed costs entry by competitors into a market will also increase total use of services.
- What stops inducement?
Regulation and MAR

- Regulatory response to MAR
- Try to coordinate large expenditures
- Primarily done at the state level
- CON in particular
  - Boards that limit entry into high fixed cost procedures
  - Vary across states
  - Many were disbanded in the 1980s

Managed care controls

- Mechanisms restricting supply
  - Selective contracting (direct patients to particular providers)
    - Binding (HMO), Non-binding (PPO), Mixed approach
  - Payment incentives
    - Capitation, risk pools, withholds, discounted FFS, DRGs, per-diem, stop-loss, P4P, other risk sharing via financial or service risk (strong incentive effects)
  - Utilization review of MDs

Methodologies by HMOs (2003)

<table>
<thead>
<tr>
<th>Reimbursement Type</th>
<th>Primary Care MDs National Average</th>
<th>Specialty Care MDs National Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitation</td>
<td>29.8 %</td>
<td>18.7 %</td>
</tr>
<tr>
<td>Fee-for-Service</td>
<td>46.2 %</td>
<td>56.2 %</td>
</tr>
<tr>
<td>Relative Value Scale</td>
<td>30.8 %</td>
<td>33.7 %</td>
</tr>
<tr>
<td>Salary</td>
<td>2.1 %</td>
<td>1.3 %</td>
</tr>
</tbody>
</table>

Source: Inter-Study (in Kongstedt, 2007)
Managed care controls

- Mechanisms restricting demand
  - Co-pays and deductibles (already common in general indemnity insurance, generally lower in managed care)
  - Administrative mechanisms
  - Restrictions / incentives to visit “in network” providers
  - “Gatekeepers” (primary care MDs refer for specialist care)
  - Prior authorization

Demand side vs. supply side

<table>
<thead>
<tr>
<th>Control</th>
<th>Primary Example</th>
<th>Efficiency Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand Side</td>
<td>Increase co-insurance or deductible</td>
<td>Improve efficiency: Reduction in Moral Hazard Reduce efficiency: Reduction in insurance coverage</td>
</tr>
<tr>
<td>Supply Side</td>
<td>Utilization Review, Compensation Mechanisms, Selective Contracting</td>
<td>Improve efficiency: Reduce moral hazard through a knowledgeable intermediary (negotiates based on value), solution to 2nd best Reduce efficiency: Promote skimping</td>
</tr>
</tbody>
</table>