FACTORS OF HEALTH SERVICE PRODUCTION – PART I

Hospitals

Physicians.

EE 474 Health Economics

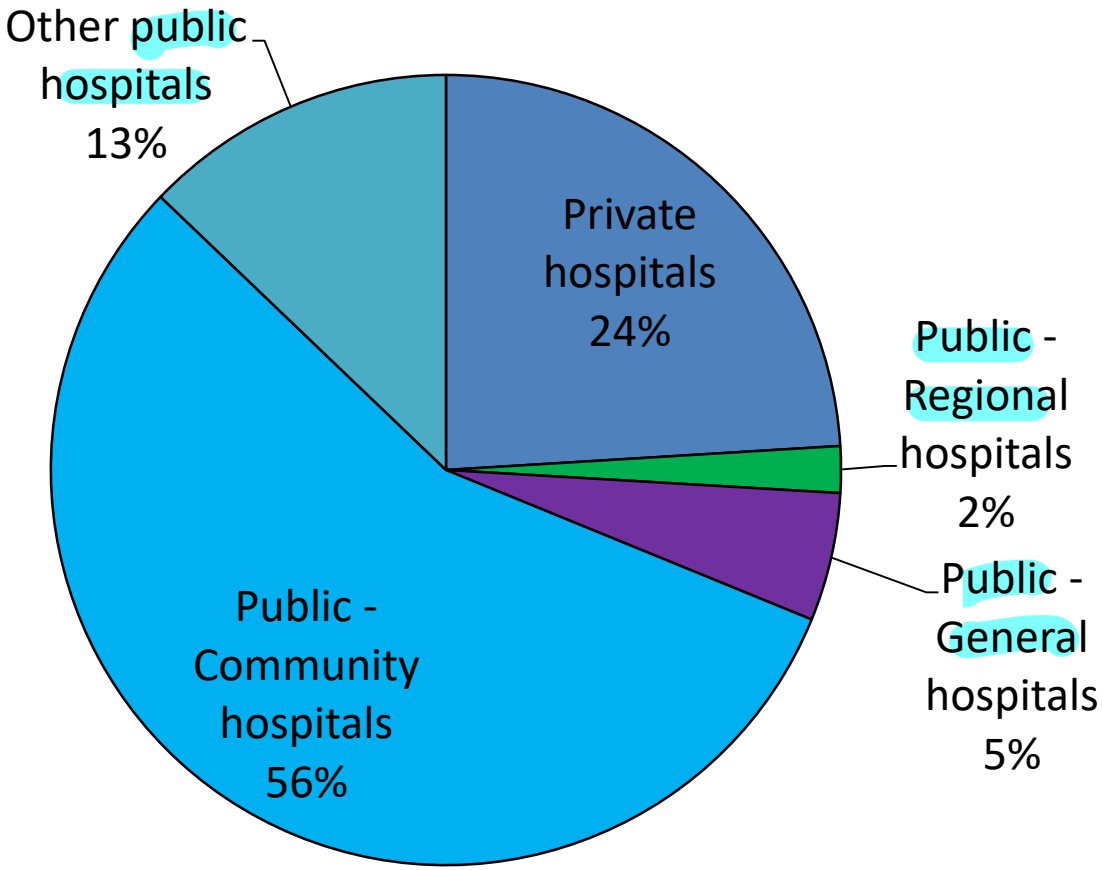
Semester 2/2021

HOSPITALS

Topics

- Some Statistics about Hospitals in Thailand
- Models of Non-Profit Hospital Behavior
  - ✓ The Quality-Quantity Nonprofit Theory (Newhouse's model)
  - ✓ The Profit-Deviating Nonprofit Hospital
  - ✓ The Hospital as a Physicians' Cooperative
- Alternative: The Hospital as Two Firms !

Hospitals in Thailand (2010)



Source: Bureau of Policy and Strategy, Ministry of Public Health

Hospitals as Non-Profits?

Max π → Not for hospitals!

?

- The majority of hospitals in Thailand are public hospitals.
  - Largely subsidized by the government
  - Often receive a large amount of "donations"
  - Are they non-profits?
- Examples of hospitals operated by non-profit organizations in Thailand:
  - King Chulalongkorn Memorial Hospital (Thai Red Cross)
  - Hua Chiew Hospital (Poh Teck Tung Foundation)

What Exactly is a Nonprofit Firm?

$\pi = TR - TC$.

- Criteria for a nonprofit firm is the nondistribution constraint.
  - No one has a legal claim on the nonprofit's residual (i.e. revenues – costs)
- Other distinctions between for profits and nonprofits:
  - Nonprofits are exempt from corporate income taxes and often from property and sales taxes.
  - Donations to nonprofits receive favorable tax treatment.

Why are Nonprofits Prevalent in Health Care?

HC has some public goods element in it.

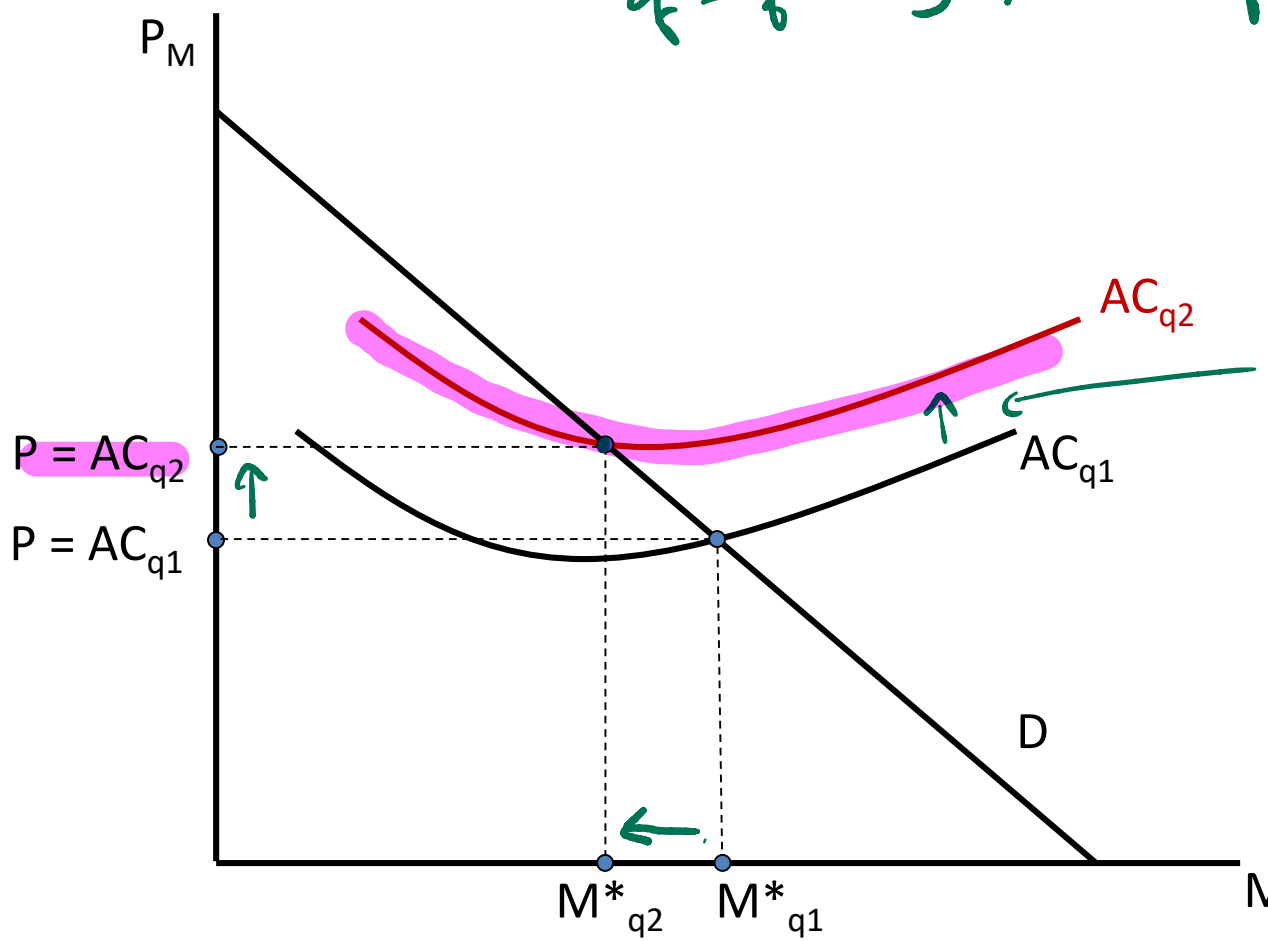
- Weisbrod (1975):
  - Nonprofits arise to provide for unmet demands for public goods, most notably in cases where there are significant external benefits to the provision of a good.
- Hansmann (1980):
  - Nonprofit firms play a role in cases of contract failure (cases where it is difficult to observe the good's provision or quality).
  - For-profit firms tend to have a conflict of interest, and so nonprofit ownership is perceived as a signal of higher quality.

I. The Quality-Quantity Nonprofit Theory

- Economists start the analysis with the objective of the hospital decision makers. → not profit maximizers
- Newhouse (1970) proposed a utility maximizing model that approximate the *altruistic firm*.
  - The hospital decision makers have altruistically internalized the community benefit in providing quantity of care.
  - An increase in quality might increase demand.
- The hospital administrator chooses the combination of quality and quantity that maximizes his or her utility.

The Quality-Quantity Nonprofit Theory

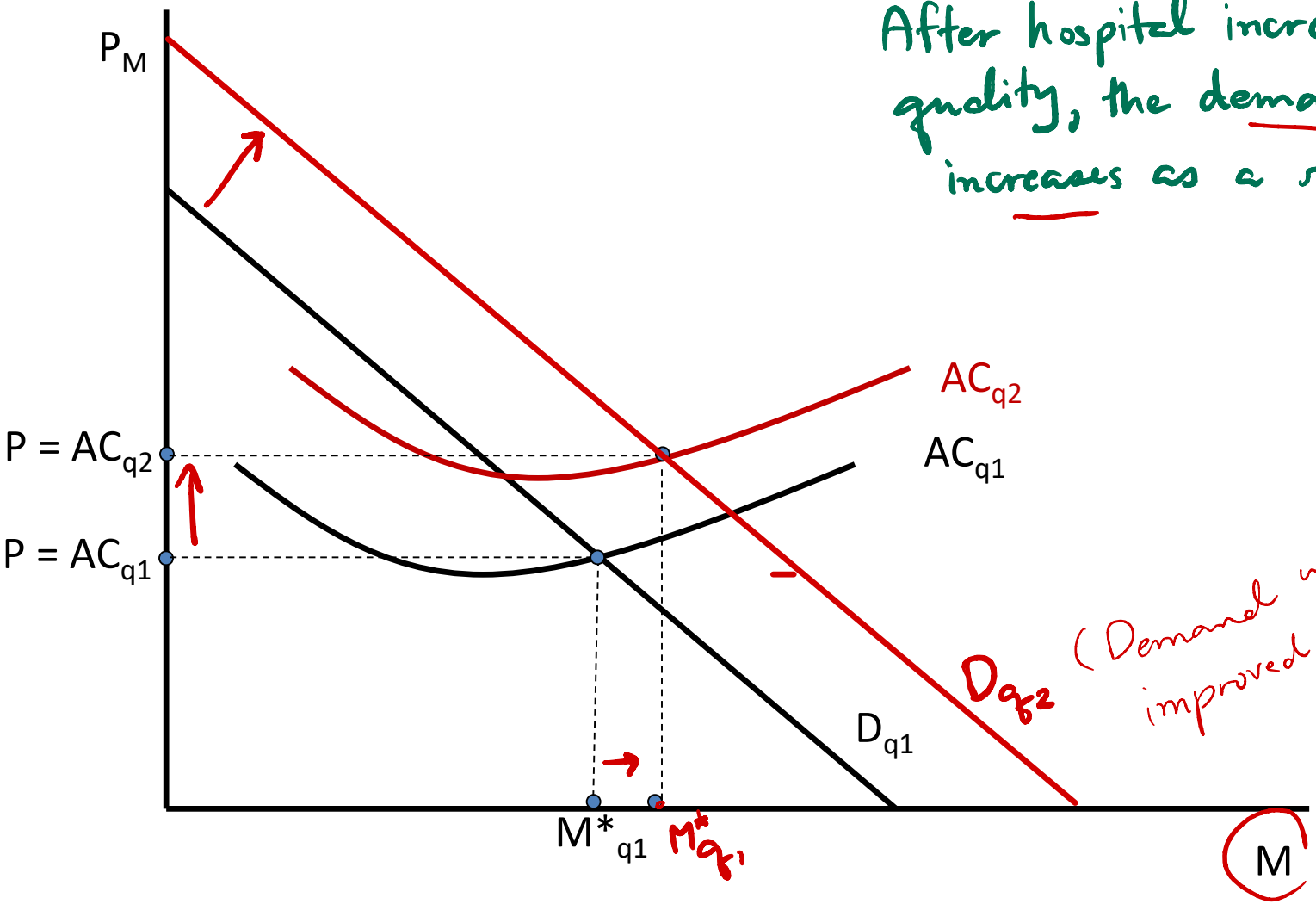
q = quality , M = quantity of med care.



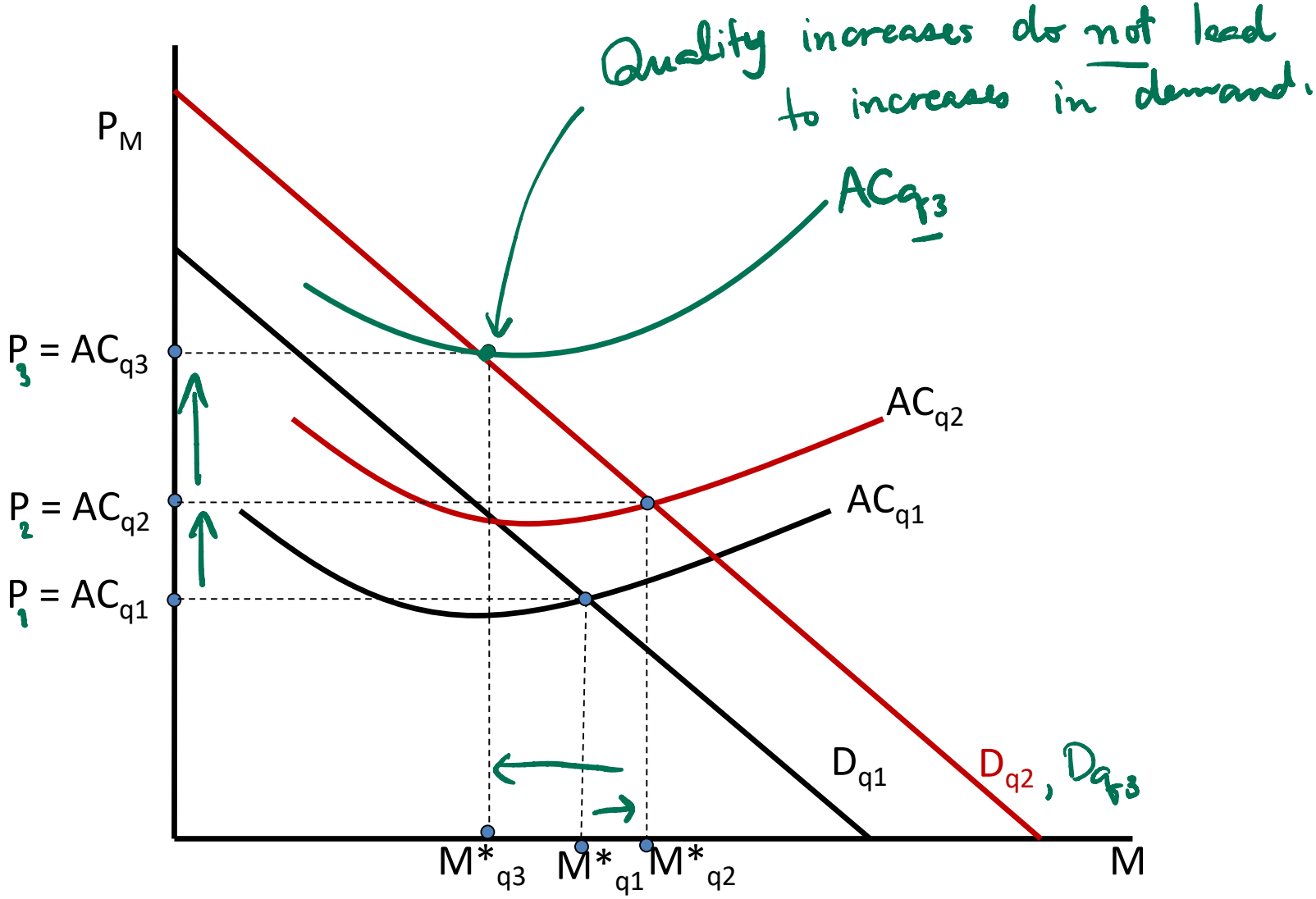
Hospital increases quality.
↑ cost increases.

The Quality-Quantity Nonprofit Theory

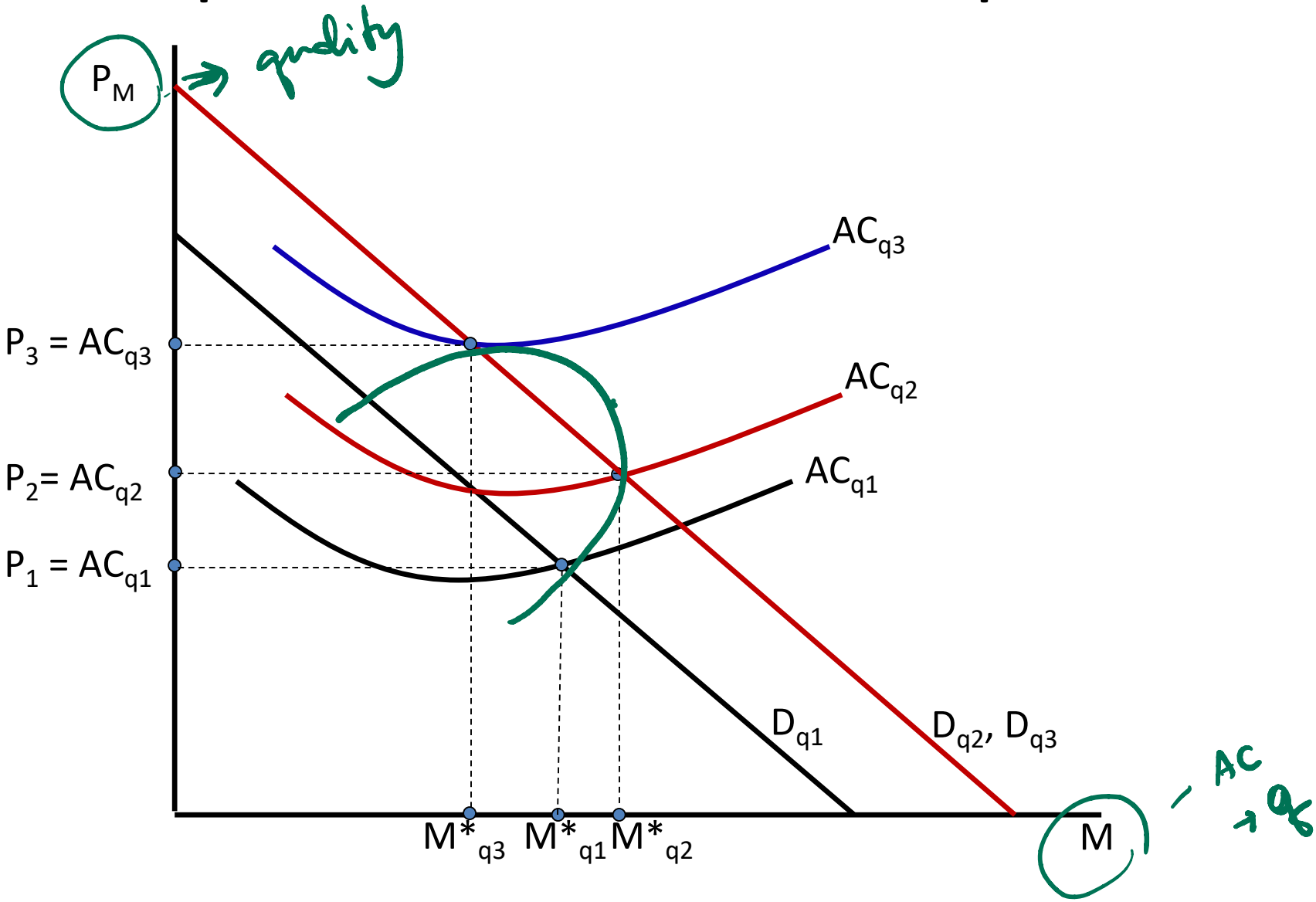
After hospital increase quality, the demand increases as a result.



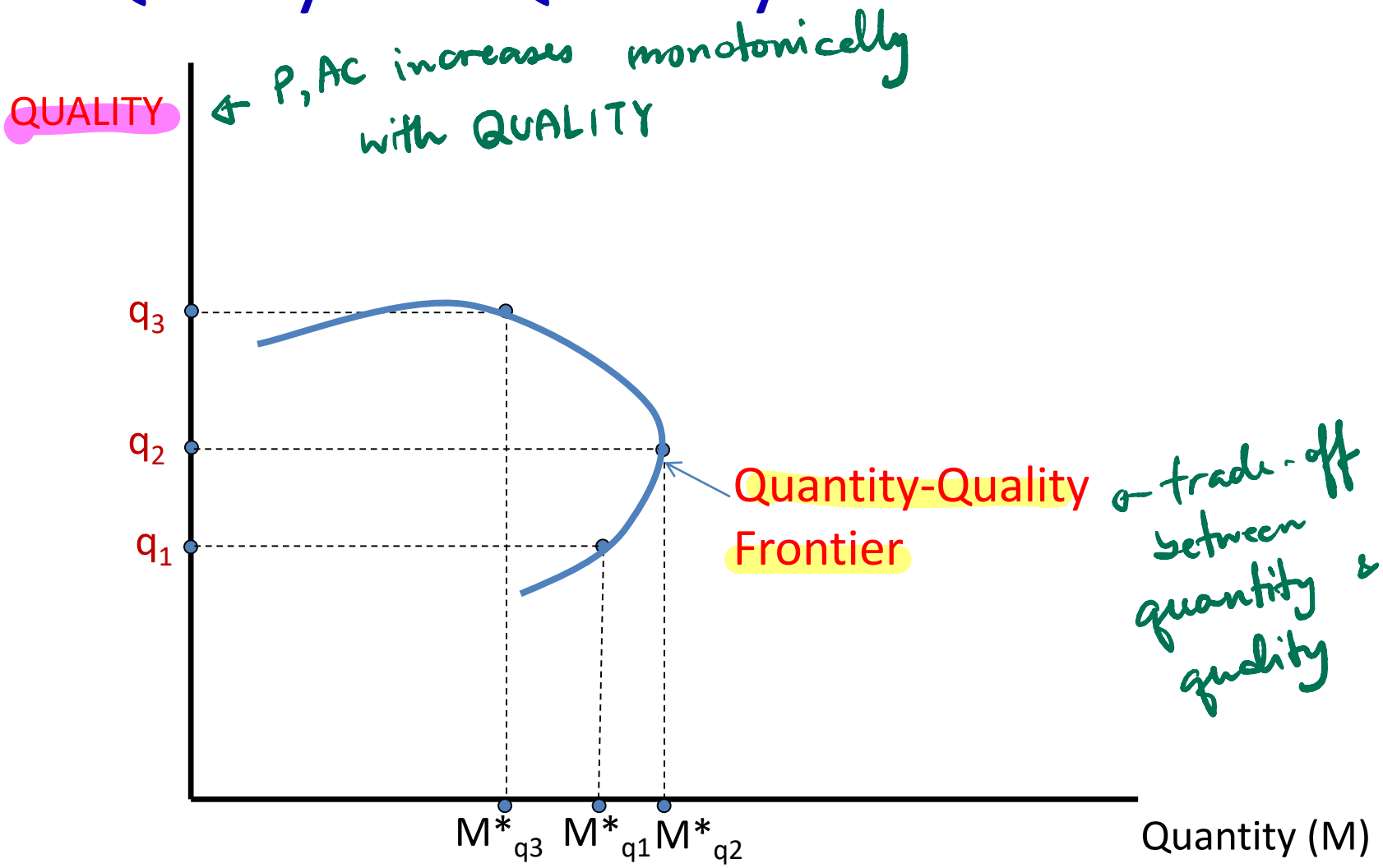
The Quality-Quantity Nonprofit Theory



Hospital Administrator's Options



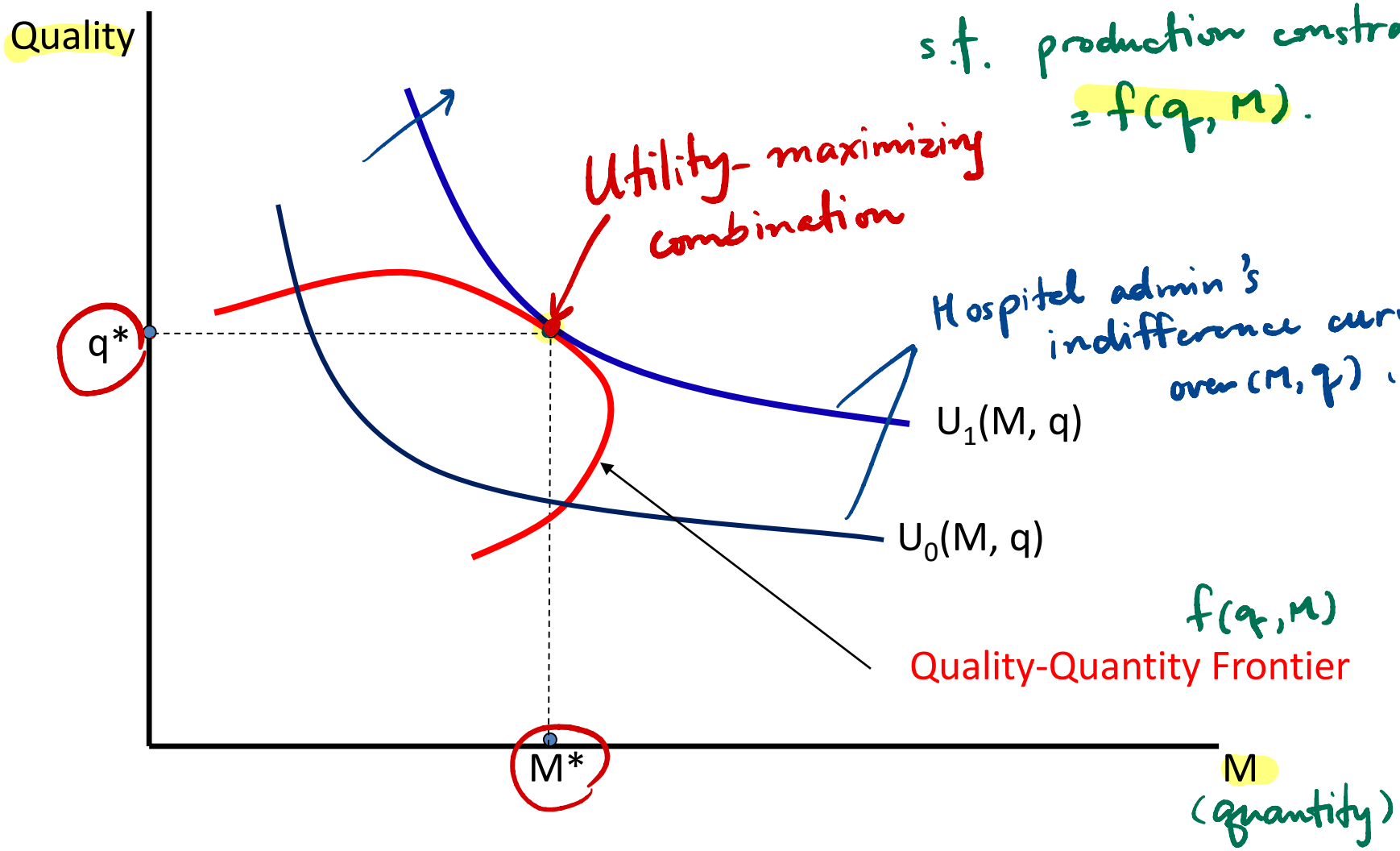
Hospital Administrator's Options in Terms of Quality and Quantity



Hospital Administrator's Utility Maximization

Max $U(M, q)$ q: quality

s.t. production constraint $= f(q, M)$.



II. The Profit-Deviating Nonprofit Hospital

- Lakdawalla and Philipson (2006) view the nonprofit as a mix of altruism and profit motives:
  - Altruistic firms can be analyzed as if they were *pure profit-maximizers with a cost advantage*.
  - For-profit firms are the "marginal ones" responding to changes in regulatory and market conditions.

Non profit

q = quantity

- Hospital's objective: Max $U = U(q, \pi)$
- Nonprofit's profit: $\pi^N = \pi_S + D$ (D = donations)
  - For-profit's profit: π^F

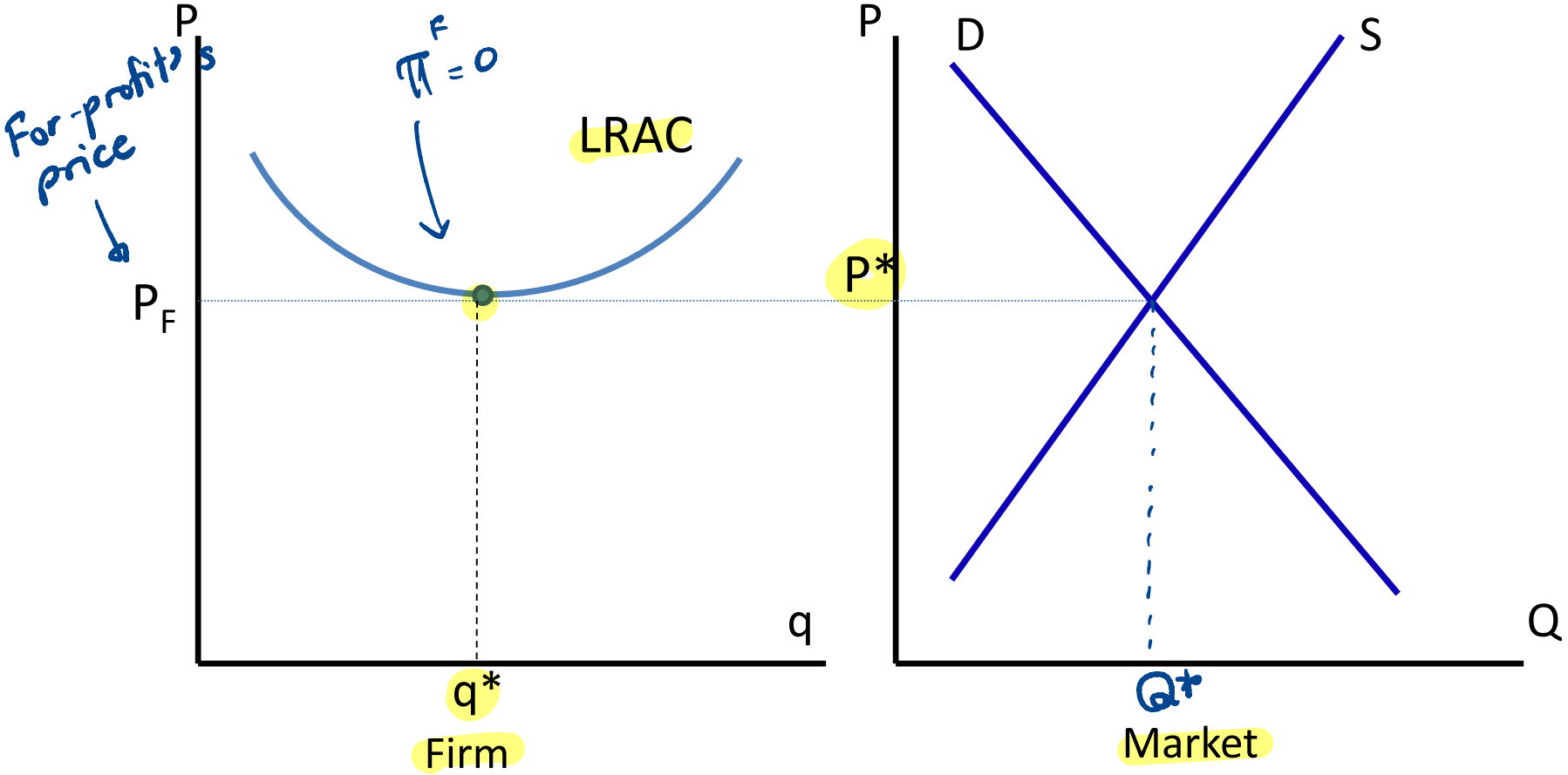
produce 0 quant.

- Reservation utility (minimum required utility): $U^* = U(q, \pi) = U(0,0)$.

$\pi = 0$

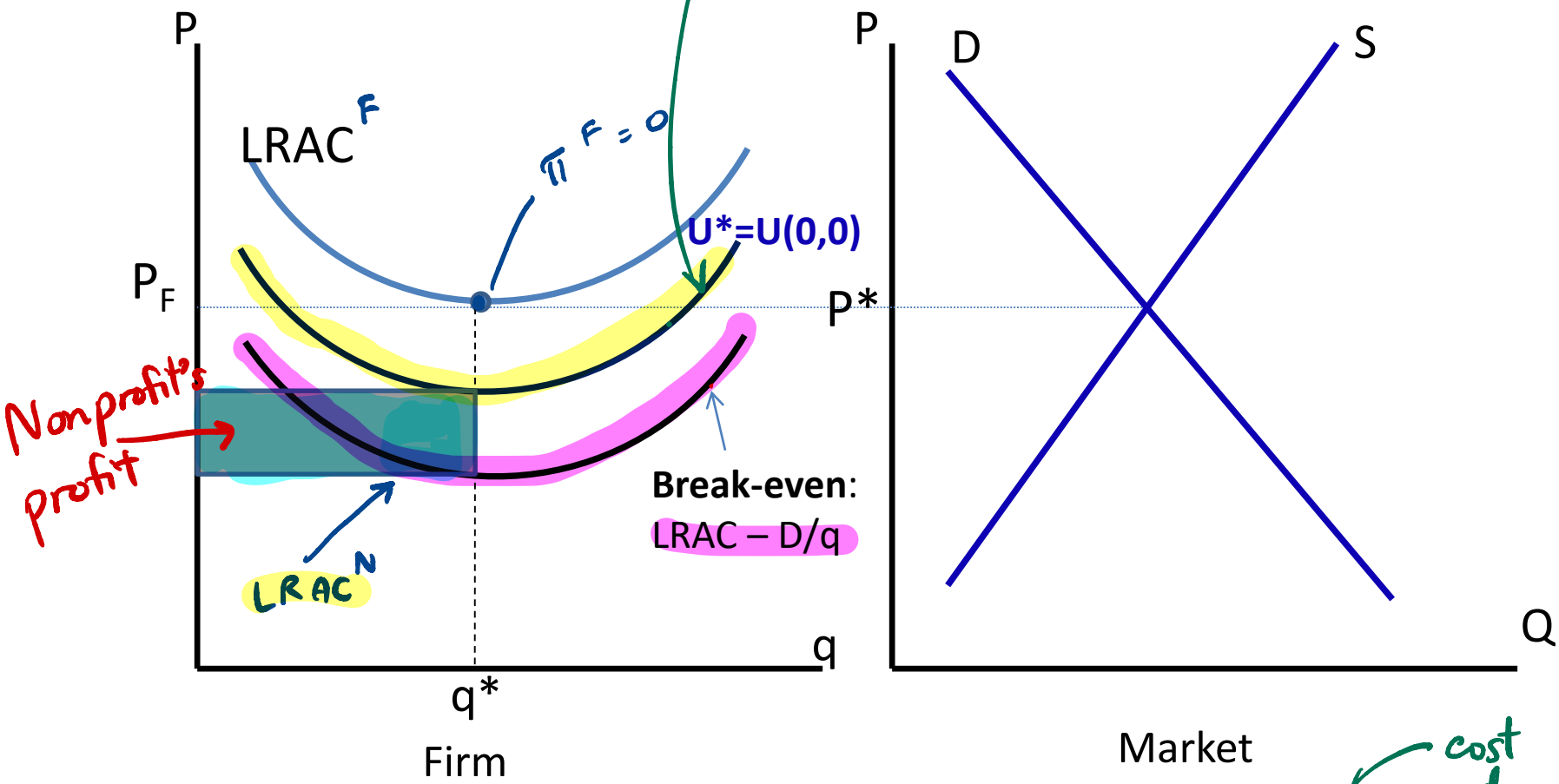
- Operating constraints:
  - For-profit: $\pi^F \geq 0$
  - Profit-deviating nonprofit: $\pi^N = \pi_S + D \geq 0$

"Traditional" Market Model:
For-Profit's Entry Condition



Profit Deviating Model

LRAC that corresponds to reservation utility : U^* where $q=0$, $\pi=0$.



Non-profit firm's incentives : altruism & profit ← cost advantage ↑ Donations.

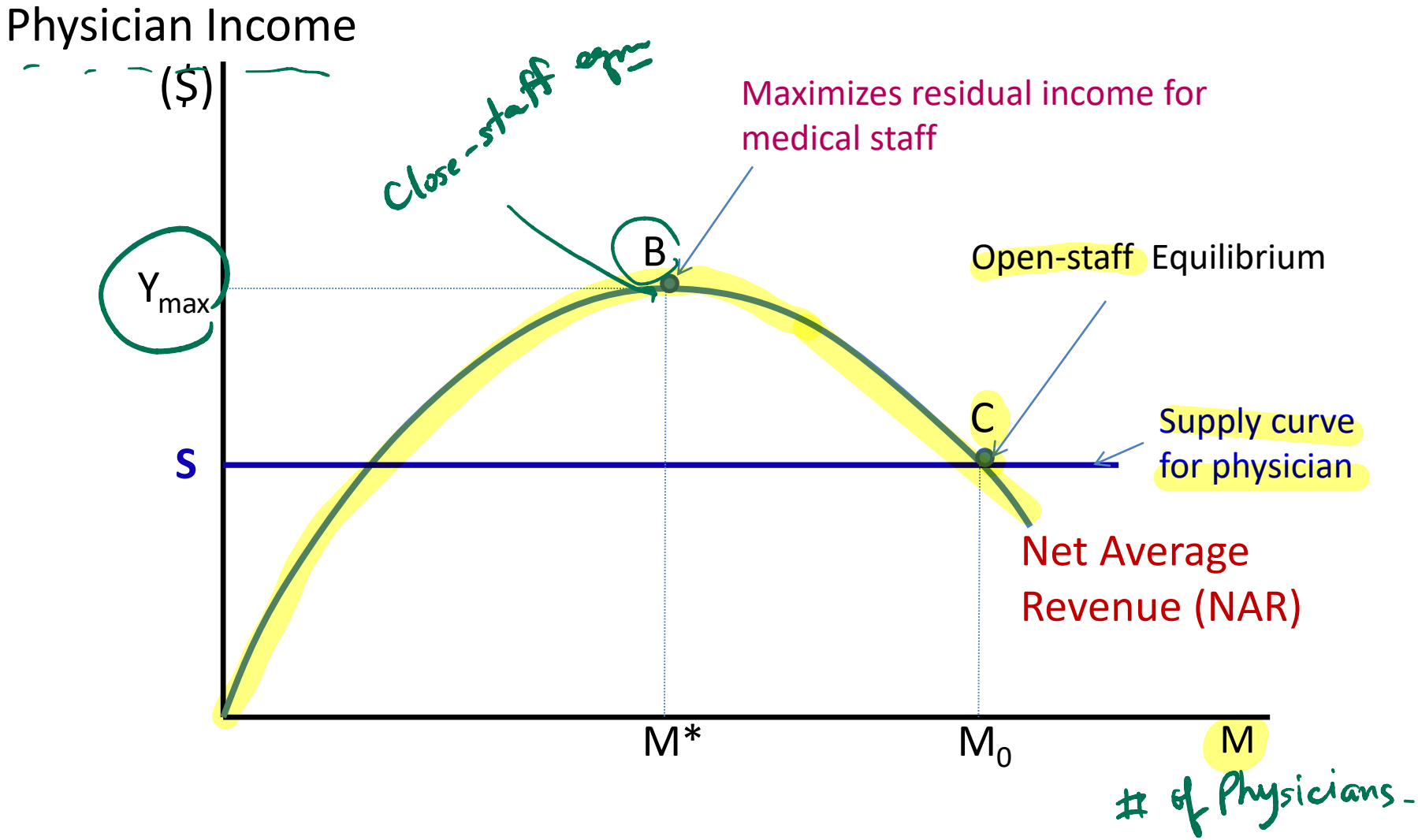
III. The Hospital as a Physicians' Cooperative

- Mark Pauly and Michael Redisch (1973) describe the nonprofit hospital as a "physicians' cooperative".
  - The hospital is controlled by a physician staff who operate the hospital so as to maximize their net incomes.
- Hospital objective: Max (NR/M)

  where NR = Net revenue = total ~~revue~~ revenue – all factor payments

  M = Number of physicians
- Two types of staff:
  - ✓ "Close" staff hospitals: Physicians can limit the size of the staff.
  - ✓ "Open" staff hospitals: Physicians are free to enter.

Physician Cooperative Model



Comparing the Quantity-Quality and the Physicians' Cooperative Theories

- Hospital and physician' revenues:

$$R = R(K,L,M_0)$$

K = capital, L = labor, M_0 = initial # of physician

- Hospital residual revenue:

$$HR = R(K,L,M_0) - wL - rK - sM_0 + D_0 + G_0$$

where D_0 = donation, G_0 = government subsidies, and physician supply price = s.

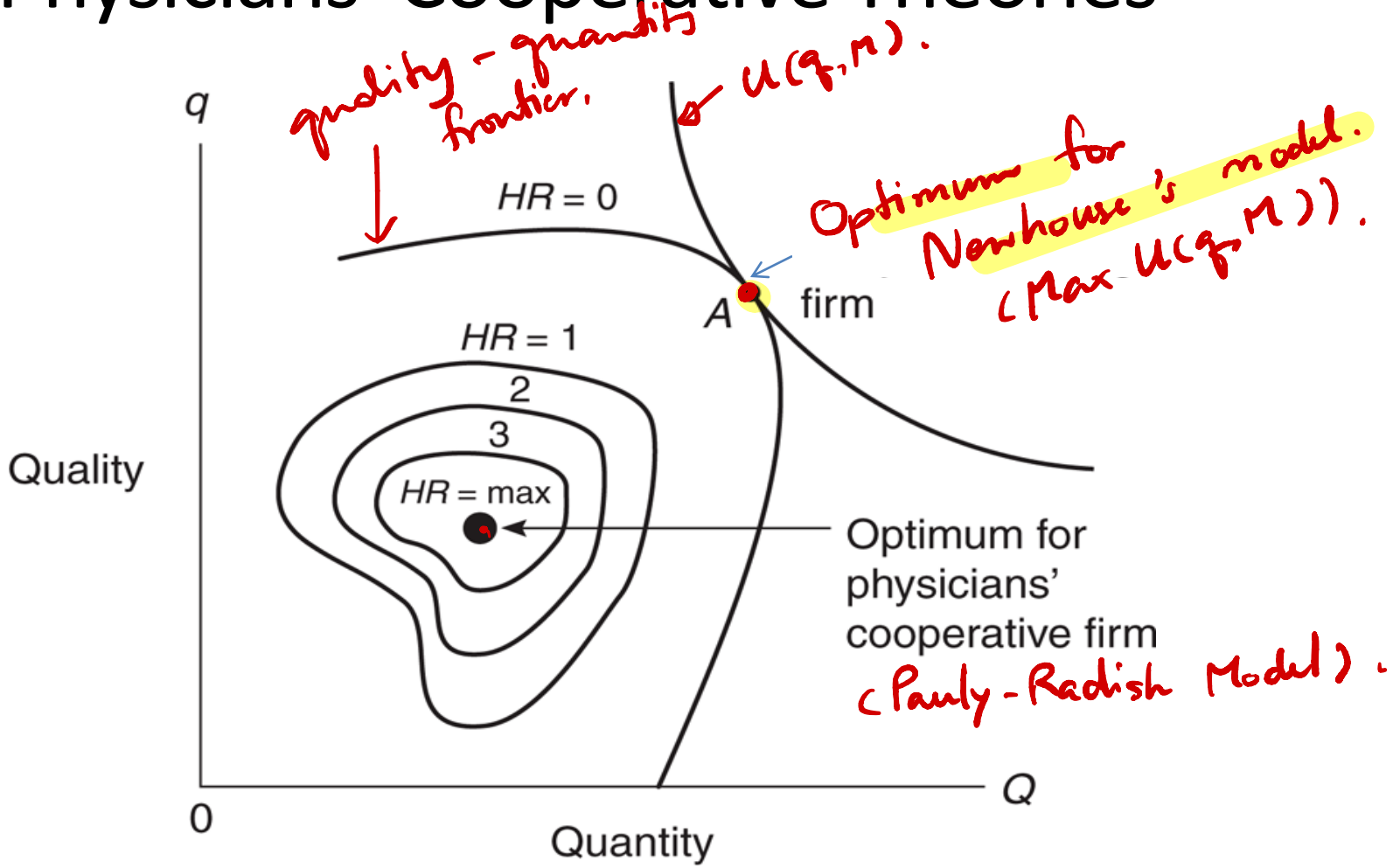
3rd • Pauly-Redisch model ➔ Max HR ← Pure profit (residual revenue).

1st • Newhouse's model ➔ Max U(q, M) s.t. HR = 0. ← Pure altruism

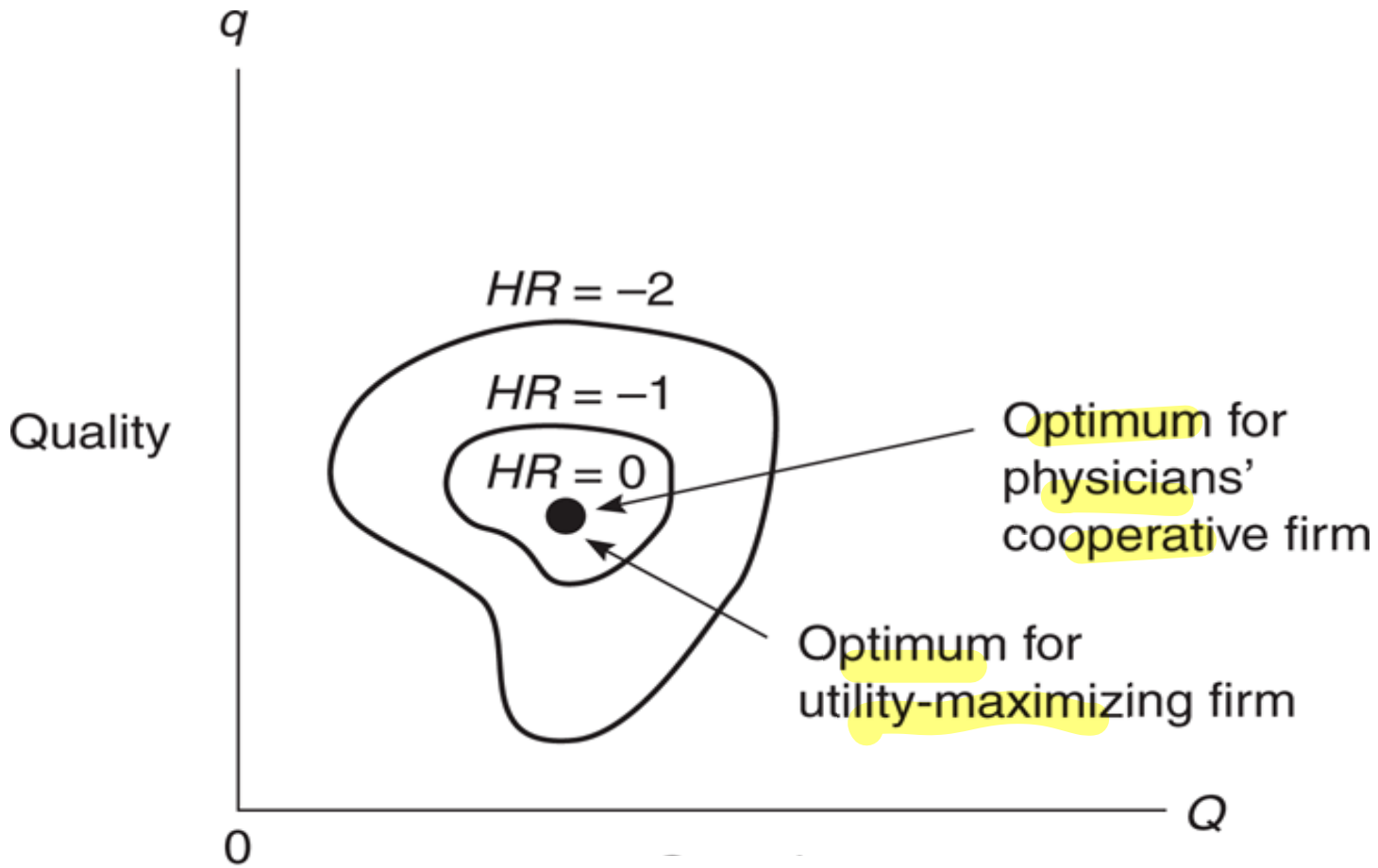
2nd. Profit-deviating model ⇒ Max π^N s.t. $U^* = U(0,0)$

$\pi^N = \pi_s + D$

The Quantity–Quality vs. The Physicians' Cooperative Theories



Effects of Increased Competition



Summary of Hospital Behavior Model

- *Newhouse*: The hospital administrator chooses the best combination of quantity and quality of care. (Utility maximization model)
- *Lakdawalla-Phillipson*: Nonprofit preferences include altruism and profit maximization.
- *Pauly-Redisch*: Optimal physician staff size maximizes the pecuniary gain to physicians. (Profit maximizing model)

Question: Which model do you think apply to hospitals in Thailand?

PHYSICIAN'S PRACTICE

Topics

- Benchmark Model of The Physician's Practice
- Physician Agency and Supplier-Induced Demand
- The Target Income Hypothesis
- Diffusion of Information and Small Area Variations
- Malpractice

Asymmetric info
&
Doctor - Agents
Patient - Principal
"Principal - agent model"

I. Benchmark Model of The Physician's Practice

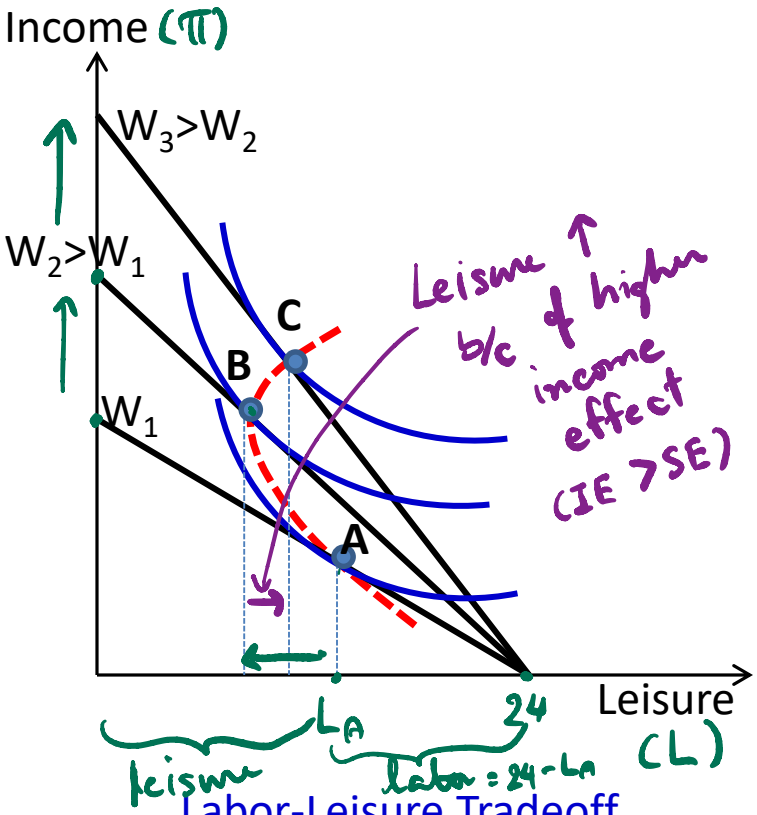
- McGuire and Pauly (1991) describe physicians as utility maximizers.
- Physician's utility depends:
  - Net income (π) ~ Profit
  - Leisure (L) → labor (l)
  - The degree of inducement (I): Physician's own efforts to induce patients to buy more care than appears medically necessary.
- Physician's Utility function:

$$U = U(\pi, L, I)$$

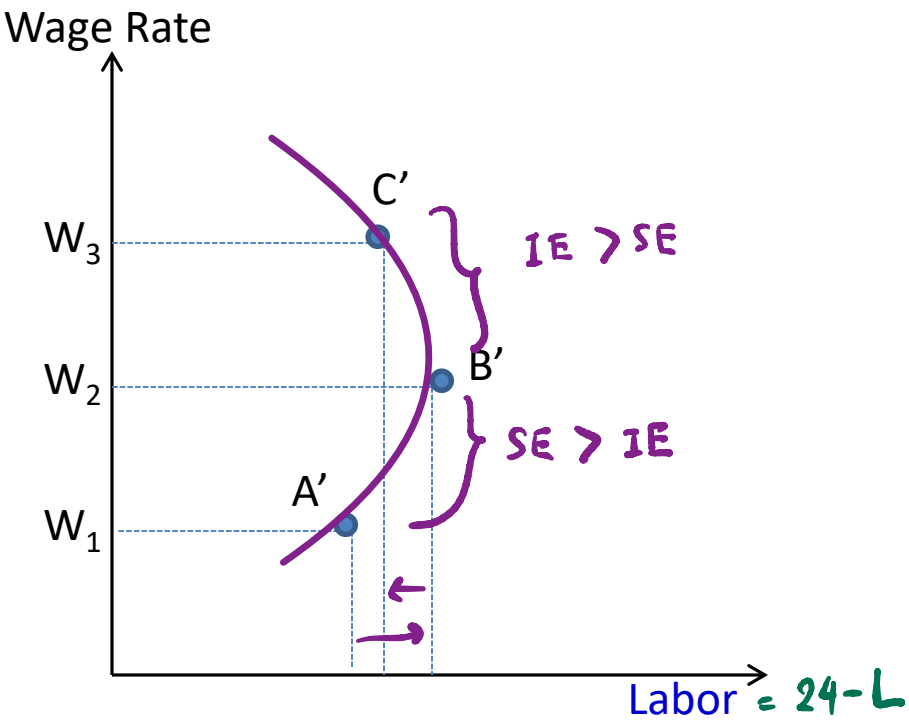
Supply of Physician Labor

$U = U(L, \pi)$

Max $U(L, \pi)$
s.t. BC.



Labor-Leisure Tradeoff



Backward-Bending Supply Curve

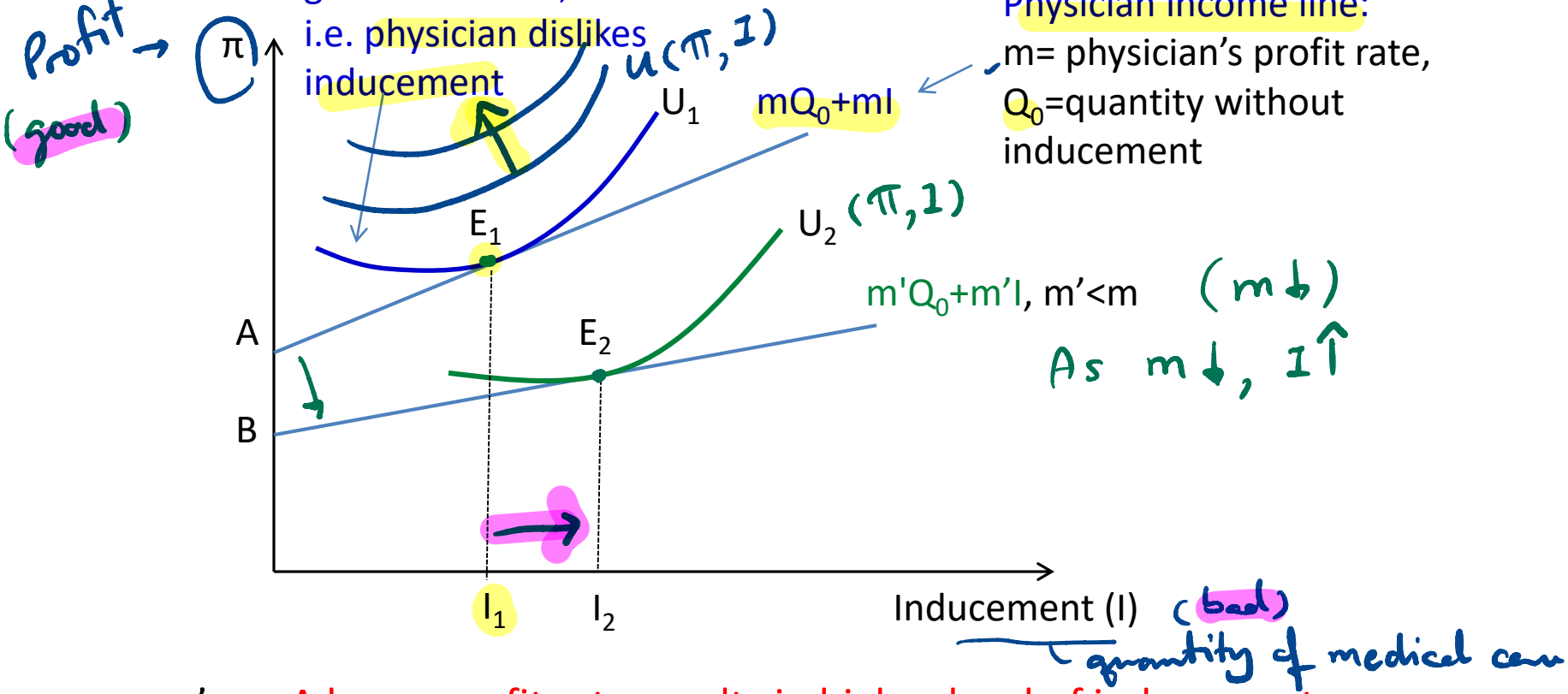
Physician's Response to Reduced Rate of Profit

$U = U(\pi, I)$, L is constant.

total income $= m(Q_0 + I)$

Indifference curve when one good is a "bad"; i.e. physician dislikes inducement

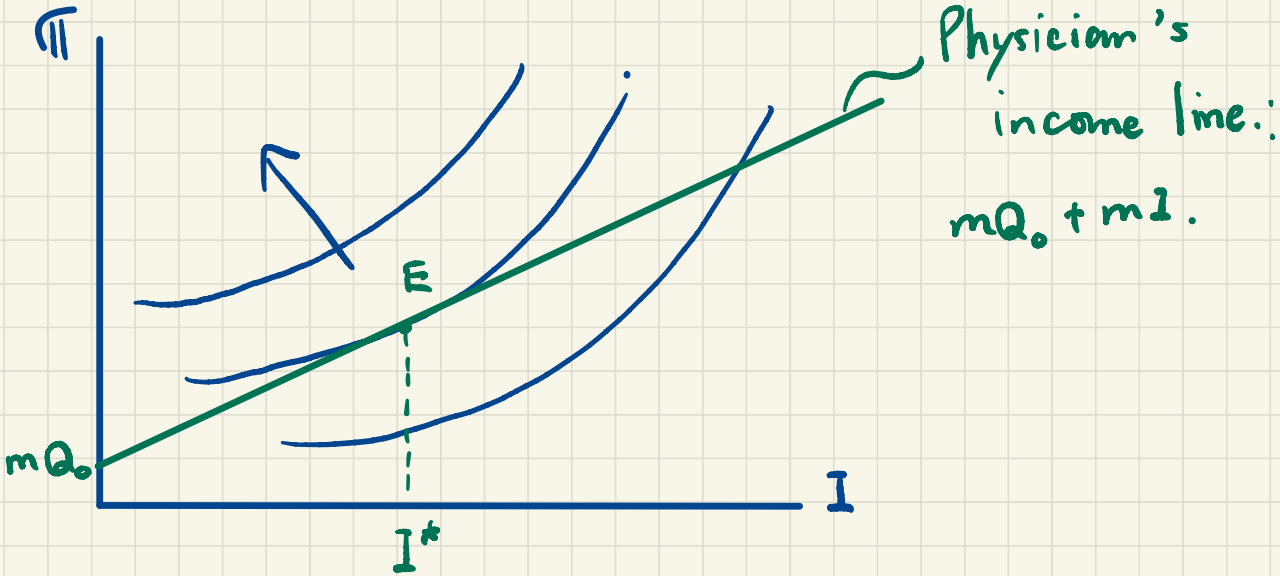
Physician income line:
m= physician's profit rate,
Q_0=quantity without inducement



m'<m: A lower profit rate results in higher level of inducement.

$$\text{Max } U(I, \pi)$$

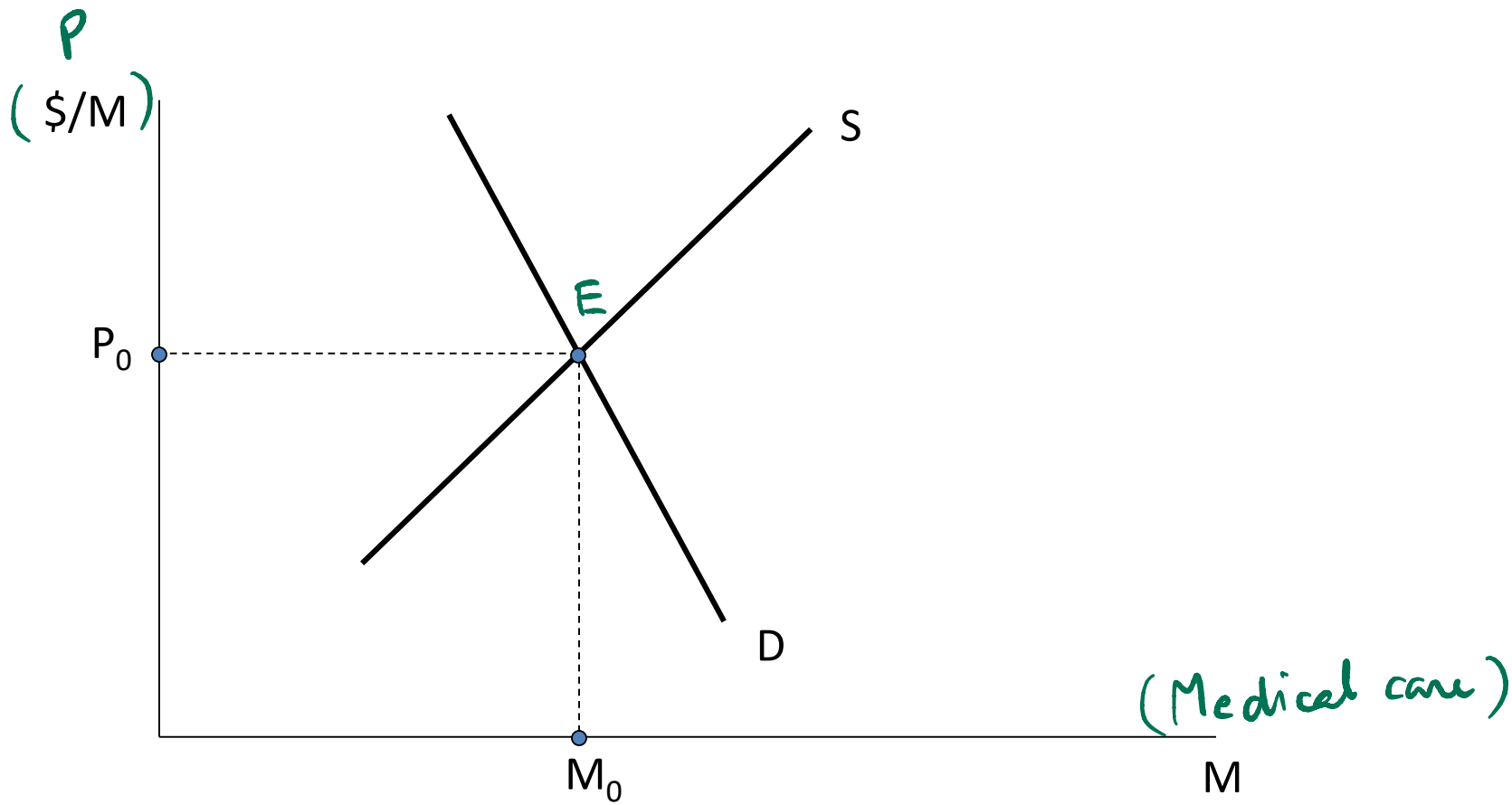
$$\text{s.t. } \pi = mQ_0 + mI.$$



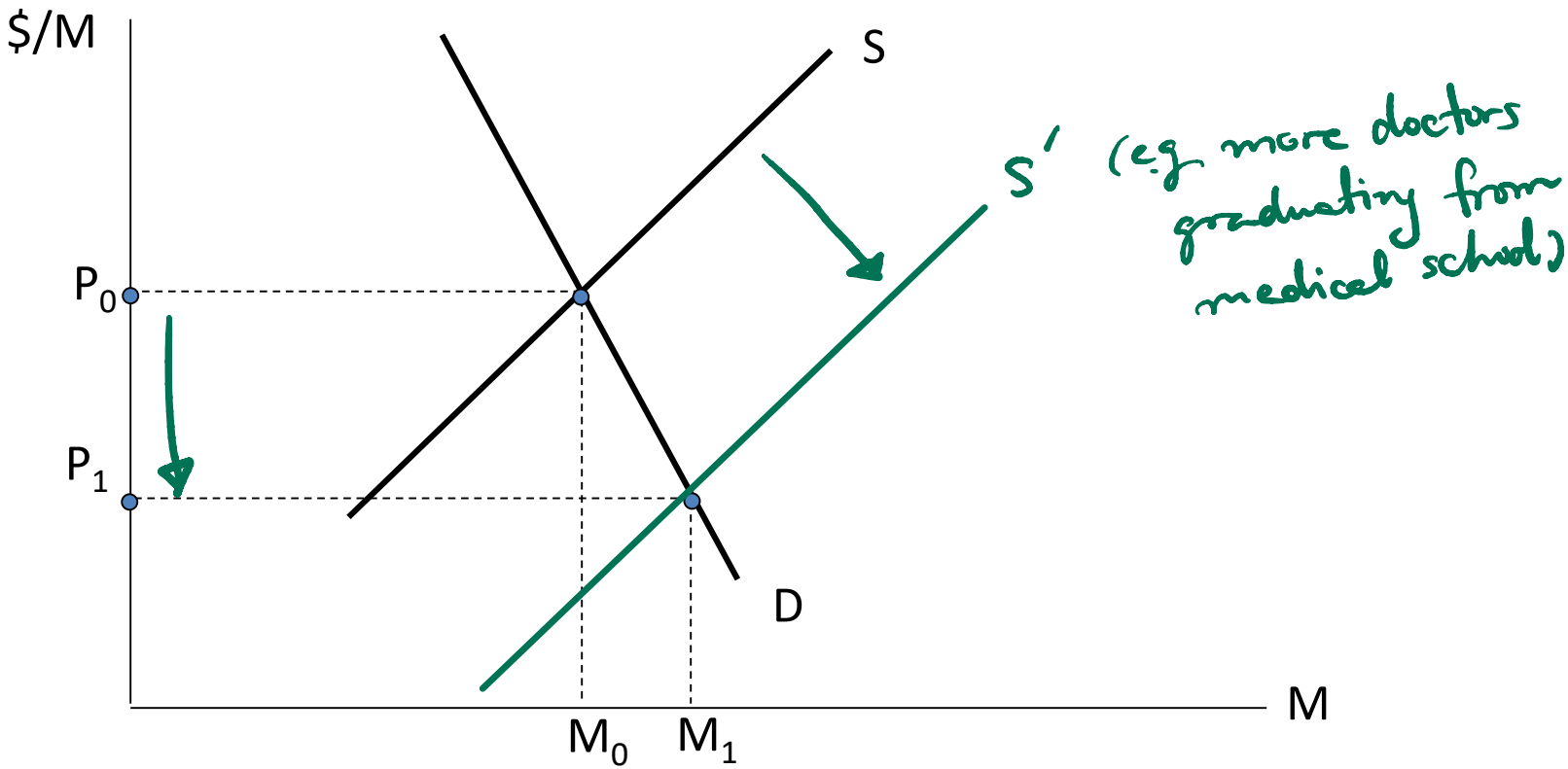
II. Physician Agency and Supply-Induced Demand

- In medicine, we identify the physician as the *agent*, and the patient as the *principal*.
- When two parties have *unequal* knowledge, the problem in called 'asymmetric information.'
- Policy concern is when self-interest physicians may violate their role as agents.
  - "Perfect agents" are the agents who make choices and recommendations on the behalf of principals that the principals themselves would have made if they had the same information.

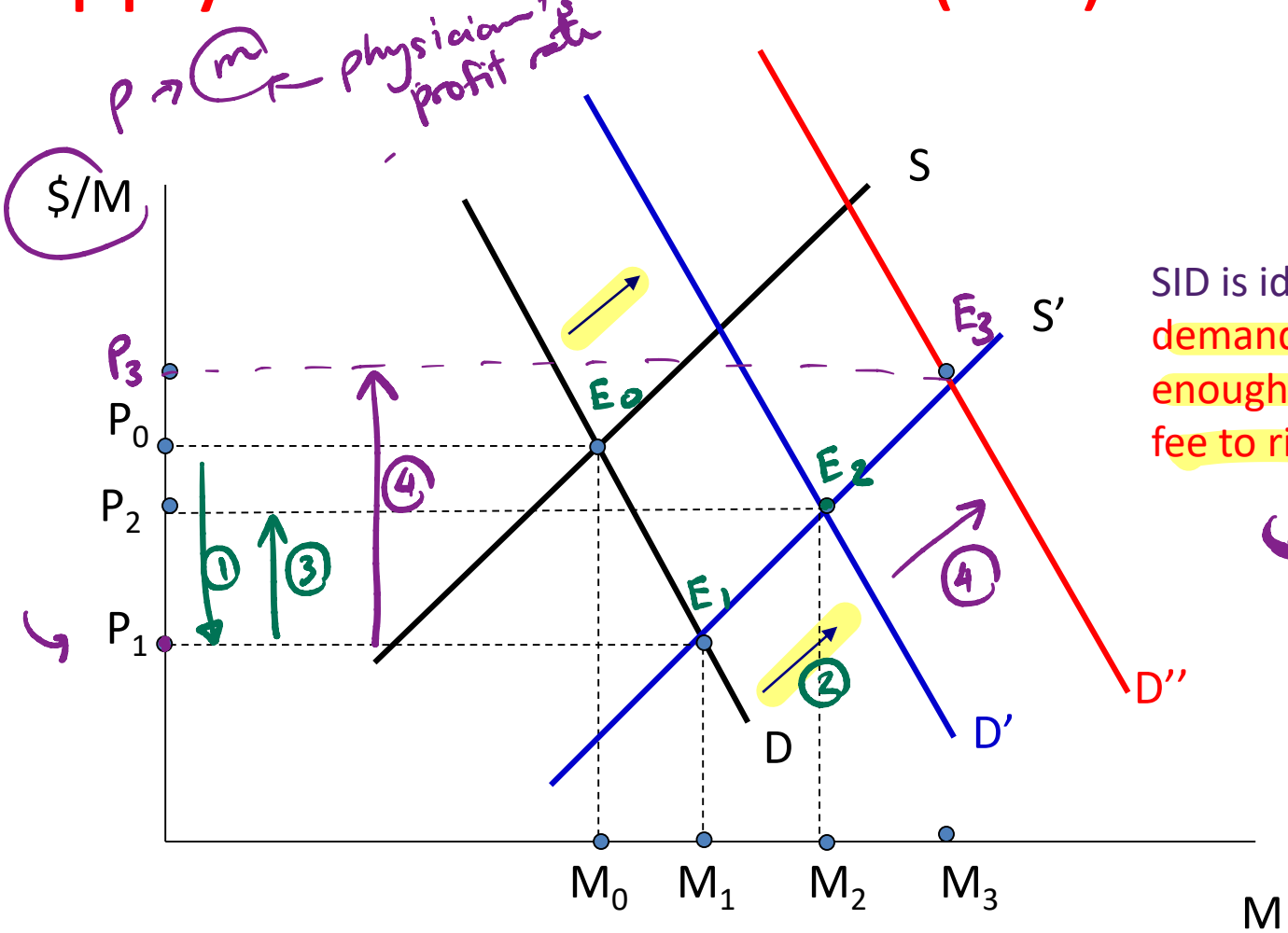
Original Situation



Some Exogenous Change in the Supply of Physicians Occurs (S increases)



Supply Induced Demand (SID)



SID is identified when demand increases enough to cause the fee to rise.

↳ Why?

III. The Target Income Hypothesis

- Economists *expect* physicians to respond to the financial incentives, but the theoretical puzzle is why physicians would wait until supply had increased to induce demand.
  - We need some theory other than profit maximization to explain the behavior

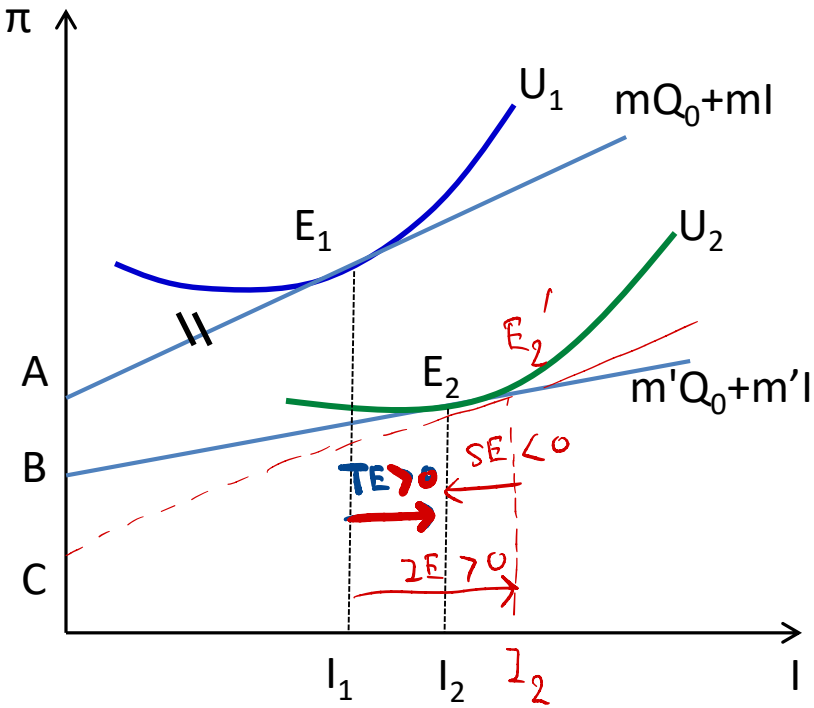
"reservation income"

- Target income hypothesis suggests that they have a certain level of income that they do not want to fall below.
  - This is an extreme case of the benchmark model.

minimum income they want to accept.

The McGuire-Pauly Synthesis of SID Benchmark Models

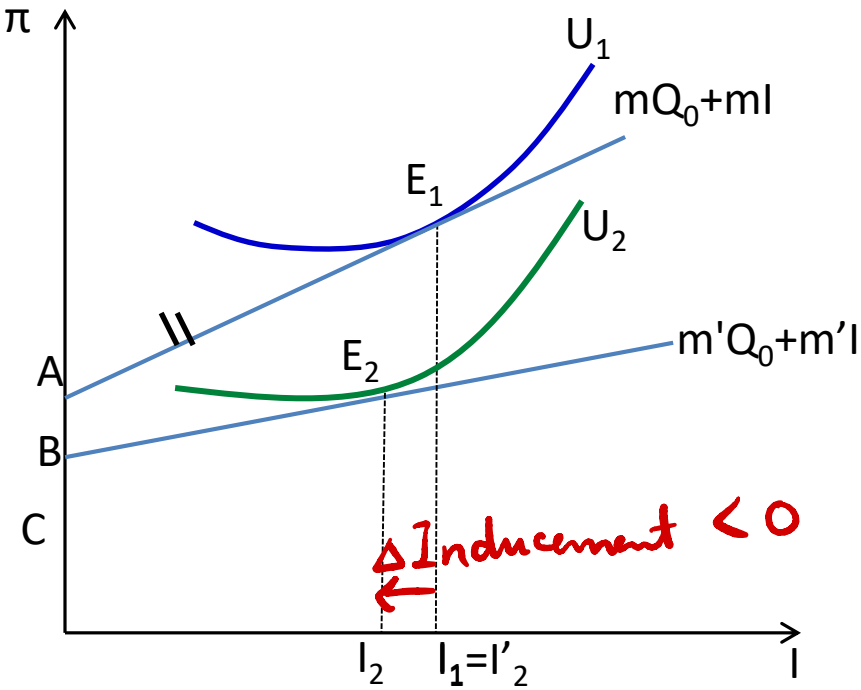
Target Income Behavior



Income Effect

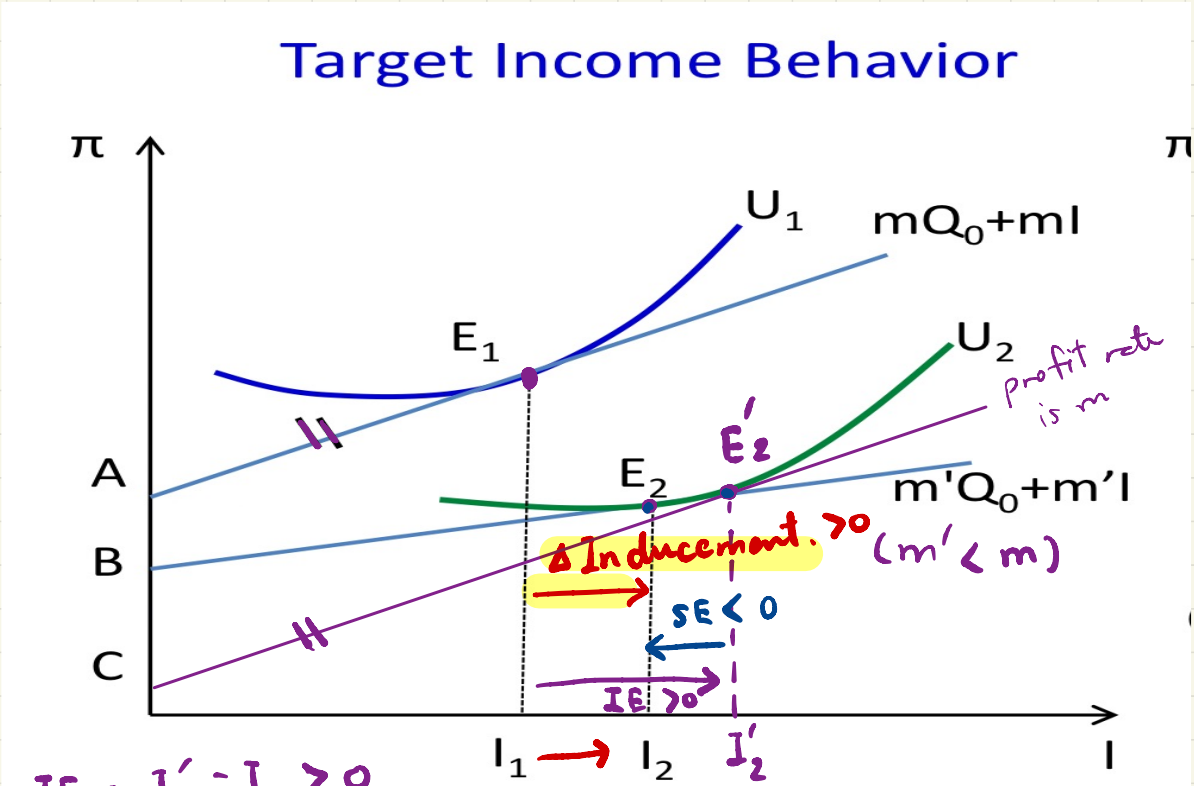
ΔInd > 0

Profit-maximizing Behavior



No income effect

$\text{Max } U(\Pi, I) \quad \text{s.t. } \Pi = mQ_0 + mI.$ (income)



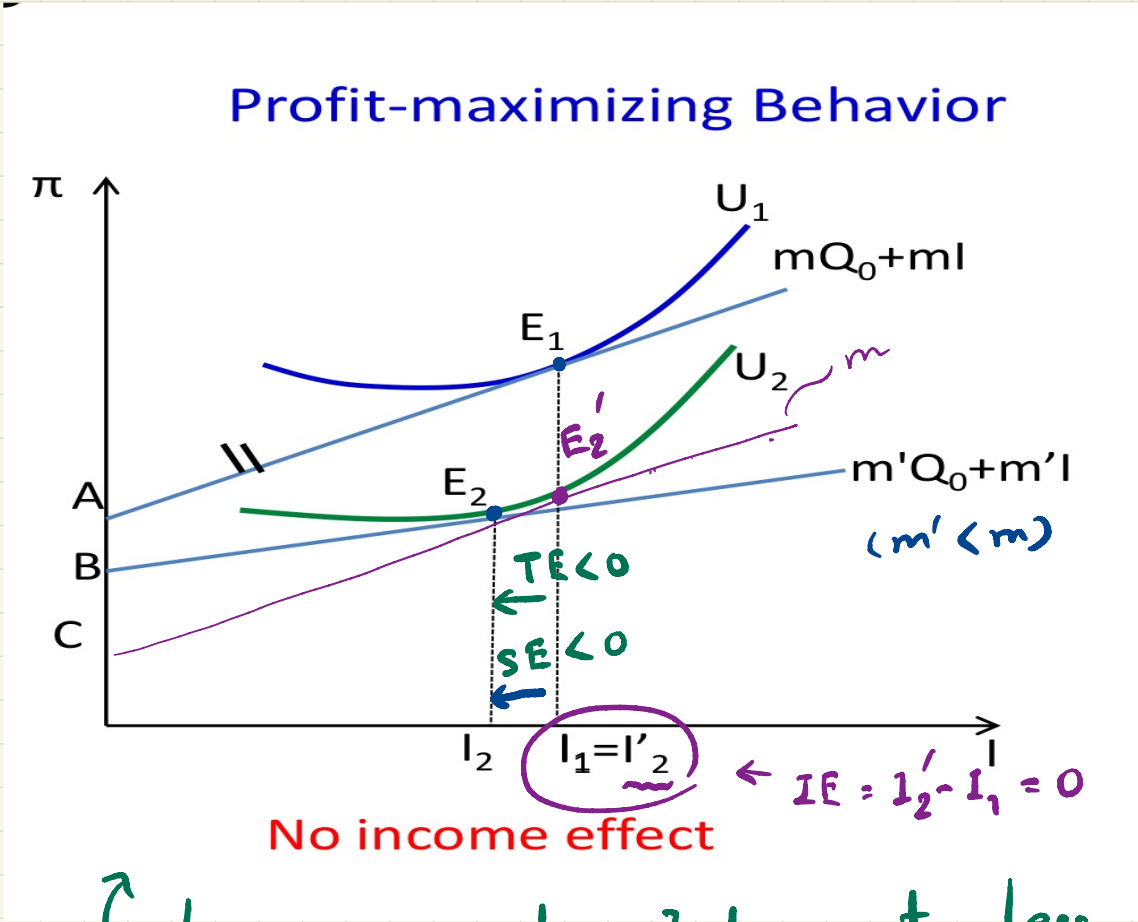
$IE = I_2' - I_1 > 0$

$SE = I_2 - I_2' < 0$

Total effect on inducement $= I_2 - I_1 > 0$ b/c $\overset{\oplus}{|IE|} > \overset{\ominus}{|SE|}$

As $m \downarrow$, lower income makes I more desirable $IE > 0$

inducement is less profitable $\Rightarrow SE < 0$



Lower m makes Inducement less profitable.

↳ m↓ ⇒ ↓I.

The Benchmark Model as a Synthesis

- The McGuire-Pauly synthesis tells us that the size of the income effect is critical to understanding and identifying SID behavior.
- A lower profit rate, *m*, has two offsetting effects on inducement:
  - *Income effect:* Decreased income would make inducement more desirable. IE > 0
  - *Substitution effect:* If inducement is less profitable (smaller m), providers would do less inducement, that is, substitute away from it. SE < 0

IV. Small Area Variation (SAV)

- Another type of information problem related to physician's practice is where neither the physician nor the patient know the best treatment.
- Patient assumes that the physician knows and is giving good information. But the physician may not know either.
- This leads to an area of inquiry known as small area variation or small area analysis.
  - There are substantial variations in medical and surgical utilization rates across and within small geographic areas (e.g. zipcodes, hospital markets, etc.).

Different Views on the Variability

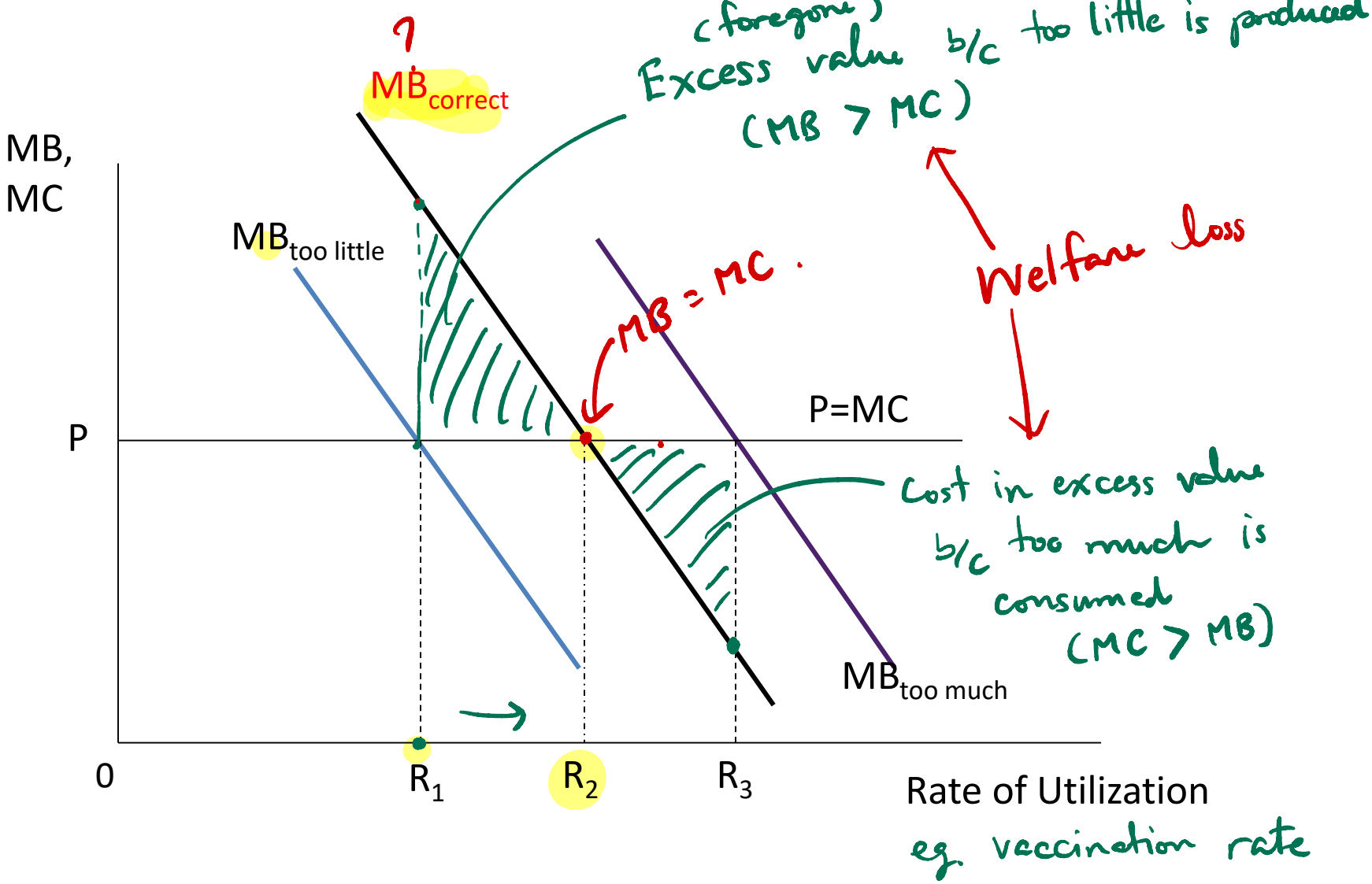
- The Physician Practice Style Hypothesis:
  - Practice style probably varies among physicians due to an *incomplete diffusion of information* on medical technologies (Wennberg, 1984).
- Formulation of Practice Style:
  - Physician's practice style are more influenced by *his peers* in the same hospitals and in other hospitals in his region (Epstein and Nicholson, 2009).
- Education, Feedback, and Surveillance:
  - *Information programs* directed at physicians can alter their behaviors and thus presumably their practice styles (Wennberg & Fowler, 1977).

Small Area Variation and the Social Cost of Inappropriate Utilization

too little or too much.

- The most important issue in the SAV literature is the proposition that substantial variation in utilization rates is an indication of *inappropriate care*.
- It is necessary to determine the variability due to economic, social, demographic and chance reasons, in order to determine the residual portion that is due to physician decisions
- What is the economic cost of this variability (i.e. physician misinformation)?

Variation Causes Welfare Loss



V. Malpractice

Book "Being Mortal" by Atul Gawande

Thai "ตาย-เป็น" นพ. บวรศม.

- Medical malpractice occurs when a negligent act or omission by a physician or medical professional results in a damage or harm to a patient.
- Many malpractice judgments are very large and malpractice insurance premiums can be very high (at least in developed countries).
- The high likelihood of malpractice suits lead to what is called "negative defensive medicine" which occurs where physicians refuse to perform risky procedures to avoid lawsuits.

E.g. Doctors at community (รพช.) hospitals refuse to perform surgeries and refer the patients to provincial hospitals (รพท., รพศ.)