CHAPTER 11
MORAL HAZARD

Moral Hazard

- **Agent** takes an action that affects his payoff as well as the principal's
  - Effort
- **Principal** only observes outcome, an imperfect indicator of the action
- Agent may choose an inefficient action
- Principal's problem is to find a contract that induces high effort
- *In insurance markets*
  - Insurance company is the Principal
  - Insured individual is the Agent
  - Action effort in avoiding accidents or thefts
  - MH : Ability of insured individuals to affect the probabilities of events

What is moral hazard?

- The term "moral hazard" was used for the first time in the context of health insurance by Arrow (1963) to characterize the fact that the insured use more healthcare to treat a given illness than the uninsured

- "It is frequently observed that widespread medical insurance increases the demand for medical care."

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Moral hazard with health insurance

- In the context of health systems, moral hazard refers to the tendency to seek health care in greater quantity and at greater cost with insurance than without.

- Insured people take risks with their health that similar uninsured people would not take, and demand more expensive treatment from their doctors when they get sick.

- Moral hazard is *the downside of health insurance* because it raises society's level of health care expenditures.

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Moral Hazard in health Insurance

- Insurance coverage, by lowering the out-of pocket price of care paid by the individual, may increase healthcare use
  - Ex ante MH: individuals excert less (unobserved) effort in maintaining their health (less exercise, more cheesburger, smoke ..)
  - Ex post MH: healthcare utilization increases with coverage (usual relationship between price and demand)
- If so, **society healthcare spending increases with coverage**
- Is there *empirical evidence* of MH in health insurance?
  - The answer is important for the design of insurance contracts and for public health policy
- What solutions?
  - Market
  - Public policy

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Ex ante vs. *Ex post*

- *Ex ante* **moral hazard:** behavior changes that occur <u>before</u> an insured event happens and make that event more likely.
  - leaving the stove on
  - skipping the flu vaccine

- *Ex post* **moral hazard:** behavior changes that occur <u>after</u> an insured event happens and make recovering from that event more expensive.
  - using expensive drugs instead of generics
  - knee replacement surgery instead of painkillers

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The moral hazard pattern

- An individual faces some risk of a bad event *X,* and his **actions** can increase or decrease its likelihood

- He holds an insurance contract that will help pay some or all of the costs of *X,* if it occurs. Thus his price of *X* is now lower.

- In response to the price distortion, he changes his behavior in a way that increases the chance of *X* or increases the costs of recovering from *X.*

- The insurance company cannot observe this behavior change – there is an *information asymmetry.* Otherwise the contract would have been written to discourage the behavior change.

- The individual's behavior change creates a **social loss** because the costly event X occurs more or the healthcare costs is higher than it would have without insurance

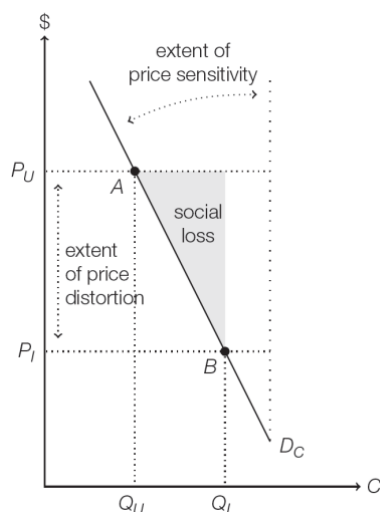Bhattacharya, Hyde and Tu – *Health Economics*

How does moral hazard lead to social loss?

- Consider an individual who loves cheeseburgers but is at risk for a heart attack.

  - *Without health insurance:* his cost for each cheeseburger includes both the price of the burger and the increased chance of a heart attack

  - *With health insurance:* the cost of each cheeseburger declines, since the insurer picks up the costs of heart attack care.

  - In this case, social loss takes the form of extra money, labor, time, and effort that others expend on caring for heart attacks caused by cheeseburger overconsumption

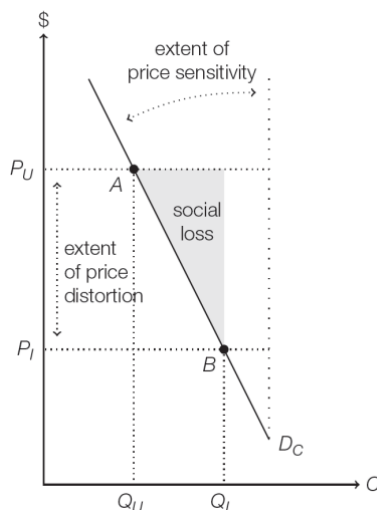Bhattacharya, Hyde and Tu – *Health Economics*

Social loss caused by moral hazard

- With insurance, the effective price per cheeseburger falls from P_U to P_I, and his consumption spikes from Q_U to Q_I.
- Point *A* is the socially efficient equilibrium, while Point *B* is the outcome with insurance.
- Extra cheeseburgers consumed between points Q_U and Q_I result in more costs than they are worth.

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Social loss caused by moral hazard

- The vertical distance between P_U and P_I shows the *extent of price distortion.*
  - This distance helps determine the social loss from moral hazard.
- The angle between the demand curve *DC* and the vertical represents the *extent of price sensitivity.*
  - The larger this angle is, the more responsive behavior is to price distortions and the larger the social loss from moral hazard.

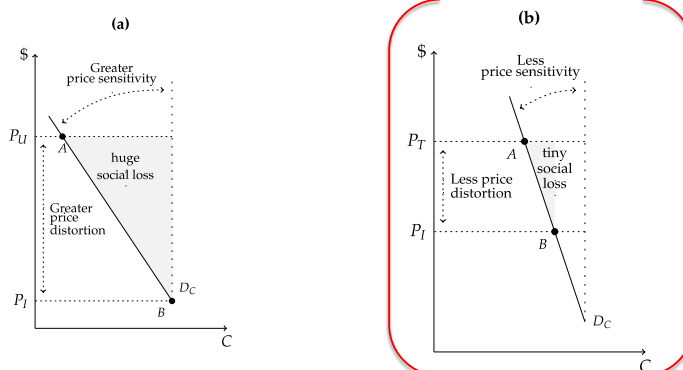Bhattacharya, Hyde and Tu – *Health Economics*

Varying price distortion and price sensitivity
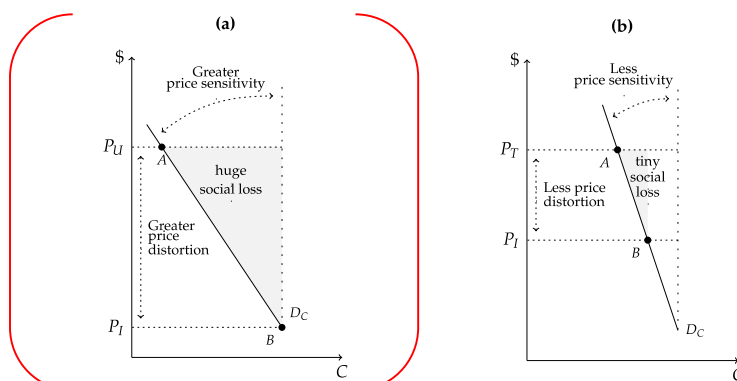
In Figure A, price distortion and price sensitivity are both quite high. Insured individuals bear little of the cost of their heart attack treatments, and as they are quite price-sensitive they respond with more frequent trips to the local burger joint. This results in a large social loss.

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Varying price distortion and price sensitivity

In Figure B, price distortion and price sensitivity are minimal. Insured individuals bear most of the cost of their cheeseburgers, and their demand for burgers is not very sensitive to prices anyway. In this case, there is still moral hazard but it produces a much smaller social loss.

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What determines the level of price distortion and price sensitivity?

- The extent of price distortion is a function of the completeness of the insurance.
  - The fuller the insurance, the greater the price distortion

- The extent of price sensitivity depends mostly on the nature of the risk being insured, and how controllable it is
  - Consider genetic disease vs heart attacks

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Moral hazard & asymmetric information

- There is price distortion in insurance markets because insurance companies cannot monitor everything patients do and price their actions accordingly.
  - For example, it would be impractical for an insurance company to count how many cheeseburgers its customers eat
  - Similarly, insurers cannot tell if a patient really needed to see his doctor ten times in the last month

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Moral hazard occurs if and only if three conditions hold:

1. **Price distortion:** the cost of a risky action to an individual is reduced, usually as a consequence of insurance.

2. **Asymmetric information** prevents an insurer from adequately pricing the action.

3. **Behavior response:** the individual responds to the price distortion by changing his behavior—either by taking more risks or demanding more covered goods and services.

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How do health insurers limit moral hazard?

☐ The extent of moral hazard depends on both how sensitive demand is to price and the amount of price distortion caused by insurance.

☐ Insurers cannot alter customers' price sensitivity (which is a property of their demand functions), but they do have ways to reduce the price distortion due to insurance

Coinsurance	Copayments	Deductibles	Monitoring

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Cost-sharing: coinsurance and copayment

- Coinsurance and copayment are two insurance contract provisions that maintain positive marginal costs for the insured. These plans effectively limit insurance coverage so they are no longer full.
  - *Coinsurance*: insurance provision in which enrollees pay a percentage of each medical bill, and the insurer covers the remaining portion.
  - *Copayment*: insurance provision in which enrollees pay a fixed amount, called a copay

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Cost-sharing: coinsurance and copayment
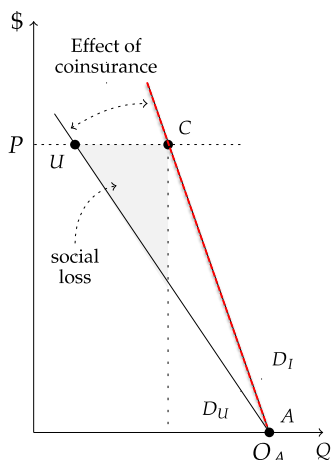
(a) Full insurance
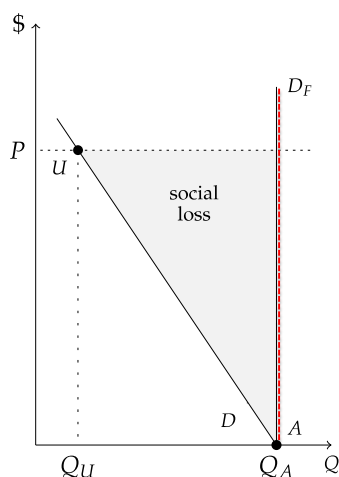
- Without insurance, the individual would consume at point Q_U.
  - Every unit of medical care he consumes would provide at least as much marginal benefit as marginal cost.
- With full insurance, his marginal costs of medical care (from his perspective) fall to zero.
  - His effective demand curve is D_F and he consumes at point Q_A

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Cost-sharing: coinsurance

(c) Coinsurance plan

$ — y-axis

Effect of coinsurance

P

U

C

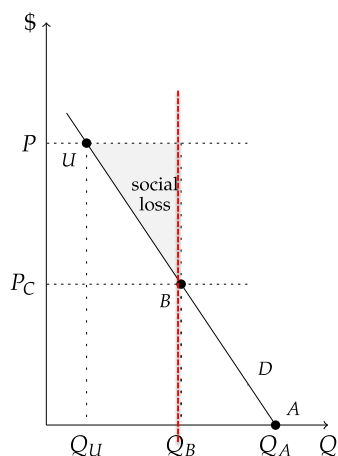social loss

D_I

D_U

A

Q_A

Q

- Imagine the consumer starts at 0% coinsurance (full insurance from the previous slide).
- His insurer then increases the level of coinsurance.
  - As coinsurance rises, out-of-pocket prices move closer to actual prices, and the demand curve rotates back toward the uninsured demand curve D_U.
  - At the extreme, coinsurance of 100% is equivalent to no insurance.

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Cost-sharing: copayment

(b) Copayment plan

$ — y-axis

P

U

social loss

P_C

B

D

A

Q_U Q_B Q_A Q

- Alternatively, imagine his insurer institutes a copay of P_C which becomes the effective price for each episode of care.
  - This reduces his demand from Q_A to Q_B.

Note: Such coinsurance and copayments reduce social loss at the expense of increased uncertainty faced by consumers who are no longer fully insured.

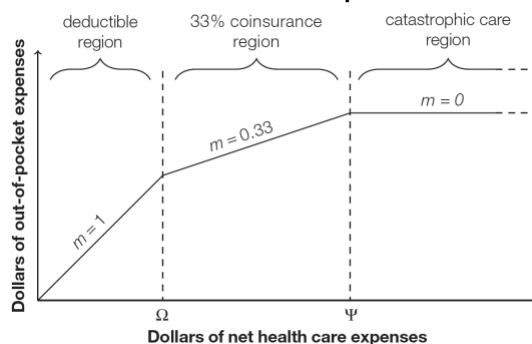Bhattacharya, Hyde and Tu – *Health Economics*

Deductibles

- In addition to coinsurance and copayment, many insurers also include deductibles as part of their offered plans.
- Deductibles set minimal levels of expenses below which the insurer does not help reimburse medical expenses.
  - Example: A person insured with a deductible of $1,000 <u>pays</u> for his <u>first</u> thousand dollars of health care expenditures <u>out-of-pocket</u>. His insurance policy *then* helps pay for expenses beyond the thousandth dollar.

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Deductibles

- This figure shows the relationship between out-of-pocket expenses and total medical expenditures for a 33% coinsurance policy with a deductible of Ω and full insurance for catastrophic care above Ψ

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Monitoring

- Some insurance companies try to observe and guide the preventative measures their customers take, while others choose to supervise the medical care that customers receive.
  - Motivation
  - Employee incentive programs with payouts if you:
    - see a nutritionist
    - do yoga once a week
    - get a fitness test
  - Gatekeeping
    - primary care physicians

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EVIDENCE OF MORAL HAZARD IN HEALTH INSURANCE

Class discussion

Does health insurance increase healthcare spending ?

Is there Moral Hazard in Health Insurance ?

- ☐ Health insurance lowers the price individuals pay for medical care. So it seems obvious that YES, there is MH

BUT

- ☐ Healthcare is not like other goods
  - ◻ Demand is determined by «needs», not (only) price, i.e. demand is inelastic
  - ◻ Demand for healthcare may actually be upward sloping: preventive care improves health and may reduce healthcare utilization
  - ◻ By reducing visits to ER, coverage of the (previously) uninsured, may reduce healthcare expenditures

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Empirical evidence of moral hazard

- ☐ Moral hazard is quite difficult to study empirically.
  - ◻ Researchers suffer from the same information asymmetry that prevents insurers from eliminating moral hazard: *behavior changes are very hard to observe*.
  - ◻ But a few careful studies do find credible evidence of moral hazard.

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Ex ante moral hazard

- **RAND HIE:** people on the free plan more likely to show up at the hospital with *broken bones* or drug abuse
- Ghana: insured households less likely to use mosquito nets, key for preventing malaria
- Seguro Popular: low-income Mexicans assigned to receive free insurance were less likely to get a flu shot and cancer screenings

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Ex ante moral hazard

Table 11.1. *Evidence of* ex ante *moral hazard from the RAND HIE.*

Diagnosis	Annual visits per 10,000 enrollees		Ratio of free to cost-sharing
	Free plan	Cost-sharing plans	
Fracture/dislocation	168	134	125%
Misc. serious trauma	67	57	118%
Acute alcohol/drug related	27	20	135%

Source: Data from Table 5.3 in Newhouse (1993). With permission from RAND.

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Ex post moral hazard

- Stanford employees: after a 1967 change that required a new 25% copay, visits to the doctor declined by 24%
- **RAND HIE:** those on the free plan more likely to visit hospital
- Germany: introducing deductibles leads to greatly decreased health expenditures
- Canada: people with prescription drug coverage visit doctor more often

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Moral hazard and risk reducation

- Given the social loss associated with moral hazard, should insurance policies that create moral hazard be prohibited?

- **BUT** insurance itself provides positive welfare gains that may offset the harm from moral hazard.
  - Asymmetric information creates a tradeoff between more insurance coverage, which generates more moral hazard, and less insurance coverage, which increases risk exposure.
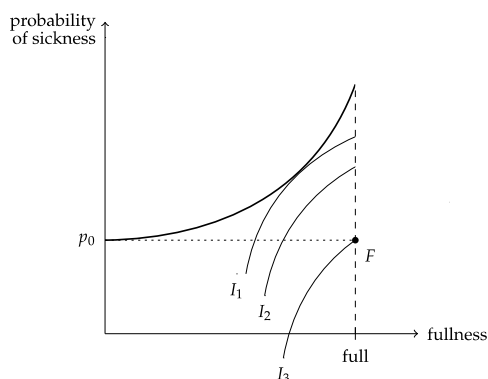
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The relationship between insurance coverage and probability of sickness *without* moral hazard
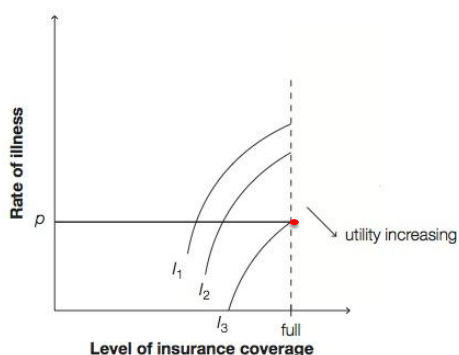
- In this case, a person's probability of sickness p does not depend on the fullness of insurance coverage.

- Risk-averse individuals prefer lower probabilities of sickness and fuller insurance, so utility is increasing toward the graph's lower-right corner.

- Fuller insurance increases consumer utility—and full insurance F maximizes it.

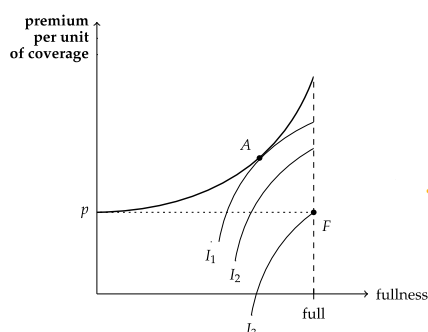Bhattacharya, Hyde and Tu – *Health Economics*

With moral hazard, probability of sickness *p* increases with coverage.

- Insurance coverage may induce recklessness, as people take less care or adopt new dangerous hobbies.

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Raising premiums…

premium per unit of coverage

p

A

F

I_1

I_2

I_3

full

fullness

- □ Since, **in a competitive market, premiums are a function of the probability of sickness,** we can re-label the *y-axis* in the previous graph the "premium per unit of coverage".

- · The upward-sloping curve represents the set of contracts that an insurer may offer to a person, who, without insurance, would have probability p_o of sickness.

With moral hazard, contract *F* is not feasible.

premium per unit of coverage

p

A

F

I_1

I_2

I_3

full

fullness
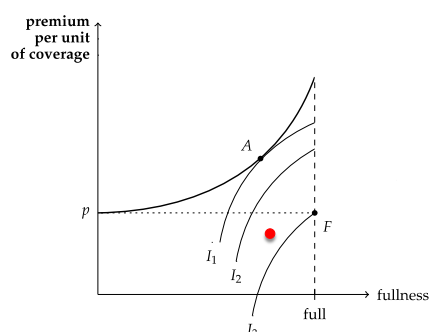
- □ Instead, the new *optimal contract* in a world with moral hazard is at *A*.

- □ However, compared to contract *F*, contract *A* charges higher per unit premiums and offers a lower coverage.

- □ Contract A falls on a lower indifference curve than contract *F*, and the drop in utility $I_3 - I_1$ is the social loss when comparing a world without moral hazard to one with moral hazard.

The upside of moral hazard?

- Extra preventative care
  - Evidence from RAND HIE, Oregon Medicaid Experiment, and elsewhere
  - This is a beneficial effect if and only if people consume less preventative care than they "should"

- The income effect
  - Insurance makes people "richer" by making expensive surgeries or treatments affordable when they may have been unaffordable without insurance
  - Does this mean moral hazard can be efficient?

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Moral hazard

and its policy implications

Moral hazard in health sector

- Conditions for (*ex post*)MH
  - Asymmetric information between patient and third-party payer (the insurance company or the NHS)
  - Price reduction at the point of use due to insurance
  - Price-sensitive demand

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On moral hazard: Arrow vs Pauly
Different views and policy implications

- **Arrow**
  - "It is frequently observed that widespread medical insurance increases the demand for medical care."
  - "MH in physician's control" [of patients' demand for medical care]
  - Policy implication: "the need for a third-party control" (public insurance with **gatekeeping)**
- **Pauly**
  - under an insurance contract that reduces the price there is nothing unethical in using more services; the insured individual simply reacts to the change in the price.
  - Policy implication: (optimal rate of) **cost-sharing** (co-payment, deductible, co-insurance)

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Arrow

1. *The moral hazard*. The welfare case for insurance policies of all sorts is overwhelming. It follows that the government should undertake insurance in those cases where this market, for whatever reason, has failed to emerge. Nevertheless, there are a number of significant practical limitations on the use of insurance. It is important to under-

the cost of medical care is not completely determined by the illness suffered by the individual but depends on the choice of a doctor and his willingness to use medical services. It is frequently observed that widespread medical insurance increases the demand for medical care.

To some extent the professional relationship between physician and patient limits the normal hazard in various forms of medical insurance. By certifying to the necessity of given treatment or the lack thereof, the physician acts as a controlling agent on behalf of the insurance companies. Needless to say, it is a far from perfect check; the physicians themselves are not under any control and it may be convenient for them or pleasing to their patients to prescribe more expensive medi-

3. *Third-party control over payments*. The moral hazard in physicians' control noted in paragraph 1 above shows itself in those insurance schemes where the physician has the greatest control, namely, major medical insurance. Here there has been a marked rise in ex-

Pauly

When uncertainty is present in economic activity, insurance is commonly found. Indeed, Kenneth Arrow [1] has identified a kind of market failure with the absence of markets to provide insurance against some uncertain events. Arrow stated that "the welfare case for insurance of all sorts is overwhelming. It follows that the government should undertake insurance where the market, for whatever reason, has failed to emerge" [1, pp. 945, 961]. This paper will show, however, that even if all individuals are risk-averters, insurance against some types of uncertain events may be nonoptimal. Hence, the fact that certain kinds of insurance have failed to emerge in the private market may be no indication of nonoptimality, and compulsory government insurance against some uncertain events may lead to inefficiency. It will also be shown that the problem of "moral hazard" in insurance has, in fact, little to do with morality, but can be analyzed with orthodox economic tools.

The particular type of insurance for which the argument will be presented is that of insurance against medical care expenses, for it was in a discussion of medical expense insurance that Arrow framed the propositions cited above. However, the analysis is applicable as well to other types of insurance, such as automobile collision insurance.

On moral hazard: Neyman

- The reason to demand health-insurance is an income transfer from the healthy to the sick state → co-insurance is a reduction in income exactly when income is needed (i.e. when sick).

- The change in healthcare utilization due to an increase in price (co-insurance) can be decomposed into an **income and a substitution effect** and only the second produces a welfare loss as in the traditional analysis of moral hazard.

- To understand the effects of health insurance, this must be compared to the alternative, or **counterfactual**
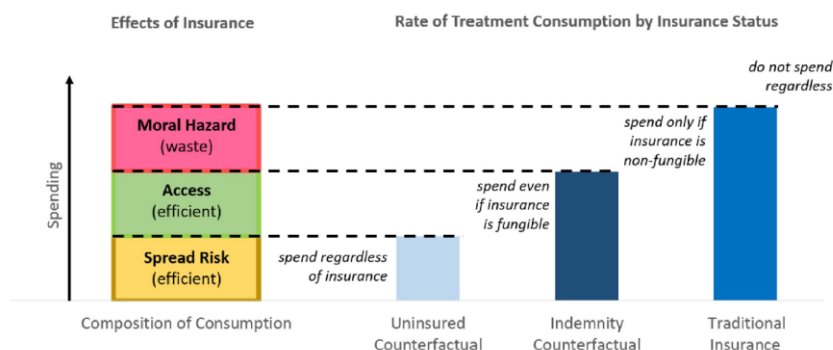
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Fig 1. Theoretical model for decomposing effects of health insurance from two counterfactual conditions. Values are hypothesized for illustration. Reproduced with permission [40].

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Summing up

- Is it "unnecessary" expenses?
- Which is the correct counterfactual?
  - Income vs substitution effects
- Whose MH?
  - Patients or providers?
  - This has implications for policy (co-insurance/copayment vs incentives for providers)
- Long-run effects on health, including preventive care
- Results are context specific

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