Economics of Health and Health Care
Econ 131

Lecture 2: Health Care Spending
Professor Martin Hackmann
In the news...

**New York Confronts Its Worst Measles Outbreak in Decades (Nytimes, Feb ‘19)**

Measles is back because states give parents too many ways to avoid vaccines (Vox, March ‘19)

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NME (Non medical exemption) rate is defined as the number of enrolling kindergarteners with an NME out of the total kindergarten enrollments (public and private) in the county. (>30% in some counties)
Outline

• Measuring health care costs and expenditures
  – Current levels
• Reasons for health care cost growth
• What is the “right” level? [more next week]
  – Evaluating levels and rates
  – Implications for current policy
Today, we focus on cost
Health Spending is growing faster than GDP

Total National Health Expenditures
1980 – 2005

Current NHE: $2.5 Trillion

(1)Expressed in 1980 dollars; adjusted using the overall Consumer Price Index for Urban Consumers.

Source: Centers for Medicare & Medicaid Services, Office of the Actuary.
NHE Spending Components

• Health Services and Supplies
  – Hospitals
  – Professional Services
    • Physicians, Other HC Workers, Dentists
  – Home Health / Nursing Home
  – Products
    • Pharmaceuticals, Durable Medical Equipment (e.g. eyeglasses, contact lenses)
      Non-durable Medical Equipment
      – Includes R&D (future benefit)
  – Administrative
    • Profits (for providers), Admin. Expenses
  – Public Health (e.g. immunization programs, educations campaigns)

• Investment (to the extent that it’s not captured in products)
  – Research and Capital Equipment
What comprises the nation’s health care dollar?

Distribution of National Health Expenditures, by Type of Service (in Billions), 2010

NHE Total Expenditures: $2,593.6 billion

- Hospital Care, $814.0 (31.4%)
- Physician/ Clinical Services, $515.5 (19.9%)
- Prescription Drugs, $259.1 (10.0%)
- Nursing Care Facilities & Continuing Care Retirement Communities, $143.1 (5.5%)
- Home Health Care, $70.2 (2.7%)
- Other Personal Health Care, $384.2 (14.8%)
- Other Health Spending, $407.6 (15.7%)

Note: Other Personal Health Care includes, for example, dental and other professional health services, durable medical equipment, etc. Other Health Spending includes, for example, administration and net cost of private health insurance, public health activity, research, and structures and equipment, etc.

## NHE Components: 1970-2005*

<table>
<thead>
<tr>
<th>Select Spending Categories</th>
<th>1970</th>
<th>1985</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B (%NHE)</td>
<td>$B (%NHE)</td>
<td>$B (%NHE)</td>
</tr>
<tr>
<td>Hospitals</td>
<td>$27.6 (36.8 %)</td>
<td>$165.4 (37.6 %)</td>
<td>$611.6 (30.8 %)</td>
</tr>
<tr>
<td>Physicians</td>
<td>$14.0 (18.7 %)</td>
<td>$89.8 (20.4 %)</td>
<td>$421.2 (21.2 %)</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>$5.5 (7.3 %)</td>
<td>$21.1** (4.8 %)</td>
<td>$200.7 (10.1 %)</td>
</tr>
<tr>
<td>Administrative</td>
<td>$2.8 (3.7 %)</td>
<td>$25.6 (5.8 %)</td>
<td>$143 (7.2 %)</td>
</tr>
<tr>
<td>Home Health / Nursing Homes</td>
<td>$4.3 (5.7 %)</td>
<td>$37.3 (8.5 %)</td>
<td>$169.3 (8.5 %)</td>
</tr>
<tr>
<td>Total NHE***</td>
<td>$74.9</td>
<td>$439.9</td>
<td>$1,987.7</td>
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* In nominal terms
***Includes categories not listed
General Trends:
Spending Components

• Hospitals share is declining over time
• Outpatient care and physician services increasing slightly
• Pharmaceutical share drops and then increases strongly through 1990s
  — Medicare Part D implemented in 2005
• Administrative share is increasing
NHE Spending Sources

• Private Funds
  – Out-of-Pocket (OOP) Expenditures
  – Private Health Insurance
    • Payments from insurers (Non-Profit and For-Profit), includes premiums

• Public Funds
  – Federal
    • Medicare (Elderly / Disabled)
    • Medicaid (“Matching” Payments to state programs for “poor”)
    • Other Federal (Includes SCHIP)
  – State and Local
    • Medicaid
    • Other State and Local (e.g. local public health facilities)
Who pays for the nation’s health care?

Percent Distribution of Source of Funds for Selected Personal Health Care Services, 1970 and 2010

Notes: Medicare and Medicaid were enacted in 1965; by January 1970, all states but two were participating in Medicaid. “Out-of-Pocket” includes direct spending by consumers for all health care goods and services not covered by insurance, except for health care premiums. “Priv. Health Ins.” includes premiums paid to health insurance plans and the net cost of private health insurance (administrative costs, reserves, taxes, and profits or losses). “Other” includes Other Public Health Insurance Programs (CHIP, Deps. of Defense and of Veterans Affairs) and Other Third Party Payers (e.g., worksite health, other private revenues, workers’ compensation, maternal/child health, other state and local programs, etc.).

Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group at https://www.cms.gov/NationalHealthExpendData/ (see Historical NHE Web tables, Tables 7, 8, 11, 12).
General Trends: Payment Components

– Government share increasing in every category
  • Especially prescription drugs
– Private health insurance increasing in every category
– Out of pocket decreasing in every category

→ Shift from private to public on net
# Who pays the bill?

<table>
<thead>
<tr>
<th>Financing Source of Expenditures</th>
<th>Funding Mechanism</th>
<th>Ultimate Payer</th>
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<tbody>
<tr>
<td>Medicaid/ SCHIP</td>
<td></td>
<td></td>
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<tr>
<td>Medicare</td>
<td></td>
<td></td>
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<tr>
<td>Private Insurance</td>
<td></td>
<td></td>
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<tr>
<td>OOP</td>
<td></td>
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</tr>
</tbody>
</table>
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<th>Ultimate Payer</th>
</tr>
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<tbody>
<tr>
<td>Medicaid/ SCHIP</td>
<td>Federal and State Taxation</td>
<td>Taxpayers</td>
</tr>
<tr>
<td>Medicare</td>
<td>Payroll tax</td>
<td>Taxpayers (Intergenerational Transfer)</td>
</tr>
<tr>
<td></td>
<td>General taxes</td>
<td>Beneficiaries</td>
</tr>
<tr>
<td></td>
<td>Premiums</td>
<td></td>
</tr>
<tr>
<td>Private Insurance</td>
<td>Premiums</td>
<td>Employees, Individuals (in case of individual market)</td>
</tr>
<tr>
<td>OOP</td>
<td>Patient</td>
<td>Individuals</td>
</tr>
</tbody>
</table>
Rates of Growth

• Growth rates: More useful metrics
  – Lasting reduction in costs calls for consistent reduction in rate of growth, not a “one time” absolute reduction (...followed by high growth)
Outline

• Measuring health care costs and expenditures
  – Current levels
  – Future predictions
• Reasons for health care cost growth
• What is the “right” level?
  – Evaluating levels and rates
  – Implications for current policy
National Health Expenditures as a Percentage of Gross Domestic Product, 1980 – 2005

Expenditure Identity

Expenditures=f (price, quantity, mix, population)

\[ \text{Total Exp} = \sum_i \sum_n P_n \times Q_n \]

Recall for any particular product or service (n) expenditures have two components: \( E_n = P_n \times Q_n \)

As technology changes the mix of goods/services also shifts (new products enter the cost function, old ones exit)

Population size (i) matters, but changes slowly
To be explained:

– Level and (especially) change in national health expenditures ($\Delta TE$)

Accounting definition:

– $\Delta TE = f(\Delta P, \Delta Q)$

• What explains/predicts $\Delta P$?
• What explains/predicts $\Delta Q$?
Explanations
Explanations for Increasing Health Care Spending

- **Income**
- Demographics
- Moral hazard
- Technology
- Excessive Administrative Costs
- Market power of providers increases prices
- Supplier Induced Demand
- Medical Malpractice
Expenditures and Income

• As income increases, the percentage spent on basic goods and services declines—leaving more to spend on healthcare: health as a luxury good.

• Income elasticity of demand >1
  – Hall and Jones – use money to buy more periods of life

• Evidence suggests this is unlikely to explain a great deal of growth
  – Acemoglu, Finkelstein, Notowidigdo, 2012 find income elasticity less than 1 using variation from oil price shocks
More Income...  
greater % devoted to HC

Source: OECD Statistics (October 2006)
Explanations for Increasing Health Care Spending

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HC spending and the demographic “time bomb”

- The elderly (65+) do have higher expenditures per capita (~3 to 5 times mean annual HC expenditures)
- However, the shift in the age distribution is still too gradual to explain more than a small share (~5%) of the spending growth
- Potential for greater effect if “obesity epidemic” increases costs of elderly in the future
- Also an impact on supply side due to labor supply shortages
Relative Costs

EXHIBIT 1
Relative Per Capita Health Spending, By Age Cohort (Age 35–44 Equals 1), 1999

<table>
<thead>
<tr>
<th>Age Cohort</th>
<th>Relative Spending</th>
</tr>
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<tbody>
<tr>
<td>0–5</td>
<td>0</td>
</tr>
<tr>
<td>6–14</td>
<td>1</td>
</tr>
<tr>
<td>15–24</td>
<td>2</td>
</tr>
<tr>
<td>25–34</td>
<td>3</td>
</tr>
<tr>
<td>35–44</td>
<td>4</td>
</tr>
<tr>
<td>45–54</td>
<td>5</td>
</tr>
<tr>
<td>55–64</td>
<td>5</td>
</tr>
<tr>
<td>65–74</td>
<td>5</td>
</tr>
<tr>
<td>75+</td>
<td>5</td>
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</table>


Demographic Shift

EXHIBIT 2
Projected Percentage Of The U.S. Population Age 65 And Older, 2000–2050

<table>
<thead>
<tr>
<th>Percent</th>
<th>100</th>
</tr>
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<tbody>
<tr>
<td>75</td>
<td></td>
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<tr>
<td>50</td>
<td></td>
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<tr>
<td>25</td>
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</table>


Contribution of Aging to HC Cost Growth

EXHIBIT 3

<table>
<thead>
<tr>
<th>Year</th>
<th>Overall growth</th>
<th>Effect of aging</th>
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</thead>
<tbody>
<tr>
<td>1991</td>
<td>8.0%</td>
<td>0%</td>
</tr>
<tr>
<td>1993</td>
<td>4.0%</td>
<td>0%</td>
</tr>
<tr>
<td>1995</td>
<td>2.0%</td>
<td>0%</td>
</tr>
<tr>
<td>1998</td>
<td>4.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>2001</td>
<td>8.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>2005</td>
<td>6.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>2010</td>
<td>4.0%</td>
<td>2.0%</td>
</tr>
</tbody>
</table>


Explanations for Increasing Health Care Spending

- Income
- Demographics
- **Moral hazard**
- Technology
- Excessive Administrative Costs
- Market power of providers increases prices
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- Medical Malpractice
Weak Market Incentives - Patients

• Insurance results in little patient cost sharing and excessive utilization
  – RAND Health Insurance Experiment
    • Lower OOP costs → Higher utilization (an example of moral hazard)
Weak Market Incentives - Patients

• ...but analysis of expansion of insurance in US occurring from 1950-84 explains only a small share (~10%) of total growth
• US has higher cost sharing than most OECD countries....and higher costs!
• Utilization levels of “very sick” are unlikely to shift even if they have large co-pays
Explanations for Increasing Health Care Spending

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Technology Adoption and Costs
Technology Adoption and Costs

- US has the most advanced and innovative technologies relative to other countries
  - e.g. pharmaceutical launches, most likely to be sold in US w/in year after worldwide launch
  - Waiting lists in other countries

- Consensus view is that technology drives costs, where “technology” is the residual (Newhouse 1992) [CT, MRI,...]
Technology and HC Expenditures

• Interaction with insurance coverage motivates cost increasing (quality increasing) technology
  – Few examples of new, less expensive / less effective technology development
    • Approval process (e.g. pharmaceuticals) in some cases requires superior performance (limits for cost-saving, lower quality technology)
Explanations for Increasing Health Care Spending

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Administrative Costs

• Private sector: Multiple firms duplicate marketing and administrative spending in private market
  – Returns to selection drive incentives

• Public sector: Medicaid (6.7%) and Medicare (3%) generally have lower administrative costs
Administrative Costs

• Is the administrative cost argument a “one-off” case? Would expanded programs yield similar percentages with different individuals?

• The administrative expense is about 7% of NHE
  – Say it shifts down to 5% per year, 2% is relatively small amount

• Single buyer diminishes incentive to meet consumer demand—potential inefficiency
Explanations for Increasing Health Care Spending

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• **Market power of providers increases prices**
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“It’s the Prices, Stupid”
(Lack of Monopsony Power)

• In the US, buyers market power (monopsony power) is limited since there are many buyers (....although Medicare and Medicaid can dictate strong terms in some cases)

• MD income (5.5x in US, 1.5x in UK), price per hospital day (3x median OECD)
“It’s the Prices, Stupid”
(Lack of Monopsony Power)

• Utilization in US similar (or less) than EU, but expenditure higher (price set higher)
• ...but “price” may be higher since the intensity of services and use of technology is greater in US (....recall technology explanation)
Percent Change in Total National Health Expenditures, 1981 – 2005

How does managed care do it?

Cutler et al. (2000) find that HMOs have 30-40% lower expenditures than traditional plans (patient struggling with heart diseases)

96% of difference can be explained by prices (reimbursements)

HMO’s bargain more aggressively with hospitals?
Cooper et al (2018): Variation in Prices

HCCI Data (left figure):
- claims for individuals with employer-sponsored insurance obtained from three large insurance companies
- 2.9 billion claims for 88.7 million unique individuals from 2007-2011
Figure 7: Within Market Price Variation for Knee Replacement, PTCA, and Colonoscopy in Denver, Atlanta, and Columbus.

- **Denver, CO**
  - Knee Replacement: Max/Min Ratio: 3.09, Gini: 0.190, CoV: 0.382
  - PTCA: Max/Min Ratio: 2.83, Gini: 0.136, CoV: 0.278
  - Lower Limb MRI: Max/Min Ratio: 2.87, Gini: 0.173, CoV: 0.318

- **Atlanta, GA**
  - Knee Replacement: Max/Min Ratio: 6.10, Gini: 0.170, CoV: 0.316
  - PTCA: Max/Min Ratio: 2.52, Gini: 0.132, CoV: 0.255
  - Lower Limb MRI: Max/Min Ratio: Not shown, Gini: 0.184, CoV: 0.347

- **Columbus, OH**
  - Knee Replacement: Max/Min Ratio: 2.77, Gini: 0.121, CoV: 0.262
  - PTCA: Max/Min Ratio: 2.12, Gini: 0.125, CoV: 0.278
  - Lower Limb MRI: Max/Min Ratio: Not shown, Gini: 0.166, CoV: 0.312
Summary:

• Health care spending per privately insured beneficiary varies by a **factor of three** across the 306 Hospital Referral Regions (HRR)
• Correlation between total spending per privately insured beneficiary and total spending per Medicare beneficiary across HRRs is **only 0.14**
• Variation in providers’ transaction prices across HRRs is the primary driver of spending variation for the privately insured
• Variation in the quantity of care provided across HRRs is the primary driver of Medicare spending variation
• Large dispersion in overall inpatient hospital prices and in prices for seven relatively homogenous procedures.
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Supplier Induced Demand (Specialists and Bed Capacity)

• Variations in US expenditure (Wennberg, Fisher, Dartmouth Group) appear correlated with specialist concentration and bed availability

• Not causal evidence
  – Endogeneity of location
The percent of cancer patients receiving chemotherapy during their last two weeks of life varies widely among hospitals. Read more in "End-of-Life Care for Medicare Beneficiaries with Cancer is Highly Intensive Overall and Varies Widely."
Supplier induced demand: Physician surveys (Cutler et. al. 2013)

- Case:
An 85 year old male patient has severe (Class IV) congestive heart failure from ischemic heart disease, is on maximal medications, and is not a candidate for coronary revascularization. He is on 2 liters per minute of supplemental oxygen at home. He presents to your office with worsening shortness of breath and difficulty sleeping due to orthopnea. Office chest x-ray confirms severe congestive heart failure. Oxygen saturation was 85% and increased to 94% on 4 liters and the patient is more comfortable. He has adequate health insurance to cover tests and medications.

At this point, for a patient presenting like this, how often would you arrange for each of the following?
Supplier induced demand: Physician surveys (Cutler et al. 2013)

Potential responses:

a) Allow the patient to return home on increased oxygen and increased diuretics
b) Admit to the hospital for aggressive diuresis (not to the ICU/CCU)
c) Admit to the ICU/CCU for intensive therapy and monitoring
d) Place a pulmonary artery catheter for hemodynamic optimization
e) Recommend biventricular pacemaker for cardiac resynchronization
f) Initiate or continue discussions about palliative care
• “Cowboys”: Advocate intense and very expensive treatments
• “Comforters”: Advocate palliative care
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Medical Malpractice

• Defensive Medicine estimate to contribute 5-9% to medical care costs
  – Kessler and McClellan (variation in tort reform and expenditures)
  – “Static” effect
  – No evidence for an impact on growth rates (dynamic effect)

• Unlikely to be a major contributor to cost growth
The Preliminary Punchline

• **Change in quantity** is the most important component historically: It depends largely on new *technology*, which in turn depends on growth in income and maybe on growth *and* level of insurance coverage, and inventions.

• **Change in price** potentially important depends on supply and demand and maybe on growth in market power of providers relative to market power of insurer-buyers
  – Not as well understood (limited data)
  – Primary driver of “savings” due to managed care
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Right level of care in Theory: Finding the optimal quantity of health care services

Consider very simple health care economy:

• Assume a quantity of services (M) provides additional healthy days according to the (strictly concave) function \( Q = f(M) \)

• Society values each additional healthy day at $100

• The price of M is $100
Assume units of care cost $100 each. Want to stop using care short of the “summit.”

If a day was worth $100, M* is the optimal amount of medical care. At M*, slope of cost line (= price per unit) equals slope of health benefit curve (= marginal benefit of healthcare (in $)).

The “efficient” quantity of M is where MB=MC, and **not** where health is maximized.

• In an efficient outcome, some good is always left undone.

• This fact tends to be more frustrating for medical care than for other goods.
The Romantic Fallacy

• All care is of infinite value or priceless.
  – But scarcity exists! The more medicine, the less butter.
• So we ought to avoid “shallow (and flat) of the curve” medicine.
• Hard message #1: There is (often) no such thing as “medical necessity”
• Hard message #2: Efficiency = leaving some good undone
• Hard message #3: We don’t always want “quality care.”
Gloomy Implications for Policy

• People shouldn’t get everything they and their doctor agree on when it is free.

• Solutions?
  – Impose positive prices
  – Restrict choices
  – Both
A Closer Look at the Concept of “Efficiency”

- Based on welfare economics which focuses on how the world “should be”
- An efficient outcome is one in which no one can be made better-off without making someone else worse-off (Pareto optimum)
- Often not equitable ➔ alternate welfare functions
  - Extreme case: One has all and one has none; Efficient, but not equitable
A Closer Look at the Concept of ‘Efficiency’

• Efficiency will be achieved in a perfectly competitive market (and equity can be improved with income redistribution)

• BUT, are health care markets perfectly competitive?
  – Probably not! Uncertainty, Information, Externalities, etc...
  – Promoting competition may or may not improve outcomes
Evaluating Policy: Efficiency vs. Equity

• Law prohibits the sale of human organs
  – Efficiency sacrificed for equity or fairness

• Providing health care or health insurance to the poor
  – Equitable, but may also be efficient due to the presence of externalities.
Empirical Evidence: Is US Health Care Expenditure Level Too Much?

• What can the level tell us about the “right” amount of spending
  – Rely on cross country comparisons but then you face the problem of differences in culture, lifestyle, other unobserved factors

• Focus on cost growth and health growth to measure returns
  – If the social returns in improved health were greater than the increase in cost may still be room to grow (or at least we haven’t gone too far)

→ Focus of lecture 3 (read Cutler’s work)