DEMAND FOR HEALTH CARE

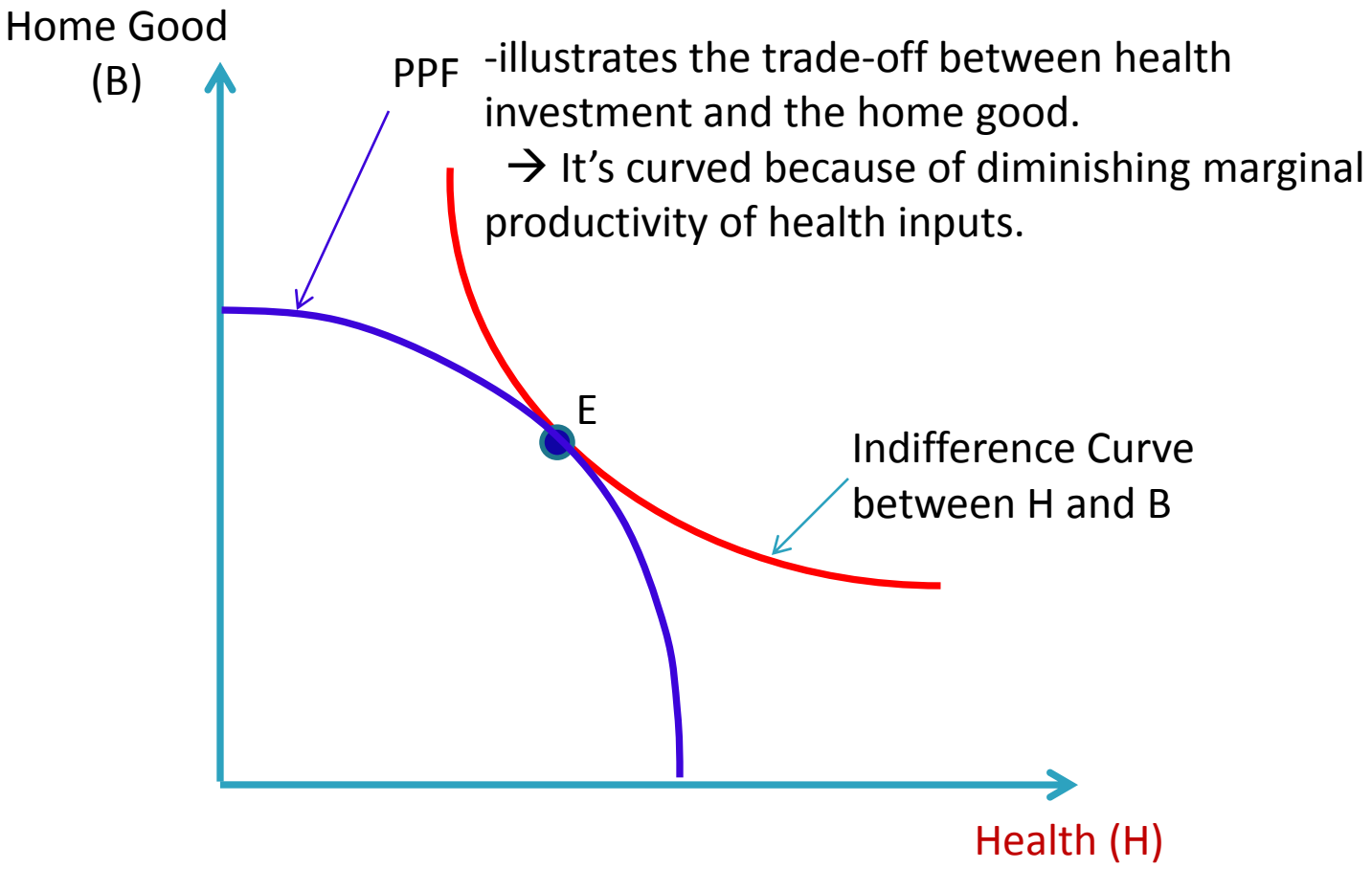
EE 474 Health Economics

Semester 1/2013

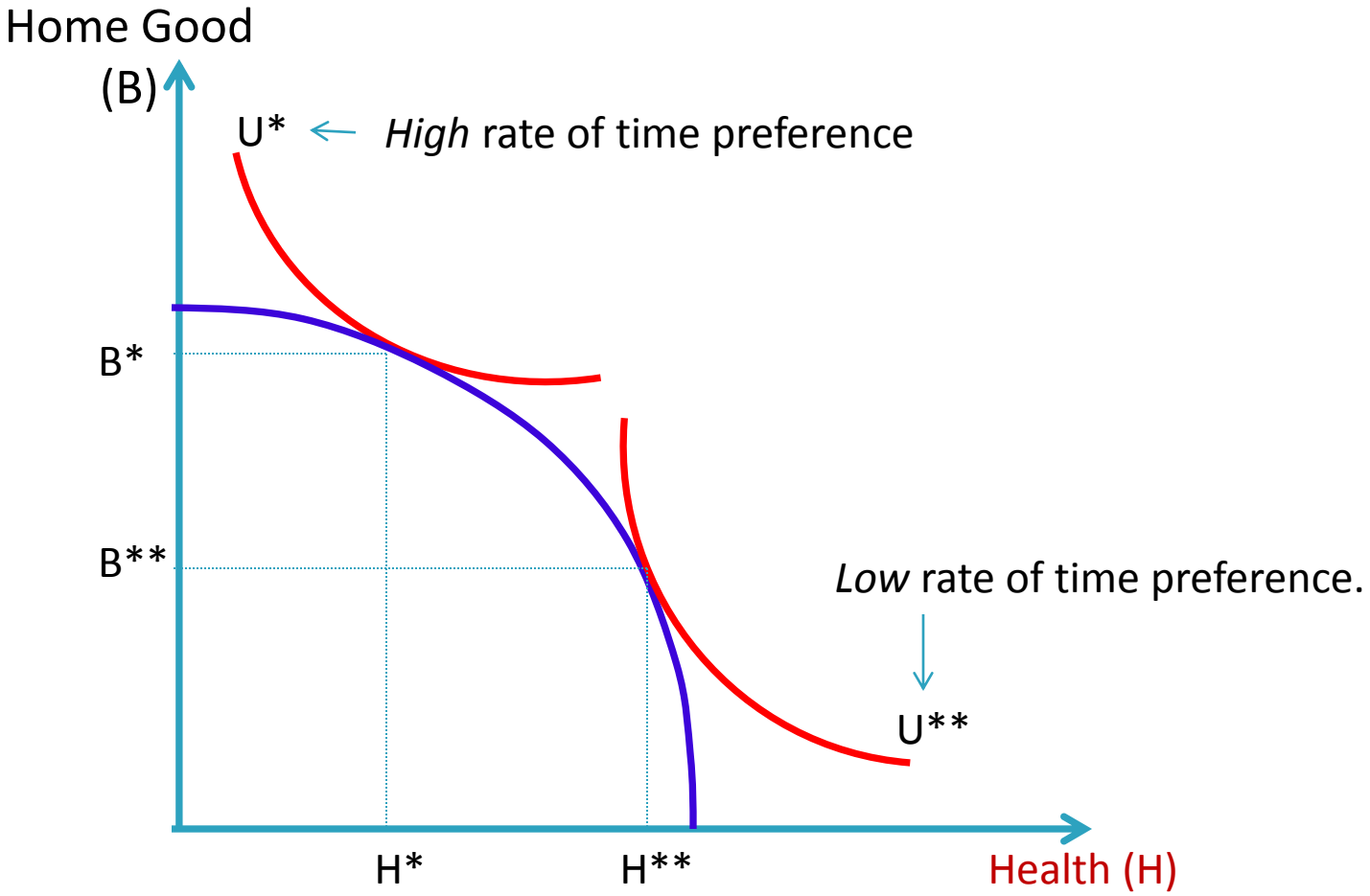
Topics

- Demand for Health Capital (Revisited)
- Demand for Health and Health Care
- Demand for Health Care in the Standard Budget Constraint Model
- Comparative Statics
- Empirical Studies
- Other Variables Affecting Demand

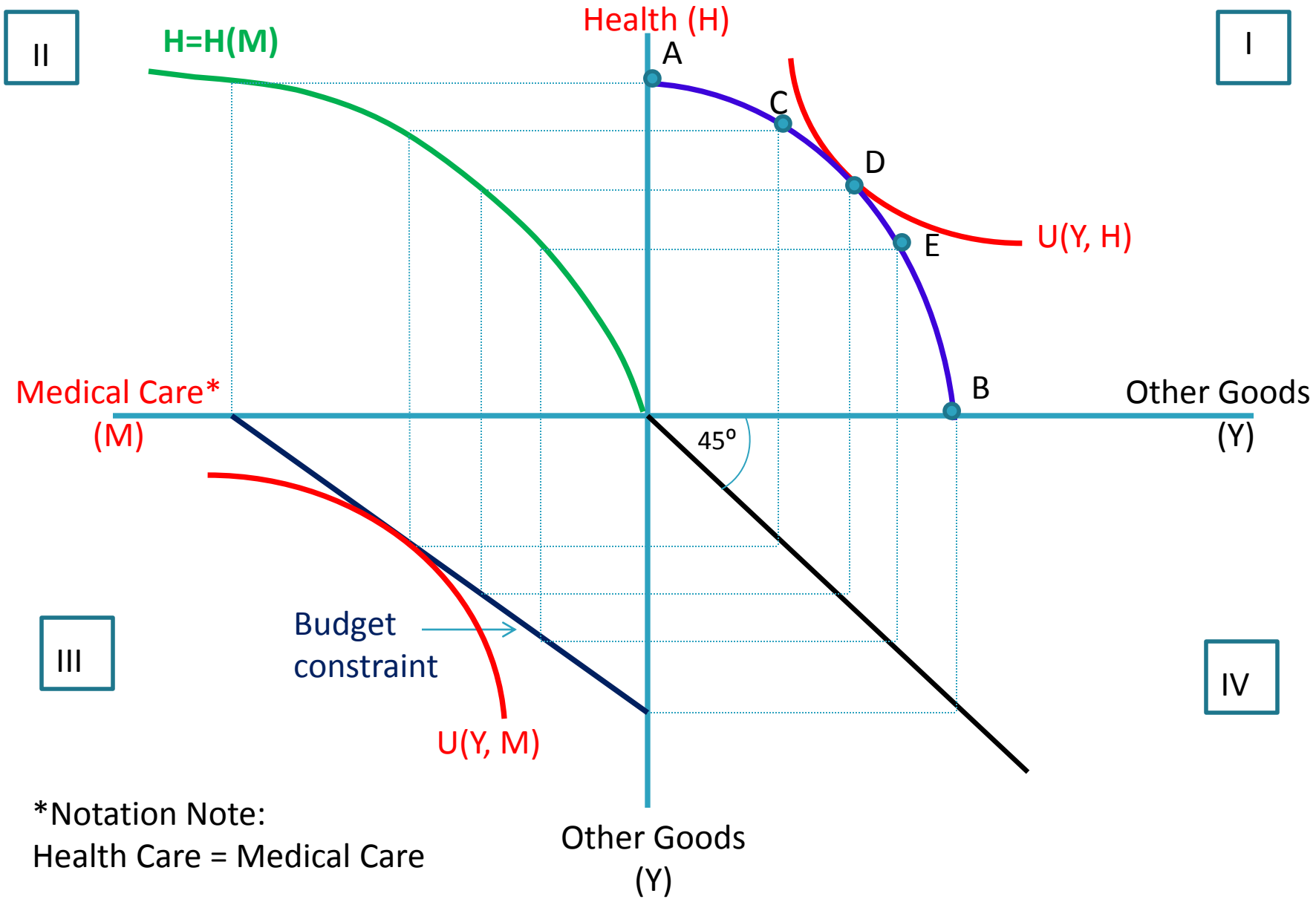
Recall: Demand for Health Capital



Demand for Health Capital at Different Rates of Time Preference



Demand for Health and Health Care



*Notation Note:
Health Care = Medical Care

Switching from Health Capital (H) to Medical Care (M)

- Now, we want to derive *the demand for medical care.*
  - We've shown that H=*f*(M), so the demand for M is derived from the demand for H.
- Consider the utility as a function of other good (Y) and medical care (M), rather than health (H): U = U(Y, M)
- Assume that M is homogeneous and represents the number of units of medical care.
- The budget line is a straight line because each unit of M costs the same number of dollars and means the same reduction in Y.
  - The slope of the budget constraint is constant.

Consumer's Maximization Problem

- The consumer's problem now is:

  Maximize $U = U(Y,M)$

  subject to $I = P_M*M + P_Y*Y$,

  where I = total income,

  P_M = Medical care price per unit

  P_Y = Price per unit of other goods

- Let $P_Y = 1$. So, the budget can be simplified to
  - $I = P_M*M + Y$
  - ➢ Or $Y = I - P_M M$

Standard Budget Constraint Model

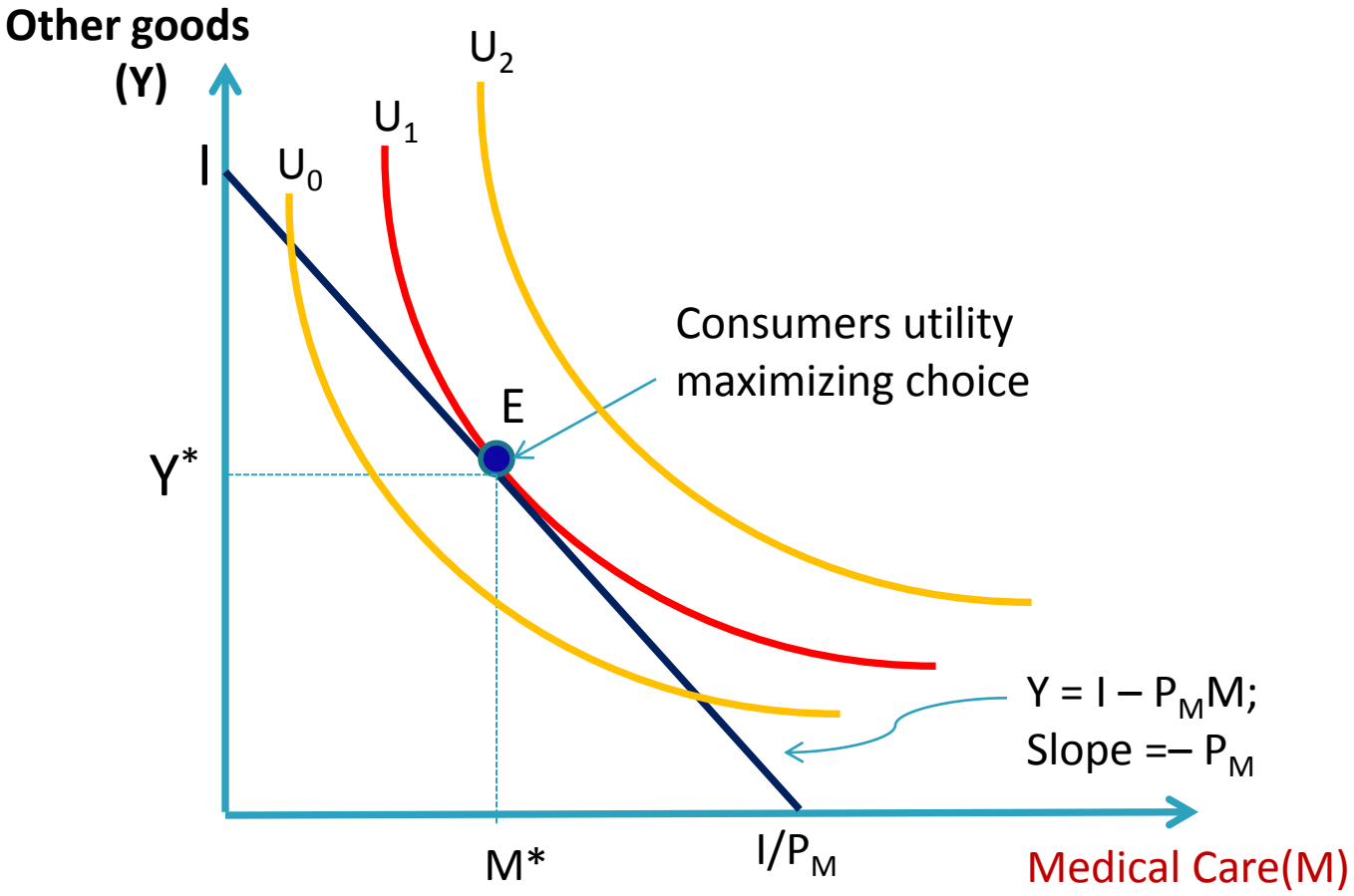
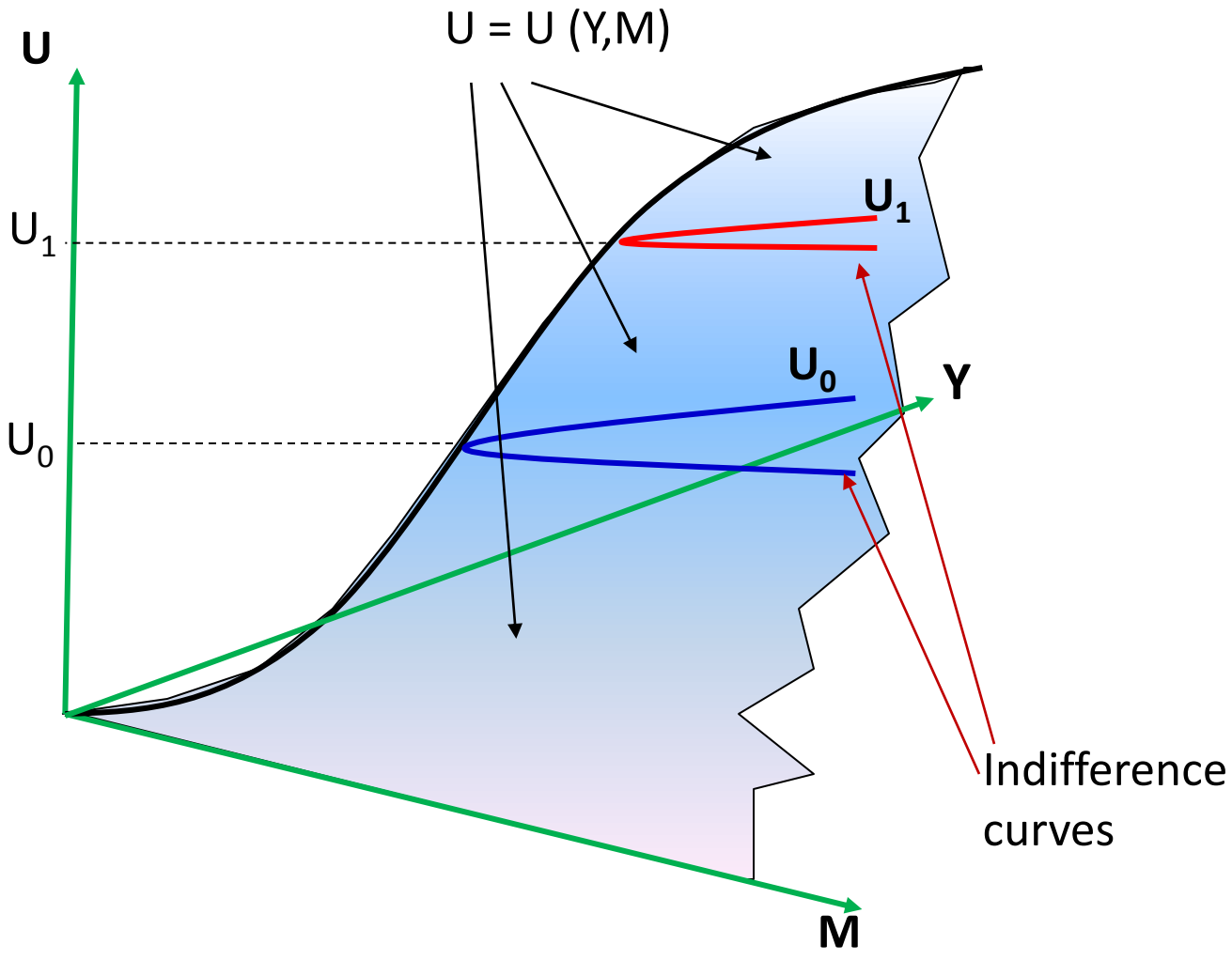
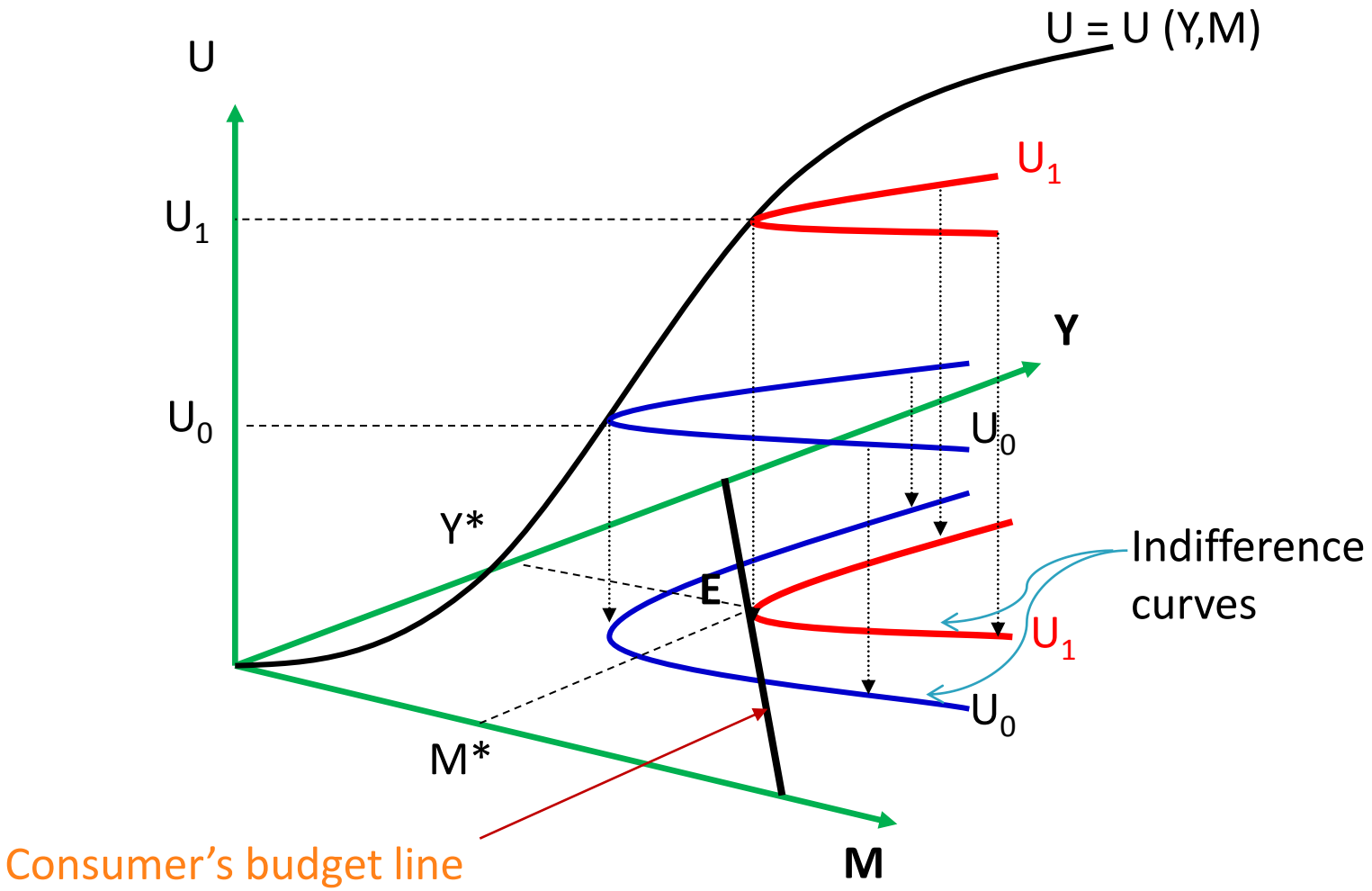


Illustration of U = U (Y, M) in a 3-space diagram.




U = U (Y,M)
U
U1
U0
Y
Y*
E
M*
M
U1
U0
U1
U0
Indifference curves
Consumer's budget line

Utility Maximization

- At point E the slope of indifference curve U_1 (marginal rate of substitution) is just equal to the price ratio:

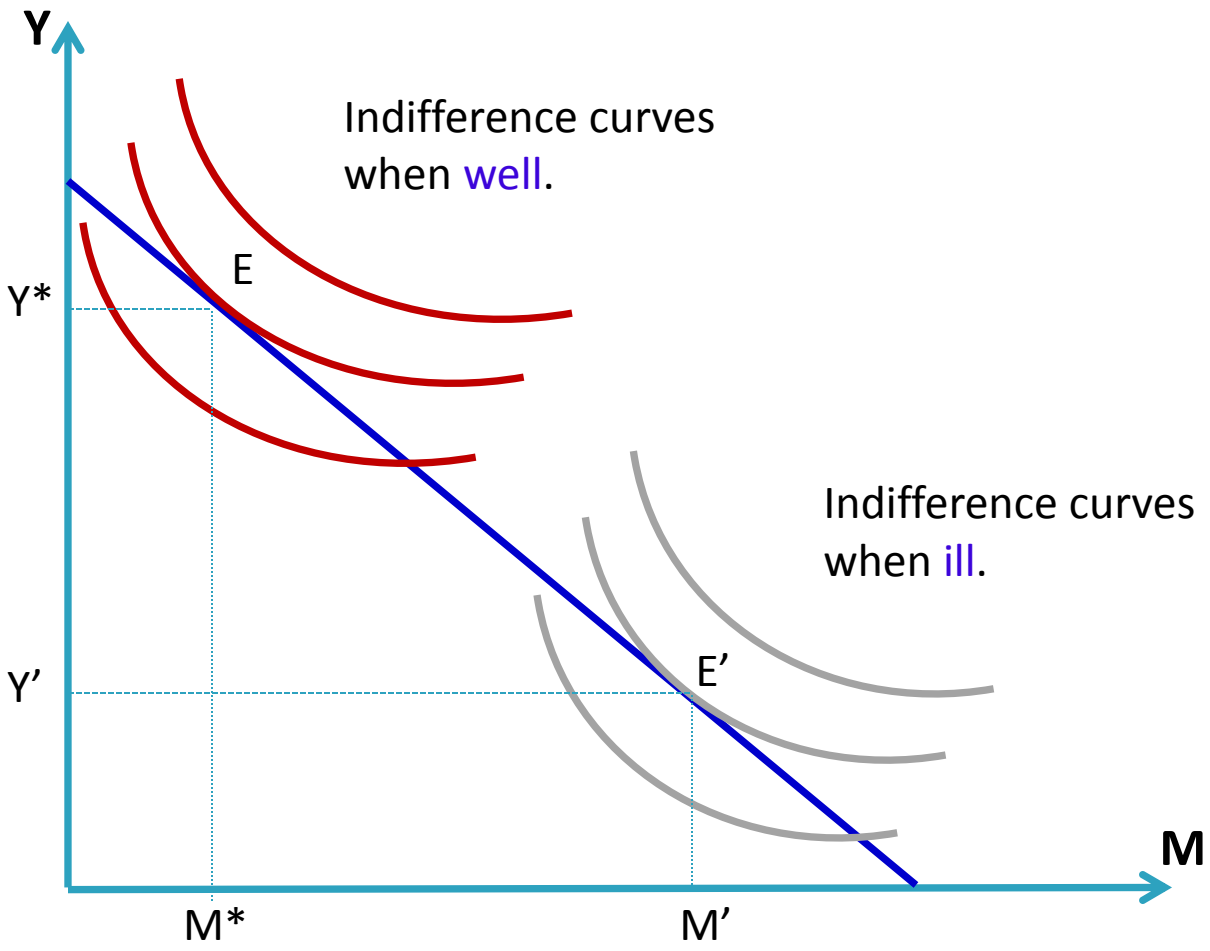
$$MRS_{MY} = -\frac{MU_M}{MU_Y} = -P_M$$

- The marginal rate of substitution (MRS) is a measure of the rate at which a consumer is *willing* to trade other goods for medical care.
- The price ratio is a measure of the rate at which a consumer *can* trade other goods for medical care.

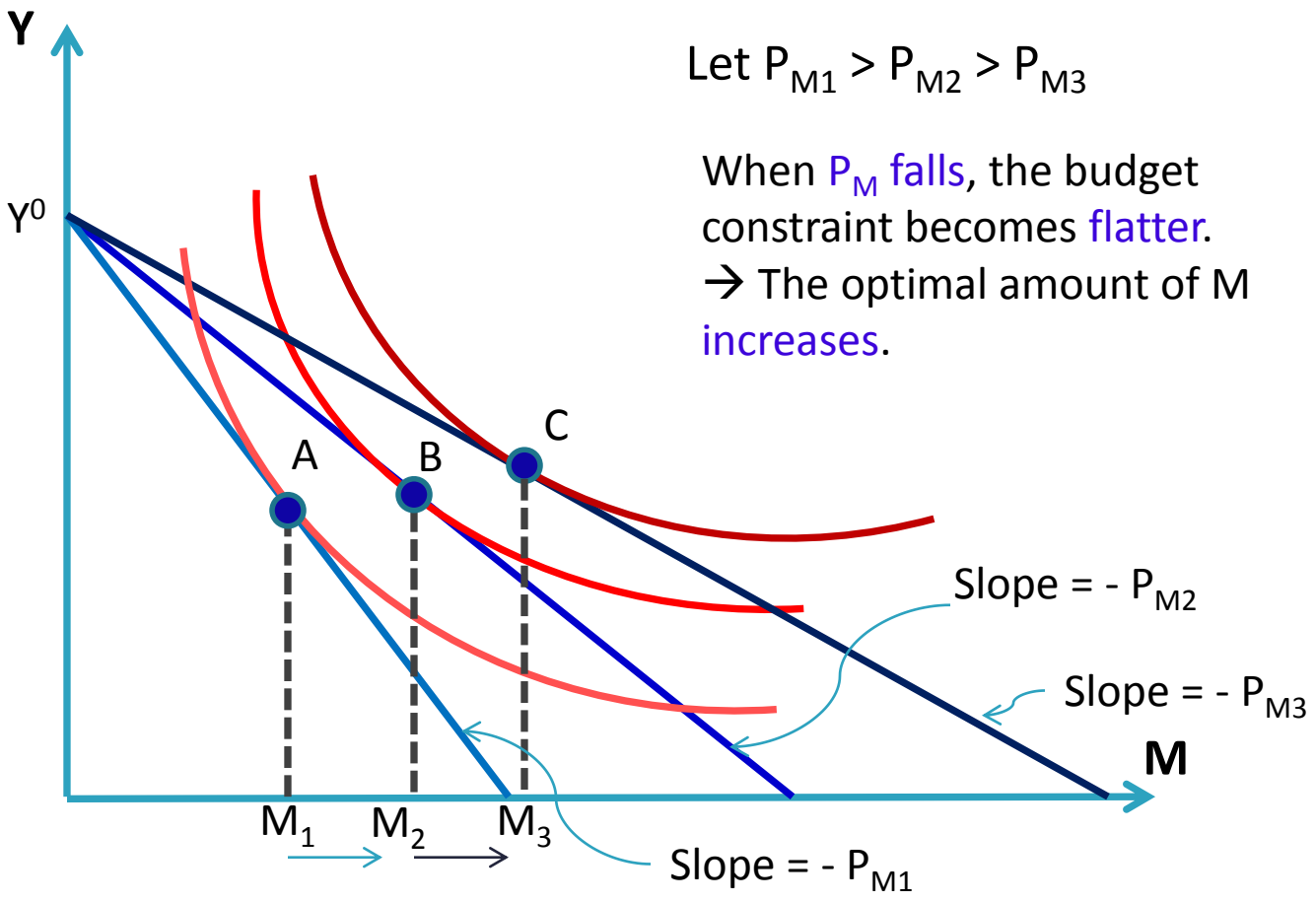
Comparative Statics

- Comparative statics is a type of analysis where the original equilibrium is identified, and *after a change occurs*, the new equilibrium is compared to the old one.
- We will consider how the following changes affect the demand for medical care.
  - Change in health status
  - A decrease in medical care price
  - An increase in income
  - An increase in the price of a substitute (or complement)
  - Two other factors that affect demand for medical care:
    - Time cost
    - Coinsurance

Changed Preference due to Illness



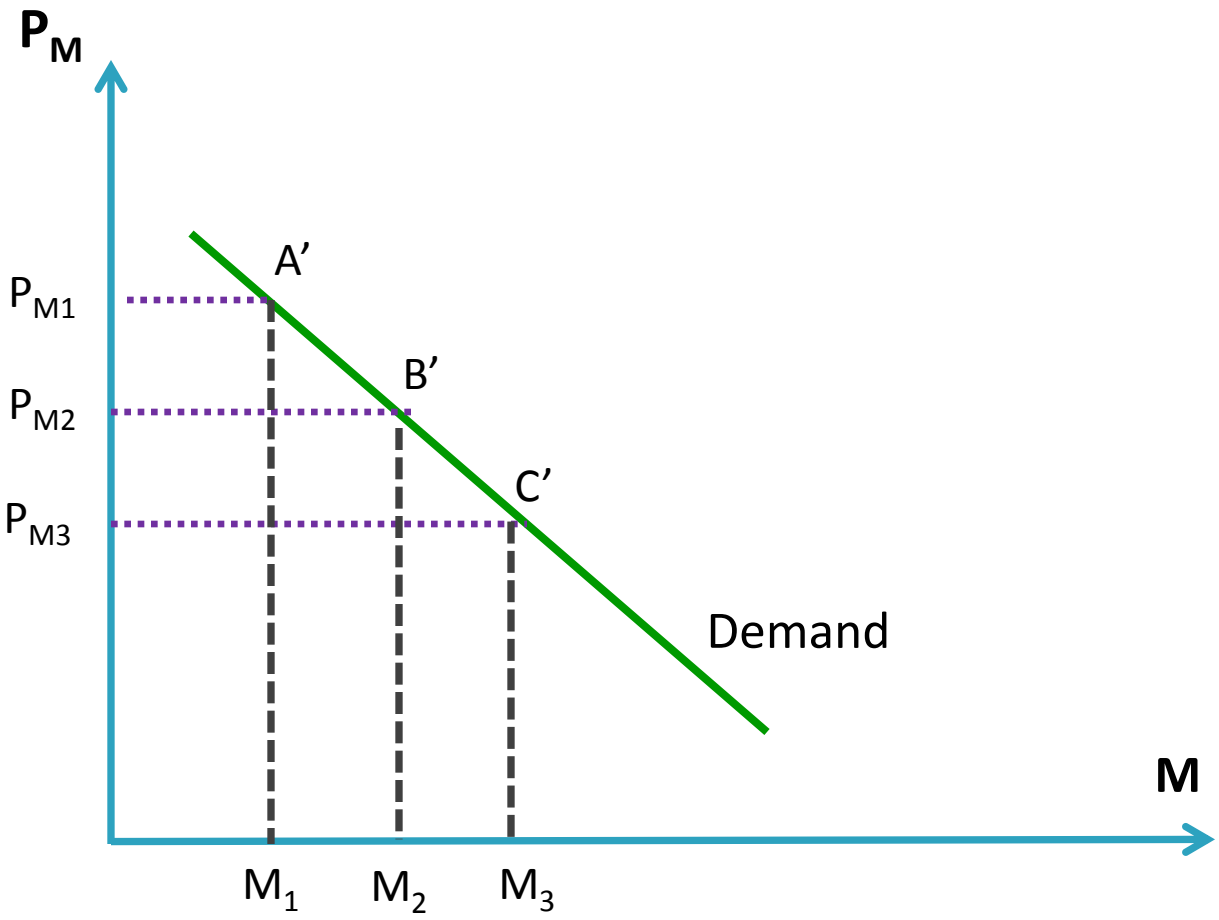
What Happens when P_M Falls?



Let $P_{M1} > P_{M2} > P_{M3}$

When P_M falls, the budget constraint becomes flatter.
→ The optimal amount of M increases.

The Demand for Medical Care



Price Elasticity of Demand

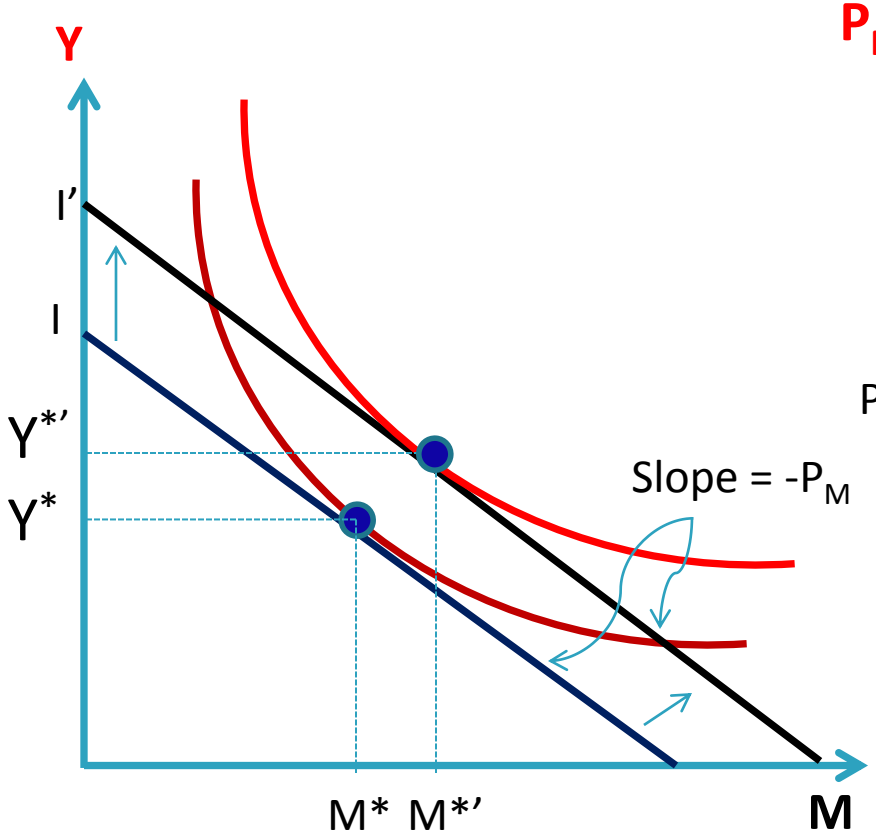
- The price elasticity of demand measures the responsiveness of the consumer's demand to price.
- Price elasticity, *Ep,* is the ratio of the percentage change in quantity demanded to the percentage change in price.

$$E_p = \frac{(\Delta Q_d / Q_d)}{(\Delta P / P)} = \frac{\Delta Q_d}{\Delta P}\frac{P}{Q_d}$$

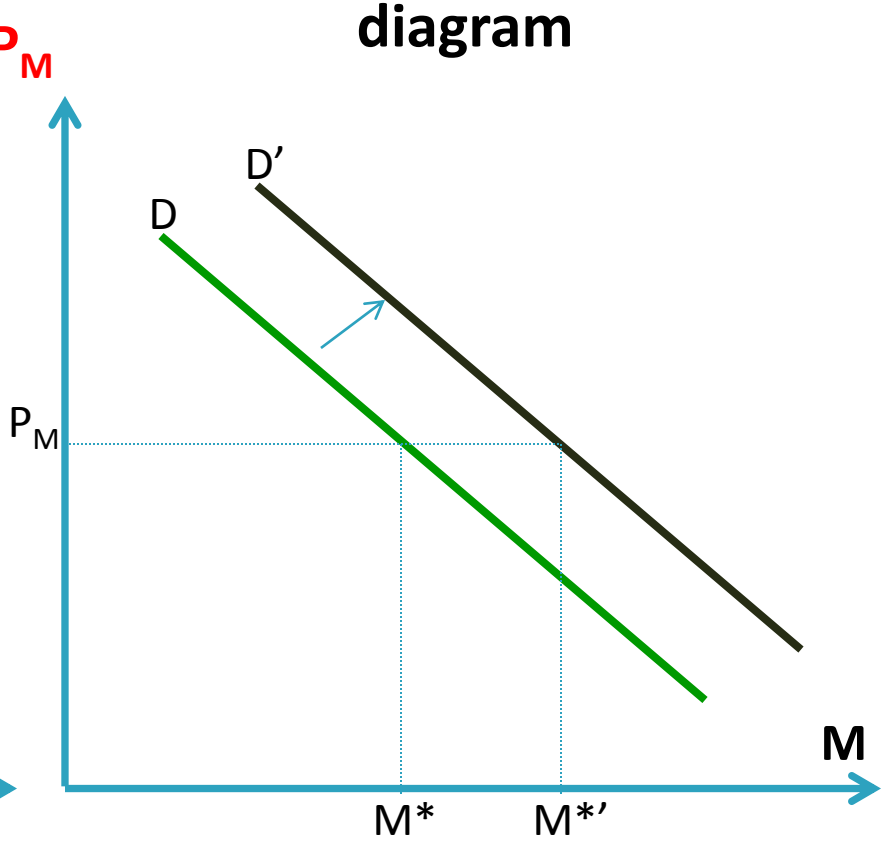
- Example: Suppose at P_1= 25, Q_1= 6, and at P_2=30, Q_2=5. What is the price elasticity of demand at the average price?

What Happens if Income Increases?

Indifference curve diagram



Individual demand curve diagram

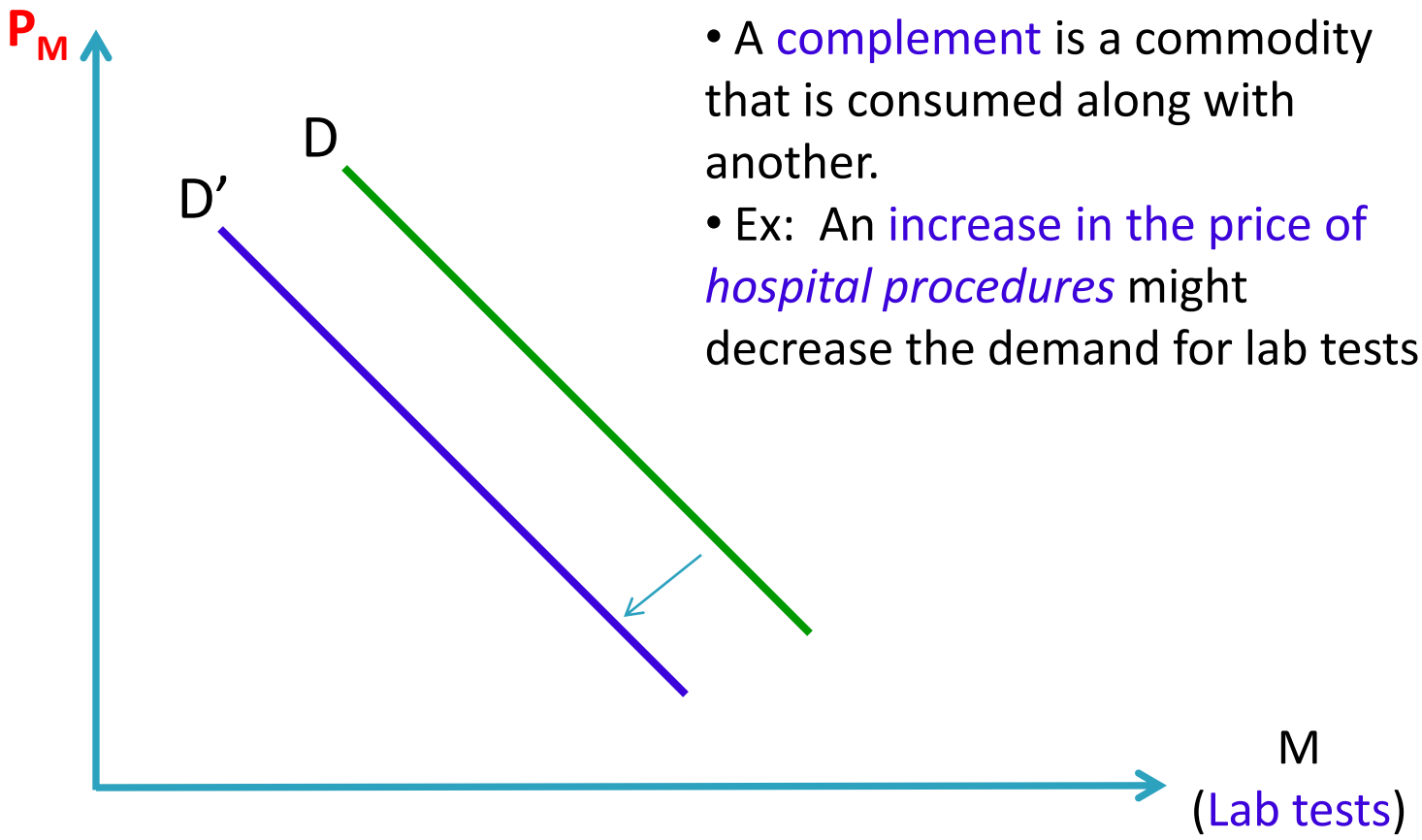


Income Elasticity

- The income elasticity of demand measures the responsiveness of demand to changes in income.
- Income elasticity, E_I, is the percentage change in quantity demanded divided by the percentage change in income:

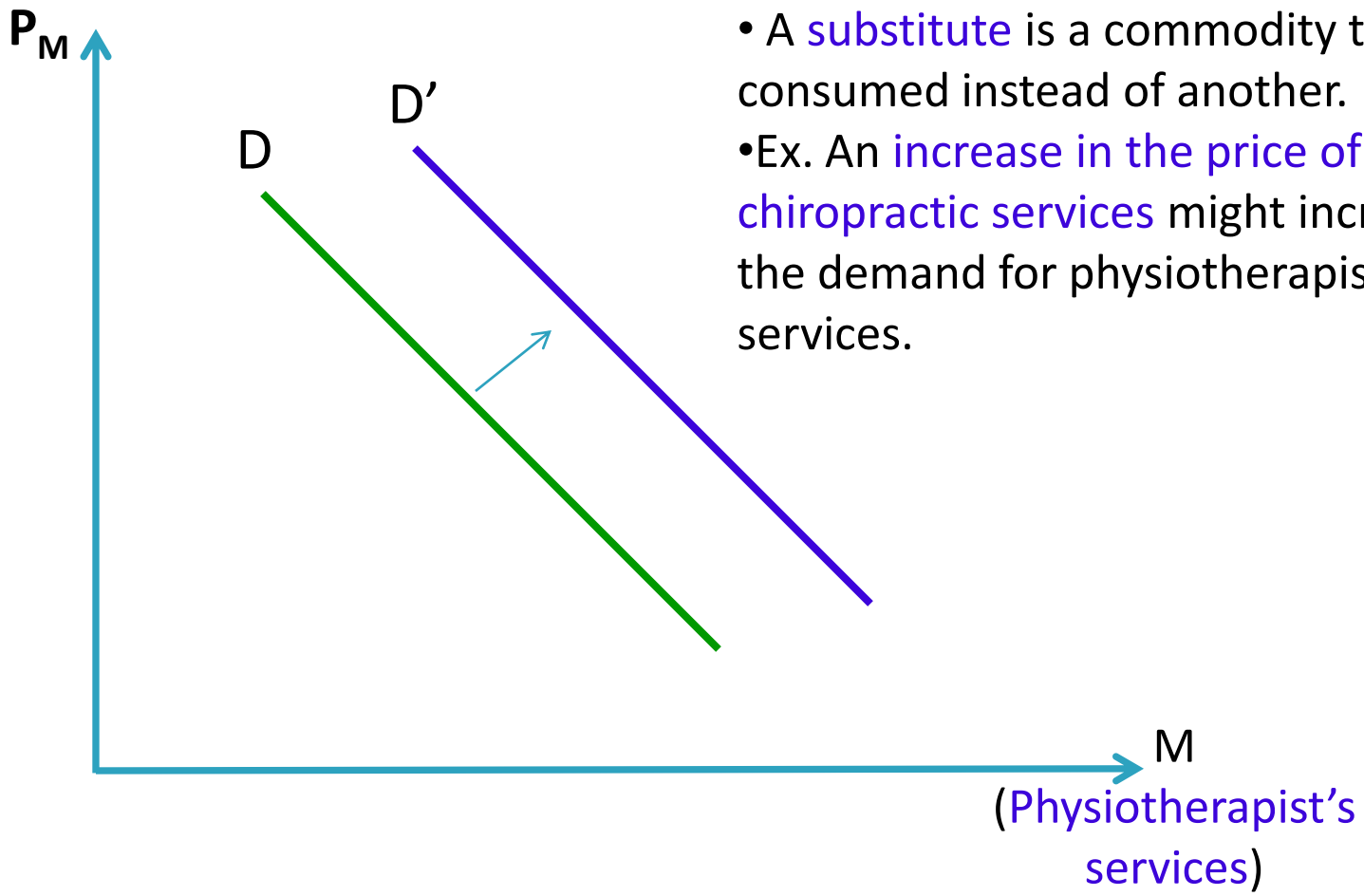
$$E_I = \frac{(\Delta Q / Q)}{(\Delta I / I)} = \frac{\Delta Q}{\Delta I}\frac{I}{Q}$$

What Happens if the Price of a Complement Increases?



- A complement is a commodity that is consumed along with another.
- Ex: An increase in the price of *hospital procedures* might decrease the demand for lab tests.

What Happens if the Price of a Substitute Increases?



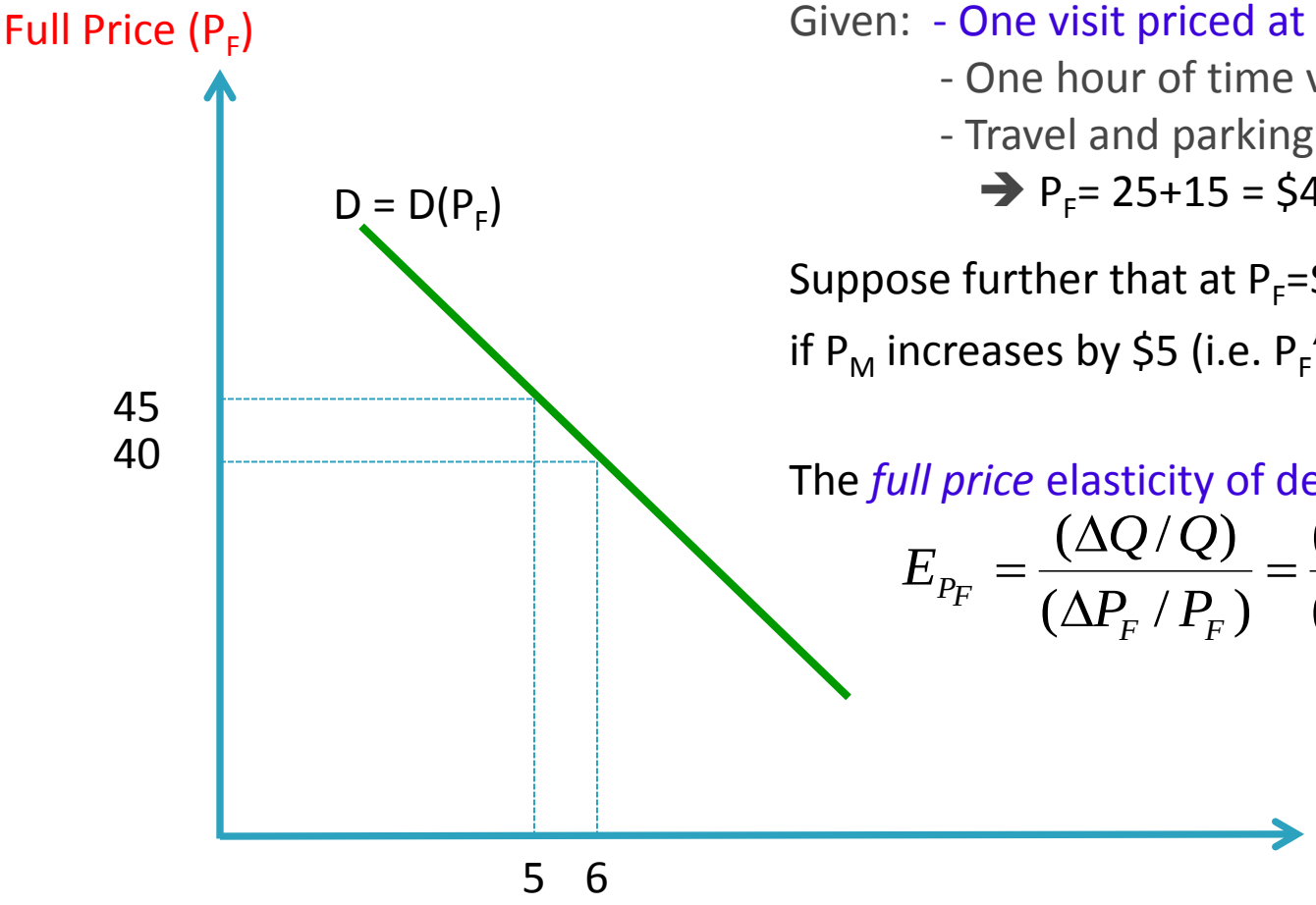
- A substitute is a commodity that is consumed instead of another.
- Ex. An increase in the price of chiropractic services might increase the demand for physiotherapist's services.

Role of Time

- Suppose the medical care is physician visits.
- The total cost of a physician visit might include both the money price of the visit itself and the cost of being away from work and not getting paid:
  - $\mathbf{P_F = P_M + P_T = P_M + wT}$,

  Where P_F= Full price, P_M = Money price, P_T =Time price, w = wage rate, and T is time spent in obtaining care.
- So, the longer the time (T) involved in traveling, waiting, and receiving services, the higher the total price of medical care, and the smaller the quantity demanded.
- Similarly for higher wages (w)

Example: Demand and Time Price for Physician Visits



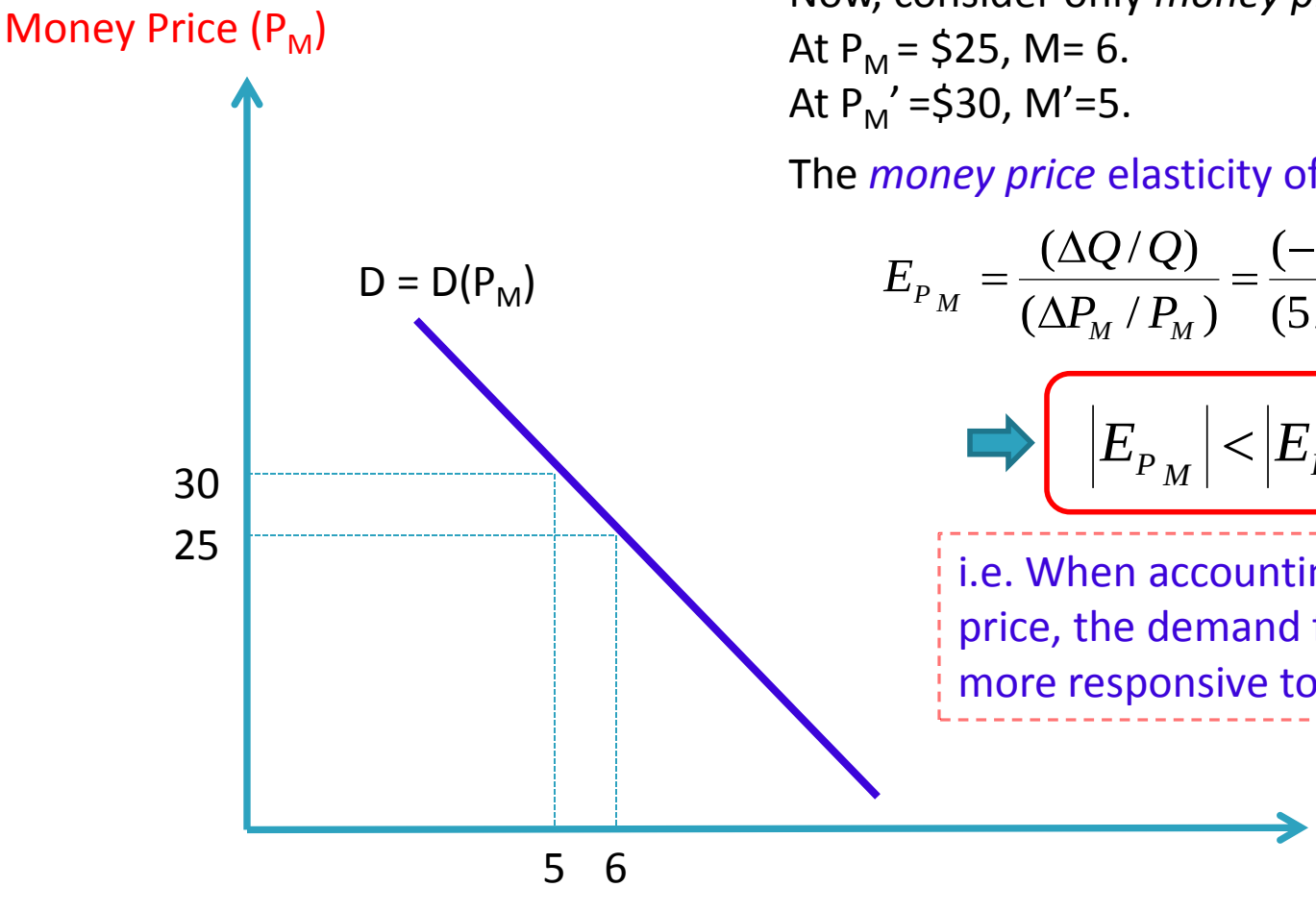
Given: - One visit priced at $25
- One hour of time valued at $10
- Travel and parking costs at $5
➔ P_F= 25+15 = $40

Suppose further that at P_F=$40, M=6 and if P_M increases by $5 (i.e. P_F'=$45), M'=5.

The *full price* elasticity of demand will be:

$$E_{P_F} = \frac{(\Delta Q/Q)}{(\Delta P_F/P_F)} = \frac{(-1/5.5)}{(5/42.5)} = -1.545$$

Example: Demand and Time Price for Physician Visits (cont'd)



Now, consider only *money price* (P_M).
At P_M = \$25, M= 6.
At P_M' =\$30, M'=5.

The *money price* elasticity of demand will be:

$$E_{P_M} = \frac{(\Delta Q / Q)}{(\Delta P_M / P_M)} = \frac{(-1/5.5)}{(5/27.5)} = -1$$

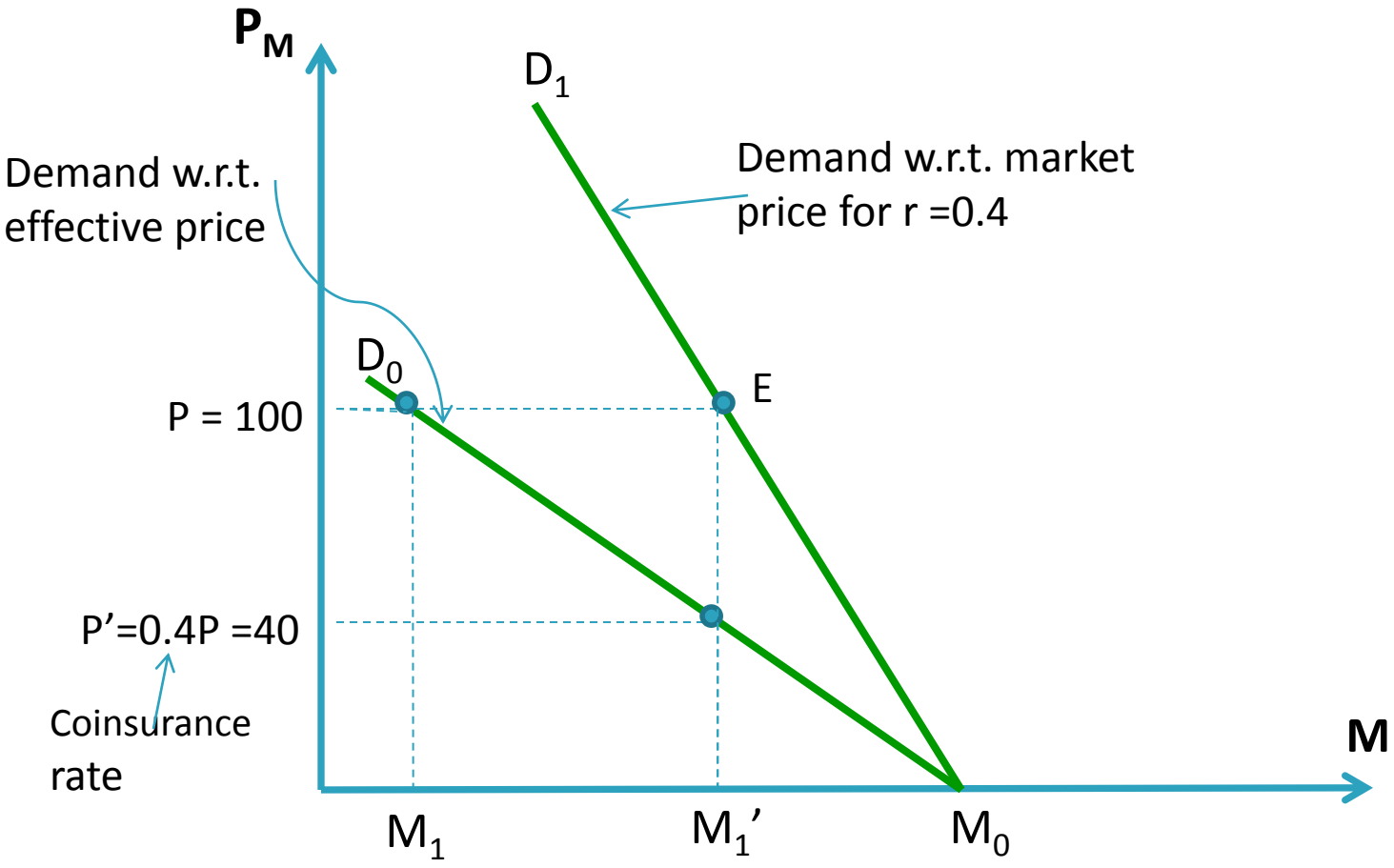
$$\Rightarrow \boxed{\left|E_{P_M}\right| < \left|E_{P_F}\right|}$$

i.e. When accounting for time price, the demand for M will be more responsive to price change.

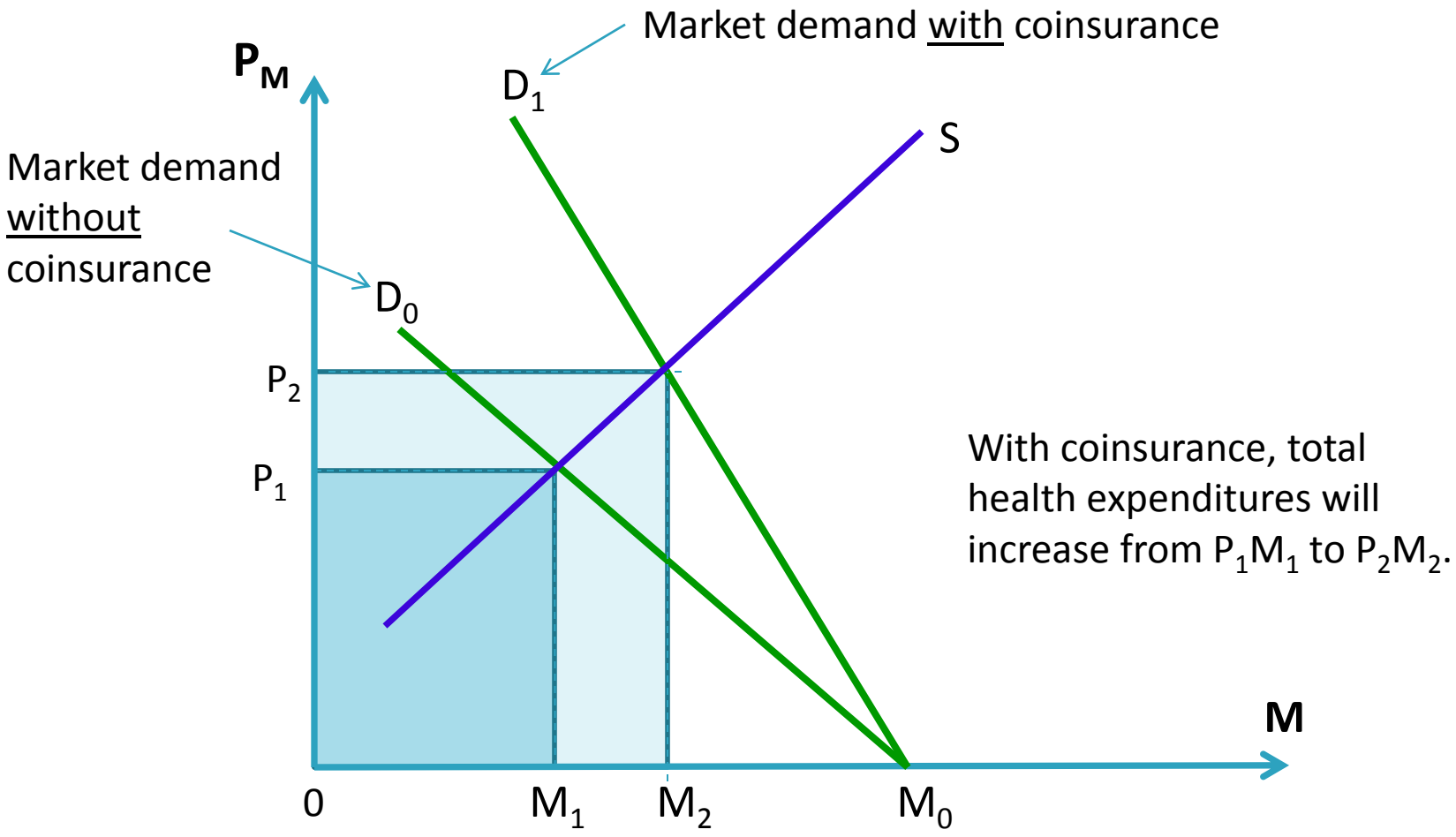
Applications: Time Costs

- People with lower opportunity costs of time would be more likely tolerate or endure long waiting times in clinics or physician offices.
- Even for the poor whose medical care is subsidized, they still have to pay for the time costs.
  - Examples:
    - Medicaid in the US,
    - UC Scheme in Thailand (long waiting time)
  - Solutions:
    - Build health facilities near people's residence
    - ???

Role of a Coinsurance Rate



Market Effects



Empirical Studies

- Demand function for physician visits (V) can be written as:

$$V = f(P, r, t, P_0, Y, HS, AGE, ED, \ldots)$$

where P = price per visit,
r = patient's coinsurance rate,
t = time price,
P_0 = price of other goods,
Y = income,
HS = the patient's health status,
AGE =age, ED = education

- *'Usual'* econometric specification for the above demand function:

$$V = b_0 + b_1 P + b_2 r + b_3 t + b_4 P_0 + b_5 Y + b_6 HS + b_7 AGE + b_8 ED + \varepsilon$$

or $$\ln V = b_0 + b_1 \ln P + b_2 r + b_3 t + b_4 P_0 + b_5 Y + b_6 HS + b_7 AGE + b_8 ED + \varepsilon$$

$$\Rightarrow \quad b_1 = \frac{d(\ln V)}{d(\ln P)} = \frac{P}{V}\frac{dV}{dP} = E_p$$

Issues in Empirical Studies on the Demand for Medical Care

- Measurement
  - Measure “medical care/services” in monetary values
    - One problem is that expenditures reflect a complex combination of price of care, quantities of care, and qualities of care
  - Alternative measures :*quantity of visits, patient days, or cases treated*
    - Still have problems with the intensity of care.
- Definition of the price of services
  - Many patients do not pay the full price for their treatments.
- Differences in study populations

Example: Price Elasticities

Study	Dependent Variable	Price Elasticity
All Expenditures:		
Manning et al. (1987)	All expenditures	−0.17 to −0.22
Physician Services:		
Newhouse and Phelps (1976)	Physician office visits	−0.08
Cromwell and Mitchell (1986)	Surgical services	−0.14 to −0.18
Wedig (1988)		
Health perceived excellent/good	Physician visits	−0.35
Health perceived fair/poor	Physician visits	−0.16
Hospital Services:		
Newhouse and Phelps (1976)	Hospital length of stay	−0.06
Manning et al. (1987)	Hospital admissions	−0.14 to −0.17
Nursing Homes:		
Chiswick (1976)	Nursing home residents per elderly population	−0.69 to −2.40
Lamberton et al. (1986)	Nursing home patient days per capita elderly	−0.69 to −0.76

Sicker people are less sensitive to price.

More elastic

Relatively Inelastic

Source: Table 9.2 in Folland et al. (2013)

Example: Firm (Physician)-Specific Price Elasticities

Study	Dependent Variable	Price Elasticity
Physician Services:		
Lee and Hadley (1981)	Physician price	−2.8 to −5.1
McCarthy (1985)	Physician visits	−3.1 to −3.3
Hospital Services:		
Feldman and Dowd (1986)	Hospital patient days	−0.7 to −0.8
	Hospital admissions	−1.1
Gaynor and Vogt (2003)	Hospital discharges	−4.9
Nursing Homes:		
Mukamel and Spector (2002)	Case-mix adjusted days	−3.5 to −3.9

Source: Table 9.3 in Folland et al. (2013)

Relatively more elastic than individual E_p

The demand for the *services of a particular physician* is more responsive than the demand for physician care in general.

Example: Income Elasticities

Study	Dependent Variable	Income Elasticity
All Expenditures:		
Rosett and Huang (1973)	Expenditures	0.25 to 0.45
Hospital Services:		
Newhouse and Phelps (1976)	Admissions	0.02 to 0.04
Physician Services:		
Newhouse and Phelps (1976)	Visits	0.01 to 0.04
Nursing Homes:		
Chiswick (1976)	Residents per elderly population	0.60 to 0.90

Source: Table 9.4 in Folland et al. (2013)

All income elasticities are positive, suggesting that medical care is normal goods,
And their values range between 0 and 1, suggesting that it is a necessity.

Other Factors Affecting Demand for Medical Care

- Ethnicity and Gender
  - In general, 'blacks' tend to consume less medical care.
  - Females, particularly at child-bearing ages, are heavy users of health care. Also, females generally live longer, so they are predominant among elder patients.
- Urban vs. Rural
  - People living in rural areas use less care. (Access problem? Or, socioeconomic status?)
- Education
  - Educated people are more informed and may demand more health care.
  - Often, education is correlated with income, and income actually leads to more demand for health care.

Other Factors Affecting Demand for Medical Care (Cont'd)

- Uncertainty
  - People demand health care for precautionary purposes, e.g. preventive care.
- Age
  - Grossman: As we age, the depreciate rate gets larger. So, more health inputs are required to restore health.
- Health status
  - The sicker tend to demand more health care.