

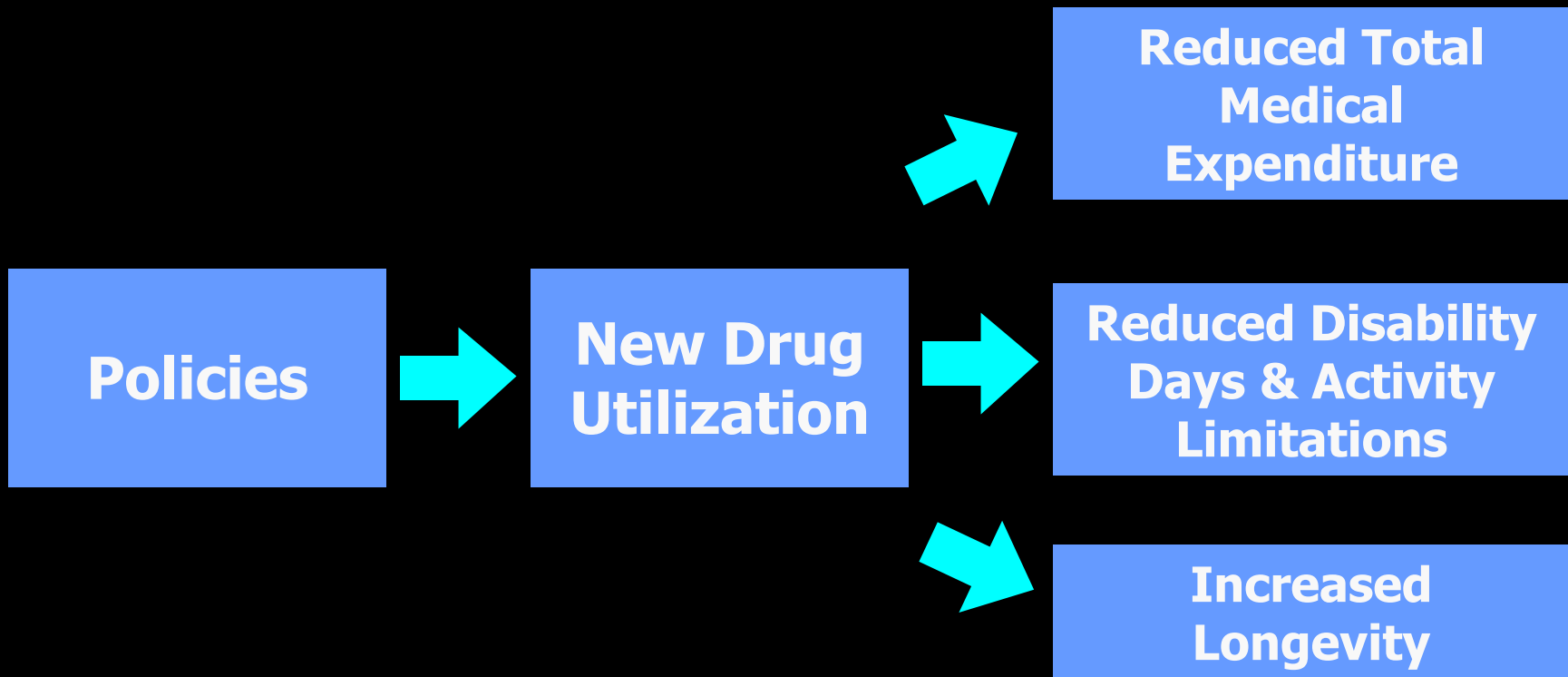
The Contribution of New Drugs to Health and Economic Growth in the United States

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National Bureau of Economic Research

Preview of Key Findings

- *In the aggregate*, the benefits to society of new drugs exceed their costs
- Three types of benefits:
 - Net decrease in overall medical expenditures
 - Reduced disability days & activity limitations
 - Increased longevity
- Policies that reduce the number and availability of new drugs deprive society of these benefits



Policies

New Drug Utilization

Reduced Total Medical Expenditure

Reduced Disability Days & Activity Limitations

Increased Longevity

Importance of Product Innovation

- Grossman & Helpman (1991): “Innovative goods are better than older products simply because they provide more ‘product services’ in relation to their cost of production”
- Bresnahan & Gordon (1997): “New goods are at the heart of economic progress”
- Pharmaceutical industry relative to other industries:
 - Propensity to generate new goods among highest
 - One of the most R&D intensive

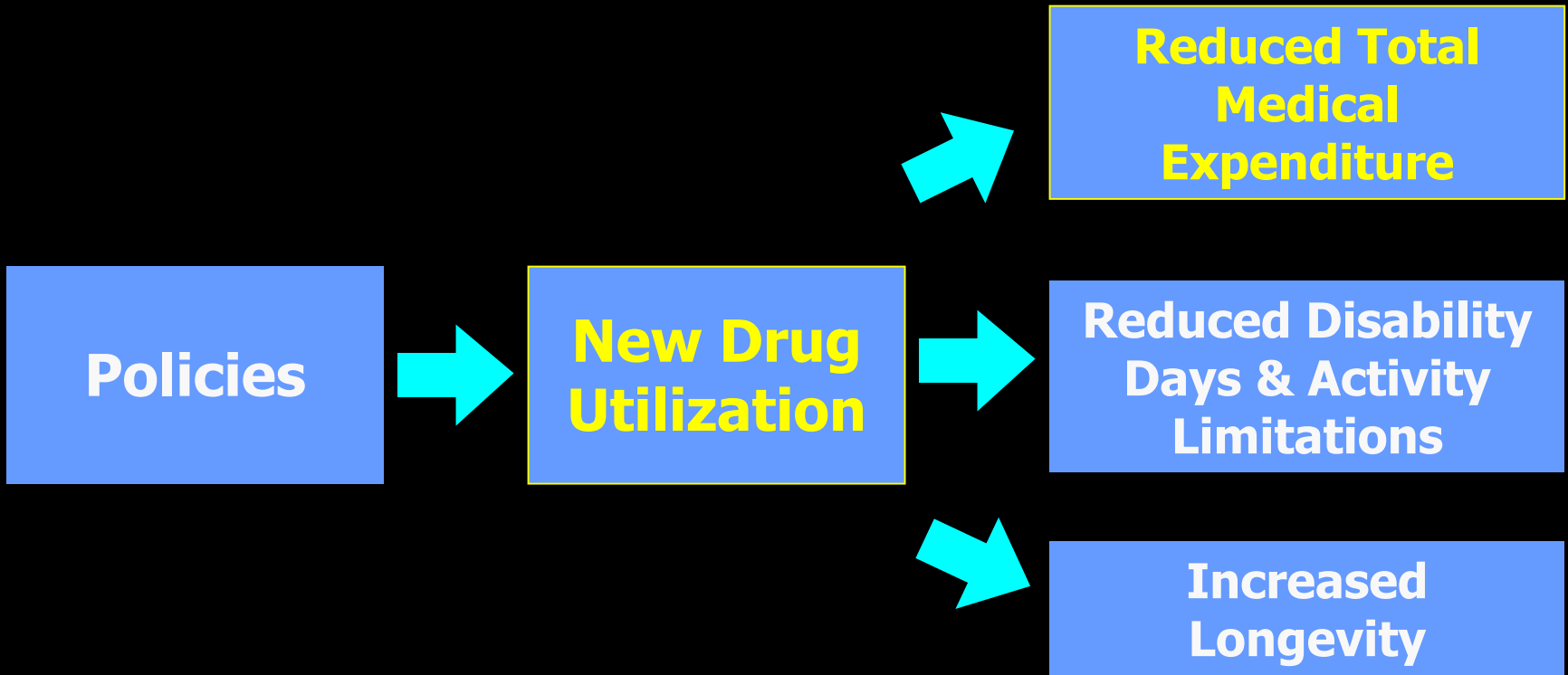
Key Hypothesis

All other things being equal, a person's health is an increasing function of the vintage* of the drugs he or she consumes

* Vintage: the year in which the FDA first approved a drug

Studies

- Based on large, comprehensive government databases
 - Many contain several decades of information on drug utilization, mortality and medical costs for the U.S. population
- At three different levels of aggregation:
 - Patient
 - Disease
 - National



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Study I: Benefits and Costs of Newer Drugs

- Quantifies dollars saved by replacing old drugs with new drugs for all diseases
- Compares total medical expenditures of people using new drugs to that of people using old drugs
- Controls for: age, sex, race, education, income, diagnosis, insurance status, disease duration, number of co-morbidities
- Published in *Health Affairs*, Sept./Oct. 2001

Comparison Example

- Two 70-year-old, white, high-school graduates, with income of \$40K, covered by Medicare and private insurance, both taking anti-arrhythmic medication, for a condition they have had for 12 years
- One man is taking a drug approved by the FDA in 1950; the other is taking a drug approved in 1995

Study I: Benefits and Costs of Newer Drugs

Findings:

- Newer drugs associated with lower total medical costs and fewer lost work days
- *Net cost savings:* Reduction in medical expenditures from using a newer drug almost 4x greater than added cost of that drug

Benefits and Costs of Newer Drugs: An Example

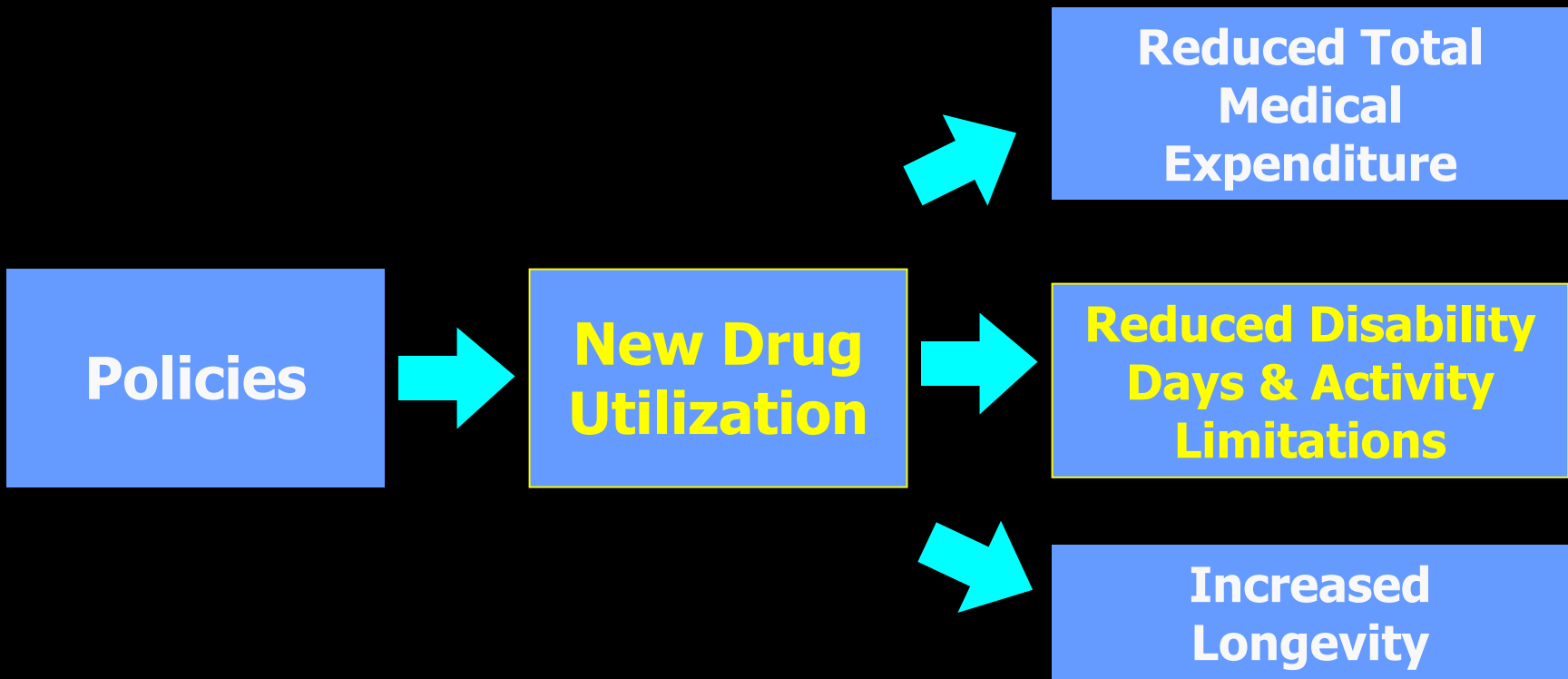
- Replace prescription for 15 year-old drug with one for 5 year-old drug; cost increase is \$18 (on average)
- This switch to newer drug reduces use and costs of medical services, including hospital, ER, and outpatient visits

Benefits and Costs of Newer Drugs: An Example

- Estimated reduction in non-drug medical costs is \$71; net savings from replacing old with new drug is \$53 ($\$71 - \18)
- Switching from old drug to new drug reduces expected hospital admissions by 6 per 1,000 people; overall saving = \$47,148 /1,000 people

Most Savings from Reduced Hospitalization

- Savings mainly from reduced number of admissions
- Additional savings from reduced length of stay



Policies

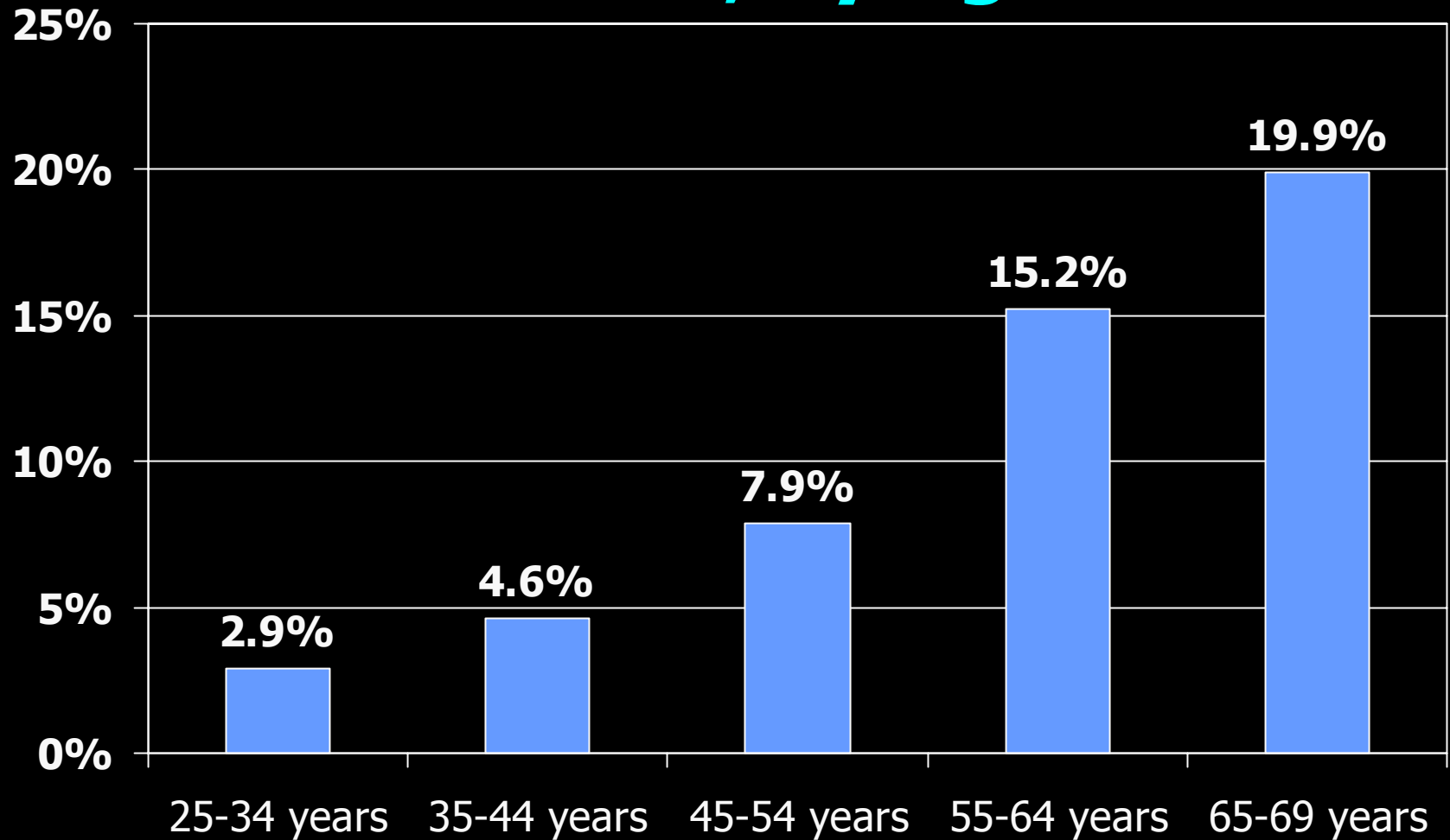
New Drug Utilization

Reduced Total Medical Expenditure

Reduced Disability Days & Activity Limitations

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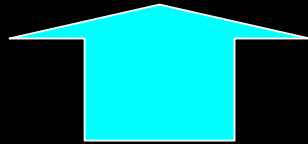
% of People Unable to Work, by Age



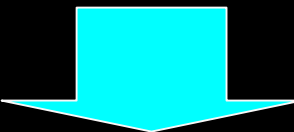
Newer Drugs → Greater Ability of People with Chronic Conditions to Work

- **The greatest reductions in work and activity limitations have been in those chronic diseases where the most new drugs have been introduced**
- **Preliminary findings:**

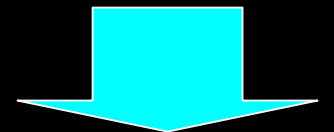
**Average
number of
prescriptions**



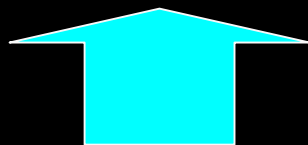
**Activity
and work
limitations**



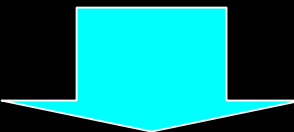
**Average
number of
restricted
activity
days**



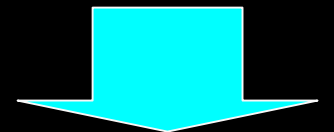
**Average
vintage of
prescriptions**



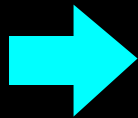
**Activity
and work
limitations**



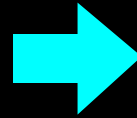
**Average
number of
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Policies



New Drug Utilization



Reduced Disability Days & Activity Limitations



Reduced Total Medical Expenditure



Increased Longevity

Analysis of *All Diseases*: New Drugs → Reduced Mortality

- Observation: Mortality from some diseases has declined much more than mortality from other diseases
- Hypothesis: The rate of mortality reduction is related to the rate of new drug introduction
- Objectives: Test the hypothesis and determine the magnitude of the effect

Analysis of *All Diseases*: New Drugs → Reduced Mortality

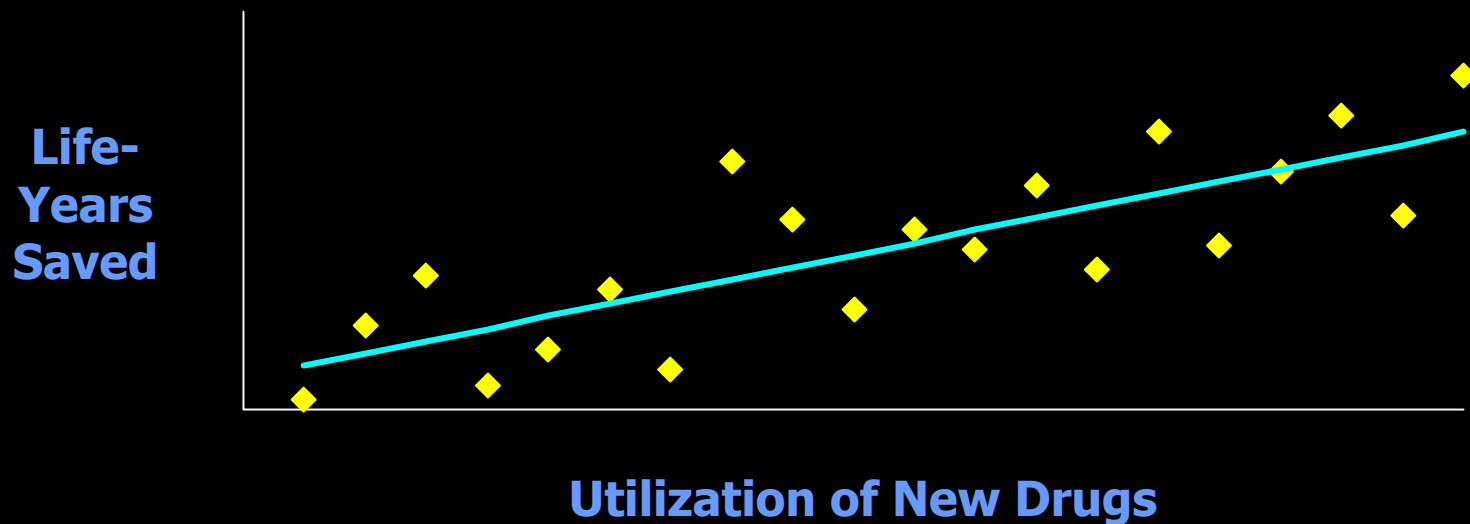
Advantages of Research Design:

- Generality: First to include all diseases, all U.S. patients, all outpatient drugs
- Controls: Accounts for effects on mortality of general economic or social trends and non-drug innovations (surgical procedures, education, vaccines, etc.)

Analysis of *All Diseases*: New Drugs → Reduced Mortality

Finding:

- Direct correlation across diseases between number of new drugs utilized and life-years saved



Analysis of *All Diseases*: New Drugs → Reduced Mortality

Specific findings:

- On average, each of the 436 new drugs introduced between 1970-91 annually added 11,200 aggregate years of life to US population
- Reduction in premature death over 5x greater for diseases with many new drugs than for diseases with fewer new drug introductions

Analysis of *All Diseases*: New Drugs → Reduced Mortality

Specific findings: (cont.)

- Each one-time expenditure of \$500 million (average for FDA new drug approval) yields *recurring* annual benefit of over \$200 million in increased longevity
- Represents very high social rate of return on pharmaceutical innovation

Analysis of *All Diseases*: New Drugs → Reduced Mortality

- To be published in *Exceptional Returns: The Economic Value of America's Investment in Medical Research*
 - Lasker Charitable Trust Symposium Proceedings
 - Published by University of Chicago
 - Chapters by nine distinguished economists

Summary of Key Findings

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