II_a: Asymmetric Information: Theory Overview

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Rationales for social insurance

1. Private market failures
   - 1.1 Imperfect competition [go take IO]
   - 1.2 **Asymmetric Information**
   - 1.3 Aggregate Shocks
   - 1.4 Externalities
2. Redistribution
3. Individual failures of rationality / optimization
4. Paternalism

Asymmetric Information

- Adverse selection (hidden types)
  - Individuals have private information about their costs to insurer
  - Can impair efficient operation of market and create scope for welfare improving public policy
- Moral hazard (hidden actions)
  - Individuals take hidden actions in response to insurance contract
  - Prevents attainment of first best insurance policy
  - In general not something the government has a comparative advantage in addressing.
  - Critical though for optimal design of insurance (public or private)
    - Tradeoff between insurance (risk spreading) and incentives (moral hazard)

Lecture outline

- Present simple theoretical frameworks for
  - Adverse selection
  - Moral hazard
- Goals
  - Conceptual clarity
  - Framework for empirical work (coming next)

The problem of adverse selection: under-insurance

- Recall "free lunch" appeal of insurance:
  - By pooling idiosyncratic risk, can make everyone better off
  - Prefer to pay $10 for sure than face a one in ten thousand risk of having to pay $100,000
- But this pooling mechanism may not work if individuals have private information about risk type
  - Risk type: chance become sick, lose job, die etc
  - High risk come into the market and drive up prices for low risk
  - Possible result: no one buys insurance even, *even though each person's benefit from insurance exceeds cost of providing it to that person*
  - Suggests possible welfare-improving role for mandates

Adverse selection

- Key points
  - Welfare gain to risk averse individuals from being able to buy actuarially fair insurance
  - Market failure: because private information about risk type, may not be able to buy actuarially fair insurance
  - Potential scope for welfare improving government intervention
- Classic theory: Akerlof (1970); Rothschild and Stiglitz (1976)
  - Rothschild and Stiglitz (1976) covered in section
  - Framework we (and others) use for empirical work follows Akerlof (1970)

Simplified graphical theoretical framework

- Sketch a simplified graphical theoretical framework
  - To illustrate under-insurance and welfare loss that can arise with private information about risk type
  - To illustrate tradeoffs involved with potential government interventions (e.g. mandates)
- Up next: Take framework to data to:
  - Test for existence of adverse selection
  - Quantify resultant welfare loss
  - Assess welfare consequences of alternative policy interventions
- Overview follows Einav and Finkelstein (JEP 2011)

A comment on applications

- Model is abstract but often helpful to discuss by way of a specific application
- Will use (intentionally and sometimes unintentionally!) health insurance to fix ideas
- Many recent empirical applications to other insurance markets including
  - flood insurance (Wagner 2020)
  - worker's compensation insurance (Cabral et al. 2019)
  - unemployment insurance (Landais et al 2020)
- Applications to credit markets too (mortgages, student loans, personal loans etc).
  - Stiglitz and Weiss (1981) is theoretical analog of Akerlof

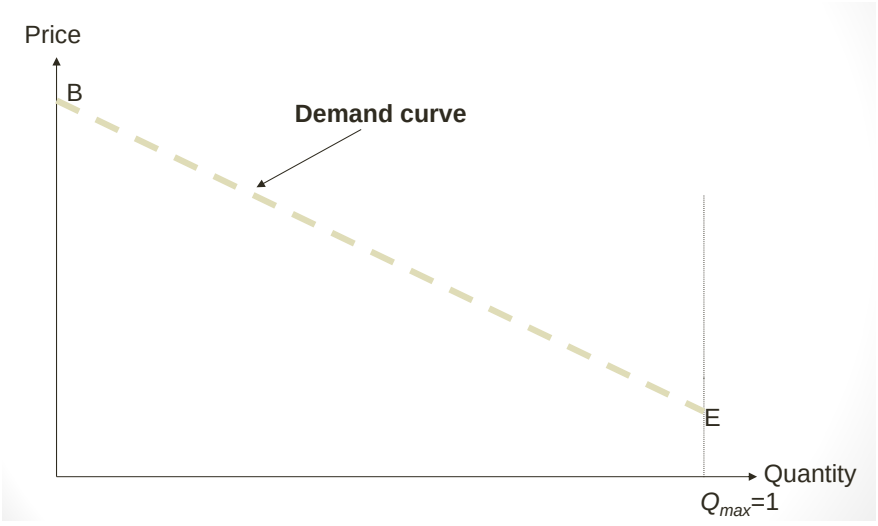
Setup - Textbook case

- Perfectly competitive, risk neutral firms offer a single health insurance product that covers you if you get sick
  - Consumer choice: buy or not buy the contract
  - Important assumption: insurance product taken as given (standard demand /supply of a "good")
    - "fixing contract space"
    - Akerlof (fixed) vs. Rothschild and Stiglitz (not fixed)
- Risk averse individuals identical except for their (privately known) probability of getting sick
  - NB: Growing empirical evidence on importance of heterogeneity in preferences (as well as risk).
  - Will relax....
- No additional frictions (e.g. administrative costs)
  - so firms' (and social) costs of providing insurance are expected insurance claims, that is expected payouts on policies
  - Will relax later in lecture...

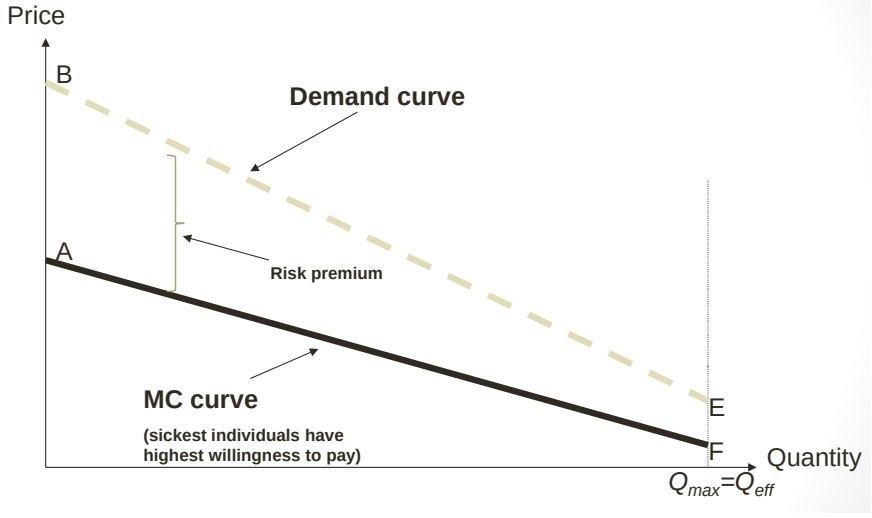
Setup (con't)

- Marginal cost: expected insurance claim of the marginal (at that price) buyer
- Given this setup, what drives demand?
  - {Note: unit demand. so "quantity" is share of population who purchases}
  - Because individuals identical except for probability of getting sick, individuals with higher probability of getting sick have higher demand (wtp) for insurance
- Key Implication: downward sloping marginal cost curve
  - Individuals with highest willingness to pay have highest expected costs
  - Link between demand and cost curve is distinguishing feature of selection markets: production costs depend on which consumers purchase your product

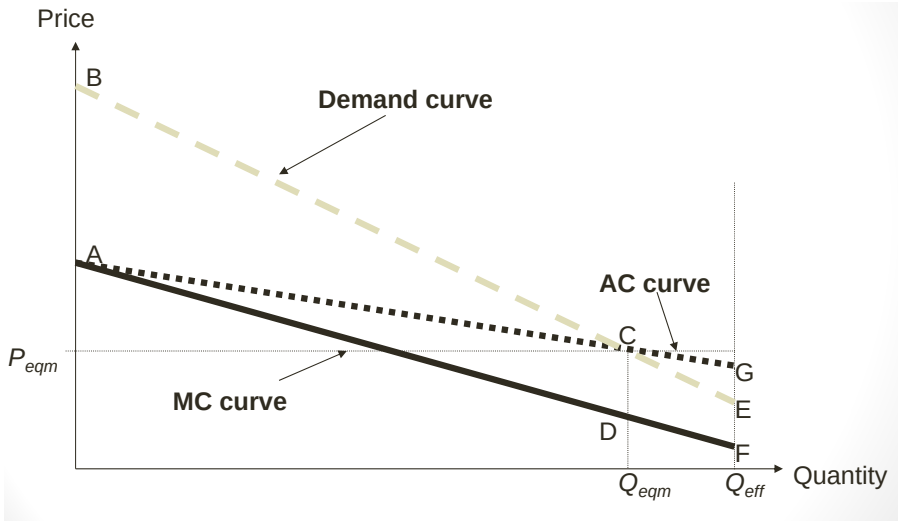
Adverse selection: under-insurance



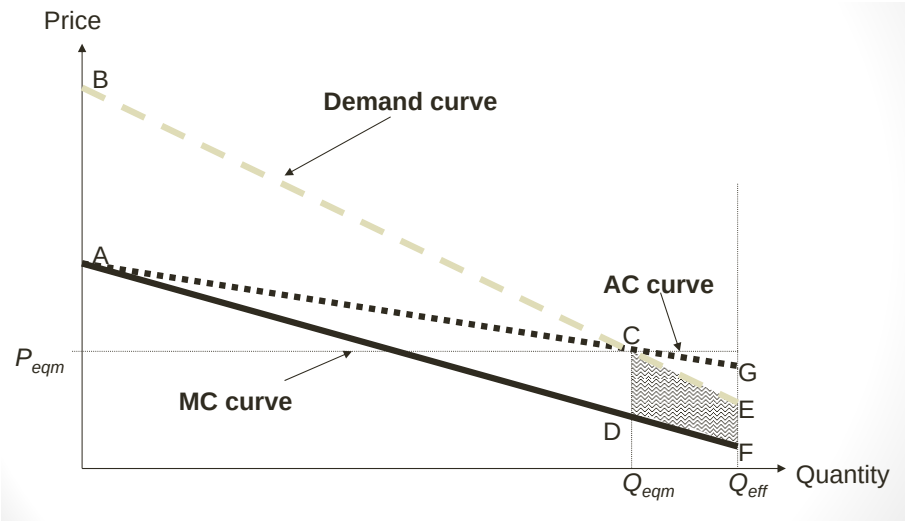
Adverse selection: under-insurance



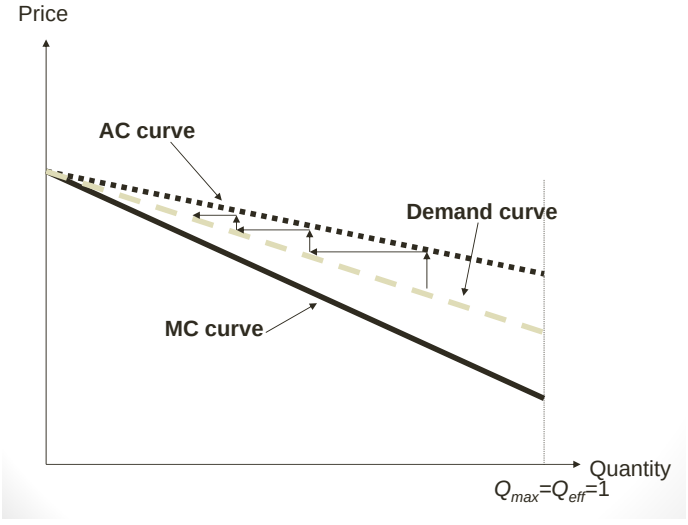
Adverse selection: under-insurance



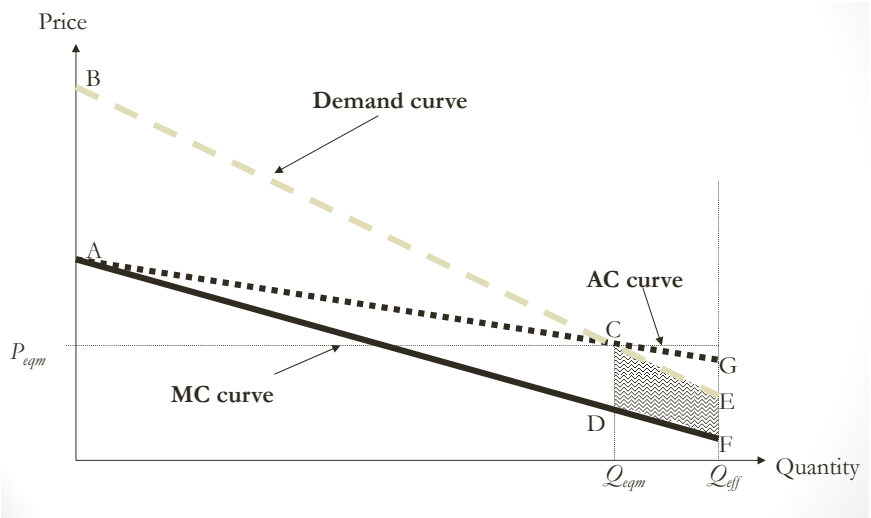
Adverse selection: under-insurance



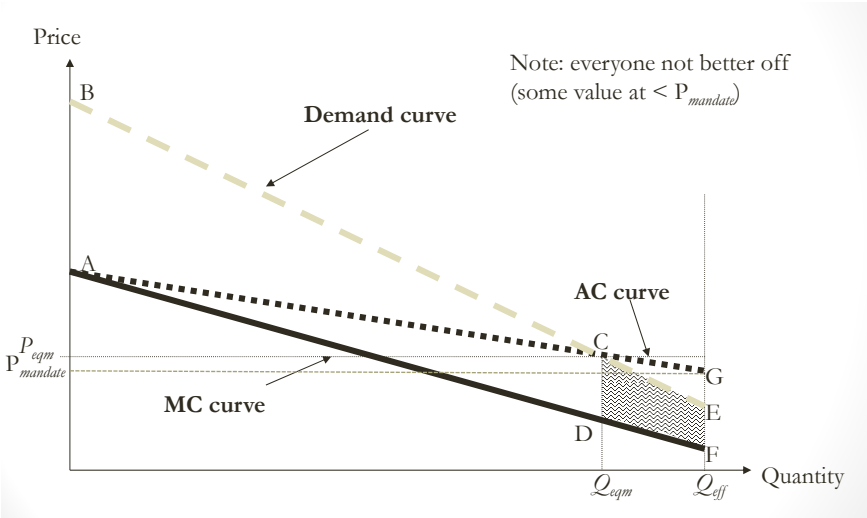
Can get complete unraveling



Mandates as possible solution



Mandates as possible solution



Potential public policy solutions

- Assume government has no better information than firm
- Comparative advantage of government is to manipulate price (tax/subsidies) or manipulate quantity (mandate)
- Subsidize insurance
  - Unambiguous welfare gain (until you consider the cost of public funds or as we will discuss it the "fiscal externalities" of the policy (Hendren 2016))
- Mandate coverage
  - Can achieve efficient outcome (mandate $Q_{mandate} = Q_{\max} = Q_{eff}$)
  - Unambiguous welfare gain; magnitude uncertain
  - Note: *No Pareto Improvement* - some will be made worse off by mandate
    - Useful in understanding '08 Obama-Clinton primary debates...
    - But also model specific (e.g. potential Pareto improving policies in Rothschild-Stiglitz)

Public Policies (Con't)

- Common policies: restrictions on price differentiation
  - e.g. no pricing on age and gender
  - extreme: "community rating"
- Tradeoff
  - Adverse Selection vs. Reclassification Risk (Handel, Hendel, Whinston EMA 2015)
    - "Reclassification risk" (aka "premium risk") = risk of becoming a bad risk and therefore paying a lot more in premiums
    - Insurance behind the veil of ignorance (Hendren 2021: Measuring Ex-Ante Welfare)

Comment: pricing on Xs

- Note: Pricing on X's does not necessarily reduce welfare cost of adverse selection
- Imagine segment market (price on) gender
  - Now have two distinct insurance markets to analyze / two graphs (one for each market)
- If pricing on gender removes all residual private information (i.e. gender-specific MC curves are flat) then unambiguously welfare improving
- Otherwise ambiguous
  - is sum of area two welfare loss triangles (for men and women) bigger or smaller than area of triangle in gender-pooled market?

Comment: pricing on Xs (con't)

- Example with three types:
  - Type 1 (10% of population) has expected cost of 20 and wtp 30
  - Type 2 (60% of population) has expected cost of 5 and wtp 20
  - Type 3 (30% of population) has expected cost of 4 and wtp 7.5
- Competitive (zero-profit price): is 6.2 and everyone buys insurance (efficient)
- If type 2 individuals are all female and type 1 and 3 are all male and price on gender
  - women are all insured (price of 5) - efficient
  - men: pooled competitive price is 8 at which point type 3 would inefficiently not buy insurance

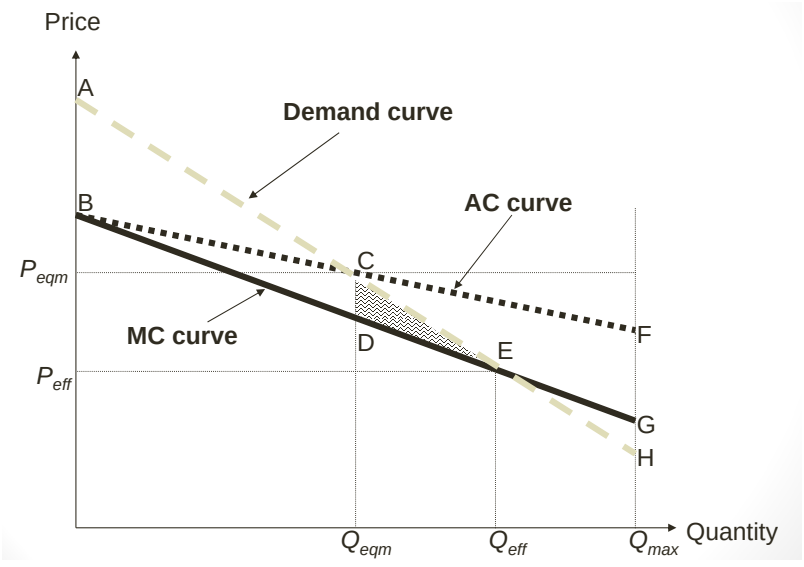
Comment: pricing on Xs (con't)

- Real world application: Medicare Advantage introduced finer risk adjustment (i.e. pricing insurance on more Xs)
  - From just demographics to also using health conditions
  - Not clear that reduced advantageous selection ("cream skimming") into this market (Brown et al. 2014 "vs." McWilliams et al. 2012)
- Key conceptual point: reducing but not eliminating a friction is not always welfare improving
  - Creates important opportunities for empirical work!

Departure from textbook case I: Loads

- Why might it not be efficient to insure everyone (i.e. why might MC be above WTP for some individuals?) Assuming everyone is risk averse...
  - Loading factors on insurance (administrative costs)
  - [Profits – not yet introduced in model]
  - Horizontal product differentiation (HMO vs PPO trades off lower oop costs but with more restrictions on doctor's choice)
  - [Moral hazard - not yet introduced in model]
- With these, everyone may not value insurance at $>$ MC of providing it to them
- What if it is not efficient for everyone to buy insurance?
  - No longer unambiguous welfare gain from mandate
  - Tradeoff between two allocative inefficiencies: under-insurance from adverse selection vs. over-insurance from mandate
    - And this is still without allowing for preference heterogeneity! That introduces further sources of ambiguity...

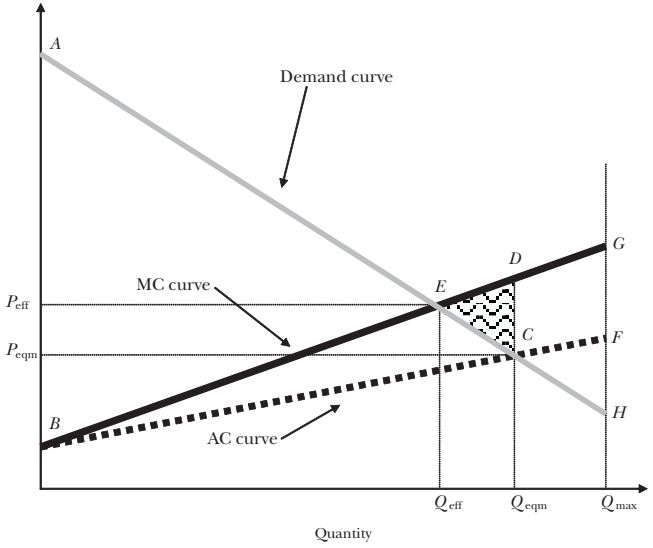
Adverse selection with loads



Departure from textbook case II: Preference heterogeneity

- Individuals may differ not only in their risk type but also their preferences (e.g. risk aversion / willingness to bear risk)
  - WTP increasing in risk aversion and in risk
- Creates potential for *advantageous* selection (opposite results of *adverse* selection)
- If high-risk individuals are less risk averse and heterogeneity in risk aversion is large, can get upward sloping marginal (and therefore average) cost curve
  - Individuals with highest WTP are the most risk averse and lowest (vs. highest) expected cost

Advantageous selection



Advantageous selection

- Over-insurance
  - Opposite problem from adverse selection
- Opposite policy solutions
  - e.g. tax (vs. subsidize) insurance

Ultimately these are empirical questions (to be covered in next few lectures)

- Does adverse selection exist?
  - i.e. is marginal cost curve downward sloping? As you raise the price, is the marginal guy who drops out lower risk than the average guy who remains?
- How large is the welfare loss from adverse selection?
- What are the net welfare effects of various government interventions

Lecture outline

- Present simple theoretical frameworks for
  - Adverse selection [done]
  - Moral hazard

Moral hazard

- Unobserved effort taken by agent in response to insurance contract that affects expected claims
- For example, in response to more (vs less) comprehensive...
  - automobile insurance - drive more or less safely
  - unemployment insurance - exert less effort searching for a job, set higher reservation wage
  - health insurance - eat more cheeseburgers, don't search for cheaper doctor
- Drives wedge between private and social cost
- Classic tradeoff of insurance vs. incentives
- Cost of insurance (not of social insurance / govt intervention)

Simple model of moral hazard

- Application: unemployment insurance
  - Pays out when you become unemployed
  - highly simplified, static model (see Chetty (2006) for richer model(s))
- The model
  - utility from consumption: additively separable and risk averse: $u(c)$
  - immediately: probability p of becoming unemployed
  - regains employment with probability q at cost $h(q)$
  - income while employed: $w - \tau$
  - income when unemployed: b
  - {simplify: assumed taxes paid only by employed, not by reemployed}
- government {or insurer} budget constraint requires:

$$p(1-q)b = (1-p)\tau$$

First best

- Suppose can control q (e.g. monitor search effort perfectly).
- Set benefits (b), taxes (τ) and remployment probability (i.e. effort) q to maximize utility subject to the government break even constraint (benefits financed by tax)
- Solve:

$$\max_{q,b,t}\{(1-p)u(w-\tau)+p[(1-q)u(b)+qu(w)-h(q)]\}$$

subject to

$$p(1-q)b \leq (1-p)\tau$$

First best (con't)

- Solve:

$$\max_{q,b,t}\{(1-p)u(w-\tau)+p[(1-q)u(b)+qu(w)-h(q)]\}$$

subject to

$$p(1-q)b \leq (1-p)\tau$$

- First order conditions:

$$\{\tau\}: \quad (1-p)u'(w-\tau) = \lambda(1-p)$$

$$\{\text{b}\}: \quad p(1-q)u'(b) = \lambda p(1-q)$$

$$\{\text{q}\}: \quad h'(q) = u(w) - u(b) + \lambda(b)$$

First best (con't)

- Interpretation
  - FOC for q: {q}: $h'(q) = u(w) - u(b) + \lambda(b)$
    - internalizes fiscal cost of benefit b. i.e. equates marginal cost of q with marginal benefit which is the private benefit (difference in utility between re-employment and unemployment) and the public benefit (the fiscal cost of the benefit)
  - We get "full insurance": marginal utility of consumption equated across states ("consumption smoothing"):

$$u'(w - \tau) = u'(b) \tag{1}$$

(note: here we can't do anything about the fact that consumption is not equalized with the reemployment state, due to our simplifying assumption)

Worker private optimization problem

- Key: social planner can't choose q, b, τ. Can set parameters of social insurance (b, t) but then worker privately optimizes / chooses q
- Worker optimization:

$$V(b, \tau) = \max_q \{(1-p)u(w-\tau) + p(1-q)u(b) + pqu(w) - ph(q)\}$$

- optimum yields $q^*(b)$ with first order condition

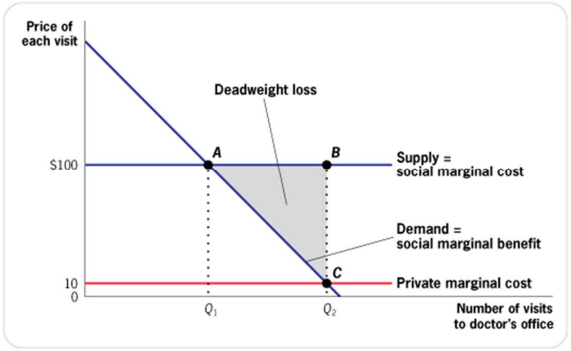
$$h'(q) = u(w) - u(b)$$

- Interpretation
  - Worker equates marginal cost of q with *private* marginal benefit (difference in utility between re-employment and unemployment). Unlike in the social optimum, he does not take account of the public benefit (fiscal cost of the benefit)
  - Note: if reemployed paid taxes we would have $q^*(b, \tau)$ [this is what we are buying in simplicity]

Tradeoff between insurance and incentives

- Because of insurance, private marginal benefit from re-employment is less than social marginal benefit
  - Therefore insurance distorts private behavior (here: search effort)
- Consequence: cannot achieve first best (equalizing marginal utility of consumption across states)
  - If consumption were same whether unemployed or not, would exert no search effort
- Holmstrom (1979): presence of moral hazard leads optimal isnruance contracts to be incomplete, striking a balance between reducing risk and maintaining incentives

Welfare loss from moral hazard: graphical illustration



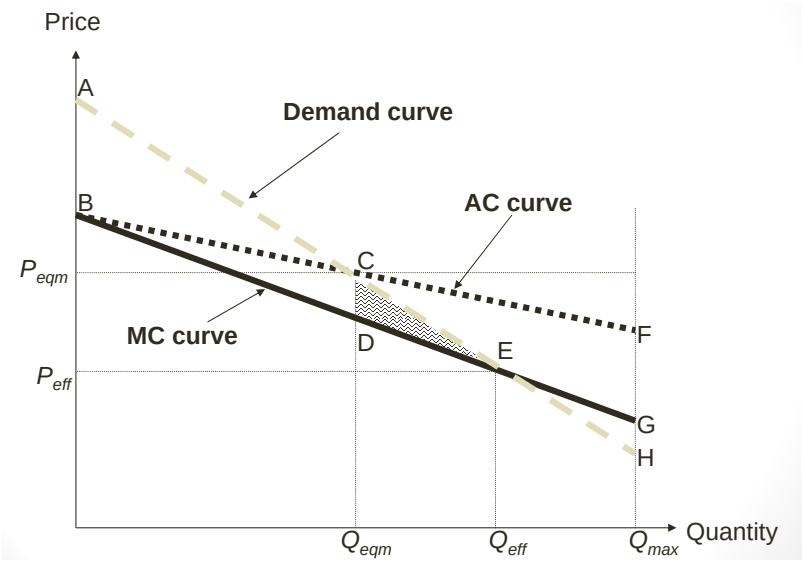
Patient-side Moral Hazard • With no insurance, at a cost of $100 per visit, individuals would consume Q_1 doctor's office visits, where marginal costs and benefits are equal. With only a $10 copayment, however, individuals consume Q_2 worth of visits, where private marginal costs equal social marginal benefit; this overconsumption of health care leads to a deadweight loss of *ABC*.

Source: Gruber textbook

Moral hazard reduces willingness to pay for insurance

- The extra insurance claims due to moral hazard raise actuarially fair premiums, but are not valued by individuals at their cost
- Imagine
  - an insurance policy with a 20% coinsurance (individual pays 20 cents per dollar of claims; insurance pays 80 cents)
  - Insurance increases expected claims by $100 (from say $500 without insurance to $600).
  - Therefore expected insurance costs (hence premiums) increase by $80
  - What is individual's WTP for (how much does individual value) that extra $100 of healthcare use?

Moral hazard is therefore one reason not everyone "should" be insured



Potential design responses (markets or government)

- Provide only partial insurance
  - High deductibles (Arrow 1963)
    - Concavity of utility function suggests value of insurance is higher for larger losses
    - Optimal trade off between combatting moral hazard through higher consumer cost-sharing with the goal of providing risk protection through lower consumer cost sharing
  - Exclusions (e.g. life insurance policies don't cover suicide or sky diving accidents)
  - Partial experience rating (e.g. automobile insurance) - see discussion of reclassification risk
- Lump sum (indemnity) insurance
  - Observability? Residual Risk?

Recap

- Moral hazard (hidden action)
  - Introduces fundamental tension / tradeoff in design of optimal insurance (private or public)
- Adverse selection (hidden types)
  - Can impair efficient operation of market and create scope for welfare improving public policy

Food for thought

- Are moral hazard and adverse selection really distinct?
- "Ex post adverse selection" (Cabral Restud 2017)
  - Strategically delay healthcare treatment to minimize out of pocket costs (moral hazard)
  - Can generate subsequent adverse selection
  - Helps explain why market for dental insurance has largely unravelled
  - Implications for e.g. open enrollment period or annual caps (less effective as opportunity for intertemporal substitution rises)
- Selection on moral hazard (Einav et al. AER 2013)
  - Choice of high deductible vs no deductible health insurance plan can depend on anticipated behavioral response (moral hazard) to the deductible
    - analogy: all you can eat restaurants
  - Implications for e.g. policies to combat selection
    - eg better monitoring may not only reduce moral hazard but also selection
  - Related to broader idea of Selection on Gains / Roy Model

Up next

- Existence: how do we empirically detect selection
- Welfare cost of asymmetric information
- Welfare consequences of government intervention