Mgmt 444

Insurance

This week's class explores the health insurance market

- In recent years, a number of analysts have claimed that the way in which we obtain our health insurance is fraught with inefficiency

- Consumers are unable to obtain the insurance products that best meet their needs, and, in some cases, entire classes of products are driven from the market

- Even worse, some consumers cannot purchase insurance at close to actuarially fair rates

- Finally, there is considerable evidence that problems in health insurance markets have grave spillover effects on labor markets

To understand these effects in greater detail, we will work through a model of competition among insurers

- Model clarifies the problems of adverse selection and cream skimming

- Model is challenging but has two benefits

  . Model illustrates precisely how these problems emerge and their implications for consumers and insurers
  . It is possible to grasp many of these problems intuitively, but if you understand the model, then you will surely understand them

Rothschild/Stiglitz model

- The teaching note is rather thorough but I will go through the model slowly so that you all can grasp it

- Start with key assumptions -- this is all written out for you so I suggest you put down your pencils and try to follow along

. In an individual falls ill he always purchases one treatment and is always restored to full health; Only bad thing about falling ill is the expense

. Probability of falling ill is ρ

. Price of treatment is P. Initial wealth is W. If there is no insurance, then:

. $W_h = W$
. $W_s = W - P$

- Define an insurance contract as two values (α_1,α_2)

. α_1 is the profit that the insurance company earns from each healthy individual (i.e., α_1 is the premium)

. α_2 is the loss that the insurance company incurs on each and every individual who gets sick. This equals the payment to the provider, less the premium. (In the case of full coverage $\alpha_2 = P - \alpha_1$)

. It follows that if an individual buys insurance policy (α_1,α_2), then $W_h = W-\alpha_1$ and $W_s = W - P + \alpha_2$

- Here is another way to think about W_s

. Let R = amount that the insurance company reimburses the patient
. Then $\alpha_2 = R - \alpha_1$
. $W_s = W - \alpha_1 – P + R = W – P + \alpha_2$

- We will assume that the insurance market is competitive, so we only will observe contracts that break even. Insurers are too smart to offer unprofitable contracts, and competition through price cutting prevents insurers from making profits.

. Assume that there are no costs other than the payment to the provider
. Breakeven contracts will satisfy $(1-\rho)\alpha_1 = \rho\alpha_2$
. That is, premia collected from healthy equal net payout to the sick

- We also assume that consumers choose the available contract that maximizes their utility

- Lastly, we assume that the cost of medical care is independent of whether individuals have insurance; this implies that there is no "moral hazard" (the topic of next week's lecture)

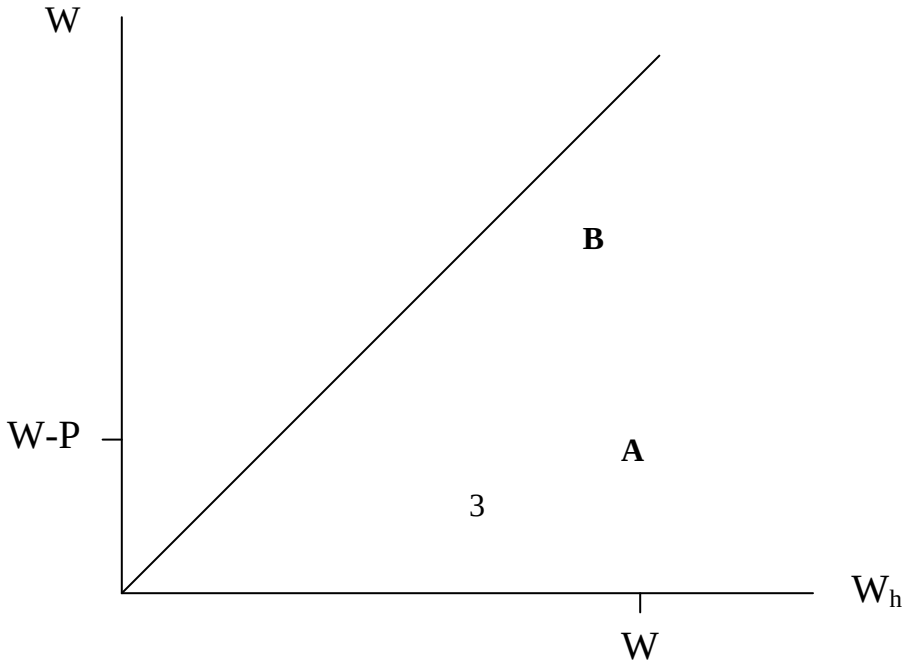
Let's examine some contracts graphically (Note: Not all graphs are complete – we will view completed graphs in class)

- All points on the graph are potential contracts

- **A** is "no insurance" $\alpha_1 = \alpha_2 = 0$

- **B** is a contract that has a small premium and a generous payout

- Q: What do points on 45^0 line have in common? A: At these points, $W_h = W_s$ (I.e., these points represent "complete insurance.")



Recall that competition forces insurers to sell breakeven contracts

- Let's plot these; they fall on a straight line - we need only to find two points to plot out the line!

  . (0, 0) is one breakeven point
  . Another useful breakeven contract to consider is the one which offers full insurance

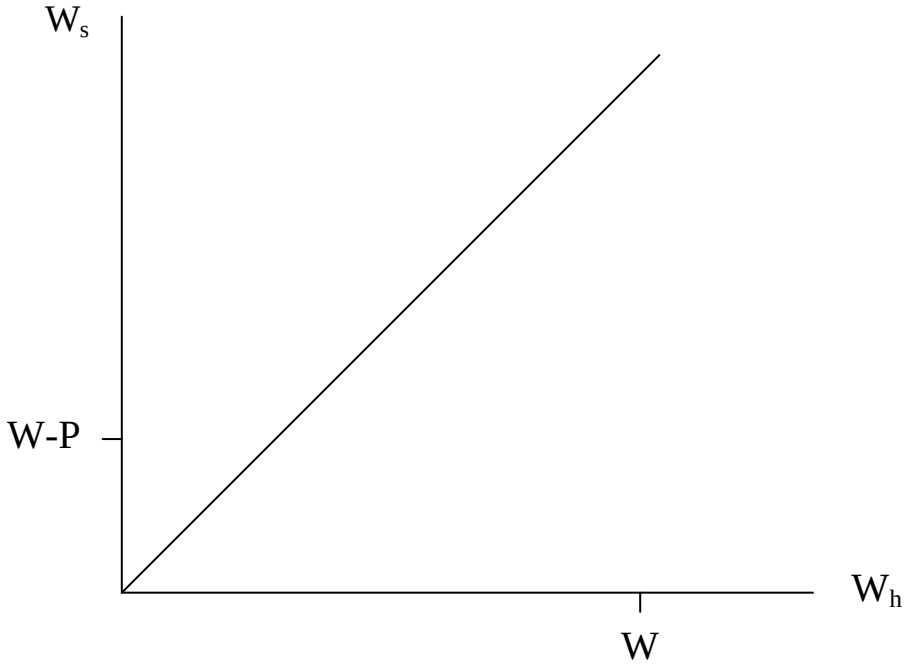
- I.e., the consumer is fully insured, and the premium is high enough so that the insurer breaks even

  . Must satisfy $W-\alpha_1 = W-P+\alpha_2$ (Full insurance)
  $(1-\rho)\alpha_1 = \rho\alpha_2$ (Breakeven)

  . This implies $\alpha_1 = \rho P$ and $\alpha_2 = (1-\rho)P$

- We can plot these two contracts and the connecting line (incomplete graph)

  . This line has a slope of $-(1-\rho)/\rho$ (confirm yourself)



- This breakeven line represents the contracts that the market will make available. The consumer will choose from among these the one that maximizes utility

. Recall that at the utility maximizing point, the MRS = slope of the budget line (in this case, the breakeven line)
. Some straightforward calculus shows that

$$MRS = -\frac{\partial U/\partial W_H}{\partial U/\partial W_s} \; x \; \frac{1-\rho}{\rho}$$

- At what contract does MRS equal the slope of the breakeven line?

. Recall that the slope of the BL = $-(1-\rho)/\rho$.
. If we equate this to the MRS, then $(\partial U/\partial W_h)/(\partial U/\partial W_s) = 1$
. This implies $W_h = W_s$, which is *full insurance*
. Thus, the indifference curve is tangent to the BE line at full insurance
. This implies that full insurance is optimal

This is an important discovery

- We have proven that *of all actuarially fair policies, individuals prefer full insurance*

- This is a fundamental result of insurance theory. It is just as important for a critical caveat

. We have assumed no moral hazard

Thus far we have assumed that all consumers are identical. Let's consider the possibility that the risk of illness varies from person to person

Let's start by supposing that there are two risk levels, where $\rho_2 > \rho_1$

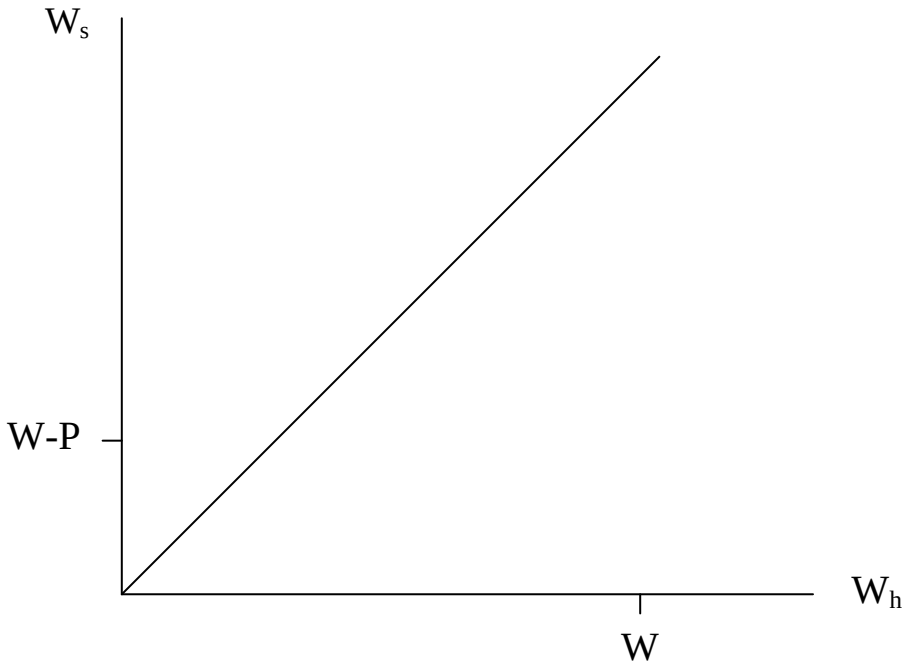
- Suppose that everyone (including insurers) knows everyone's risk type

- Suppose that each risk type can be offered a different contract

  . "Experience rating"

- What will we see?

  . Each risk group gets full insurance, but premium is much higher for type 2 (incomplete graph)



- Suppose both of the full insurance policies are offered, but insurers cannot detect, in advance, which buyers are which

- Q: What will happen?

- A: Type 2 buyers buy the cheaper full insurance policy, driving sellers of that policy from the market

- Sellers of the low premium have suffered adverse selection - the policy attracted a higher risk level than was intended

    . Sellers use experience rating to prevent this from happening
    . Q: Experience rating helps to solve the adverse selection problem. But do you think that it is a fair solution?
    . Consider smoking, drinking, colon cancer…

- A popular legislative proposal to prevent experience rating is to require an "open enrollment" period

    . During this period, insurers must accept all comers without experience rating
    . Charging the same premium regardless of risk is known as "community rating"
    . Q: What will this look like in the R/S model?

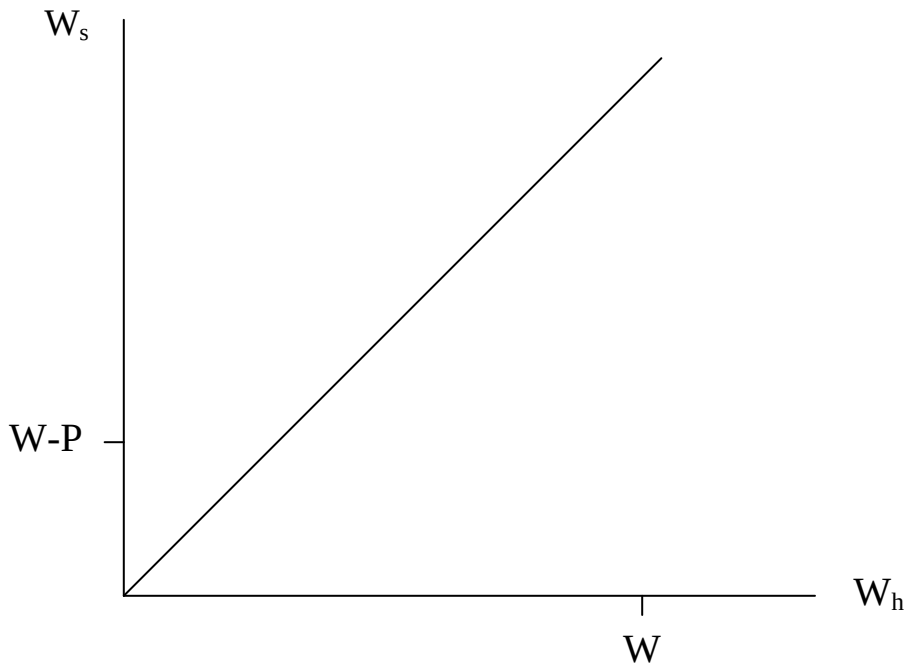
Before drawing the relevant graph, note that individuals with different risks will have different slopes to their UU curves

- Recall the formula for the MRS. If two individuals have the same insurance policy, (and therefore the same W_h and W_s), the slopes of their UU will be determined solely by their risk levels

  . In particular, if $\rho_2 > \rho_1$, then $(1-\rho_2)/\rho_2 < (1-\rho_1)/\rho_1$
  . I.e., the individual with the greater risk of illness has the flatter UU curve
  . This creates opportunities for *cream skimming*

- With this in mind, let's suppose that an insurer is selling a policy to both risk types, at a premium high enough to just break even (money made on type 1s covers losses from type 2s)

- Following picture shows you how things get messed up (drawn in class)



- The intuition is that an insurer can offer a policy with lower benefits and lower premiums. Low risks will want it but high risks will not

. This is known as "cream skimming"
. This does not require that the skimmer have any information about the enrollees!
. Skimming can occur even during open enrollment

- What are the problems with this?

. Destabilizes markets in which experience rating is not allowed
. Drives high risks into their own pool even without experience rating --giving them the same premia
. Limits the policies that are offered to low risks – If the benefits are too generous, you will attract high risks

Can such destabilization occur in practice?

- A first step to answering this question is to determine if, in fact, some plans systematically enjoy favorable selection

- Q: Why is the answer to this question so important to public and private sector policy?

- There have been many such studies, often focusing on whether HMOs serving the Medicare population enroll lower risks than average

. Research is pretty clear here – Medicare HMOs do enjoy favorable risk selection
. For example, the GAO in 1997 examined the health status of individuals who selected to enroll in a Medicare+Choice HMO plan rather than remain in traditional Medicare
. GAO found that the HMO enrollees had 15 percent lower costs than average Medicare beneficiaries in years prior to joining the HMO
. Rules regarding Medicare payments to HMOs now account for this – pay less than the average cost for traditional Medicare. More plan-specific reductions may be on the way

Sean Nicholson et al. did a fine study of risk selection in the under-65 population

- They use data from a major household survey that includes medical expenditures over a two year period and information about whether individuals switched plans during this time

- They restrict attention to individuals who were offered a choice of plans

- Their approach is to see if individuals who switched plans had different expenditures in the base year than those who stayed in the same plan

- They also ask whether it is possible to predict expenditures and risk adjust premiums using only age and sex

- Nicholson et al. compared two groups of "switchers"

  . (1) HMO enrollees who switched to non-HMOs. These represented about 8% of the HMO enrollees
  . (2) Non-HMO enrollees who switched to HMOs. These represented about 20% of the non-HMO enrollees

- They find evidence that HMOs enjoyed favorable selection

  . The average "previous year expenses" for group (1) was $2100
  . The average for group (2) was $1500.

- They then ask whether age and sex alone could explain the $600 difference

  . If so, then risk adjustment could be used to prevent HMOs from cream skimming
  . This would level the insurance market playing field and prevent the adverse selection death spiral

- Nicholson et al. find that age and sex differences do not explain the $600 cost difference between the two groups

  . Moreover, even factors such as self-reported health status are not important enough to account for the difference

. Thus, some cost difference would persist even if plans adjusted premiums for age, sex, and self-reported health status

- Conclusion: HMOs will enjoy favorable risk selection unless premiums are adjusted for sophisticated risk factors

The next question: Can such selection lead to destabilization?

- In general, health care markets have not witnessed the death spiral

- There are some examples of destabilization, however

In a famous paper, Harvard's David Cutler and Richard Zeckhauser look at two examples from Massachusetts in the 1990s

- Beginning in 1992, Harvard University began offering a generous PPO plan and several less generous HMOs

. The premiums for the two plans were initially very close
. As a result, employees only had to pay about $400 (before tax) to purchase the more generous PPO coverage

- In 1995, Harvard changed the rules so that employees who wished to purchase the PPO coverage had to pay the full cost differential

. Fully half the affected employees dropped their PPO coverage
. Those who disenrolled were healthier and younger than average
. The PPO lost money in 1995, and had to raise premiums

- In 1996, the PPO price differential increased to $2000

    . Enrollments plummeted once again
    . The PPO lost money once again and was disbanded

- This "health insurance death spiral" is consistent with R/S

- The Massachusetts Group Insurance Commission (which covers local employees) offered both generous indemnity and HMO coverage

    . The indemnity plan premium was $2500 above the HMO premium
    . GIC initially paid for 90 percent of the cost of each plan, so enrollees only had to pay $250 extra
    . In 1995, the state enacted legislation increasing the cost sharing percentage to 15%
    . At the same time, a PPO has been introduced
    . Adverse selection has been less pronounced and the different plans have coexisted

Q: Why did the latter plan not "blow up" like the Harvard Plan?

For all the attention that has been lavished on this paper, there have been few other demonstrations of an insurance death spiral.

- One important example – the Health Insurance Plan of California/ PacAdvantage

    . Created with much fanfare in 1992, eventually covering 150,000 lives
    . In early 2000s, low risk employer groups began opting out, leaving HIPC with higher risks.
    . Premiums increased, more groups opted out, and in 2006

- Q: What do you think keeps risk pools for more expensive insurers intact?

Despite these cautionary papers, many health economies believe that the risk of market destabilization due to adverse selection is minimal

- Examples of the death spiral are few and far between

- Individuals and employer groups do not switch coverage all that often

Risk prediction models are far more sophisticated than simple age/sex adjustment

- The best and most popular risk adjustment algorithm is DxCG developed by Ash and Ellis at Boston University

  . DxCG uses data on prior spending, diagnostic codes and prior drug use to predict current year spending
  . Prior spending alone generates an R^2 of 0.11
  . The combo models achieve an R^2 of about 0.30.
  . DxCG is used by 300+ organizations, including CMS, which uses it to set payment rates for Medicare HMOs

- This model may allow payers to predict risk better than individuals can predict their own risk

Q: Do you see any potential limitations of basing insurance premiums on DxCG methods?

Q: How else might DxCG be useful?

In-class discussion question:

Suppose that you work for a firm that funds health care start-up enterprises. You have been approached by a firm that proposes to be an insurance "market maker". Specifically, that firm will sign up small businesses and health insurers within distinct geographic areas. The health insurers will offer coverage though a web portal that can be accessed by any employee of one of the participating small businesses. Employees are free to enroll in any participating insurer. The market maker will collect premiums from employers and pay them to insurers. The market maker proposes to risk adjust the premiums based on each enrollee's age, sex, and available historical health information. The market maker will collect from the insurers a modest 3% fee for its services. This will be more than sufficient to cover its costs.

> Why might employers and insurers be willing to do business with the market maker? What factors will you weigh as you consider providing seed money for this venture?