Housekeeping

- Mon 2-3 5B.105, Mon 5-6 5B.126, Tue 10-11 5A.108
- Office: 5B313
- Office Hours: Tue 11-12 (?)
- Website: mwpweb.eu/JonathanJames/
- Revised Schedule
- Formative Assessment
Outline For Today

- Informational problems in health care
- Asymmetric Information
  - Used-car market: market for lemons
  - Market for lemons and medical insurance
- Agency problems - Principal-Agent Model
- Information, price and quality
- Conclusions
Informational problems and health care

Arrow (1963)

- Highlights the effects of uncertainty, asymmetric information, and the absence of markets for risk bearing
- Medical care market is different than the traditional commodity market
- The nature of the demand: irregular, unpredictable
- Expected behaviour of Physician: trust the doctor, cannot test the product
Informational problems in general

- Misunderstanding the true costs or benefits of a product
- Uncertainty about costs and benefits
- Complex information
- Inaccurate or misleading information
Informational problems and health care
How prevalent are information problems in the health sector?

- Product uncertainty
  - Incidence and recovery of an illness in unpredictable. Provider information gap. Diffusion issues.
  - Information (relative to the consequence of a purchase of medical care) possessed by patients and physician is unequal. (Asymmetric Information)
  - Physicians (are supposed) to know much more than patients

- Supply conditions
  - Licencing (Drugs, Doctors)
  - Regulation (Drugs, Doctors)
Asymmetric information

- Information gaps and asymmetries exist in the health sector and are more serious for health care than other goods.
- Patient knows less about treatment, expected outcomes and relative prices than provider (end up with too much/little care?)
- Note though provider also faces uncertainties (doesn't know)
  - However: they do not preclude competition.
    - Regulation through licensure, certification and accreditation;
    - Threat of malpractice suits;
    - The physician-patient relationship;
    - Ethical constraints;
    - Presence of (enough) informed (experienced) consumers.
Asymmetric information: The Market For Lemons

- 9 cars on the market
- Quality varies from 0 (Lemon) to 2 (Mint)
- Owner (seller) knows quality perfectly, buyer only knows the distribution
- Reserve value of sellers = $5000 \times Q$
- Reserve value of buyers = $7500 \times Q$
Asymmetric information: The Market For Lemons

- Auctioneer calls price of 10,000
- Average of distribution is $Q=1$
- All are supplied
- None are purchased
Asymmetric information: The Market For Lemons

- Auctioneer calls price of 7,500
- Sellers of top 2 cars drop out
- Average of distribution drops to Q=3/4
- Buyers only willing to pay 7500 × 3/4 = 5,625
- None are purchased
Asymmetric information: The Market For Lemons

- There's no equilibrium in this case.
- One side knows the true value, the other side only knows the average value.
- Top quality cars are withheld, and driven out by the lemons.

![Graph showing probability distribution of quality levels.](image)
Asymmetric information vs Imperfect Information

- 9 cars on the market
- Quality varies from 0 (Lemon) to 2 (Mint)
- Both buyer and seller uncertain of quality and only know the average quality ($Q=1$)
- Reserve value of sellers $= 5000 \times Q$
- Reserve value of buyers $= 7500 \times Q$
Asymmetric information vs Imperfect Information

- Auctioneer calls 10,000 - No Sale!
- Auctioneer calls 7,500
- Sellers only know average quality \((Q=1)\), therefore sell
- Buyers willing to purchase
Market for lemons and health insurance

- Adverse selection applies to markets involving health insurance and to comparisons of alternative health care provider arrangements.
- Information asymmetry will likely occur because the potential insures (buyers) know more about their expected health expenditures than does the insurance company (sellers).
- In this market, the higher health risks tend to drive out the lower health risk people
- Because insurance company expecting an average expenditure will require a premium of at least that amount but the low risk people will not pay premiums higher than their likely health costs so they leave the market.
- A functioning market may fail to appear at all for some otherwise-insurable health care risks (under asymmetric information)
- Remark: Again, asymmetric information (and not incomplete information i.e. patients are no better than insurance company in predicting their health expenditures) leads to this result.
In terms of efficiency, if the lower risks are grouped with higher risks and all pay the same premium:

- The lower risks will tend to underinsure. They sustain a welfare loss by not being able to purchase insurance at rates appropriate to their risk.
- The higher risks will face a favourable premium and therefore over insure. That is, they will insure against risks that they would not otherwise insure against.
- Therefore, adverse selection brings inefficiency and redistribution of income from low risks to high risks.
Market for lemons and health insurance

Example:
- Cost of heart by-pass operation is constant at $c$
- The size of the population is $N$
- The number of operations performed per annum is $n$
- If everyone was insured: $Pr_{ave} = n/N$
- If everyone insured the average pay-off would be: $Pr_{ave} = c$
- If the insurer sets the premium equal to $c$, then breaks even
- This presumes everyone takes out the insurance. What if they do not?
Assume all individuals are risk-neutral and that individuals have better information about their health than the insurers.

Let $P_{ri}$ be the individual's assessment of the probability of their making a claim, it is not known by insurers.

The individual's expected pay-off is: $P_{ri} \times c$

The individual will opt for the medical insurance iff: $P_{ri} \times c > P_{\text{ave}} \times c$
Market for lemons and health insurance

- Only those with a greater than average risk will choose to insure
- Under this scenario the insurer makes a loss
- Insurer can raise premium but this forces more individuals not to insure
- Ultimately premiums are raised to the level where no-one insures
- This is the adverse selection problem (lemons) in the health insurance market
Adverse Selection and health insurance

- Is this merely a theoretical prospect or is adverse selection a likely problem?
- Evidence of adverse selection has been found in markets for supplemental Medicare insurance (Wolfe and Goddeeris, 1991) and individual (nongroup) insurance (Browne and Doerpinghaus, 1993).
- In more recent work with a sample of single, employed persons, Cardon and Hendel (2001) found that those who were insured spent about 50 percent more on health care than the uninsured.
Personalized genetic information is increasingly available.

They examine data on individuals at risk for Huntington disease (HD)

HD is a degenerative neurological disorder caused by an inherited genetic mutation on chromosome 4 that affects roughly 1 in 10,000 individuals in Caucasian populations.

Nature of the disease makes long term care insurance particularly salient

Most policies are individual rather than group

HD is a genetic disorder due to an inappropriate expansion in the Huntington gene on chromosome 4.

The disease is inherited in such that individuals who have a parent with HD will have a 50% chance of inheriting the genetic mutation and subsequently developing the disease. Development of the disease without an affected parent is extremely rare. There is no cure for HD or treatment that slows the progression.
Long-term care insurance is designed to cover expenditures for either home care or nursing home care for the elderly.

Fairly limited in the general population, with ownership rates around 10% for individuals in the 60-85 age range.

There is significant overlap between services offered by Medicaid and long-term care insurance— but not all covered.

Application process suggests that currently healthy individuals regardless of their HD risk are likely to face the same long-term care insurance pricing.

Probability of needing care: 70% chance of living in a nursing home at some point, and a roughly 100% chance of needing any nursing care. Around double than for healthy 65 yr old.
The PHAROS (Prospective Huntington At Risk Observational Study) study is a prospective, observational study of individuals at risk for HD conducted by the Huntington Study Group. Individuals had to be at risk for HD: that is, they had one parent (or first-degree relative) with HD, but were not tested prior to enrollment.

1) Willing 2) Untested 3) Not show symptoms of HD

Doctor Screening:
- 0 normal (no abnormalities)
- 1 non-specific motor abnormalities (less than 50% confidence)
- 2 motor abnormalities which may be a symptom of HD (5089% confidence)
- 3 motor abnormalities that are likely signs of HD (90–98% confidence)
- 4 motor abnormalities that are unequivocal signs of HD (> 99% confidence).

Health and retirement survey 2000
- 20,000 individuals over 50
- Restrict to under 65s to make comparable
First test: Comparing PHAROS with HRS

\[ Own_i = \alpha + \beta (HD_{risk})_i + \Lambda X_i \]

Second test: Within PHAROS

\[ Own_i = \alpha + \beta_1 (test_{pos})_i + \beta_2 (test_{neg})_i + \Lambda X_i \]
Adverse Selection and health insurance

Oster et al (2011, JPopE) Results

<table>
<thead>
<tr>
<th>Dependent variable: own long-term care insurance</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>PHAROS and HRS</td>
<td>PHAROS only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHAROS restrictions</td>
<td>Doctor score&lt;3</td>
<td>Doctor score&lt;3</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Doctor score&lt;3</td>
<td>Doctor score&lt;2</td>
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<tr>
<td></td>
<td>Doctor score&lt;3</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Explanatory variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At risk for HD</td>
<td>.1494*** (.019)</td>
<td>.1603*** (.02)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested, positive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested, negative</td>
<td>.2203** (.103)</td>
<td>.2356** (.111)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested next period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested in two periods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Age fixed effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>p-value, pos vs. neg</td>
<td>.026</td>
<td>.026</td>
<td>.016</td>
<td>.016</td>
<td>.098</td>
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<tr>
<td>Number of observations</td>
<td>7356</td>
<td>7356</td>
<td>2340</td>
<td>2114</td>
<td>2246</td>
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<tr>
<td>R²</td>
<td>.03</td>
<td>.04</td>
<td>.07</td>
<td>.07</td>
<td>.07</td>
</tr>
</tbody>
</table>
The positive correlation prediction: Ex-post those with greatest health risk most likely to have insurance

The positive correlation can arise from either adverse selection or moral hazard, but mechanisms differ

Adverse selection: the insured is assumed to have ex-ante superior information to the insurance company about his risk type

Moral hazard: insurance coverage lowers the cost of an adverse outcome and thus increases the probability or magnitude of the risk occurrence
Evidence for positive correlation is mixed, why might there not be a positive correlation?

Consider first the possibility that information is symmetric (insurance companies gather a lot of information!)

OR no moral hazard For example, in the case of long-term care insurance, the unappealing nature of nursing homes may be sufficient to dampen any potential moral hazard effects

Risk type may not be the only source of private information. Individuals may also differ with respect to unobserved preferences such as risk aversion
Adverse Selection and health insurance

- Cutler et al (2008, AER)

**Table 1—Relationship between Risky (or Risk-Reducing) Behavior and Insurance Coverage**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Term Life (1)</th>
<th>Annuity (2)</th>
<th>Long-term care (3)</th>
<th>Medigap (4)</th>
<th>Acute health (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean dep var</td>
<td>0.50</td>
<td>0.07</td>
<td>0.10</td>
<td>0.65</td>
<td>0.84</td>
</tr>
<tr>
<td>Smoking</td>
<td>-0.034***</td>
<td>-0.027***</td>
<td>0.007</td>
<td>-0.083***</td>
<td>-0.084***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.009)</td>
<td>(0.014)</td>
<td>(0.022)</td>
<td>(0.009)</td>
</tr>
<tr>
<td></td>
<td>[11.453]</td>
<td>[6.420]</td>
<td>[6.401]</td>
<td>[6.383]</td>
<td>[10.945]</td>
</tr>
<tr>
<td>Drinking</td>
<td>-0.017</td>
<td>-0.013</td>
<td>0.016</td>
<td>-0.022</td>
<td>-0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.016)</td>
<td>(0.023)</td>
<td>(0.035)</td>
<td>(0.017)</td>
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<tr>
<td></td>
<td>[11.453]</td>
<td>[6.393]</td>
<td>[6.376]</td>
<td>[6.357]</td>
<td>[10.945]</td>
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<tr>
<td>Job risk</td>
<td>-0.002*</td>
<td>-0.003***</td>
<td>-0.002***</td>
<td>-0.016***</td>
<td>-0.005***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.001)</td>
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<tr>
<td></td>
<td>[10.556]</td>
<td>[4.878]</td>
<td>[4.845]</td>
<td>[4.852]</td>
<td>[10.207]</td>
</tr>
<tr>
<td>Preventive care</td>
<td>0.115***</td>
<td>0.053***</td>
<td>0.082***</td>
<td>0.187***</td>
<td>0.220***</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.020)</td>
<td>(0.013)</td>
</tr>
<tr>
<td></td>
<td>[9.773]</td>
<td>[6.251]</td>
<td>[6.233]</td>
<td>[6.218]</td>
<td>[9.411]</td>
</tr>
<tr>
<td>Always wears seat belt</td>
<td>0.063***</td>
<td>0.030***</td>
<td>0.037***</td>
<td>0.058***</td>
<td>0.058***</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.007)</td>
<td>(0.009)</td>
<td>(0.016)</td>
<td>(0.010)</td>
</tr>
<tr>
<td></td>
<td>[9.805]</td>
<td>[6.408]</td>
<td>[6.390]</td>
<td>[6.373]</td>
<td>[9.488]</td>
</tr>
</tbody>
</table>
Can we do something to mitigate adverse selection?

- Car buyers can employ a mechanic
- Sellers can offer guarantees
- Sellers face incentives to build reputations
- Health insurers can exclude pre-existing conditions
- Health insurers can collect other information
- Moral hazard
- Individuals have different attitudes to risk and may not even know their own level of risk!
Reducing Adverse Selection/Moral Hazard

- What Health Insurance Companies do to reduce moral hazard

We'll reward you for buying healthy foods at Sainsbury's when you use a Nectar card

We'll keep track of all your good work and reward you with Vitality points that could help towards your premium and give you back great discounts on our reward partners.

Eat well with Sainsbury's healthy foods

We'll reward you for buying certain healthy foods at Sainsbury's when you use a Nectar card.

Points category limit for single and family members whether it's online or in-store:
Reducing Moral Hazard

- What Health Insurance Companies do to adverse selection/reduce moral hazard
Group insurance (in the US, through employer group plans) can be a more useful mechanism to reduce adverse selection.

Group plans enable insurers to implement experience rating, a practice where premiums are based on the past experience of the group, or other risk-rating systems to project expenditures.

Because employees usually have limited choices both within and among plans, they cannot fully capitalize on their information advantage.
Agency Problems

- Principal (Patient)
- Agent (Doctor)
- Asymmetric Information

In many cases, the physician will also be the provider of the recommended services.

Delegation happens because principals are relatively less informed than the agent, so the agency problem is related to the problem of asymmetric information.

The problem for the principal is to determine and ensure that the agent is acting in the principal’s best interests.

Unfortunately, the interests may diverge, and it may be difficult to introduce arrangements or contracts that eliminate conflicts of interest.
Information, Prices and Quality

- Does poor consumer information reduce the competitiveness of markets?
- Does increasing physician availability increase competition and lower prices as traditional economics suggests?
- How do consumers obtain and use information?
- Satterthwaite (1979) and Pauly and Satterthwaite (1981) : novel approaches to handle issues involving consumer information and competition.
- They identify primary medical care as a reputation good: a good for which consumers rely on the information provided by friends, neighbours, and others to select from the various services available in the market.
Physicians are not identical and do not offer identical services. Because of this product differentiation, the market can be characterized as monopolistically competitive.

Under these conditions, the authors show that an increase in the number of providers can increase prices (which is counterintuitive).

Why?

1. friends per physician is reduced
2. reduced information
3. less elastic demand faced by the firm
4. higher equilibrium prices
5. Give each firm some additional monopoly power
Providing Information About Quality

- Growing Literature on the impact of providing information on choice.
- Examples of providing information in other fields? Where else could providing information be useful?
- Health Examples: Report Cards for i) Hospitals ii) Insurance Companies iii) Fertility Treatment iv) Nursing Homes
- Department of Health publishes wide range of information: e.g. waiting times
Providing Information: Report Card

Mortality Rate: Inpatient Heart Attack Deaths

Timely and effective treatments for acute myocardial infarction (AMI), which are essential for patient survival, include appropriate use of thrombolytic therapy and revascularization. Better processes of care may reduce mortality for AMI, which represents better quality. This measure is used to assess the number of deaths per 100 discharges with a principal diagnosis code of AMI.

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>John T Mather Memorial Hospital of P...</td>
<td>0.0%</td>
</tr>
<tr>
<td>Peconic Bay Medical Center</td>
<td>2.0%</td>
</tr>
<tr>
<td>Huntington Hospital</td>
<td>2.6%</td>
</tr>
<tr>
<td>Southside Hospital</td>
<td>3.0%</td>
</tr>
<tr>
<td>Eastern Long Island Hospital</td>
<td>3.5%</td>
</tr>
<tr>
<td>University Hospital</td>
<td>4.8%</td>
</tr>
<tr>
<td>Good Samaritan Hospital Medical Ce...</td>
<td>6.5%</td>
</tr>
<tr>
<td>St Catherine of Sierra Hospital</td>
<td>9.3%</td>
</tr>
<tr>
<td>Brookhaven Memorial Hospital Medic...</td>
<td>11.2%</td>
</tr>
<tr>
<td>St Charles Hospital</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

No data available for 2 hospitals.
Providing Information: Empirical Evidence

- What are the potential impact of information report cards?
  - Identify the best doctors
  - Identify the best hospitals
  - Improve Quality

- However....
  - Selection (on unobservables)
  - Low quality providers have incentives to shift to healthier patients
Providing Information: Empirical Evidence

- Dranove et al 2003, JPE
- New York (1991) and Phil (1993) provided CABG report cards
- Examine health of patients before admission
- Data from 1987-1994
- Diff-in-Diff approach

\[
\ln (h_{ist}) = A_i + B_t + g \cdot Z_{ist} + p \cdot L_{ist} + q \cdot N_{ist} + e_{ist} \tag{1}
\]

- If there’s shifting to healthier patients \( p < 0 \)
Providing Information: Empirical Evidence

- Higher Costs
- Worse Outcomes, especially among more ill patients
- Overall Welfare Reducing