Elasticity measures the degree of downward-sloping

- **Elastic demand** $D_E$
  - **price sensitive:** changes in price greatly affect the quantity demanded

- **Inelastic demand** $D_I$
  - **Price insensitive:** changes in price do not significantly change the quantity demanded
Does the demand curve for health care slope downward?

- Are people sensitive to the price of health care?
  - Is demand for vaccines such that...
    - P = $100, Q=1,000
    - P = $1, Q=1,000
    - i.e. demand is inelastic?
  - Is demand for band-aids such that...
    - P = $100, Q = 1
    - P = $1, Q = 30
    - i.e. demand is elastic?
- If people *always* obey their doctors, then demand should be *inelastic*!
Need randomized experiments

- **Randomized experiments:**
  - **Definition:** a study that assigns treatments randomly to different groups of study participants
  - **Includes:**
    - A control group (no treatment)
    - Placebo group
  - Helps generate experimental groups that are statistically similar to each other
Non-randomized experiments can be biased

- Measured demand curve $D_M$ is biased compared to true demand $D_T$
- People generally choose the amount of insurance they receive
- Sicker people will choose more insurance because they know they will need more care
Evidence from Randomized Experiments
Two Randomized Experiments

- RAND Health Insurance Experiment (HIE)
- Oregon Medicaid Experiment
Randomly assigned 2,000 families from six US cities to different insurance coverage plans

- Copayments groups:
  - Free, 25%, 50%, and 95%

- Tracked utilization of health care (Q) in each copayment plan (P)

- Copayment acts as the marginal cost that each family faces when buying care
Oregon Medicaid Experiment

- Compared two groups of low-income adults
  - Medicaid lottery winners vs. lottery losers
- Lottery winners got to apply for public health insurance through Medicaid
  - So they faced lower out-of-pocket prices for care
- Lottery losers could not get Medicaid (but might have purchased outside insurance)
Results?

- Health care demand curves are downward sloping (economic theory prevails!)
  - Price changes affected demand for health care
Different measures of care

- **Outpatient Care**
  - **Def:** any medical care that does not involve an overnight hospital stay
    - E.g. runny noses, twisted ankles, minor broken bones

- **Inpatient Care**
  - **Def:** medical care requiring overnight stays
    - E.g. More serious surgeries or conditions that require overnight recovery or monitoring

- **ER Care**
  - **Def:** care involving the emergency room
    - E.g. heart attacks, strokes
Outpatient care

- RAND HIE
  - As patient cost-sharing (P) increases, number of episodes (Q) of outpatient care decreases
  - Holds for both acute and chronic conditions

<table>
<thead>
<tr>
<th>Plan</th>
<th>Total</th>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>2.99</td>
<td>2.29</td>
<td>0.70</td>
</tr>
<tr>
<td>25%</td>
<td>2.32</td>
<td>1.78</td>
<td>0.54</td>
</tr>
<tr>
<td>50%</td>
<td>2.11</td>
<td>1.60</td>
<td>0.51</td>
</tr>
<tr>
<td>95%</td>
<td>1.90</td>
<td>1.44</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Data from Keeler et al. (1988)
Outpatient care

- Oregon Medicaid Study
  - Lottery winners have more outpatient visits than lottery losers

Both the RAND HIE and the Oregon Medicaid Study find downward-sloping demand for outpatient care!
Inpatient care

**RAND HIE**

<table>
<thead>
<tr>
<th>Plan</th>
<th>Avg # of Annual Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>0.133</td>
</tr>
<tr>
<td>25%</td>
<td>0.109</td>
</tr>
<tr>
<td>50%</td>
<td>0.099</td>
</tr>
<tr>
<td>95%</td>
<td>0.098</td>
</tr>
</tbody>
</table>

(Data from Keeler, 1988)

* Indicates significantly different from the free plan at the $p = 5\%$ level.

** Oregon Medicaid Study **

No significant difference in usage rates between lottery winners and lottery losers

Demand is still downward-sloping but less elastic than demand for outpatient care
ER care

- **RAND HIE**

<table>
<thead>
<tr>
<th>Plan</th>
<th>Probability of ER use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>22%</td>
</tr>
<tr>
<td>25%</td>
<td>19%*</td>
</tr>
<tr>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td>95%</td>
<td>15%**</td>
</tr>
</tbody>
</table>

(Data from Newhouse, 1993)

* Indicates significantly different from the free plan at the $p = 5\%$ level.
** Indicates significantly different from the free plan at the $p = 1\%$ level.

- **Oregon Medicaid Study**

No significant difference in ER care for lottery winners vs. lottery losers

Even for emergency room care – likely the most urgent kind – those on the highest copayment plan in the RAND HIE were less likely to buy care!
Pediatric care

- **Def:** care for infants or children usually paid for by a parent or guardian

Data from RAND HIE:

**Table 2.5.** Percentage with preventative pediatric care over three years, by age and care type.

<table>
<thead>
<tr>
<th></th>
<th>0–6 years</th>
<th>7–16 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Immunization</td>
<td>Any preventative</td>
</tr>
<tr>
<td>Free</td>
<td>58.9</td>
<td>82.5</td>
</tr>
<tr>
<td>Copayment</td>
<td>48.7*</td>
<td>73.7*</td>
</tr>
</tbody>
</table>

*Statistically significant discrepancy from free plan.

*Source:* Newhouse (1993). With permission from RAND.
Table 2.6. *Per-capita mental health expenditures, by plan type.*

<table>
<thead>
<tr>
<th>Plan</th>
<th>Mean expense ($)</th>
<th>Percentage of free plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>42.2</td>
<td>–</td>
</tr>
<tr>
<td>25%</td>
<td>28.4</td>
<td>67%</td>
</tr>
<tr>
<td>50%</td>
<td>13.1</td>
<td>33%</td>
</tr>
<tr>
<td>95%</td>
<td>18.1</td>
<td>43%</td>
</tr>
</tbody>
</table>

*Source:* Newhouse (1993). With permission from RAND.

Table 2.7. *Dental care utilization by income level.*

<table>
<thead>
<tr>
<th></th>
<th>Low-income group†</th>
<th>High-income group†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage with any use</td>
<td>Average expenditures ($)</td>
</tr>
<tr>
<td>Free</td>
<td>57.8</td>
<td>317</td>
</tr>
<tr>
<td>95%</td>
<td>39.8*</td>
<td>216*</td>
</tr>
</tbody>
</table>

*Statistically significant discrepancy from free plan.
†The low-income group comprises the third of households with the lowest incomes. The high-income group comprises the third of households with the highest incomes.

*Source:* Newhouse (1993). With permission from RAND.
## Prescription drugs

- Data from RAND HIE

### Table 2.8. Antibiotic use in the RAND HIE.

<table>
<thead>
<tr>
<th>Plan</th>
<th>No. of antibiotics per person</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bacterial conditions</td>
<td>Viral conditions</td>
<td></td>
</tr>
<tr>
<td>Free</td>
<td>0.47</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Copay</td>
<td>0.24**</td>
<td>0.08**</td>
<td></td>
</tr>
</tbody>
</table>

**Statistically significant discrepancy from the free plan.

*Source:* Keeler et al. (1988). With permission from RAND.
Non-randomized experiment evidence

- U.S. Medicare
  - Citizens are eligible for health insurance through Medicare when they turn 65 but not before
  - If demand for health care is downward-sloping, we expect a jump in health care usage at age 65
  - This is known as a discontinuity study
    - There is a discontinuity in health insurance at age 65
Card et al. (2009)

- Card et al. have two main findings:
  - **Unplanned** emergency department admissions follow a linear trend around the age of 65
  - Other hospital admissions *jump* up at the age of 65
- There is a discontinuity in medical usage at the same point of discontinuity in Medicare coverage!
- This is further evidence that demand for health care is sensitive to price
Comparing demand curves

How can we determine which type of demand is more price sensitive?

Data from Keeler et al. (1988)
Arc Elasticity

- Need a measure to compare the relative price sensitivity of different goods
  - So the measure needs to be unitless (how else would we compare ER visits to sticks of gum?)

- **Arc Elasticity:**

\[
\epsilon_{arc} = \frac{\Delta Q/(Q_1 + Q_2)}{\Delta P/(P_1 + P_2)}
\]

where \(\Delta Q = Q_2 - Q_1\) and \(\Delta P = P_2 - P_1\)
Health care has inelastic demand

![Diagram showing elasticities of various goods]

**Figure 2.5. Elasticities of various goods.**

*Source: Developed from Newhouse (1993) and Gwartney et al. (2008).*
Does the price of care affect health?
Does price for care affect health?

- **RAND HIE:**
  - Generally, no health differences between people on free plan vs. cost-sharing!
  - **Only statistically significant difference between plans were in blood pressure, myopia, & presbyopia**

### Table 2.10. Health indicators by insurance plan in the RAND HIE.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Free plan</th>
<th>Copay plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV$_1$</td>
<td>95.0</td>
<td>94.8</td>
</tr>
<tr>
<td>Diastolic blood pressure (mm Hg)</td>
<td>78.0</td>
<td>78.8*</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>203</td>
<td>202</td>
</tr>
<tr>
<td>Glucose (mg/dl)</td>
<td>94.7</td>
<td>94.2</td>
</tr>
<tr>
<td>Abnormal thyroid level (% of sample)</td>
<td>2.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Hemoglobin (g/100 ml)</td>
<td>14.5</td>
<td>14.5</td>
</tr>
<tr>
<td>Functional far vision (Snellen lines)</td>
<td>2.4</td>
<td>2.5*</td>
</tr>
<tr>
<td>Functional near vision (Snellen lines)</td>
<td>2.35</td>
<td>2.44*</td>
</tr>
<tr>
<td>Chronic joint symptoms (% of sample)</td>
<td>30.0</td>
<td>31.6</td>
</tr>
</tbody>
</table>

*a FEV is forced expiratory volume in 1 second.
* Indicates significantly different from the free plan at the $p = 5\%$ level.

Source: Newhouse (1993). With permission from RAND.
Does price for care affect health?

- **Oregon Medicaid Experiment**
  - Lottery winners self-reported better overall health, more healthy days, and lower rates of depression

- Discrepancy with RAND HIE may be because Oregon Medicaid Study worked with the very low-income, while RAND HIE studied a broader cross-section of the U.S.
Conclusion

- Demand curves for health care are downward sloping
  - Quantity of care demanded is sensitive to price (though not as sensitive as other demands, e.g. for movies)
- **BUT** generally, price of health care does not seem to affect one’s health
  - Exception is that price seems to affect the most vulnerable segments of the population (low-income, high blood pressure, etc.)
- Policy and health insurance implications?