

Chapter 9

의료기술과 의료장비

A. 문제제기

Why have costs risen so dramatically and is the more expensive health care “worth it”?

Researchers get very different estimates of the effect of improved medical technology when they look at the effect of changes in treatments for particular conditions versus aggregate effects on measures of community health, such as life expectancy or infant mortality rates.

Here we need to distinguish between findings in studies using time-series data vs. cross-sectional data, especially in cross-country comparisons.

B. 기술진보(효과측정의 문제)

Changes over time: How do we measure the contribution of technological change in comparing 2005 health care and 1960 health care?

Look at technological change using production function analysis.

Change in output = f (change in inputs)

If change is found in the relationship between inputs and outputs, this is attributed to a change in technology, which often cannot be measured directly, but only by looking at the residual.

(However, it is much easier to measure effects of technological change if one is studying particular diseases.)

B. 기술진보(효과측정의 문제)

Measuring inputs and output

1) 투입요소(Inputs)

Measuring changes in quantities of particular inputs is hazardous as it will not pick up quality improvements. For instance, physician training has improved and operating rooms are now equipped very differently. An alternative is to measure inputs in terms of cost (inflation adjusted \$ or % of real GDP).

2) 산출물(Output)

Common measures are changes in mortality, average survival time, or proportion of patients who recover completely, and for macro studies, changes in life-expectancy (at birth or at 65 yrs. of age).

C. 기술진보의 요소

1. 기술혁신(Innovation)

What is the difference between an invention and an innovation? An invention is a discovery; an innovation is the resulting new product or process that has practical use and can be marketed.

2. In a market economy, what promotes innovation?

One incentive is the **economic motive, profit**. In order for firms or individuals to gain from innovation, there must be intellectual property rights (copy rights and patents).

In order for innovation to take place there must also be a stock of human capital and research institutions, whether they are supported by government, business, or embedded in academia.

D. 기술진보와 의료비의 문제

1. Cost-Increasing vs. Cost-Decreasing Technological Change

Innovations can either be cost-saving, cost-neutral, or cost increasing.

a) 비용증가형 혁신(**Cost-increasing innovations**)

A cost-increasing innovation is one that increases the average cost of treatment of a disease. Note: an innovation may be cost-increasing because a condition formerly rarely treated (due to lack of effective treatment) is now more widely treated.

Examples: allergies, kidney stones.

D. 기술진보와 의료비의 문제

b) 비용절약형 혁신(**Cost-Reducing Innovations**)

Example: the introduction of the assembly line by Henry Ford was a cost-reducing innovation. It enabled more cars to be produced per hour with fewer inputs. There was an initial high fixed cost to setting up assembly lines, but over time it resulted in cheaper cars.

(However, introducing some of the now-standard equipment into cars has increased their cost over time. The latter is an example of a cost-increasing innovation.)

Medical analogy: Substituting angioplasty for invasive heart surgery which involves start up costs of training and hospital equipment.

D. 기술진보와 의료비의 문제

2. 비용-효과적 기술진보(Cost-Effective Technological Change)

Do we care about whether an innovation is cost-increasing? Isn't the issue more one of cost-effectiveness?

Today most health economists and health policy experts use incremental cost-effectiveness or cost-utility analysis.

- Incremental cost-utility analysis is used because so much of our health care is devoted to improving quality of life, not just length of life.

David Cutler, Mark McClellan, and Joseph Newhouse have done a series of studies on the cost-effectiveness of treatment for AMI (heart attack) which illustrate this approach.

D. 기술진보와 의료비의 문제

3. 생산성 효율(Productive Efficiency)

Studying productive efficiency avoids the cost dimension. This is common practice when comparing treatments in different countries where costs of inputs differ. In such cases, we look at the quantities of inputs and compare them with patient outcomes.

Note: Previous levels of investment in technology, including both training in the use of new techniques and physical capital will affect the relative productive efficiency of a country.

E. 의료보험과 기술진보

There will only be an incentive to innovate if there is a market for the resulting innovation.

- Therefore whether insurance companies will reimburse treatments that use a new innovation is crucial.

Note Weisbrod's concept, "**the health-care quadrilemma**". How can this be used to explain the tendency for technological change in medicine in the U.S. to have been, on balance, cost-increasing?

As cost-containment becomes important, does this reduce the rate of innovation and the rate of diffusion of new technology? We will return to this question in our next topic, the pharmaceutical industry.