

Asymmetric Information

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Textbook chapter 22 (section 1)

Game of Chance

- Suppose I have 2 lottery tickets
 - A winner: worth \$20
 - A loser: worth \$0
- Consider the following arrangement:
 - You pay me some fee, \$F
 - I turn the tickets face-down, shuffle them, and hand you one at random
- What fee, \$F, would you be willing to pay to play that game?

Game of Chance?

- Suppose I have 2 lottery tickets
 - A winner: worth \$20
 - A loser: worth \$0
- Consider the following arrangement:
 - You pay me some fee, \$F
 - I look at the tickets face-up and give you one of my choosing
- What fee, \$F, would you be willing to pay to play that game?

Information Economics

- Our analysis has assumed complete knowledge by all parties
 - Perfect Information: agents know exactly what good they are getting when they buy it
- Can also study Uncertainty, when true randomness prevents anyone from knowing what is being transacted (e.g. lottery tickets)
 - Major focus of “Finance,” a sub-discipline of Economics
 - Markets typically work very well (i.e. are efficient) in the presence of Uncertainty

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 - Major focus of “Finance,” a sub-discipline of Economics
 - Markets typically work very well (i.e. are efficient) in the presence of Uncertainty
- We now examine markets with Asymmetric Information
 - One party knows more about the good than the other
 - This can weaken, or even destroy markets (i.e. cause inefficiency)
 - All parties lose, not just the one without information!
- Asymmetric information is found in tons of contexts:
 - Consumer goods, insurance, labor market, ...
 - In some instances, private solutions exist, and in others the government can help

Adverse Selection

“Lemons”

- The Lemons Problem occurs when goods vary in quality, and the seller can observe the quality but the buyer cannot
- Buyers know they are at a “disadvantage” and will respond accordingly
- Sellers may have to sell their goods at a low price
- Or they may not be able to sell them at all!

Used Car Market

- Consider a market for used cars, with 100 buyers and 100 sellers
- There are 2 qualities:
 - High (“Peach”) – 50 cars
 - Low (“Lemon”) – 50 cars
- Agents’ values of the cars are given by:

$$V_{Buyer} = \begin{cases} 100 & \text{if Peach} \\ 60 & \text{if Lemon} \end{cases} \quad V_{Seller} = \begin{cases} 90 & \text{if Peach} \\ 50 & \text{if Lemon} \end{cases}$$

- What will happen if there is Perfect Information, so both buyers and sellers know which cars are Peaches vs Lemons?

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- What will happen if there is Perfect Information, so both buyers and sellers know which cars are Peaches vs Lemons?
 - $P_{Peach} \in [90, 100]$, $P_{Lemon} \in [50, 60]$
 - All 100 cars sell, generating overall surplus of $100 * 10 = 1,000$

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- What will happen if there is Asymmetric Information, so only sellers know which cars are Peaches vs Lemons?

Average Value

$$V_{Buyer} = \begin{cases} 100 & \text{if Peach} \\ 60 & \text{if Lemon} \end{cases} \quad V_{Seller} = \begin{cases} 90 & \text{if Peach} \\ 50 & \text{if Lemon} \end{cases}$$

- Consider the following logic from a prospective Buyer:
 - “Half of the cars are Peaches, which I value at \$100.
 - “And half of the cars are Lemons, which I value at \$60.
 - “So on average, a car I’m offered is worth \$80.
 - “So I will be willing to pay up to – but not above – \$80.”
- What is wrong with this logic?

Average Value

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- Consider the following logic from a prospective Buyer:
 - “None of the cars are Peaches, which I value at \$100.
 - “And all of the cars are Lemons, which I value at \$60.
 - “So on average, a car I’m offered is worth \$60.
 - “So I will be willing to pay up to – but not above – \$60.”
- What is wrong with this logic?
 - If you offer \$80, the Sellers of Peaches won’t sell!

Adverse Selection

$$V_{Buyer} = \begin{cases} 100 & \text{if Peach} \\ 60 & \text{if Lemon} \end{cases} \quad V_{Seller} = \begin{cases} 90 & \text{if Peach} \\ 50 & \text{if Lemon} \end{cases}$$

- Asymmetric Information can hurt or destroy markets via Adverse Selection
 - Buyers might assume that only the low-quality good is being sold, and this might be a self-fulfilling prophecy.
 - If you assume I'll give you the Loser lottery ticket, we won't play the game.
 - If Buyers assume a car is a Lemon and pay accordingly, Peaches won't be sold
- This is inefficient!
 - Buyers value the cars more than Sellers – we want all cars to sell
 - But Asymmetric Information/Adverse Selection prevents this:
 - Surplus is now $50 \cdot 10 = 500 < 1,000$
 - ***Nobody*** benefits from the information asymmetry, not even those with the advantage

Solution to The Lemons Problem: #1

- Reputation
 - Suppose the Seller plans to sell many cars for years into the future.
 - Then they have incentive to protect their reputation.
 - “If I charge a high price, you can be sure it’s a Peach!”
 - The Buyer can trust this and pay a “Peach price.”
 - This can bring back the market for Peaches and undo the Adverse Selection

Solution to The Lemons Problem: #2

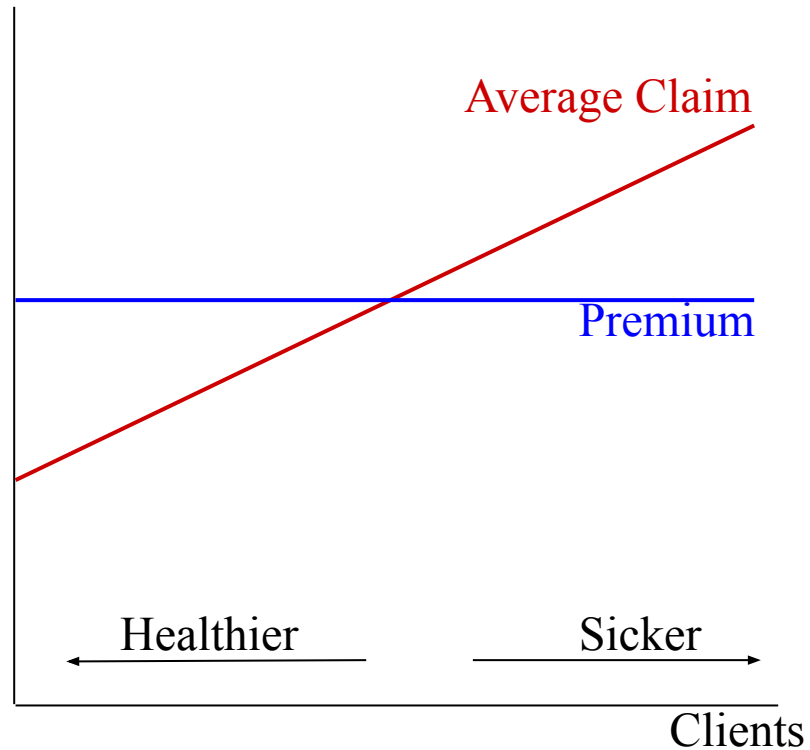
- Third-party information providers
 - Carfax has information about whether used cars have been in accidents, etc.
 - If they have the expertise to gather this information...
 - ...and people are willing to pay for that information...
 - ...then the private sector can might generate “disinterested” third-parties who will reveal the private information
 - This can bring back the market for Peaches and undo the Adverse Selection
 - Sometimes the private sector does not do this, and the government may be able to help (e.g. Consumer Financial Protection Bureau)

Solution to The Lemons Problem: #3

- Signaling
 - Consider a Warranty – a promise to fix the car if it breaks down
 - Warranties impose different costs to Sellers of Peaches vs. Lemons
 - Peach: unlikely to break down; won't have to honor the Warranty often
 - Lemon: likely to break down; will have to pay repair costs often
 - So a Peach Seller may be willing to offer a Warranty when a Lemon Seller would not
 - So if you see a Warranty, you know it's a Peach
 - This can bring back the market for Peaches and undo the Adverse Selection

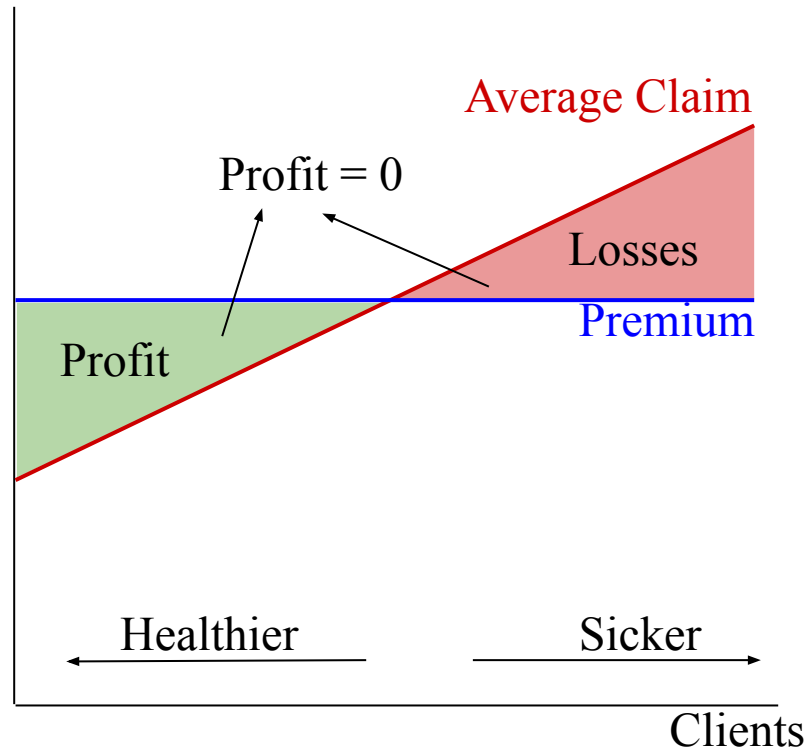
Health Insurance

- Health insurance is one of the most important applications of Adverse Selection
- Clients pay a “Premium” to insurer
- If sick, client gets a “Claim” from insurer
 - Some are sick often (high Claims)
 - Others are sick rarely (low Claims)



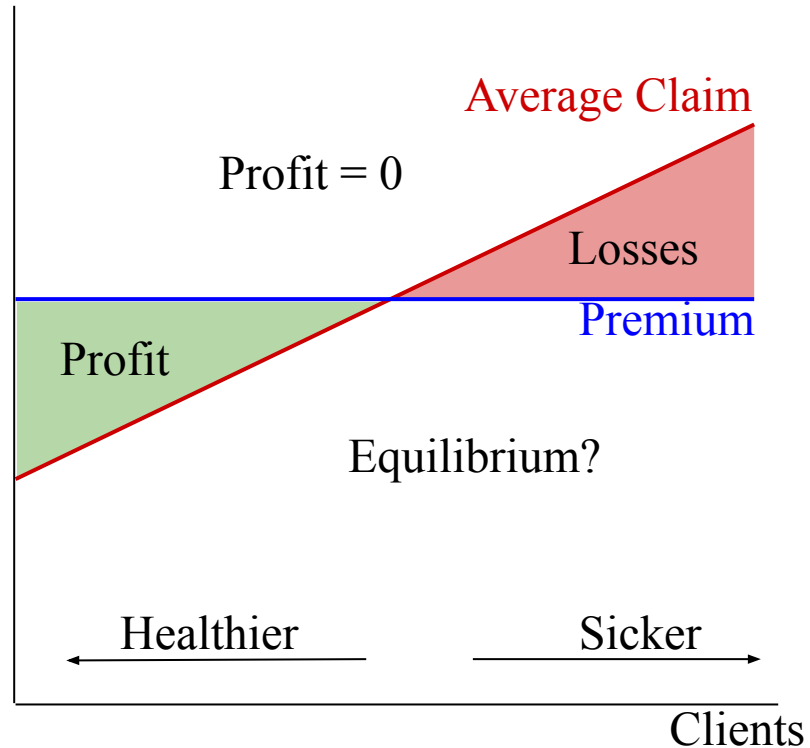
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- Assume:
 - Clients know if they are sickly
 - Insurers do not
 - Must charge all same Premium
 - Perfect competition: zero profit
 - Premium = Avg. Claim



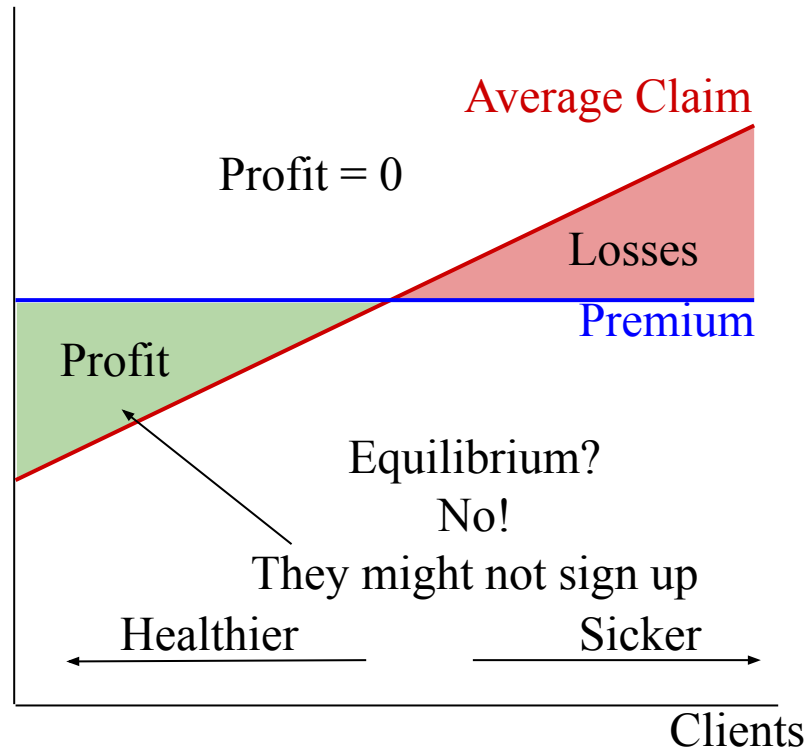
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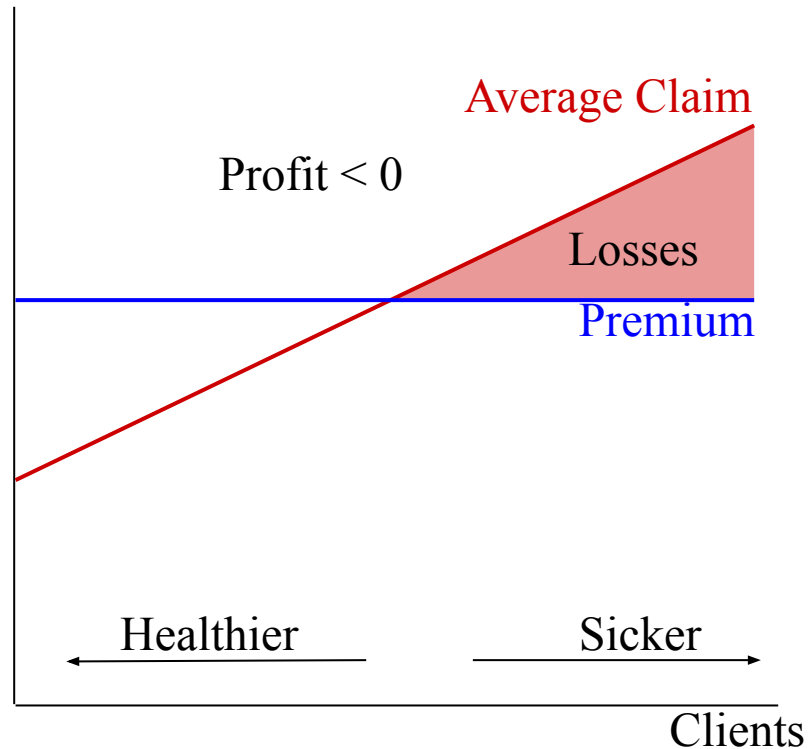
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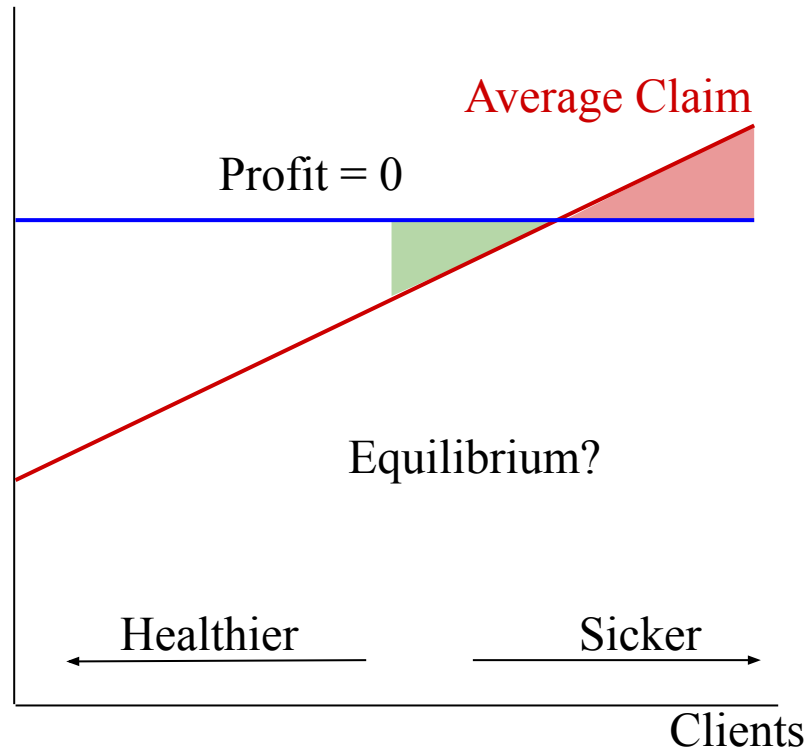
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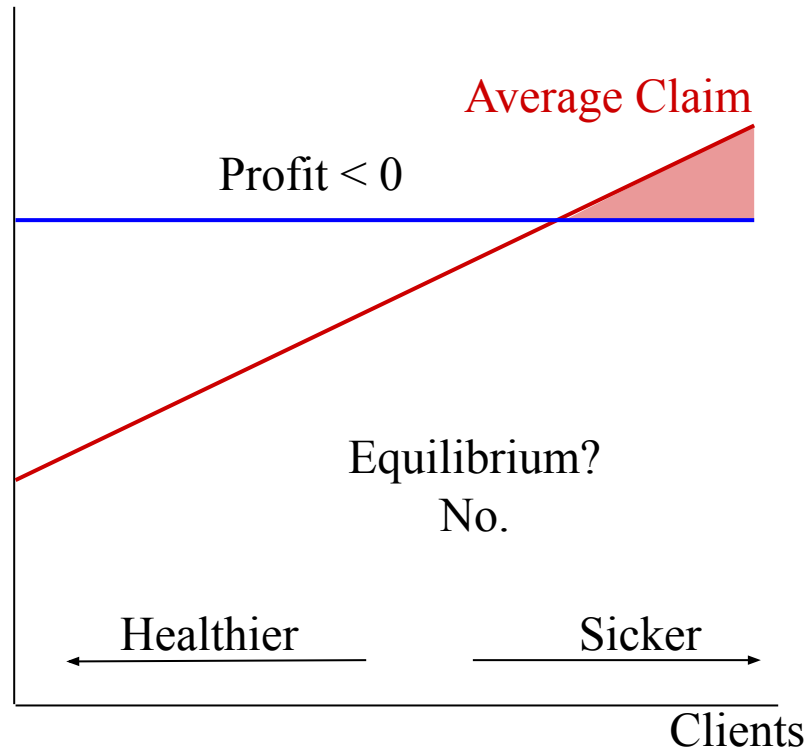
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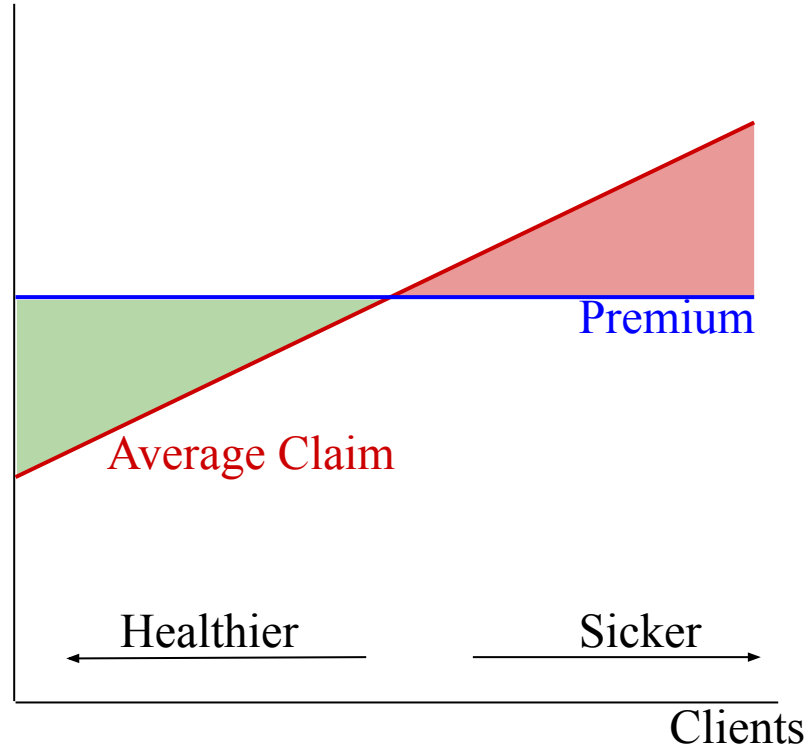


Adverse Selection for Health Insurance

- “Unraveling” like demonstrated on the last slide can destroy the entire market
- Insurance essentially requires healthy people to “subsidize” sick people
 - That way, the insurer breaks even on average
 - Profit on healthy, loss on sick
- But if you know you’re healthy, you might view this as a bad deal and not sign up
 - Because insurer does not know who is healthy, they cannot charge a lower premium to healthy people!
- This is Adverse Selection: only the sick people are left
- A higher premium will just lead to a client base that’s even more sickly on average
- This happens in many health insurance markets
 - As a 75-year old, you cannot find long-term care (i.e. nursing home) insurance

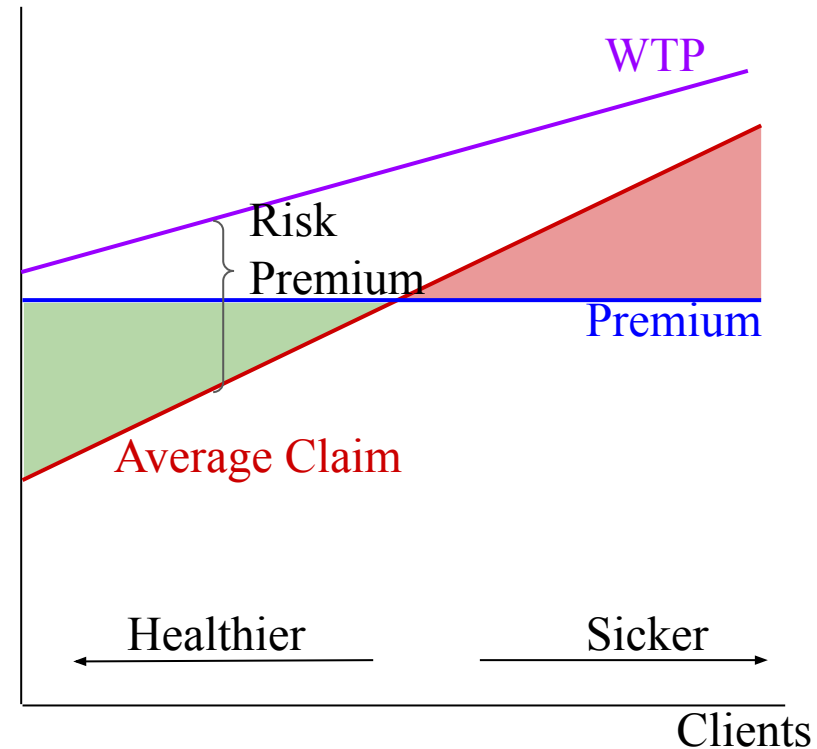
Risk Premium

- Unraveling might not occur



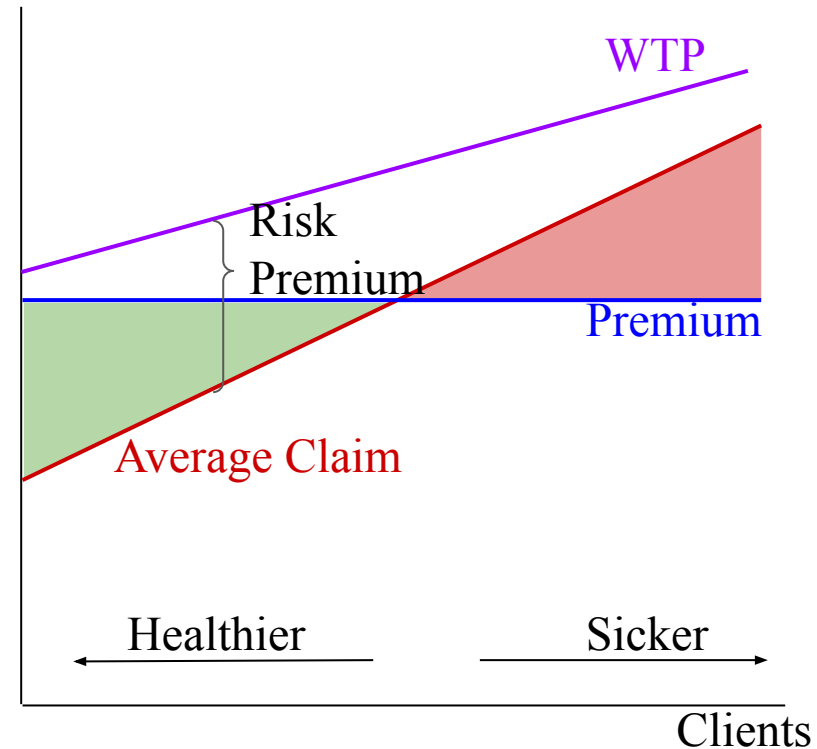
Risk Premium

- Unraveling might not occur
- People may be willing to “over-pay”
 - May be willing to pay in excess of your average claim
 - Eliminating risk is valuable, even if you lose a little money on average
 - Known as Risk Premium
- Healthy types won't leave market
 - Willing to subsidize the sick
- Market works just fine



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- Healthy types won't leave market
 - Willing to subsidize the sick
- Market works just fine
- But often it won't
 - How can government help?



Government Involvement in Health Insurance

- Government health programs have different populations, functions, and justifications
 - Medicare
 - Medicaid
 - VHA
 - CHIP
 - IHS
- Let's discuss the Affordable Care Act (ACA)
 - Sometimes known as “Obamacare”
 - Passed in 2010

Pre-Existing Conditions

- Problem: people with pre-existing conditions could not access affordable health insurance
- ACA: Insurers must charge same premium to all people, even with pre-existing conditions

Individual Mandate

- Addressing pre-existing condition causes a new problem
- Problem: Adverse Selection
 - Healthy people may not be willing to pay the high premium required to cover people with pre-existing conditions
 - Market unravels: no affordable insurance for anyone!
- ACA: mandate that everyone must buy health insurance
 - Insurers can charge a reasonable premium to cover the whole population
 - No risk that healthy types will leave
 - Such a mandate is a unique power of government

Health Insurance Subsidies

- But the individual mandate creates a new problem
- Problem: Some people really cannot afford the premiums, but now are forced to pay them
- ACA: Give income-based subsidies for health insurance
 - People who cannot afford the market rate will get assistance

“The Three-Legged Stool”

- The resulting policy worked as a 3-legged stool
 - **No denials based on pre-existing conditions**
 - **Individual mandate**
 - **Subsidies**
- In concert, these features assured that insurance companies could stay in business while offering (relatively) affordable health insurance to everyone, regardless of pre-existing conditions

Figure 1

Number of Uninsured and Uninsured Rate among the Nonelderly Population, 2008-2019



NOTE: Includes nonelderly individuals ages 0 to 64.

SOURCE: KFF analysis of 2008-2019 American Community Survey, 1-Year Estimates.

2017 Reform

- In 2017, the individual mandate was removed.
- This caused a lot of concern because it removes one of the stool's legs
- However, the system has survived
 - The number of people opting to go without insurance did not jump back to pre-ACA levels
 - Ultimately, the “mandate” is just a tax, and so while it's a loss of tax revenue, it doesn't fundamentally alter the viability of the system

Moral Hazard

Moral Hazard

- Adverse Selection: information asymmetry *prior to a transaction*
- Moral Hazard: information asymmetry *after an agreement is reached*

Inducing Effort

- Consider car accidents and car insurance
- The driver's "effort" to be safe is a major determinant of whether an accident occurs
- Suppose I have car insurance, which **fully** covers the cost of any damage from an accident
 - I will not be so inclined to exert the effort to drive carefully: "Hey, I'm insured!"
 - I don't bear the cost of an accident, so I won't exert effort to avoid one
 - Information asymmetry: insurer does not know if I was being careful, cannot condition the claim on whether I was careful
- Insurers may be forced to charge a very high premium, since an accident is very likely
 - But with such a high premium, I may just go uninsured
- ***We cannot fully insure someone and get them to exert effort:*** inefficient

Partial Solutions to Moral Hazard

1. Improved monitoring
 - If the car can record data on my effort, then we can have full insurance
 - “If you gave effort, insurer pays all damage; if you did not, you have to pay for it.”
2. Partial insurance (easier, more common)
 - Coinsurance
 - Insurer only covers a certain percentage of the bill; you cover the rest
 - Copay
 - You have to pay a fee every time you make a claim
 - Deductible
 - You cover the first \$X of damage before insurer starts chipping in

Moral Hazard Beyond Insurance

- Employee compensation
 - Company profits depend on workers' Effort
 - If they get a flat wage, they will not work as hard
 - So give performance-based bonuses
 - But if compensation is too bonus-heavy, they bear a lot of risk (external factors also determine company profits) – may not want to work there
 - Need to strike the right balance

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 - But if compensation is too bonus-heavy, they bear a lot of risk (external factors also determine company profits) – may not want to work there
 - Need to strike the right balance
- Hiring a contractor
 - Flat fee: they will find the cheapest materials and make a low-quality product
 - Cost-plus: They will not have incentive to keep costs low, budget will balloon
 - Need to strike the right balance

Summary

- Private/asymmetric information can hinder or even destroy markets
 - Inefficient – lost gains from trade!
- Adverse Selection
 - Undesirable types will be overrepresented in the market
 - Other side of the market will understand this and pull back
 - Prices may be low (or insurance premiums high), if market functions at all
- Moral Hazard
 - People may not exert effort if insulated from the risk
 - Other side of market will understand this and not provide full insurance