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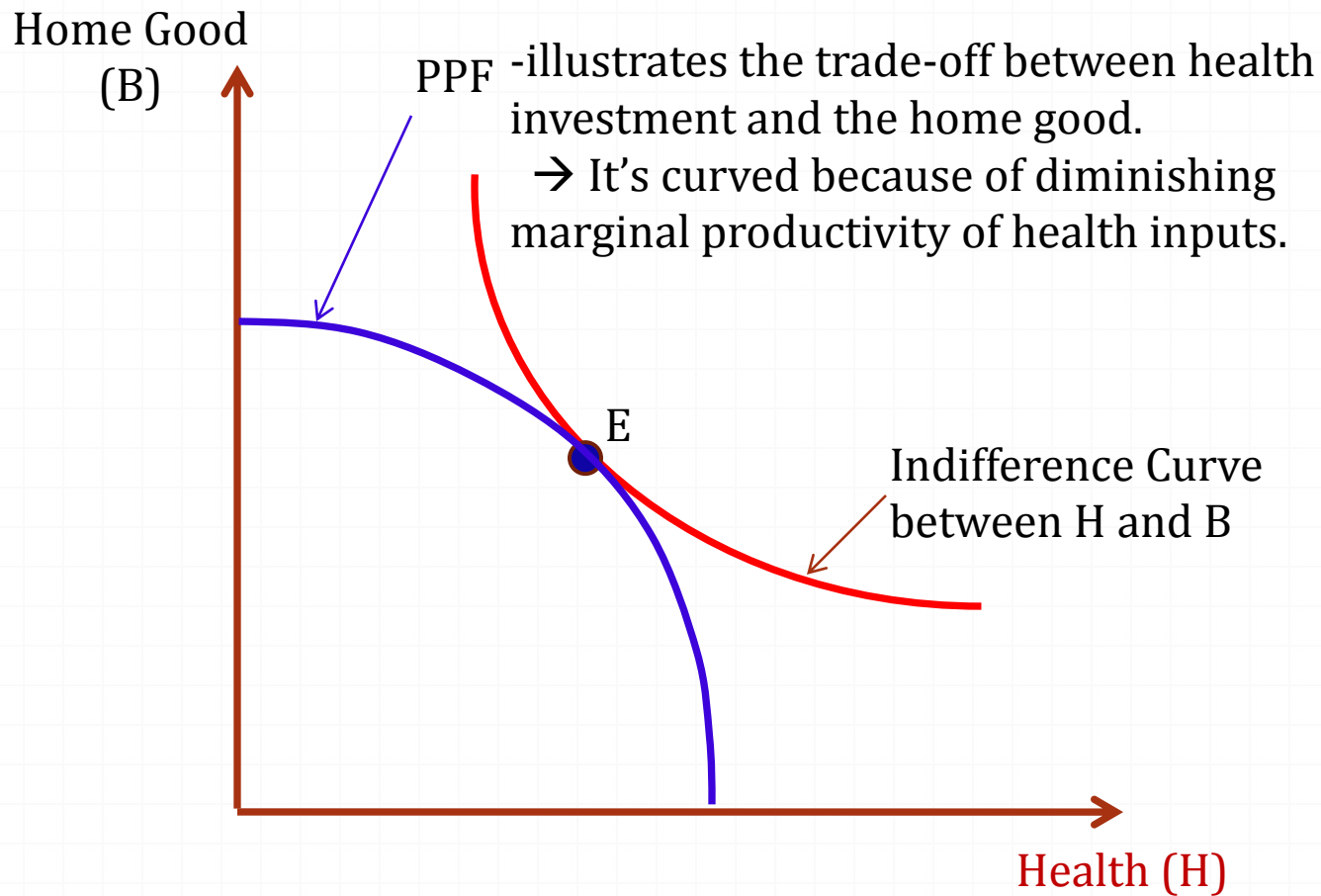
Demand for Health Care

EE 474 Health Economics
Semester 1/2012

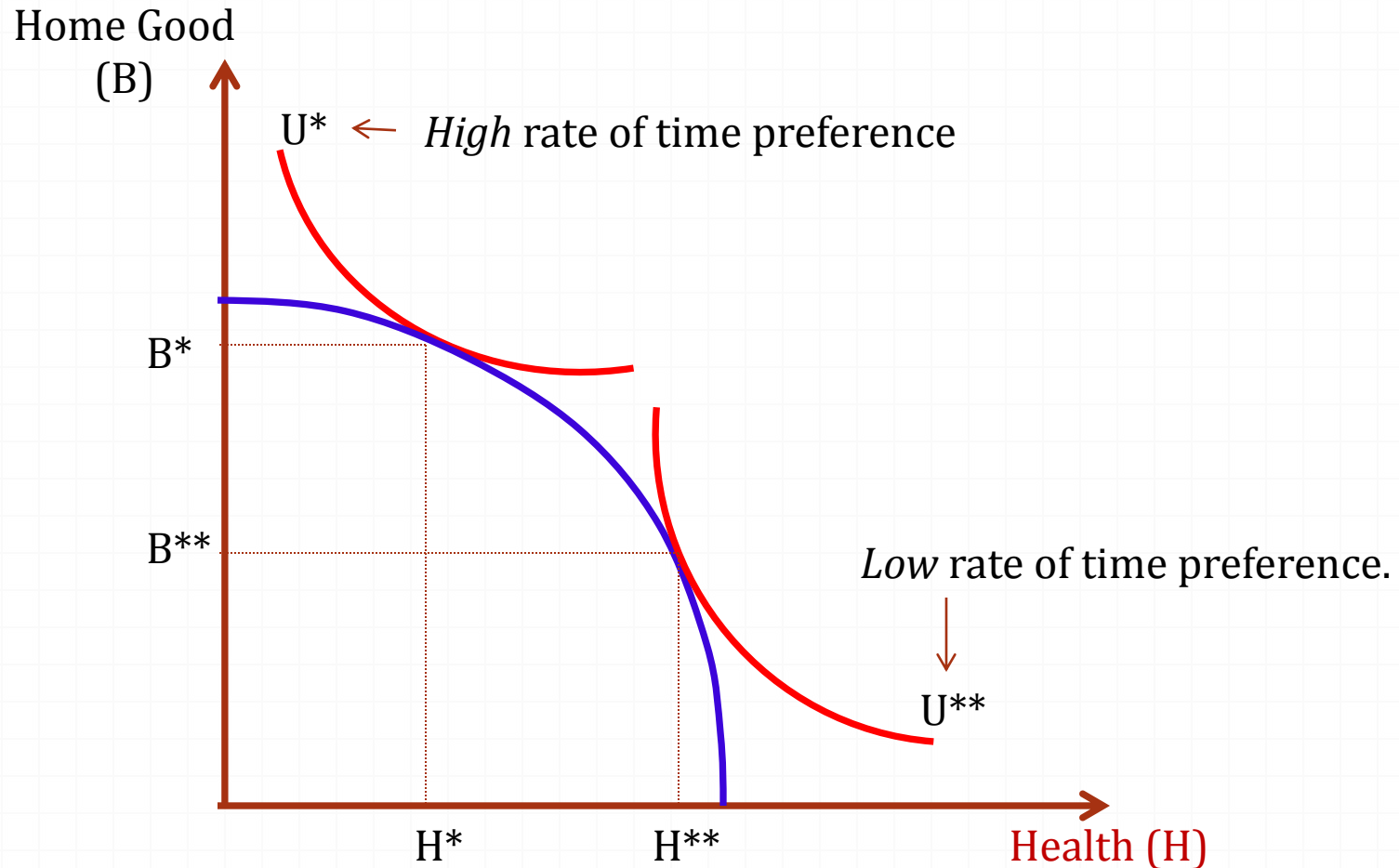
Topics

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

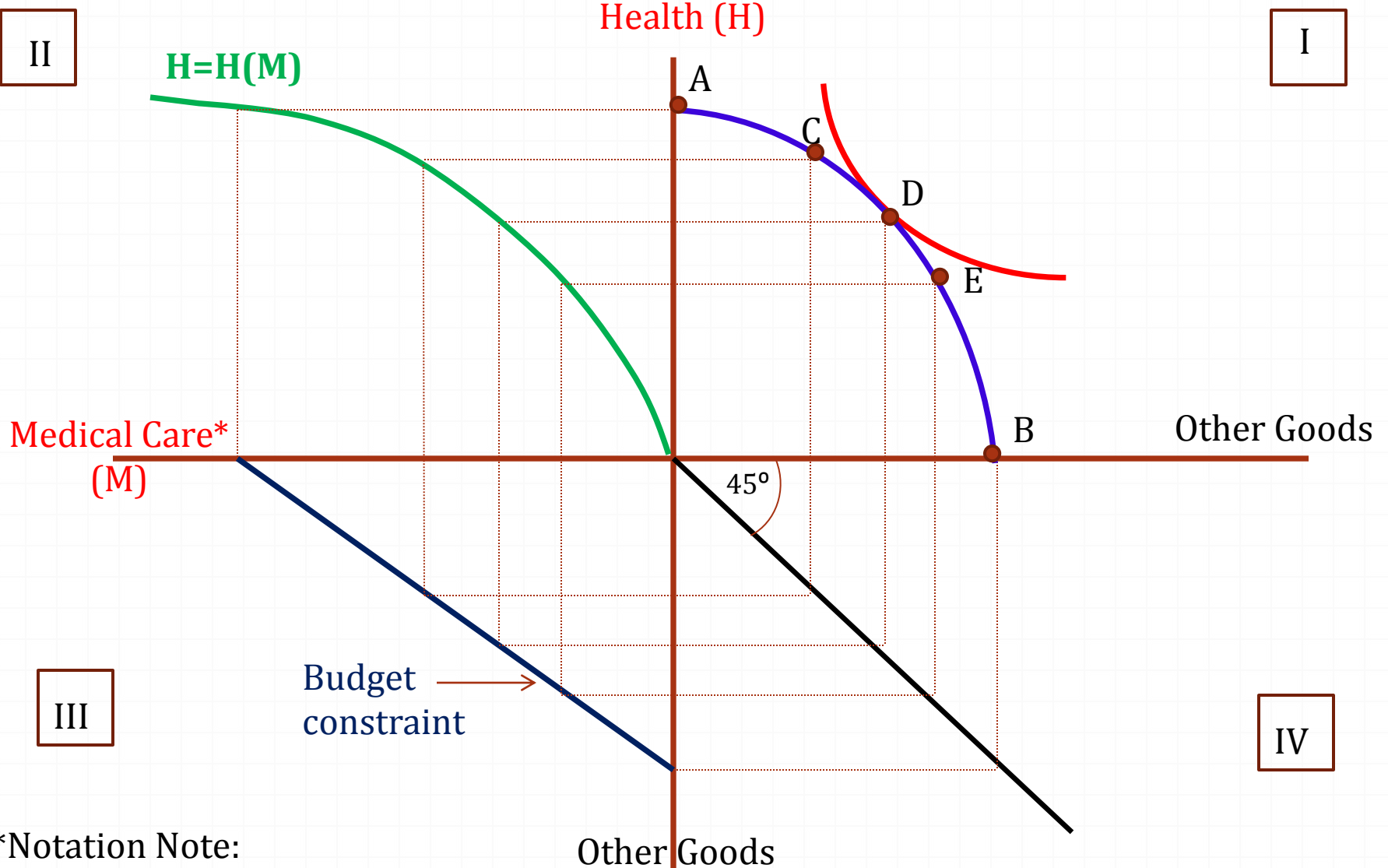
Recall: Demand for Health Capital



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

o The consumer's problem now is:

$$\text{Maximize } U = U(Y, M)$$

$$\text{subject to } Y^0 = P_M * M + P_Y * Y,$$

where Y^0 = total income,

P_M = Medical care price per unit

P_Y = Price per unit of other goods

o Let $P_Y = 1$. So, the budget can be simplified to

$$o Y^0 = P_M * M + Y$$

$$\triangleright \text{Or } Y = Y^0 - P_M M$$

Y-intercept Slope

Standard Budget Constraint Model

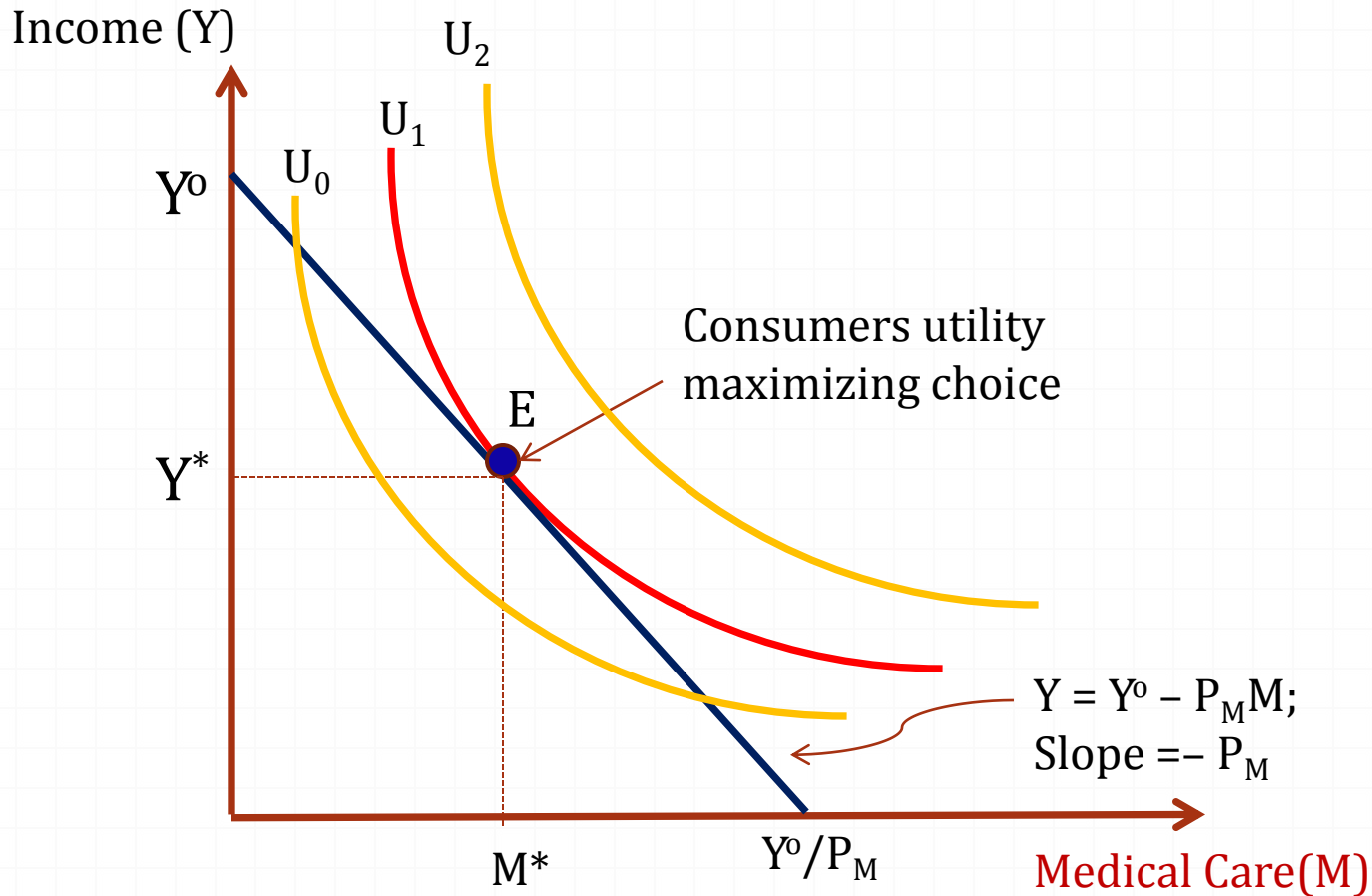
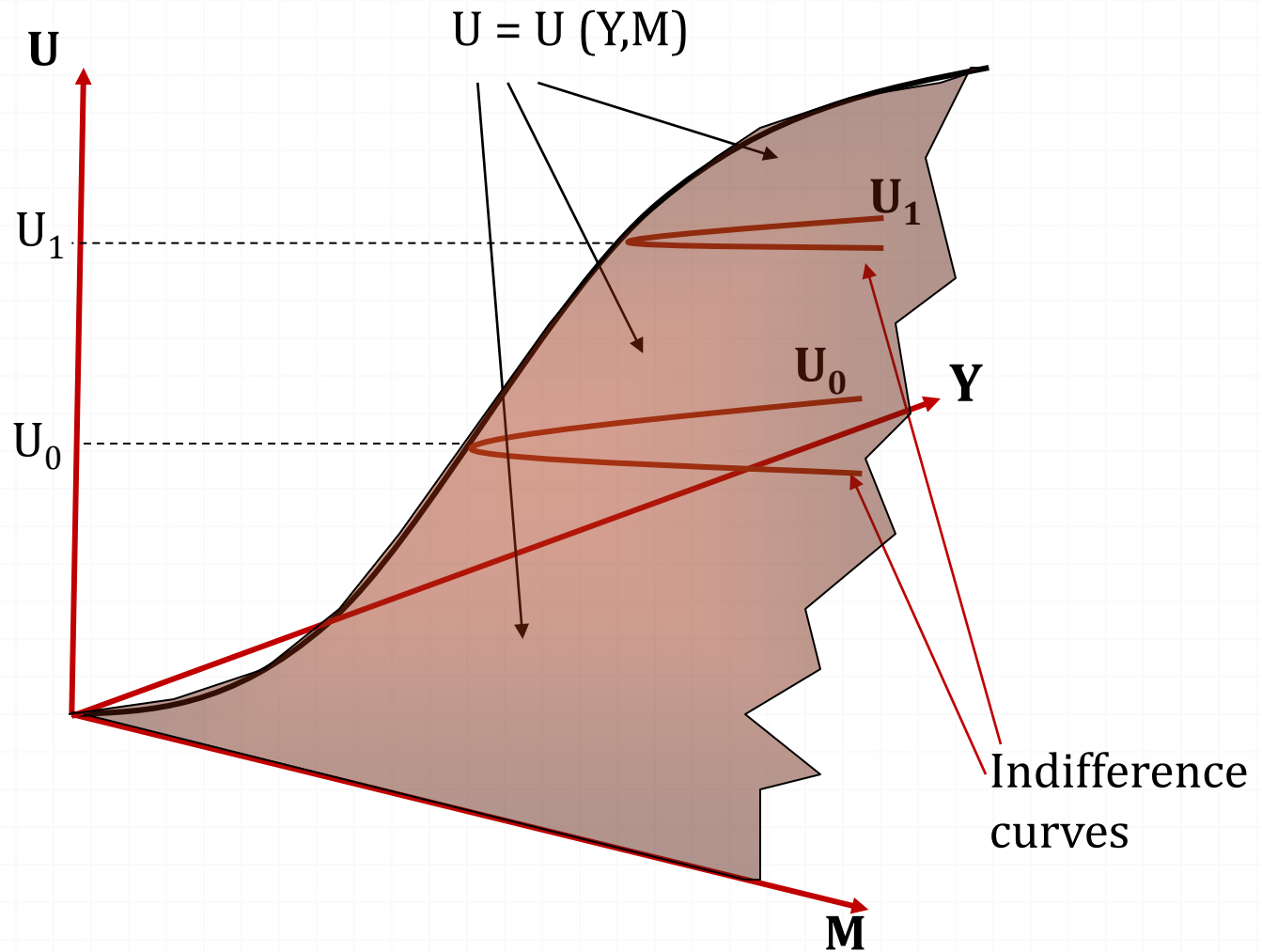
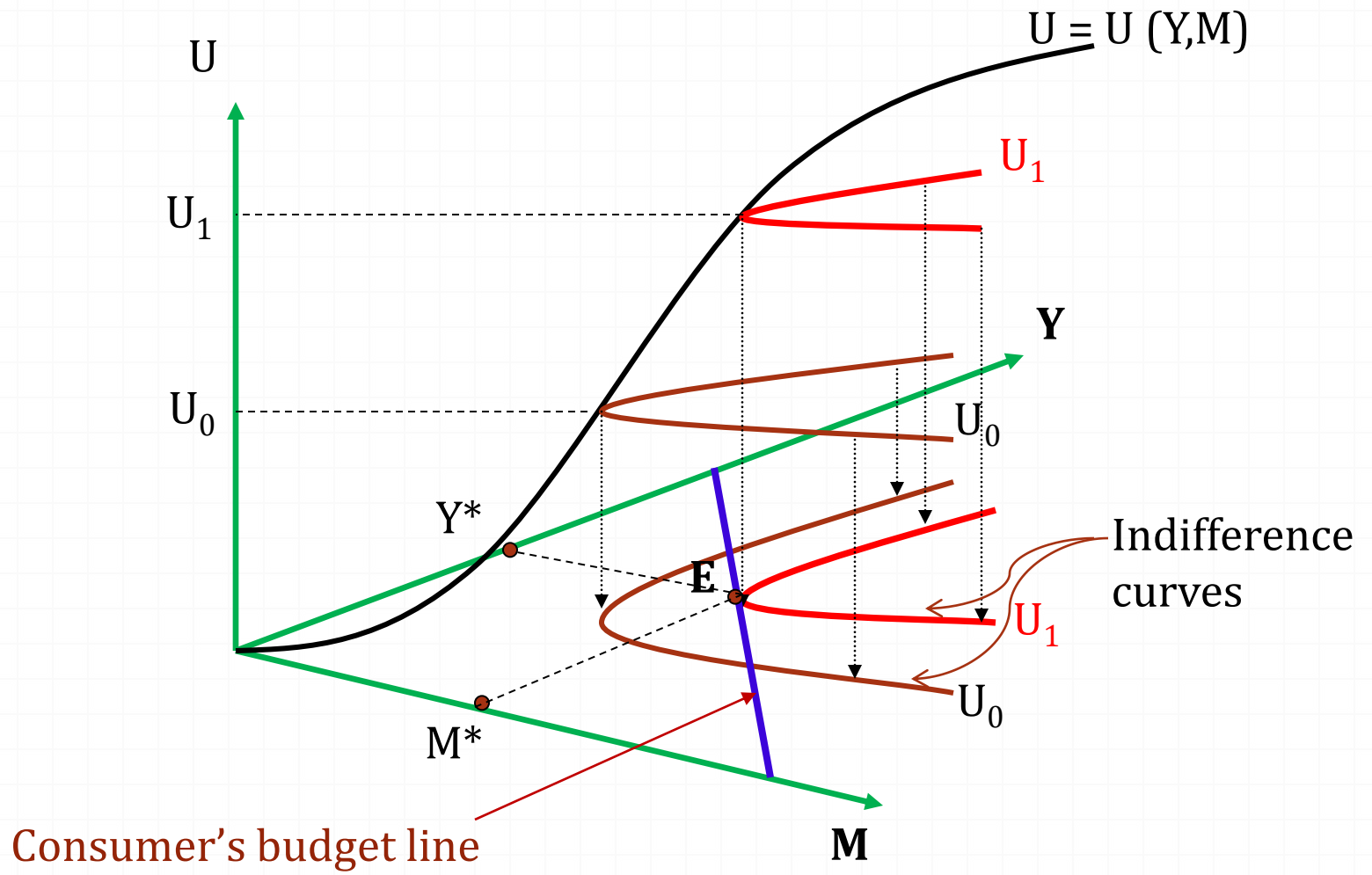


Illustration of $U = U(Y, M)$ in a 3-space diagram.





Utility Maximization

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

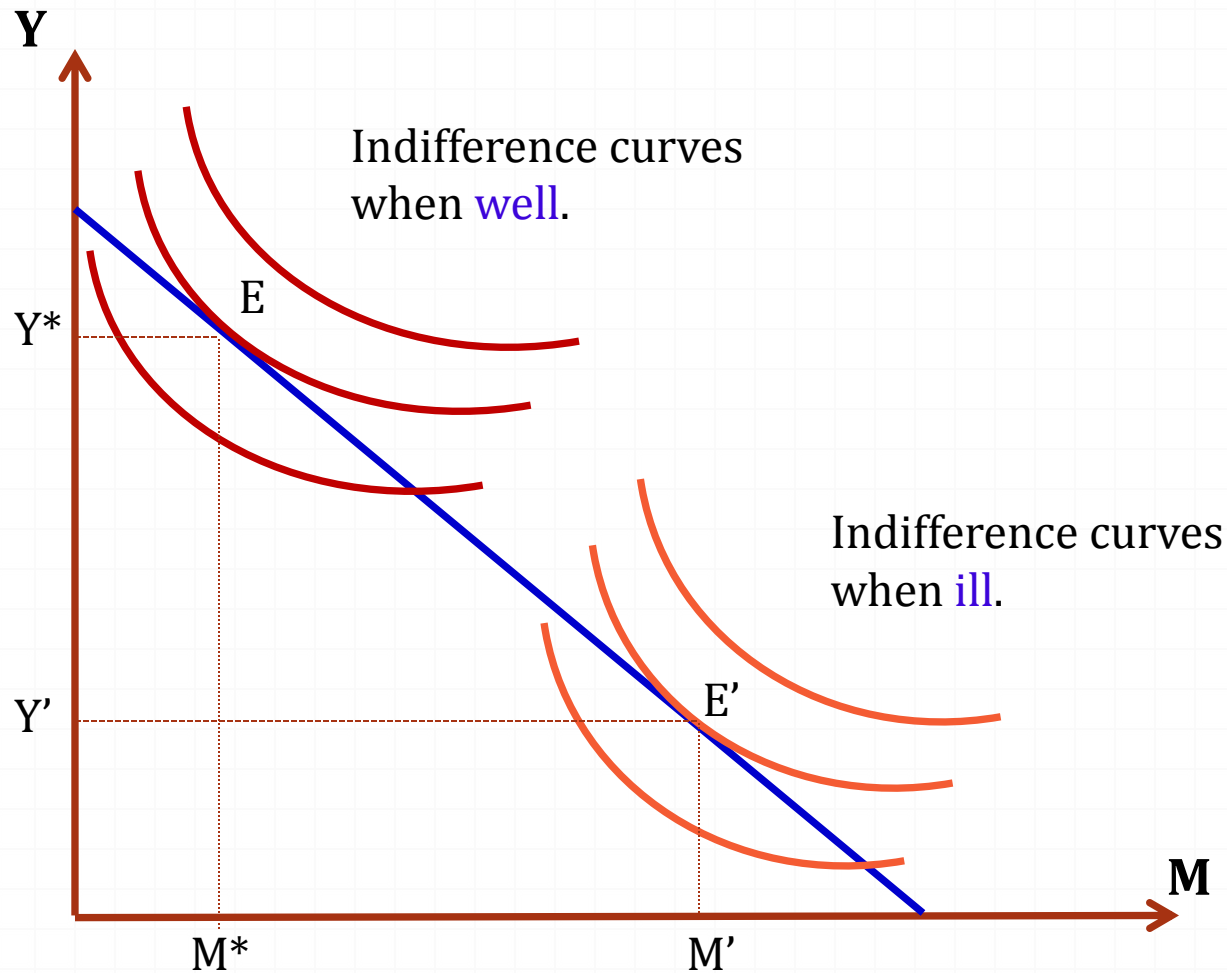
$$MRS_{MY} = -\frac{MU_M}{MU_Y} = -P_M$$

- 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.

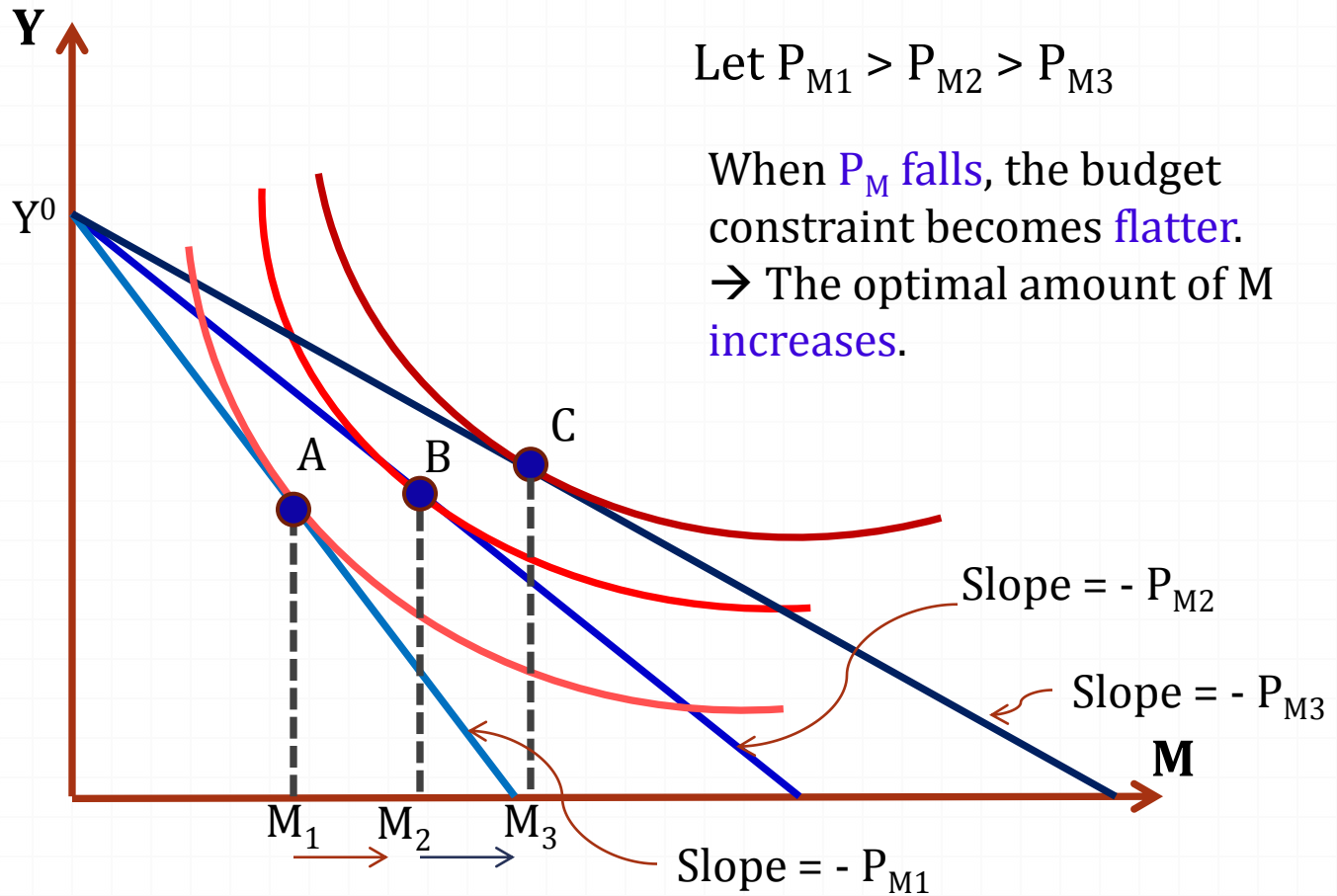
Comparative Statics

- **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**)
- 2 other factors that affect demand for medical care:
 - **Time cost**
 - **Coinsurance**

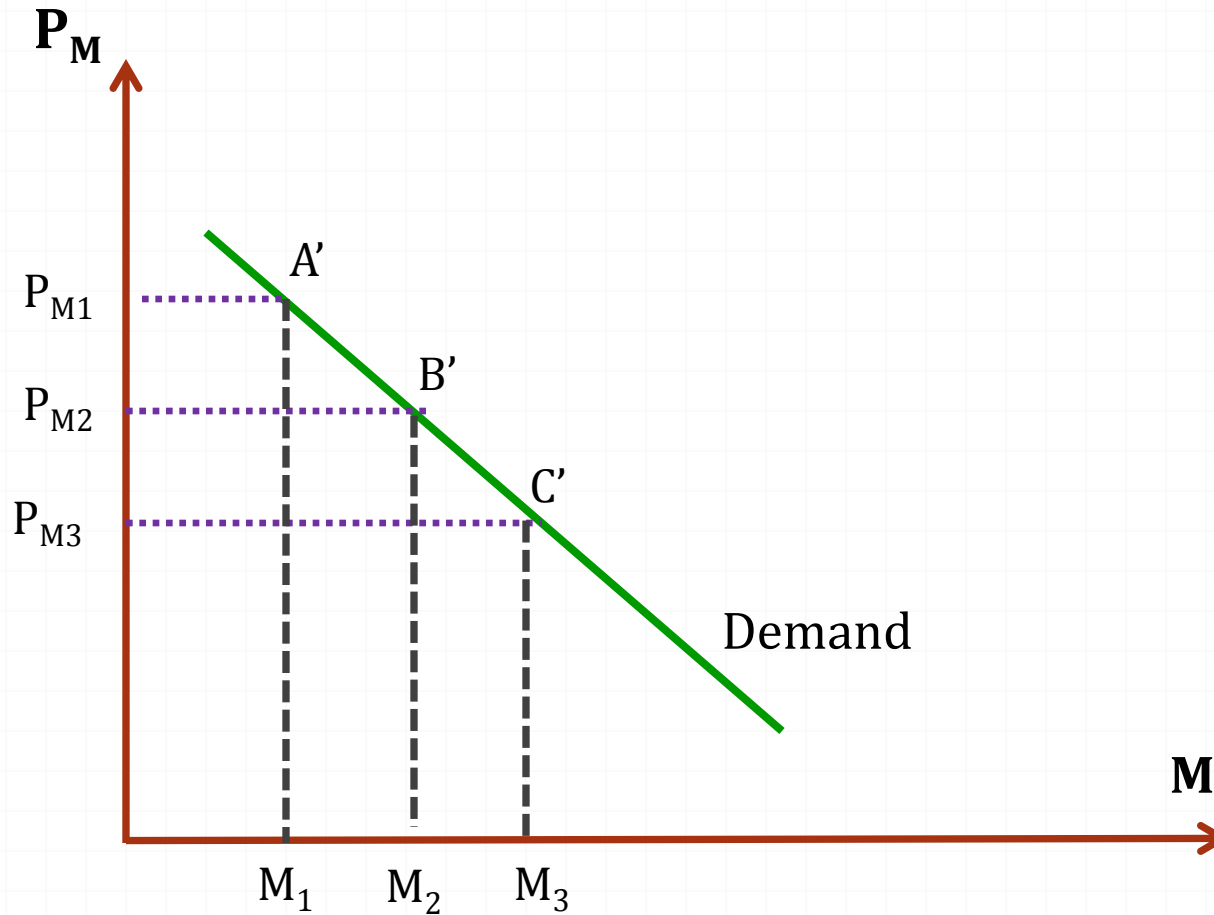
Changed Preference due to Illness



What Happens when P_M Falls?



The Demand for Medical Care



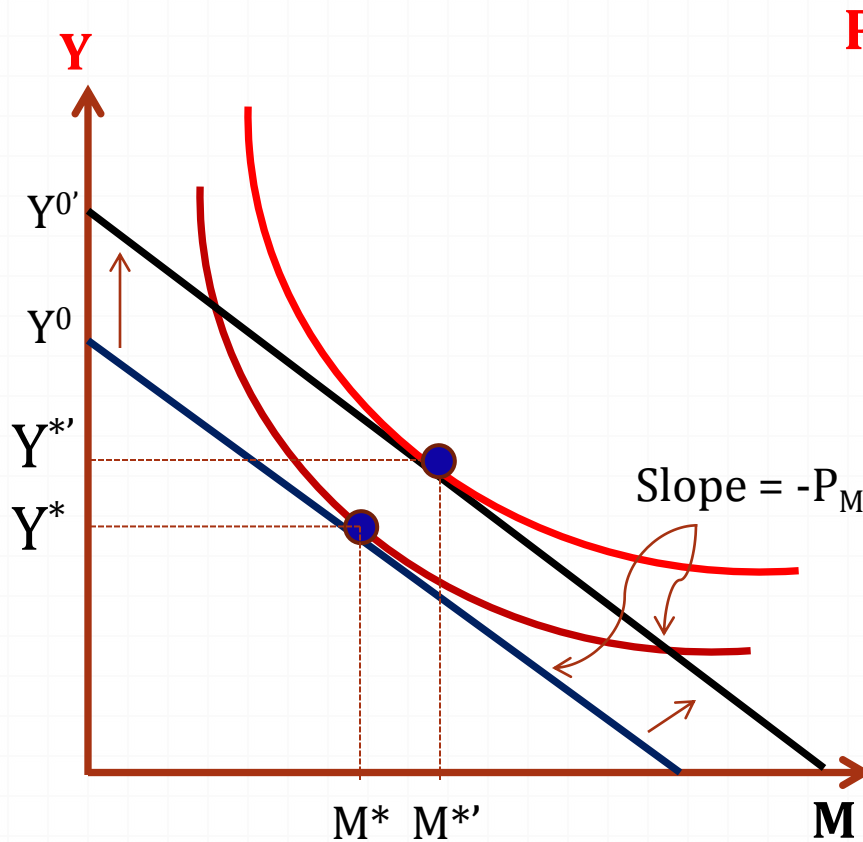
Price Elasticity of Demand

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

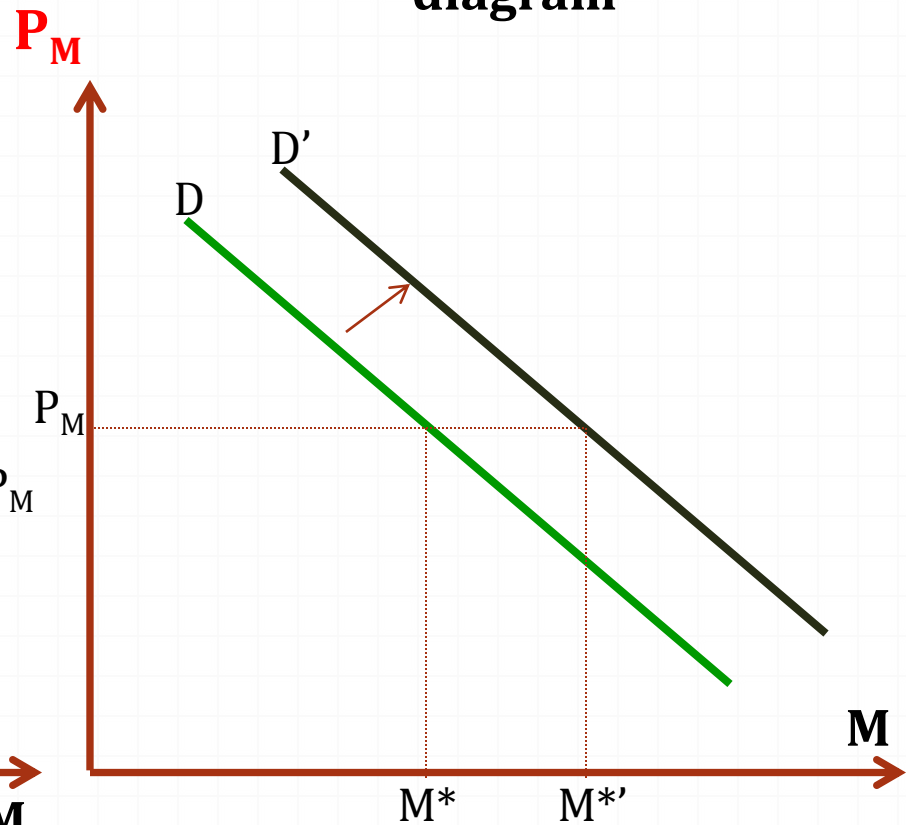
$$\text{Elasticity} = E_p = \frac{(\Delta Q / Q)}{(\Delta P / P)}$$

What Happens if Income Increases?

Indifference curve diagram



Individual demand curve diagram

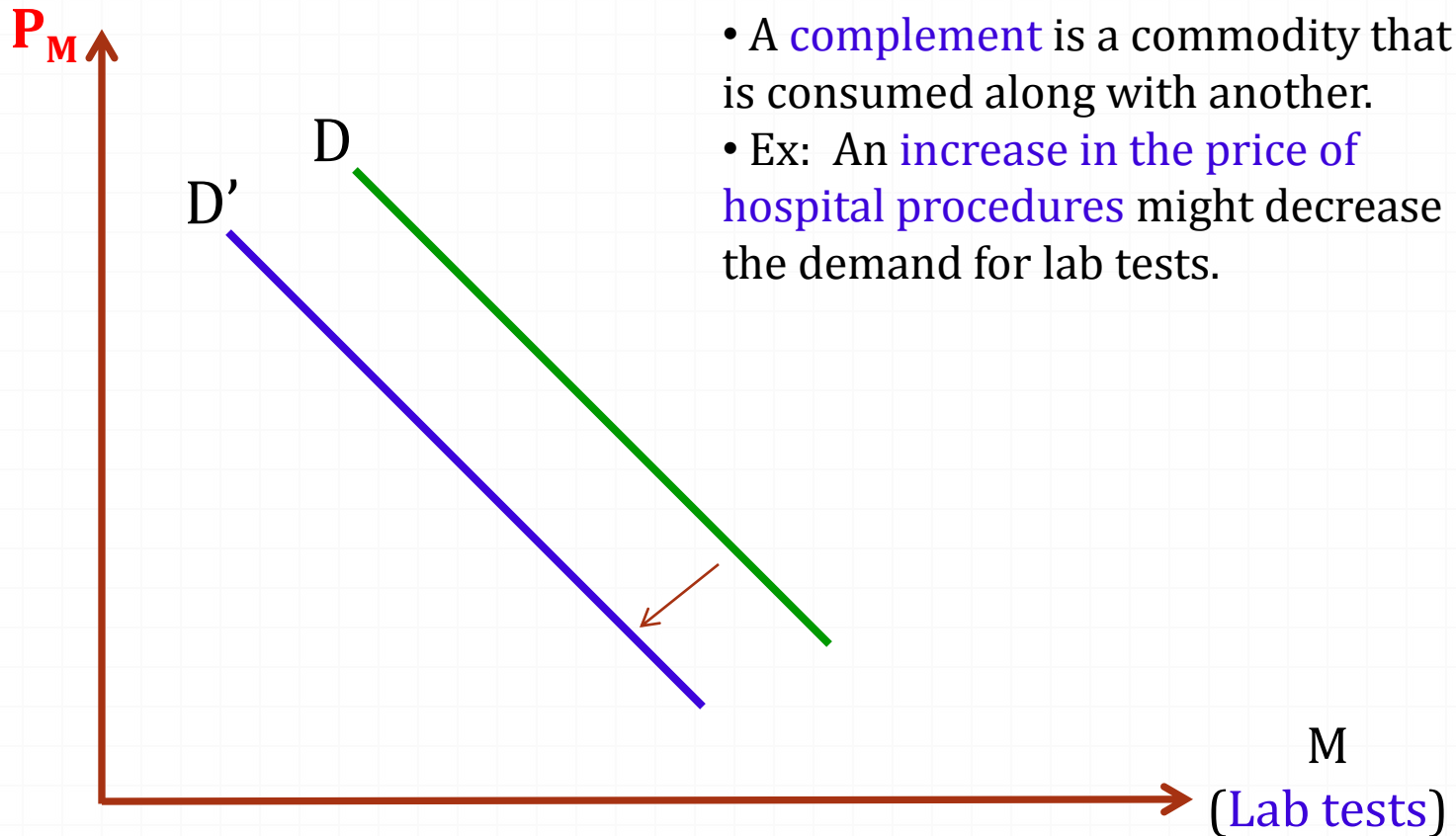


Income Elasticity

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

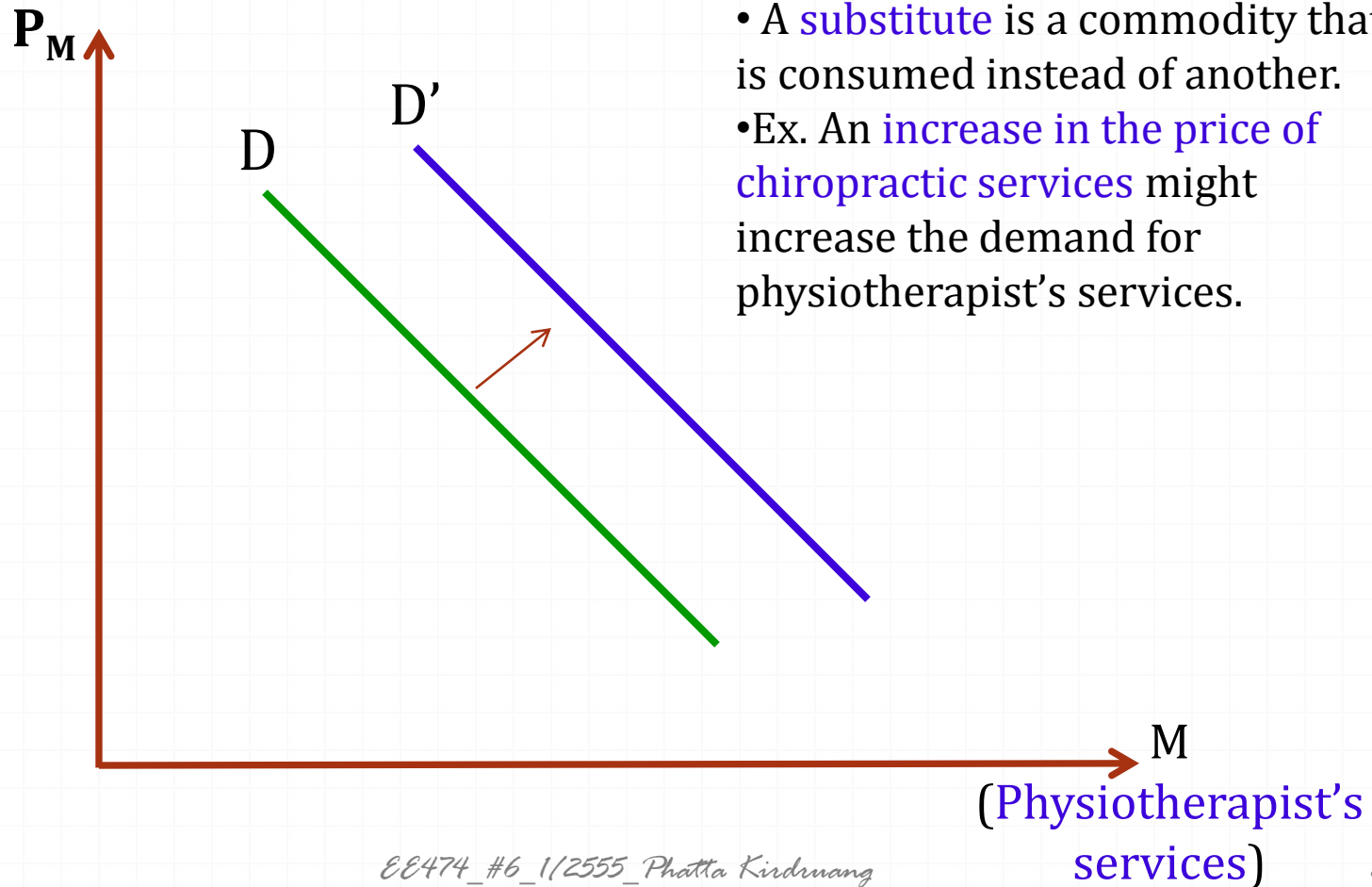
$$E_Y = \frac{(\Delta Q / Q)}{(\Delta Y / Y)} = \frac{\Delta Q}{\Delta Y} \frac{Y}{Q}$$

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?



Role of Time

- o Suppose the medical care is physician visits.
- o 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**:

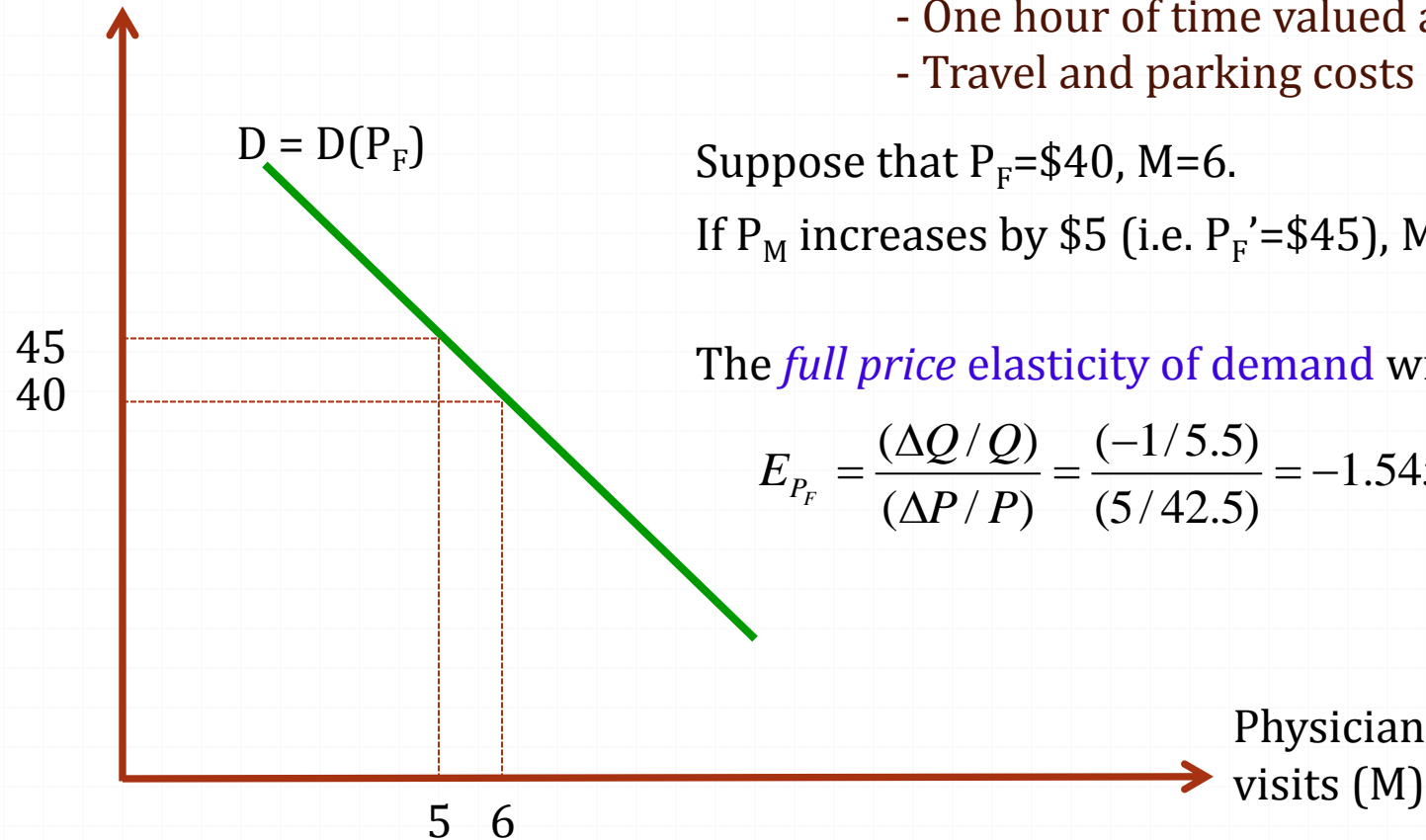
$$\text{➤ } P_F = P_M + P_T = P_M + wT,$$

Where P_F = Full price, P_M = Money price, P_T = Time price, w = wage rate, and T is time spent in obtaining care.

- o 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.**
- o Similarly for higher wages (w)

Example: Demand and Time Price for Physician Visits

Full Price (P_F)



Example - One visit priced at \$25 ← P_M
 - One hour of time valued at \$10
 - Travel and parking costs at \$5 } P_T

Suppose that $P_F = \$40$, $M = 6$.

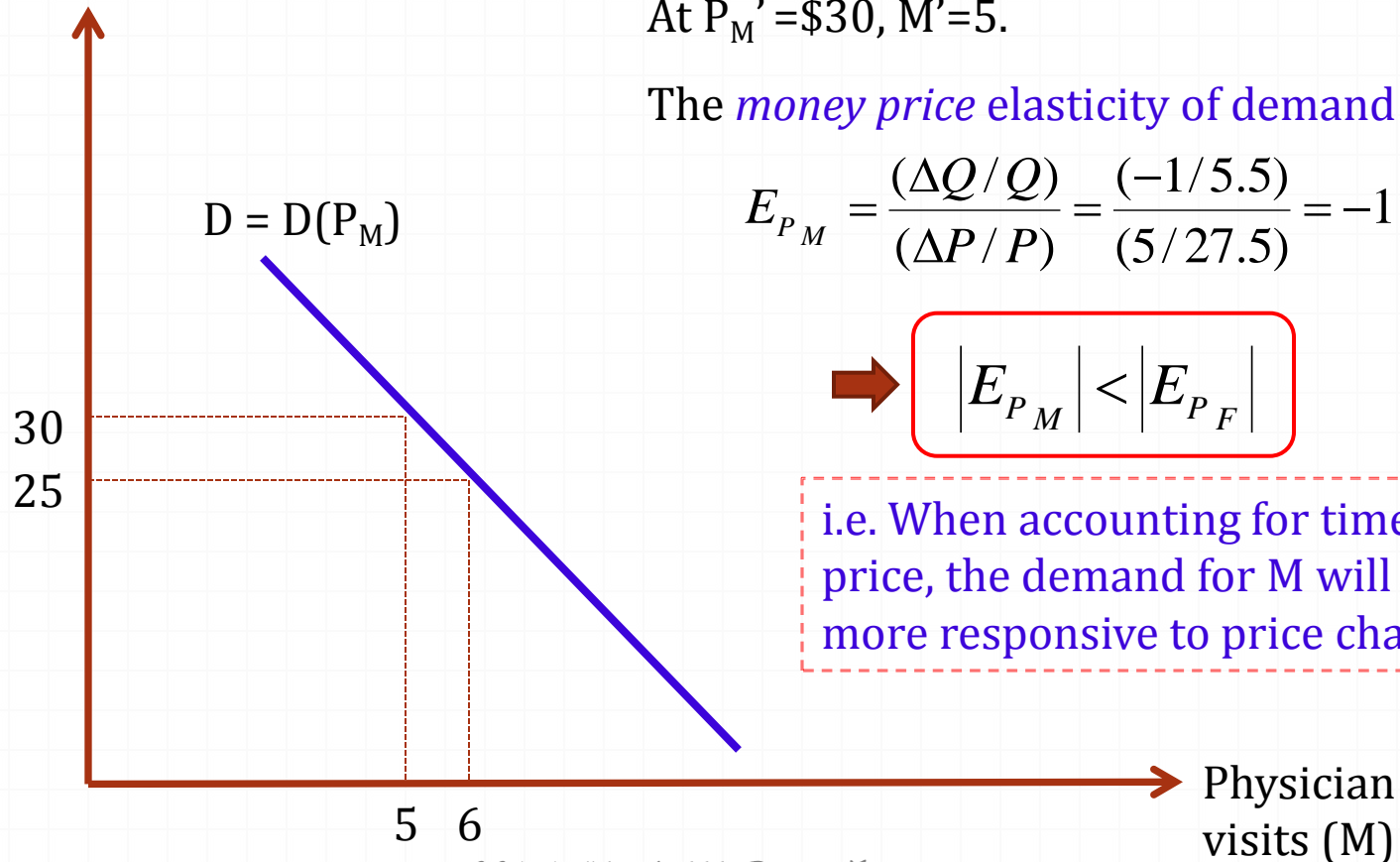
If P_M increases by \$5 (i.e. $P_F' = \$45$), $M' = 5$.

The *full price elasticity of demand* will be:

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

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

Money Price (P_M)



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:

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



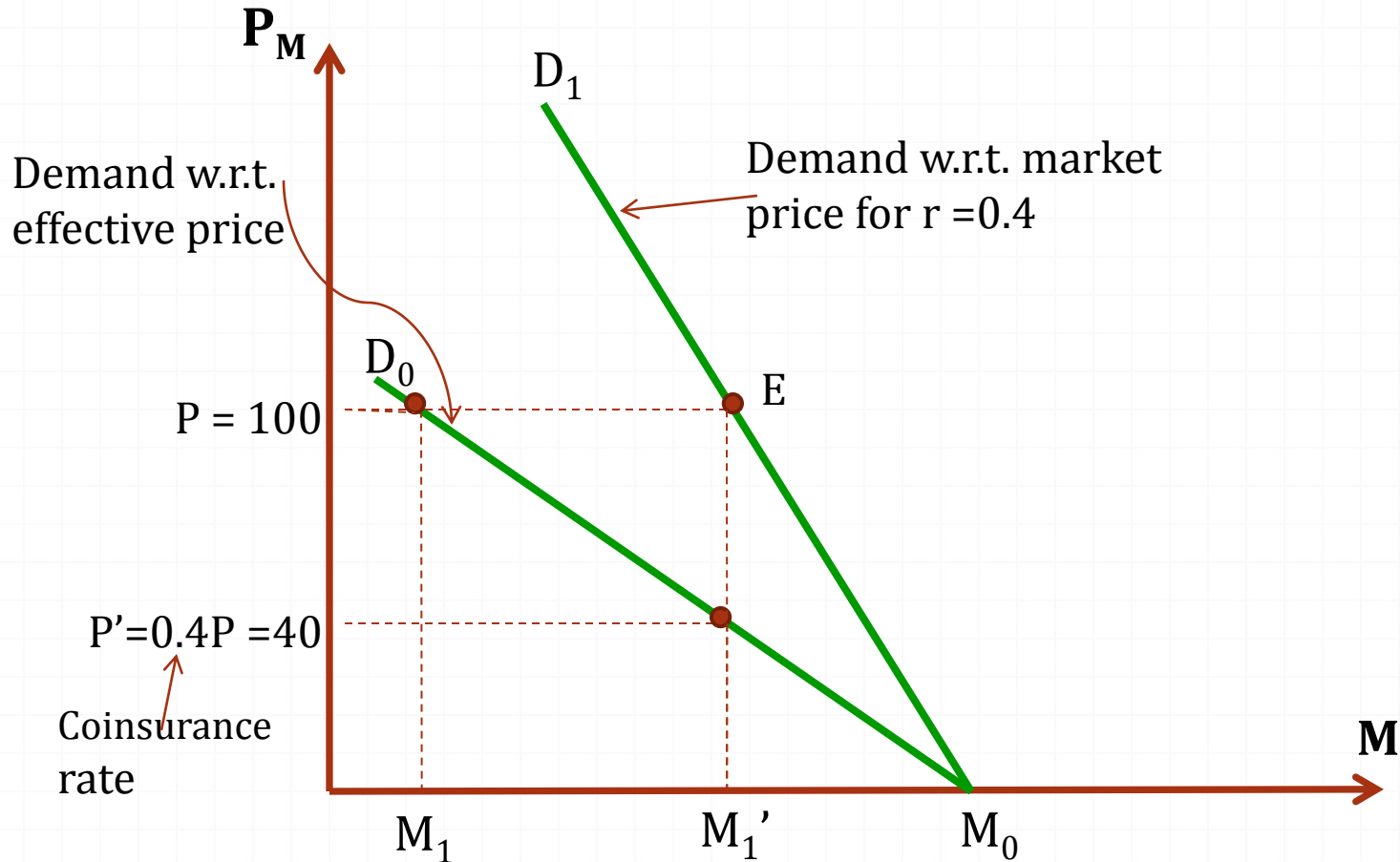
$$|E_{P_M}| < |E_{P_F}|$$

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

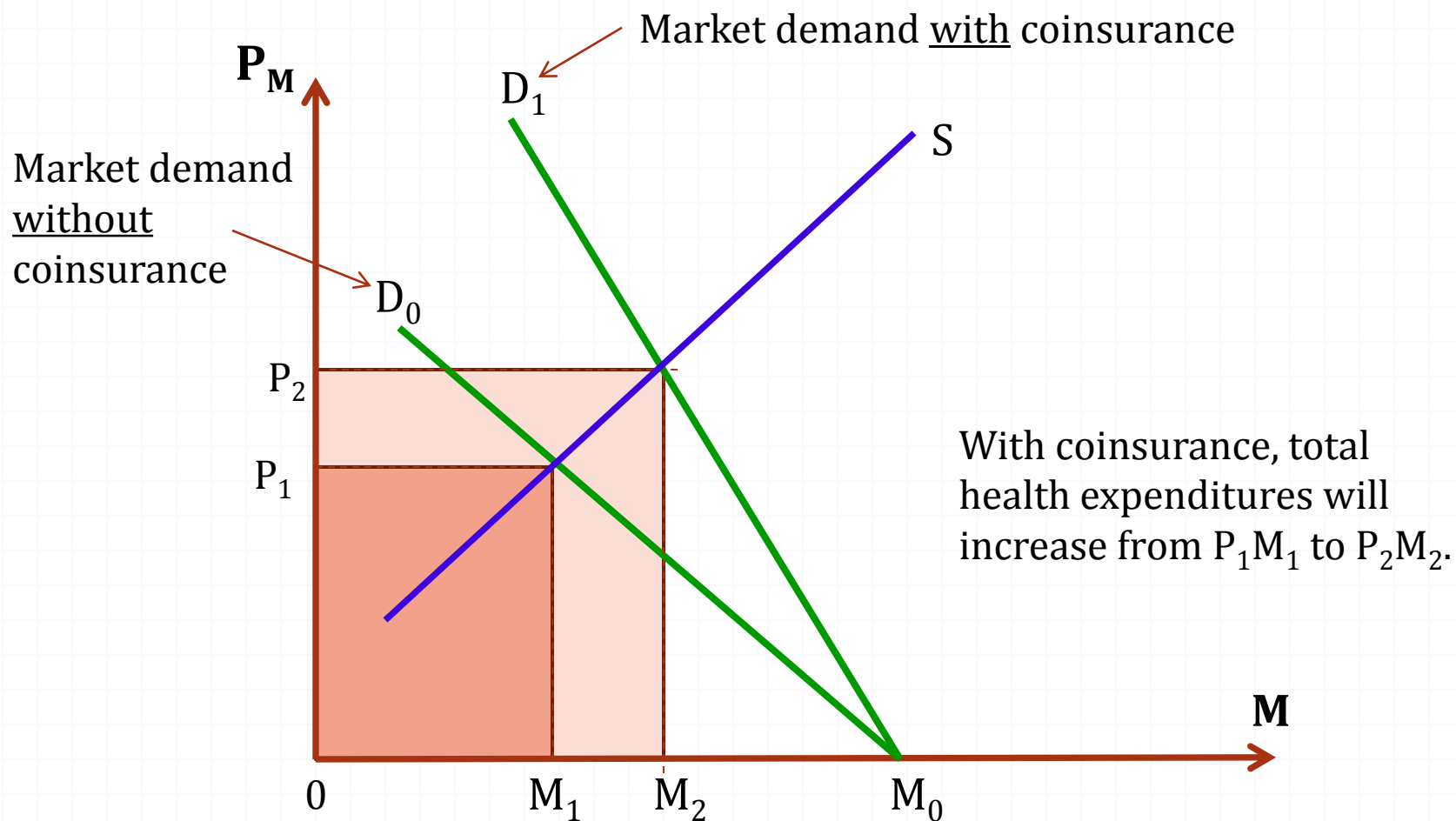
Applications: Time Costs

- 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
 - Solution: Build health facilities near people's residence.

Role of a Coinsurance Rate



Market Effects



Empirical Studies

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

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

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

o 'Usual' econometric specification for the above demand function:

$$V = b_0 + b_1P + b_2r + b_3t + b_4P_0 + b_5Y + b_6HS + b_7AGE + b_8ED + \varepsilon$$

or $\ln V = b_0 + b_1 \ln P + b_2r + b_3t + b_4P_0 + b_5Y + b_6HS + b_7AGE + b_8ED + \varepsilon$

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

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.