

Grossman's theory of the demand for health care

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Aims of the session

(what I hope to do)

- Provide an insight into the Grossman model
- Provide guidance on the technical concepts and graphical representation of the model
- Show the implications of the model – and highlight some criticisms

Objectives

(what I hope you are able to do)

- Understand the contribution of the Grossman model to health economics
- Assess the application of consumer theory to the debate on the demand for health and health care
- Be able to discuss the role of variables such as age, income and education on the demand for health care

General background

- Health is determined by many factors among which medical care is only one
- These factors include social class, work environment, employment status, income, housing conditions, heating, education, diet and lifestyle
- The relative importance of inequalities in these types of resources cannot be determined unless there is an understanding of the links between resources, behaviour and health

Background to Grossman

- Grossman (JPE, 1972) was concerned with how individuals allocate their resources to produce health
- The model goes beyond traditional demand analysis and has been extremely influential in health economics
- It utilises the idea of the individual as a producer of health (not simply a consumer) by removing the artificial separation of consumption and production
- It also introduces the idea of investing in human capital (health and education) to improve outcomes in both the market (work) and non-market (household) sectors

Key concepts

- Demand for health care is derived
 - from a demand for health (few people want health care for its own sake)
- Demand for health is derived
 - from the demand for utility (e.g. healthy days in which to participate in leisure and work)
- Individuals are not passive consumers of health
 - but active producers who spend time and money on the production of health
- Health can be seen as lasting over time periods.
 - It depreciates (perhaps at a non-constant rate) and can therefore be analysed as a capital good

Key assumptions

- Individuals value health but do not value it above all else (if they did, they would not over-eat, smoke, drink too much, or drive too fast)
- We have limited incomes with which to finance health and other activities, and neither is costless
- We exert a relatively high degree of control over our health by virtue of the fact that we can influence our health-affecting consumption patterns, our health care utilisation and our environment.

The demand for health

Health demand consists of two elements:

(1) Consumption effects:

health yields direct utility i.e. you feel better when you are healthier

(2) Investment effects:

health increases the number of days available to participate in market and non-market activities – the novel bit of the model

Health as a capital good

$$H \text{ Stock}_t = H \text{ Stock}_{t-1} - \text{dep'n } (\delta) + \text{inv. in H } (I)$$

A person is born with initial endowment of H, which they add to by investment.

The rate of H production will depend on the efficiency of investment in H.

There will be δ in the value of the stock of H through age, accident, carelessness, sudden disease.

As we are considering U over a life-time we also need to be aware of the issue of time-preference

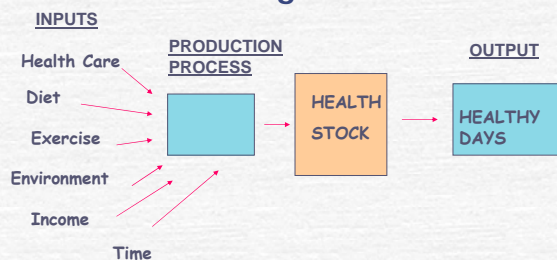
The human capital model

The individual is a producer of H (amongst other things): they buy market inputs (medical care, food, clothing), and combine them with their own time to produce services that increase their utility

The analysis is based on human capital theory which shows how individuals invest in themselves e.g. through training or education, to increase their productivity

The optimal amount of investment in human capital is determined by the relative Cs and Bs: usually the Cs occur in the short-term whilst the Bs accrue in the future in the form of enhanced job opportunities

Investing in health



And to quote ...

- ☞ "The only way to keep your health is to eat what you don't want, drink what you don't like and do what you'd rather not."
- ☞ Mark Twain (1835-1910)

The investment decision

Household production functions:

Health production

- $I = f(M, T_H; E)$

Consumption goods

- $Z = f(X, T_C; E)$

- I = investment in health
- M = market health care inputs
- T_H = time spent on improving health
- Z = composite consumption good
- X = market produced goods
- T_C = time spent on composite consumption good
- E = education

The investment decision

Analogy with a firm using inputs to produce goods: decisions made according to production functions – relationship between inputs and outputs.

Education plays a crucial role in determining the efficiency of health capital and also in other production functions, therefore influences consumption patterns of households

Assume:

- individuals want to maximise their lifetime utility
- they have perfect knowledge
- and able to allocate time between different activities

Implied choices

Inter-related time choices:

- Labour time (income) vs. leisure time vs. ill time

Within leisure time choice:

- health producing time (gym) vs. non-health producing time

Resource choices:

- Health care inputs vs. other consumption
- subject to budget constraint

Optimal choice of investment

Marginal cost (of investing in H) = Marginal benefits

- Marginal cost = $r + \delta$,

where

r = rate of interest on other investments

δ = rate of depreciation of health

i.e. the opportunity cost

- Both r and δ are exogenous to the model

Optimal choice of investment

Marginal benefit = rate of return = $(W \cdot G)/C$

where

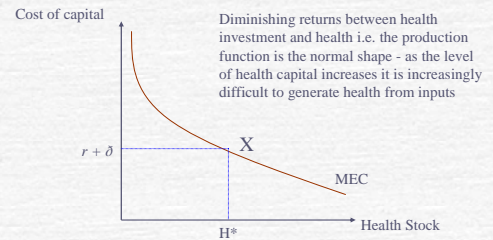
W = wage rate,

G = marginal product (rate of return) of health investment which is subject to diminishing MR (stop smoking through to Michael Jackson's oxygen tent)

C = direct cost of investment in health

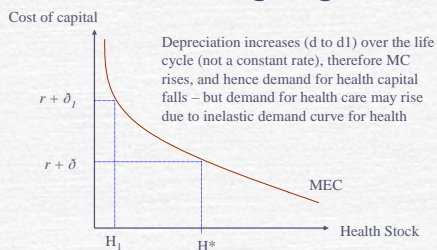
☞ This is the 'marginal efficiency of capital' (MEC)

Demand for Health Capital



At point X marginal cost = marginal benefit

The Effect of Ageing

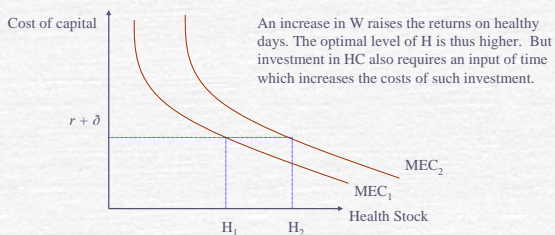


Part of this is offset by increasing investment in H so health care demand rises.

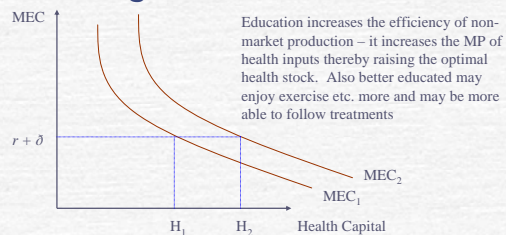
And to quote ...

☞ "Biological factors associated with ageing raise the price of human capital and cause individuals to substitute away from future health until death is chosen" (Grossman, 1972)

Changes in the Wage Rate



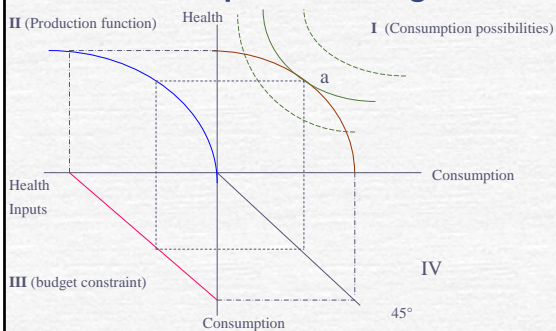
Changes in Education

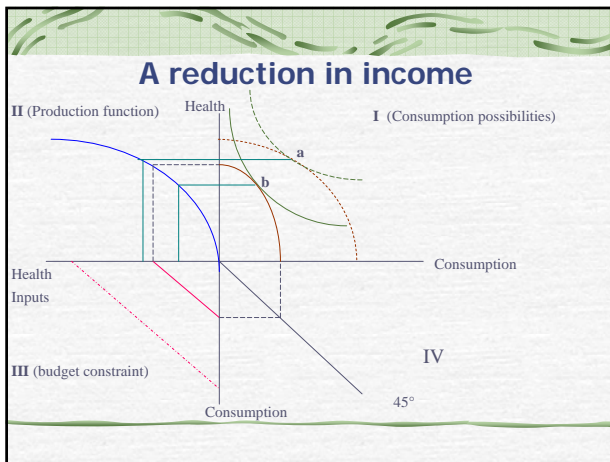


Implications

- ☛ Raise education amongst the poorly educated
- ☛ Reduce price of health care, especially to the poor
- ☛ Increase wages of the low paid
- ☛ Use policies to affect depreciation

The 4 quadrant diagram





- ### Change in prices
- ☞ A fall in the price of a unit of health inputs results in the budget line swivelling outwards from the intercept on the consumption axis
 - ☞ Assuming that the individual did not devote all of her income to consumption before the price change, she will employ more health inputs and consequently will be able to achieve better health.
 - ☞ This suggests that subsidising the price of health inputs (for example, milk and heating) will result in improved health for those receiving such subsidies.

- ### Technical knowledge/education
- ☞ Advances in medical science or education will cause an upward shift in the health production function
 - ☞ This means that the individual can reach a higher level of health for the same level of health inputs
 - ☞ This suggests that a health education programme may bring about improved health without any increase in the demand placed on health services and other health inputs

- ### Application to choice behaviour
- ☞ If other capital stocks are low an individual will choose to deplete her health stocks in order to replenish other stocks
 - ☞ e.g. a high wage occupation that causes the stock of health to decline may be chosen if the stock of wealth is low
 - ☞ A similar kind of argument might be applied to the type of recreation activities which are chosen
 - ☞ e.g. an individual with low stocks of wealth relative to health may smoke since it is a relatively cheap in terms of wealth and expensive in terms of health

Policy implications

- ☞ The model can be used to predict the likely (and opposite than intended) effects of policy changes
- ☞ e.g the government may attempt to reduce queuing time in order to encourage greater utilisation of health care by the poor
- ☞ This will increase the MEC of both rich and poor but since the value of extra time is greater for the rich, the MEC will shift up further for this group, thus increasing the inequality

Criticisms of the model

- ☞ Assumes health care is a constant life time investment
- ☞ It ignores insurance markets
- ☞ Assumes perfect information on the part of consumers about the MEC of health care, interest rates, depreciation, etc. – for now and the future.
- ☞ It is deterministic including the choice of when to die!

Summary

- ☞ Consumers want health not health care *per se*
- ☞ Consumers produce health
- ☞ Health does not depreciate instantly
- ☞ Demand for health has pure consumption and pure investment aspects
- ☞ The cost of holding health is the opportunity costs of capital plus the depreciation rate
- ☞ The MEC curve is downward sloping due to \downarrow MR
- ☞ Rewards of being healthy are greater for high income
- ☞ Health can be generated as less cost by educated

Questions

- ☞ Describe the aspects of health that make it a consumption good and those aspects that make it an investment good
- ☞ Give examples of how health might be produced from market and non-market goods
- ☞ Discuss some of the factors that might increase an individual's marginal efficiency of investment in health capital
- ☞ Do you think the typical person becomes more or less healthy upon retirement? What does the Grossman model predict?
- ☞ Richer people can afford more of all goods (including health care) yet according to the model will choose a higher health stock. Why?
- ☞ Provide a critique of the paper by Hey and Patel (JHE, 1993)