L6: Demand for health insurance

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Health Economics
HSMP 6604
2021

Outline

- A simple example to illustrate it all
- Bringing utility back
- Uncertainty, insurance contracts, and income
- Fair contracts, full and partial insurance
- Adverse selection: the market for lemons
- Adverse selection: the Rothschhild-Stiglitz model
- Empirical evidence and moral hazard

Health insurance

- Let's go back to the situation we discussed last week. You're planning next year's insurance
  - **Scenario 1**: If you need health care, your income next year will be \$50,000 with a probability of being sick of p=0.05 (spring chicken probability)
  - **Scenario 2**: If you don't need health care, your income will be \$70,000 – with probability (1-p=0.95)
- That means your income next year is **uncertain**. You will either have \$50K or \$70K
- The implied cost of health care is \$20,000
- Here is the part that to make sense you need to think in terms of repeated events (not crazy, you are going to repeat this process every single year). The **expected value** of your income next year is:

  $70K * (1 - 0.05) + 50K * 0.05 = \$69,000$
- But, you will have either 50K or 70K, not 69K

Health insurance policy

- Because you all look spring chickeny too me, I'll offer you an insurance contract for the modest price of $1,000
- If you get sick, I'll cover the $20,000 in medical care costs
- That's a sweet deal for you. If you get sick, you end up with $\$69K$ (70K-1K). But if you don't get sick, you also have $69K
- For a modest $1000, you have **substantially eliminated your losses**
- And in fact, you have **eliminated uncertainty** about your income next year
- Of course, the expected value of income is now $(70K - 1K) * 0.95 + (50K - 1K + 20K) * 0.05 = \$69K$

Health insurance policy

- What about me? Well, I did not eliminate uncertainty for sure. However, my expected gain is zero
- If you get sick, I would lose $19,000. I have to pay your health care (20K), but you gave me 1K. If you don't get sick, I pocket the 1K
- My expected profit (assuming zero costs) is:
  $-19,000 * 0.05 + 1000 * 0.95 = 0$
- **Fair insurance** or **actuarially fair insurance** is an insurance contract with zero profit (we are ignoring costs here)
- But, but, but... **now my income is uncertain**
- How could I reduce my uncertainty? Glad you ask: **I could insure a lot of people**, some will get sick, others won't. It's like coin (fair or not) toss: if I do it 1000 times, I know about 500 will be head and 500 will be tails
- My **insurance pool** is key to reduce my uncertainty. I can reduce my uncertainty if I convince all you to accept the policy, although you are only 26. I'd like more

Would you buy the insurance policy?

- Preferences reign supreme in economics, so we need to incorporate preferences (utility) at some point
- If a person is **risk-averse**, she **prefers the certain outcome to the uncertain outcome** with the *same expected value* (in other words, the *same amount* is preferred more when it's certain)
- So if a person is risk averse, she buys the policy since the expected value of income (69K) is the same as the certain income (69K)
- However, uncertainty did create a loss. If you don't get sick, you would have $70K$; that means **utility given the uncertainty will be lower** than without uncertainty
- A **risk-seeking** person would prefer to take the risky bet and make $70K$ if healthy. However, when it comes to health insurance, most people are risk averse
- Unless you are the strange person –sort of masochistic; Munchausen– who likes to get sick or pretend to be sick, people don't get a thrill getting sick (different than gambling or other risky behaviors)

Themes I

- With this tiny example we can get the intuition we need to understand a lot of problems, although we will elaborate and discuss evidence
- Some of you know that your chances of using 20K in health care are much less than ($p < 0.05$), therefore, my contract is much less appealing
- Some of you know that you will need a lot of medical care ($p > 0.05$), but I didn't know that when I offered the contract (that's **asymmetric information**). You all look super healthy to me
- So for those of you who need a lot of care next year, the 1K **premium** is a bargain. I'm *giving you more than your expected income*. That's **adverse selection**

Themes II

- But I just gave all of you **full insurance**
- I reduced your incentives to care about saving health care costs (**moral hazard**)
- Want to know if your tendons are damaged after an accident? Get an MRI instead of waiting two weeks – **law of demand** in full force, prices goes down, quantity demanded goes up
- There are other ways. It's not like you *want* to get sick.
- But full insurance could also change the incentives of your agent – **your medical agent, your doctor** along with entrepreneurs. I'd need to come up with some restrictions so providers don't take advantage of me (that's **insurance companies refusing to pay** for some care)
- Why do you think there are so many ads at night for durable medical equipment?

Themes III

- I was playing an insurance company, but insurance companies want to set premiums so they don't lose money, even in perfectly competitive markets
- A insurance company needs to"risk pool" to minimize uncertainty and maximize profits. Interesting things happen if not – we will talk about **separating equilibrium**, **pooling equilibrium**, the **Rothschild-Stiglitz** model...
- Remember, my **expected profit is zero**, but now *I (insurance company) bear all the uncertainty*

  (Think how surprise medical bills fit here)

Themes IV

- What if I was **forced to issue** the policy?
- Some of you **young invincibles** ($p < 0.05$) won't buy it
- Those of who need more care ($p > 0.05$) will buy it
- At the end of the year, I'll lose money. Next year, I won't charge 1K. **Premiums** will go up. I'll charge more, but since I'm force to do it, I'll have the same problem next year.... At the end, only the very sick will buy the policy. That's the **death spiral**
- Or, and here is a shocking (shocking!) idea, somebody could **force *you* to buy** the 1K policy to keep it at 1K (Does mandatory car insurance sounds familiar?)
- That's the **Affordable Care Act**

Utility

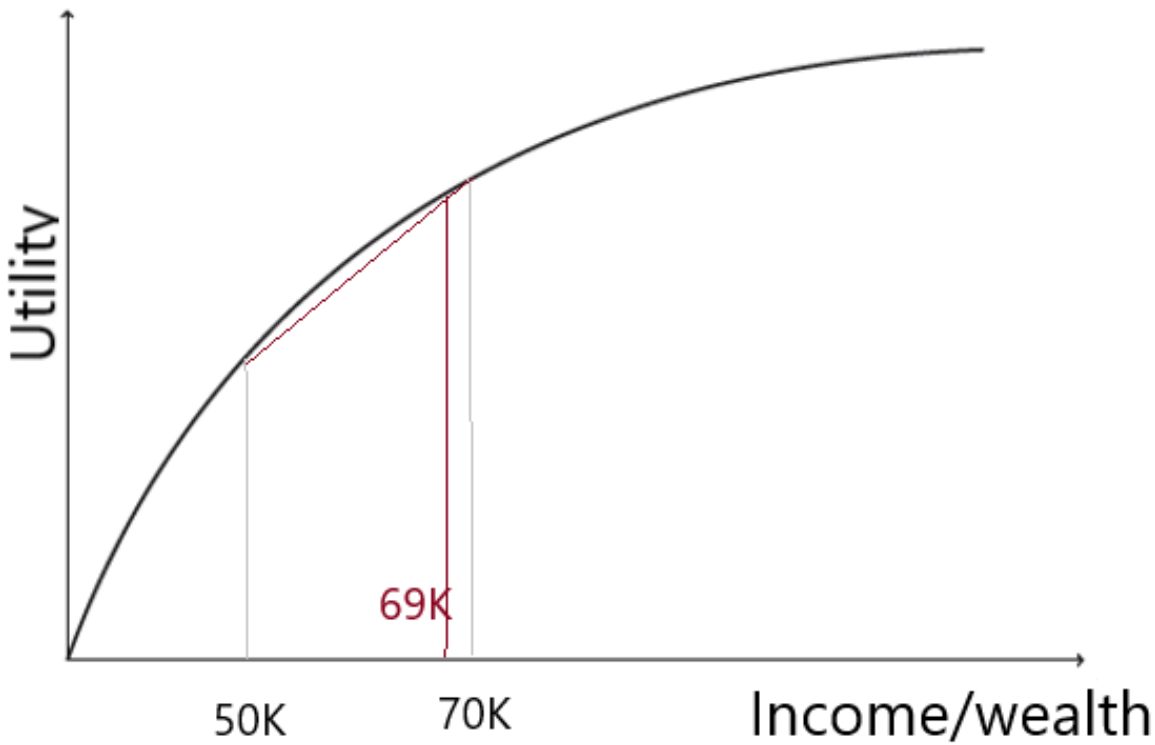
- We left utility out because in a sense we didn't quite needed it
- It's intuitive to think that **most** people:
  1. Prefer more income to less income
  2. Prefer certainty to uncertainty when it comes to losing income
- The statements above imply a **shape** for the relationship between income and utility: it must be **concave**
- The presentation follows the traditionally way of introducing risk
- See the classic paper by Pashigian et al.(1966) on plans with deductibles (grad students, go over this paper)

Utility and income

- Decreasing marginal utility of income
- Remember that it's about slope vs level

Our example

- $E[I]_{0.05} = 70,000 * 0.95 + 50000 * 0.05 = \$69000$



Math is a language

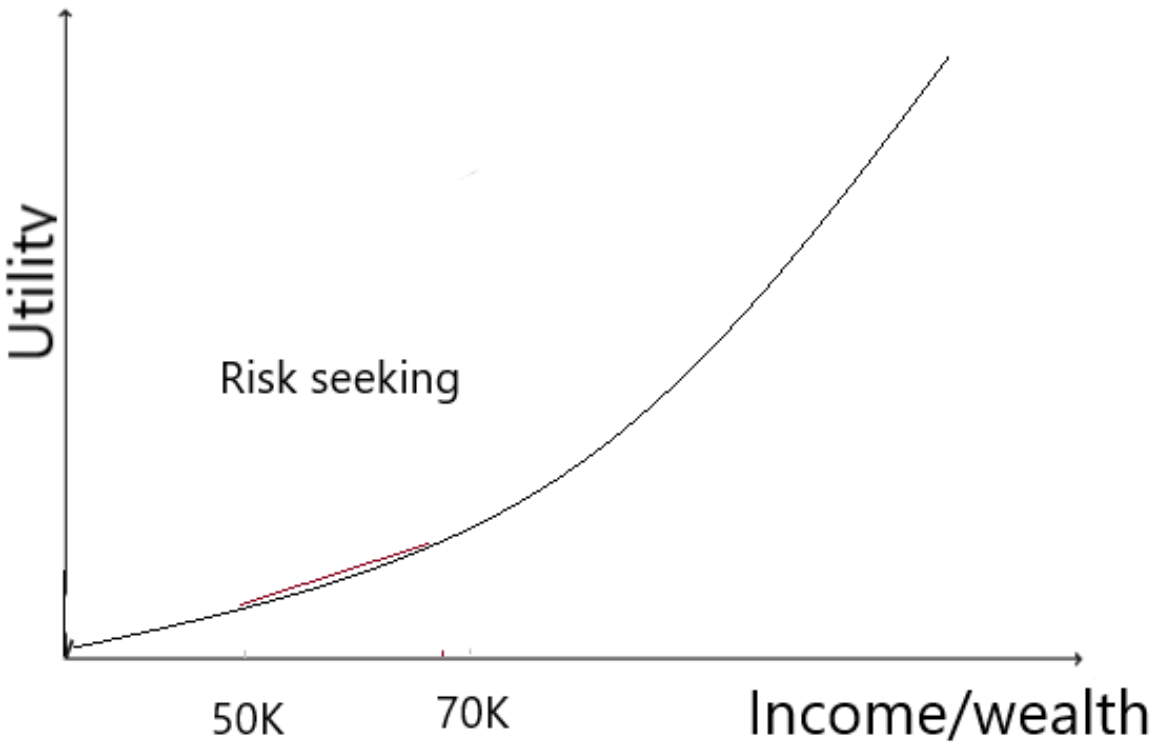
- Math is a language, which means that to understand math you need to understand the language. We create new "words" as we go, so you need to understand the new words
- In your textbook $E[I]_p$ is the expected income when the probability of being sick is p. So $E[I]_{0.05}$ is the expected income when $p = 0.05$. Therefore, $E[I]_{0.05} = 69,000$
- $E[U(I)]_p$ is the *expected utility* we get from the uncertain income
- $U(I)$ is the *certain utility* we get from income (we don't care about measuring utility)
- With a concave curve, $U(69K) > E[U(69K)]_{0.05}$. So the certain utility of 69K is preferred to the expected value of the same amount – this person is risk-averse
- With uncertainty, we are in the red line connecting $U(50K)$ to $U(70K)$
- Definition 7.3: in $U(E[I]) > E[U(I)]$, it would be clearer to write $U(E[I]_p) > E[U(I)]_p$

In summary

- The point is that a risk-averse person prefers the income when it's certain than when it's uncertain (expected), but to make sense of this statement we need to qualify that we are taking about the **same level of income**
- The other key point is that with uncertainty, this risk-averse person is never as happy as she is with certainty (the utility level is given by the straight line that is below the curve when there is uncertainty)
- That's the reason this person would like **protection from uncertainty**
- That expected 69K can become certain with the policy insurance I offered, which means that if you are risk-averse, eliminating uncertainty means more happiness (utility)

Risk seeking

- In case you wonder, a risk-seeking person prefers the uncertain income to the certain income, which means that the curve has to be convex
- This person gets a thrill out of risk
- (By the way, how would you measure the degree of risk aversion of risk seeking behavior?)



More notation

- If you got sick, I said I'd pay for your health care. That's the **payout**, which we denote by q
- My modest premium of $1K$ is denoted by r
- An **actuarially fair contract** (**fair insurance**) is when: $r = p * q$. So $r = 0.05 * 20000 = \$1000$
- An **unfair insurance**: $r > p * q$, which means $r > \$1000$
- Fair insurance is "free" for you. Wiped out uncertainty but you get the same as your expected income
- "Fair," "unfair" is like "moral" hazard. Careful with words
- The insurance expected profit is: $E[\Pi] = (1 - p) * r + p(r - q)$
- Profit is a function of premium, payout, probability of getting sick, so you write as: $\Pi(p, q, r)$. The letter Π is capital "pi"

More definitions

- We also have **full** and **partial** insurance
- In the example, I gave you full insurance. That means we sign the contract, your income after premiums and payouts are taken into account is the same when your are sick or healthy (so income is same in every **state**)
- That income is denoted as $I'_{S,H}$ in textbook (see, I just made up notation). So with **full insurance**: $I'_S = I'_H$
- With **partial insurance**: $I'_S < I'_H$
- Note that providing full insurance increases the likelihood of moral hazard
- Should we provide full malpractice insurance to a surgeon?

Combinations

- Of course we could have many combinations of insurance contracts
- I could still give you full insurance in the sense that $I'_S = I'_H$, but I could make it "unfair" by charging $r > p * q$
- An **ideal contract** (for you) is one that is both fair and full
- That's not an ideal contract for me, unless we live in the unicorn world in which there is a lot of competition and perfect information
- With perfect information, I can tell if you are a real spring chicken or an Instagram fake spring chicken (you know, the filtered chicken type, always happy and cheerful eating super healthy food)

The market for lemons

- The market for lemons (the tile of George Akerlof's 1970 paper) is too much fun not to cover it
- But we cover this paper because is highly relevant to understand **asymmetric information** and **adverse selection**
- What happens in a market when buyers and sellers do not have the same (perfect) information?
- In particular, what happens when one party knows more relevant information than the other?

Act I

- We know that a used car sells for a lot less than a new car. If we browsed online ads for used cars, we could see that even a one-year old car with 7K miles sells for thousands of dollars less than a brand-new car
- Why? The usual explanation is (was?) that we pay more for the pleasure of driving a new car. But is that pleasure worth so much?
- Akerlof's explanation was different. Let's go to the source:

  "Suppose (for the sake of clarity rather than reality) that there are just four kinds of cars. There are new cars and used cars. There are good cars and bad cars (which in America are known as "lemons"). A new car may be a good car or a lemon, and of course the same is true of used cars."
- Some time after you buy a new car, you *learn* whether you care is a lemon

  "An asymmetry in available information has developed: for the sellers now have more knowledge about the quality of a car than the buyers."

Act II

- This asymmetry causes a problem

  "... good cars and bad cars must still sell at the same price – since it is impossible for a buyer to tell the difference between a good car and a bad car."
- The owner of a good car has a problem. She can't sell the car at the price of a good used car, so she will likely keep using the car (why sell for the price of an average used car?)
- But that means that most used cars in the market will be "lemons." Good cars may not be traded at all
- The "bad" cars tend to drive out the good ones
- The issue is that bad cars sell at the same price as good cars since it's impossible [in this hypothetical example] for a buyer to tell the difference between a good car and a bad car; and only the seller knows.

Act III

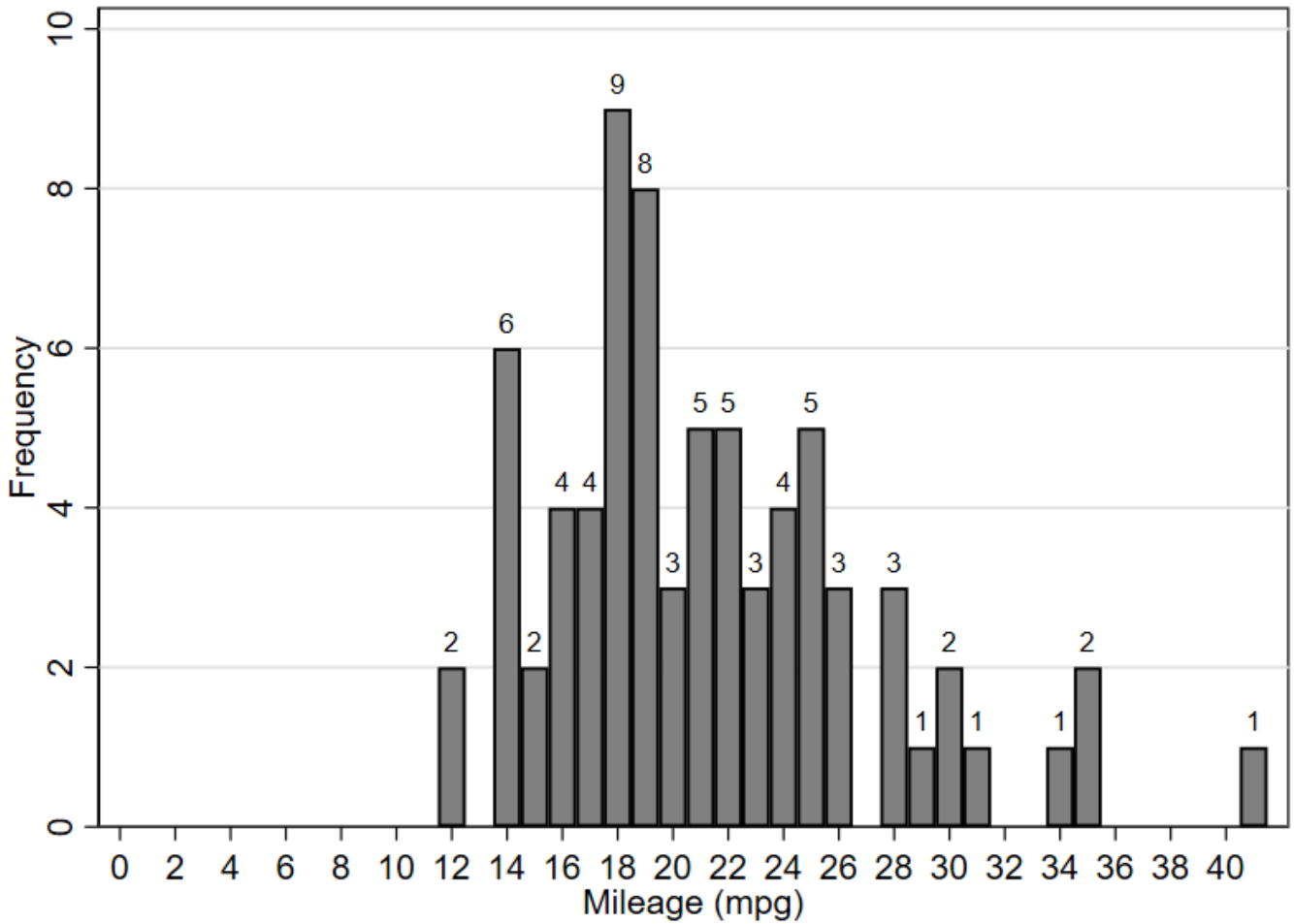
- The key elements in this story are two: 1) there is no way for the buyer to know the quality, and 2) a good and bad cars sell at the same price
- The part of selling at the same price is probably confusing but easy to understand with one example. It's not that *all* cars sell at the same price
- Suppose you are in the market for a Subaru Forester (we are in Colorado), red, with 27K miles, with a sticker that says "I run 200 miles, and you?"
- You find two with exactly those attributes. They are identically in every other respect **except one is a lemon**
- Why would they sell at different prices if you can't tell if the car is bad? Why would you believe the owner if he tells you otherwise?
- If you ponder this example a little longer, you'll realize that if you are the proud owner if a good used car, the selling price might not be great. **You know it**, your potential buyers don't
- The selling price depends on **how common lemons are** (think used prices for Saab versus Honda)

Finale

- We will see under which conditions a market can collapse
- We will see that the **distribution** of lemons is important
- We will understand the infamous **death spiral**
- But for all that we also need to add more details and complications
- We of course don't care about used cars, but one way a car dealer can charge a higher price is by giving you a warranty in case the car is a lemon (Does pre-owned certified sound familiar?)

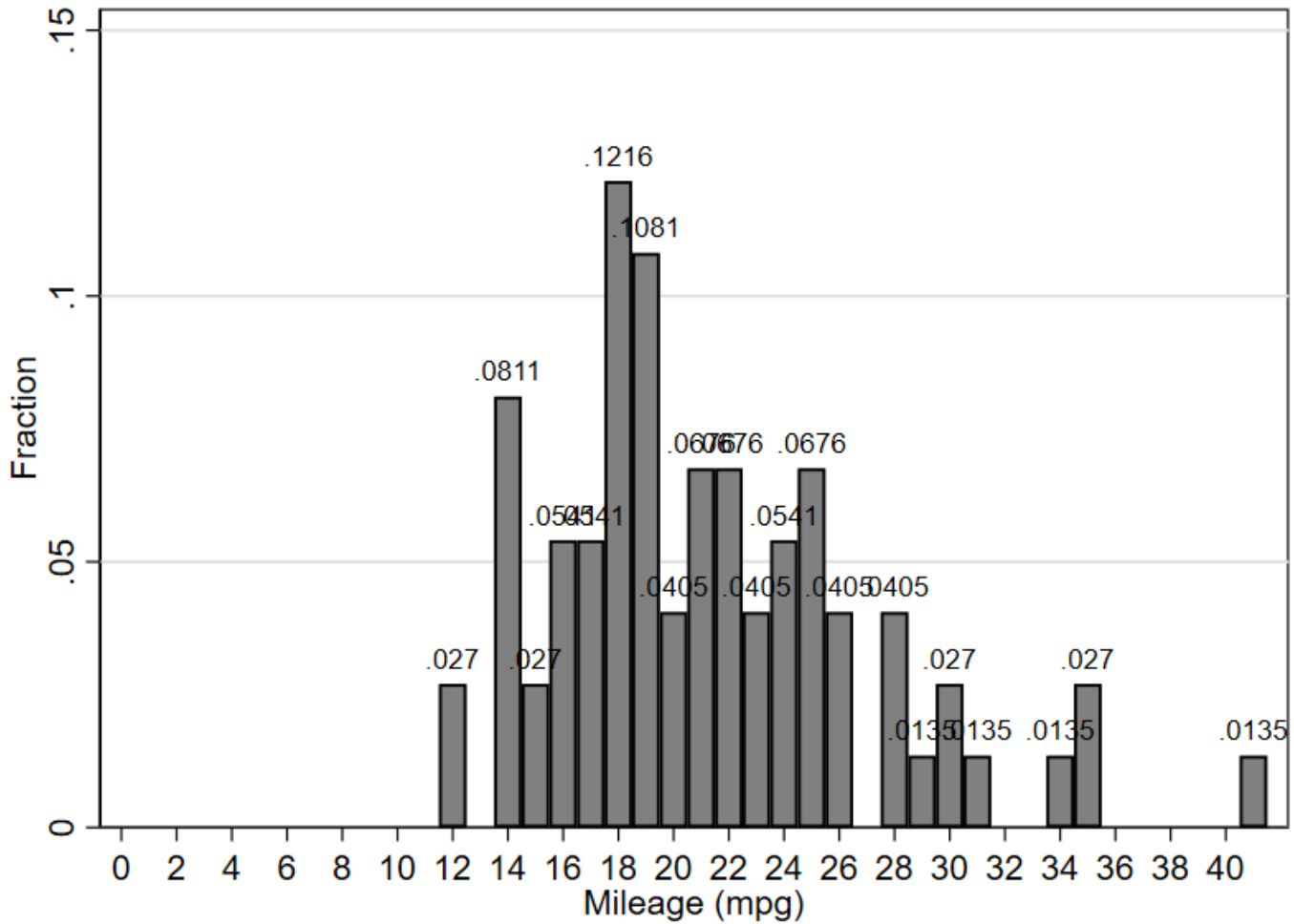
Distributions

- You all know how to read a **histogram**. There is one below
- That's data cars and miles per gallon (mpg). So about 9 cars get 18 mpg



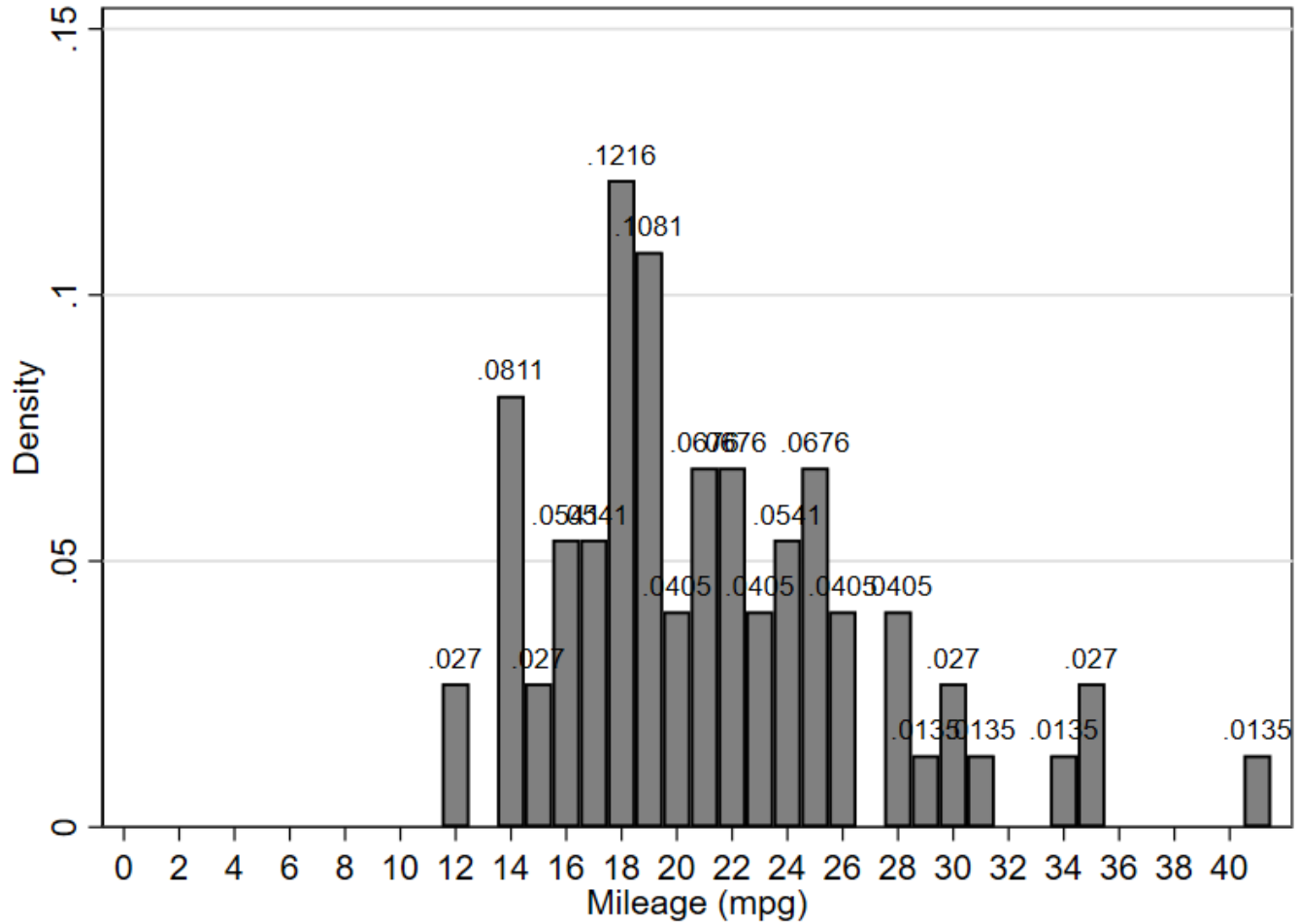
Distributions

- We could do it as proportions. So about 12.16 percent of the cars get 18 mpg



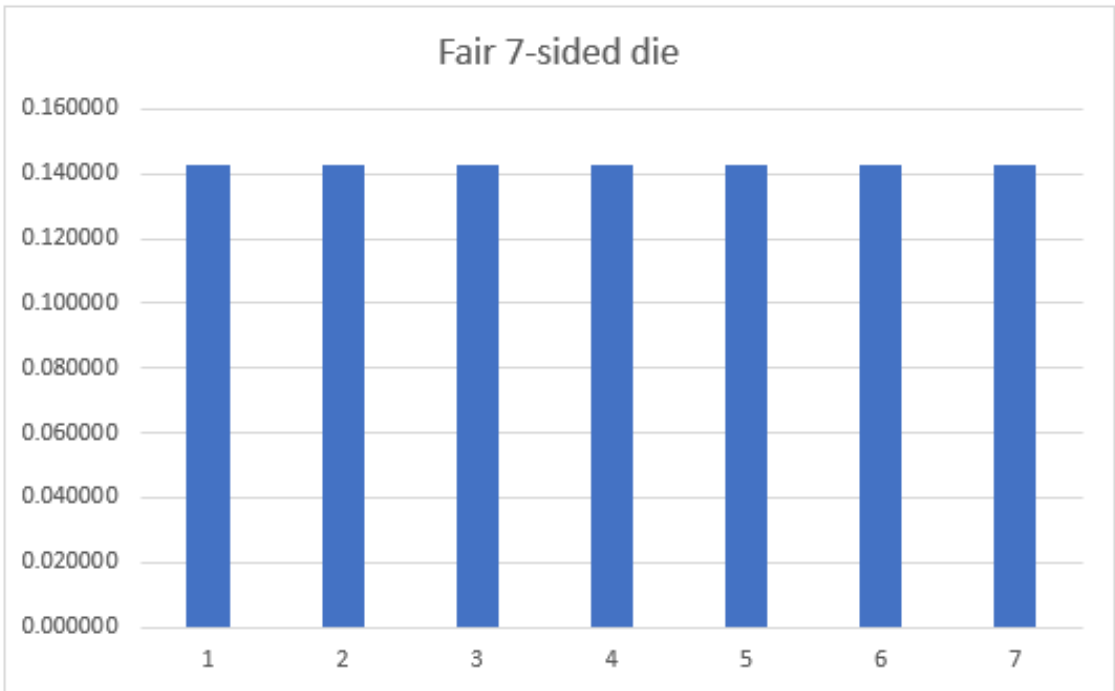
Distributions

- We could also use **density**, which in this case is the same. With density, all those proportions add up to 1



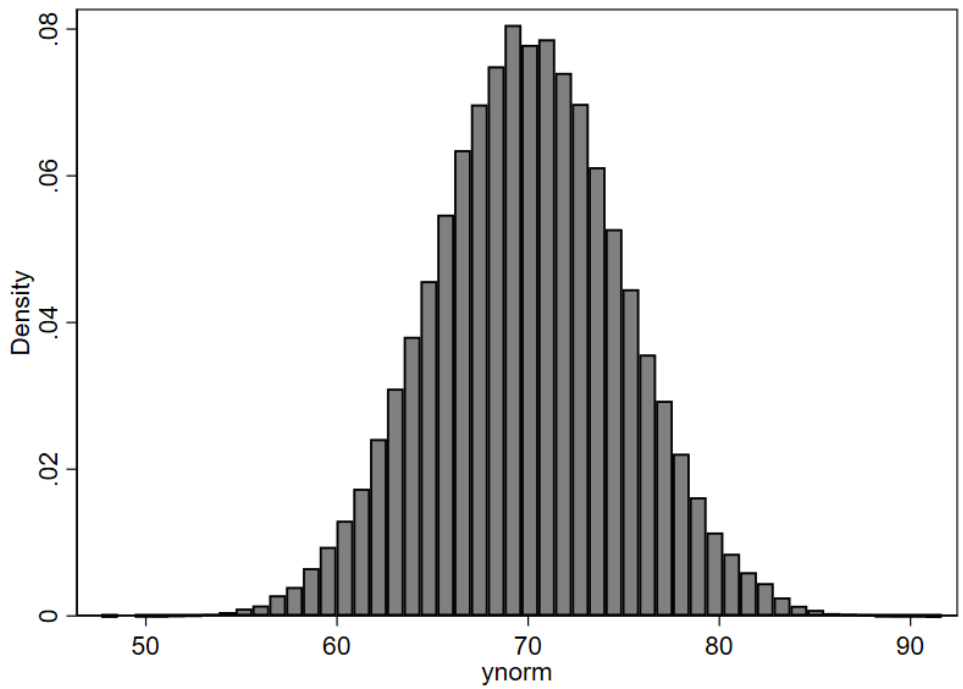
Probability Distributions

- We can extend this logic to probability density functions. Remember the die with 7 faces? Assuming it's a fair die, the probability of each number is $1/7 \approx 0.143$. This is the **probability density function**:
- The probability density function of a random variable describes the values a random variable can take and their probabilities



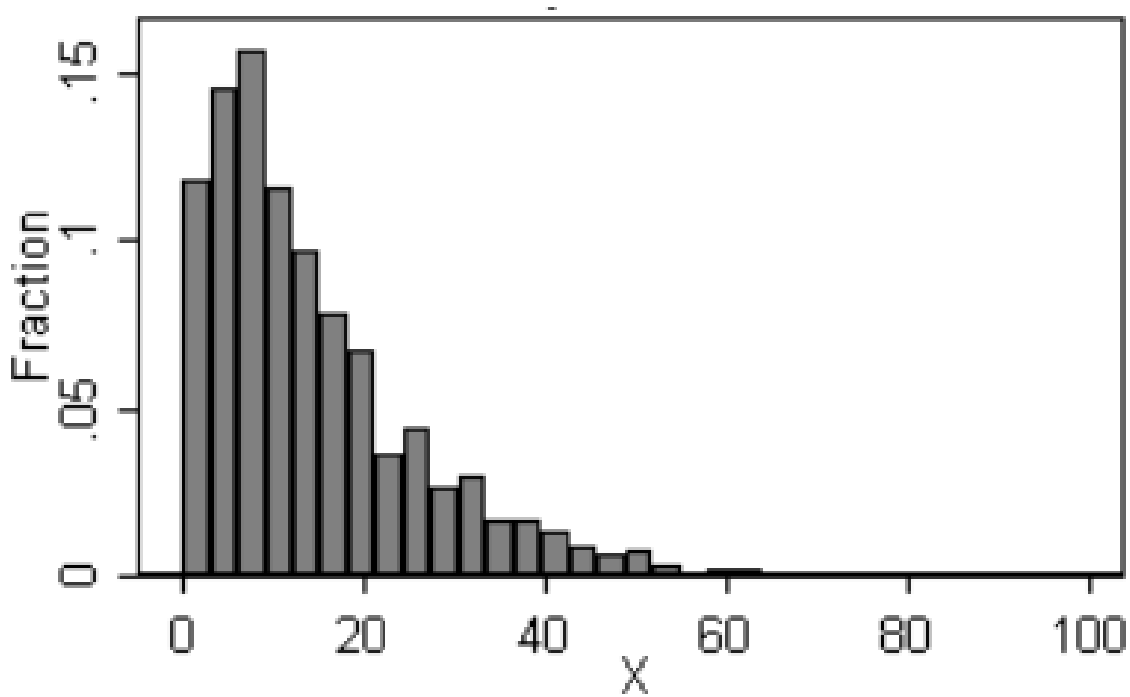
Probability Distributions

- You are used to think about normally distributed random variables like the one below. Say that's grade distributions with a mean of 70 and standard deviation 5. Everybody did more or less the same. I simulated 10,000 students
- Most people cannot be better than the average (in the normal, the mean, median, and mode are the same)



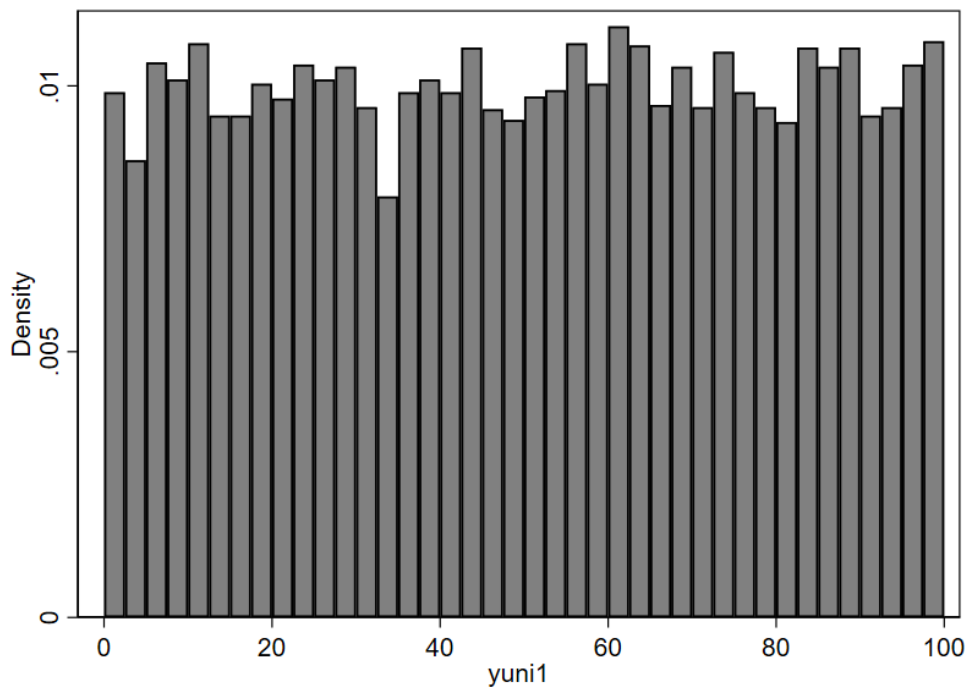
Not everything is "normal"

- We tend to think everything is normal, but it's not. Here is an example of a difficult exam. The average is a larger than the median. So in fact most people did worse than the average
- GRE scores are the opposite. **Most people score above average** – that's why we use percentiles



Uniform random variables

- Another distribution is the uniform distribution. Each possible score has the same probability. Similar to the die, but the uniform is for a continuous random variable
- I simulated 10000 draws

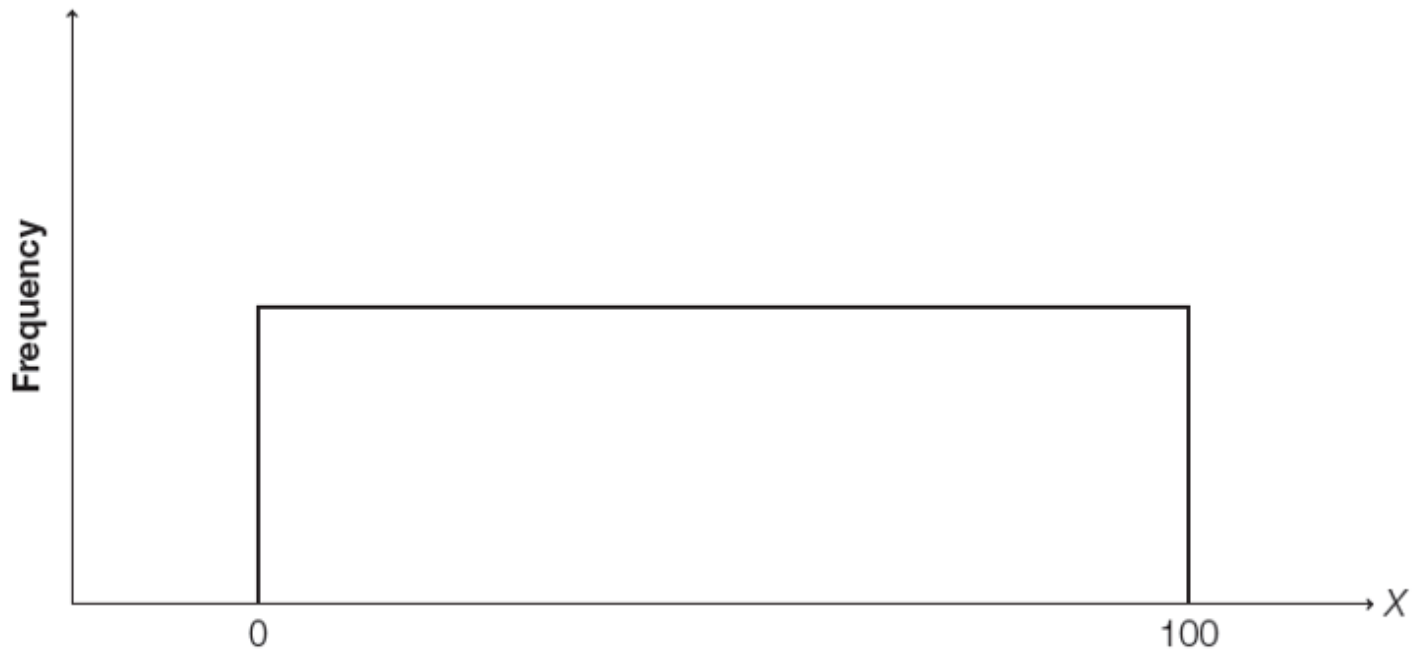


But why?

- We could use uniform random variables to, for example, model the probability that people die on a given day. It's usually uniform. No reason to expect more people die at the end of the month or at the beginning of the week (although more accidents happen Friday night)
- The expected value is just the middle: $E[X] = \frac{a+b}{2} = \frac{0+100}{2} = 50$
- **So why on earth am I doing this?, your may wonder**
- It's because we will assume that **car quality** and the **cost of health insurance** distribute uniformly
- It's not the more realistic assumption, but it's the most didactic assumption
- **Costs do not distribute uniform or normal** (they distribute like the difficult exam example, skewed to the right)

Textbook

- Their version of uniform distribution. Obviously, an abstraction, theoretical with exactly the same probability



Car market - seller

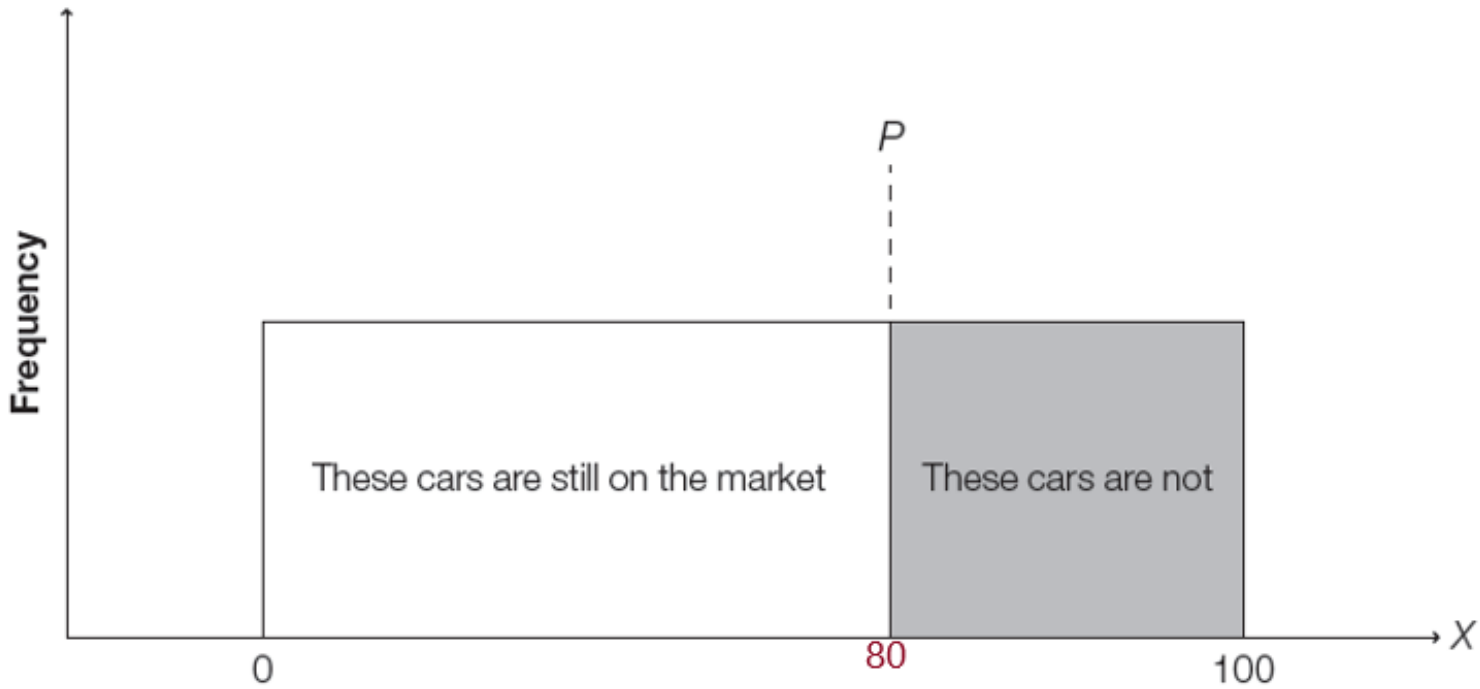
- The idea is simple. A **seller values the car and its quality less than the buyer**, otherwise, there wouldn't be a trade
- For a seller to sell, the utility of the price of the car $U(P)$ has has to be lager or equal than the quality of the car $U(X)$. For the buyer, the opposite
- Some modeling tricks: linear and additive utility functions for buyers and sellers: $U_s = \sum_{j=1}^{n} X_j + M$ and $U_b = \sum_{j=1}^{n} 1.5X_j + M$
- M are other market goods and services
- We can simplify more. Just one car: $U_s = X_1 + M$ and $U_b = 1.5X_1 + M$
- So a buyer "values" quality 50% more than the seller

Car market - seller

- Here is a key assumption: the buyer doesn't know the true quality of a car, but the buyer knows the **distribution of quality** and **understands the adverse selection issue**
- Think about it this way: when you buy a used car, you know that it's likely that you are not going to get the best quality car because the best quality cars are not in the market
- This is why: a seller sells the car at P. So after the trade, the seller's utility is $U_{s\_after} = X_1 - X_1 + P + M = P + M$. So
  $U_{s\_after} - U_{s\_before} = X_1 + M = P - X_1$
- So for a trade to happen if $P - X_1 \geq 0$ or $P \geq X_1$
- **P is set by the market** (key assumption too)
- Nothing fancy here. We needed additive utility functions, and we can always standardize units so we can make comparisons. We make quality be between 0 and 100. We make the price of of M equal to \$1

Cars in market

- We can tell the proportion of cars not in the market. Let's make P=80



Car market - buyer

- **The buyer is in a more complicated situation**. The buyer knows that the good cars are not in the market (those with quality > 80 in the graph)
- What the buyer knows is that there is equal chance that the car she wants to buy has a quality between 0 and 80 (here is where the uniform distribution enters into the picture)
- So the buyer now needs to make a decision **under uncertainty**
- That's the hard situation for the buyer. How can the buyer tell her utility *after* buying the car if she doesn't know the true quality of the car?

Car market - buyer

- She knows something for sure: her utility **before** the trade is $U_{b\_before} = M$
- Because of uncertainty, the utility after the trade is **an expected utility**
- $U_{b\_after} = 1.5E[X] + M - P$
- So $U_{b\_after} - U_{b\_before} = 1.5E[X] + M - P - M = 1.5E[X] - P$
- Is she better off than before? We don't know yet. We know that $1.5E[X] - P > 0$ to be better off, which means $1.5E[X] - P > 0$
- Note that I'm **not entirely following the textbook**. No need to introduce more cars. One car is enough

  (The textbook uses Akerlof's 1970 example. Akerlof's paper is very clever, almost beautiful. You can always explain things in an easy way. As Einstein said, "*Everything should be made as simple as possible, but not simpler*")

Car market - buyer

- So we now we know that for the buyer to buy, this has to be true: $1.5E[X] - P \geq P$
- We can calculate $E[X]$. We assume that quality X is a random variable that distributes uniform, which means that all values are equally possible
- See the graph again. The cars in the market have quality 0 to 80, so $E[X] = 40$
- (The expected value of a uniform random variable is $E[X] = (a + b)/2$ where a is the lower bound and b is the upper bound)
- So for a trade to happen, $1.5E[X] - P \geq 0$, so $1.5 * 40 - 80 \geq 0$ but we have $-20 \ngeq 0$
- Ugh, no trade here. **If all buyers and sellers are identical, there is no market**. Kaput. Market collapses

Market collapses

- To recap:
  - Seller sells if $P \geq X_1$ (for sure wants to sell a car whose quality is lower than the price)
  - Buyer buys if $1.5E[X] \geq P$ (buys only is the expected quality is grater or equal than the price)
- Given how we set up the numbers in this example, the market always collapses
- Suppose $P > 100$, say 200. Seller wants to sell for sure. All cars are in the market
- From the point of view of the buyer, $E[X] = 50$. That means $1.5 * 50 - P = 75 - 200$ is negative
- Here is the bottom line: at higher prices, good and bad cars are in the market, but then the price is too high for our consumer
- **Note the problem**: She would like to buy cheaper cars, but at prices lower than 100, the quality of the cars in the market goes down

Insight

- The main issue is asymmetric information and the uncertainty it introduced
- Without uncertainty, there would be a market. Say, at $P = 80$ there is no "penalty" for using the expected value of quality. So instead of using $1.5E[X] \geq P$ we could see that $1.5 * 80 - 80 = 40 \geq 0$
- For the buyer, it's the guessing game that *lowers* the expected quality of the car
- Obviously, there could be a market if we play with numbers. A buyers buy if $1.5E[X] \geq P$. We can make 1.5 larger. So they buy if they value the cars a lot more than the sellers
- What about if the government fixes the price (**price ceiling**)? **Doesn't matter, unless they also force sellers to sell**
- What if somebody [**government really**] sets quality standard? **That works because the expected qualify goes up**

Insurance

- Akerlof saw insurance as a key application:

  "It is a well-known fact that people over 65 have great difficulty in buying medical insurance. The natural question arises: **why doesn't the price rise to match the risk**? Our answer is that as the price level [of health care] rises the people who insure themselves will be those who are *increasingly certain that they will need the insurance*; for error in medical check-ups, doctors' sympathy with older patients, and so on make it much easier for the applicant to assess the risks involved than the insurance company [Akerlof is in a world of preexisting conditions]. **The result is that the average medical condition of insurance applicants deteriorates as the price level rises – with the result** that **no insurance sales may take place at any price**. This is strictly analogous to our automobiles case, where the average quality of used cars supplied fell with a corresponding fall in the price level."

Insurance

- More from Akerlof:

  "This agrees with the explanation in insurance textbooks:
  Generally speaking policies are not available at ages materially greater than sixty-five.... The term premiums are too high for any but the most pessimistic (which is to say the least healthy) insureds to find attractive. Thus there is a severe problem of adverse selection at these ages.

- That's why Medicare (and Medicaid) were created in 1965

Insurance

- With insurance is the reverse in the graph
- X is now the health care cost. P is the premium per year

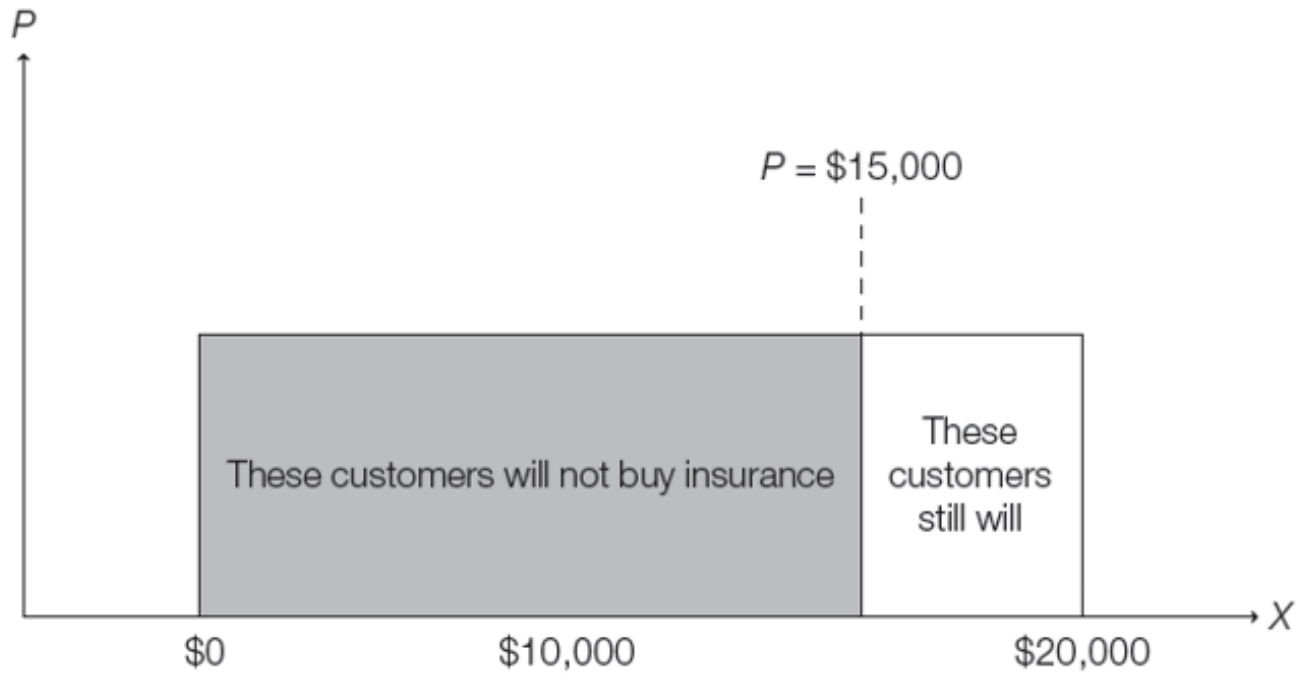


Figure: Source, BHT Chapter 8

Insurance market collapse

- **When would the health care insurance market collapse**?
- We assume people know their cost of care X for next year (that was the 20k in the example)
- The market determines the premium P (that was my premium of 1K)
- Consumers are risk neutral. They will buy the policy if P is less than expected health care costs (we could assume risk averse as well)
- ***Key in in setting ****: **insurer must insure anybody who pays the policy** (so not allowed to use preexisting conditions)
- Health care costs X distributes uniformly
- The cars and sellers are people. The buyer is an insurance company. **The one facing uncertainty is an insurance company**
- In other words, **we are the [possible] lemons**

Adverse selection death spiral

- The insurance death spiral is easy to understand. Graphically, the shaded part gets larger and larger
- Death spiral: "successive rounds of adverse selection that destroys an insurance market"
- Note something key. Where does the insurance premium come from? A profit maximizing insurance company would need to be able to pay for health care when people need it, **so health care prices** play a large role in determining premiums in a perfectly competitive market (even with zero profits)
- **How can the market work**?

Insights from Rothschild-Stiglitz

- We have asymmetric information and we have risk aversion, which tells that people prefer the same amount of money when it's certain than when it's uncertain (expected)
- What happens in the market for insurance? What is the contract in **equilibrium**?
- Equilibrium here means a contract that 1) maximizes consumer utility, 2) no negative profits, 3) it's the best both consumers and insurance companies can do
- **Pooling equilibrium**: attracts health and unhealthy people and satisfies 1), 2), 3)
- **Separating equilibrium**: two separate contracts. One for the healthy and one for the sick

Insights from Rothschild-Stiglitz

- Rothschild-Stiglitz tells us that a) no pooling equilibrium exists. That is, a contract cannot attract a mix of patients even with risk aversion
- Insurance markets can attract either type, but not both. In other words, you can have a contract for lemons and non-lemons, but not a mix
- But insurance companies need a mix to avoid the death spiral
- b) A separating equilibrium can exist. But that implies that sick people will pay a very high premium (compare to coverage) and healthy individuals will be partially insured
- We will explore evidence and some possible ways to get around this problem
- **BIG PICTURE**: The invisible hand of free markets runs into problems
- **No political statement here**, just some basics facts that emerge from asymmetric information and adverse selection

Where are we so far?

- Hope you enjoyed your Spring Break. And hope you started working on the homework
- We'll finish demand for insurance this week and then we take a deep dive into policy
- Summary:
  - **Asymmetric information** alters how markets work
  - **Adverse selection** in the insurance market is one of the consequences of asymmetric information: the sick has more incentives to buy insurance than the healthy (separating equilibrium). The sick are like the lemons in Akerlof's car market. If an insurance company cannot assess risk (or set premiums accordingly), then they have a problem
  - **Adverse selection death spiral**: Pooling equilibrium doesn't survive in the market (in theory), so eventually insurance companies would just exit the market because they can't make money
  - **Moral hazard** increases health care utilization (many mechanisms) because of insurance. Often (incorrectly, I think) is a synonymous of **law of demand** (more on this next class)

Key points

- Make sure you understand some key (some subtle) points we will discuss today
- **The existence of the death spiral depends on regulations and market conditions**. There is no death spiral if any of these conditions are met:
  - Insurance companies can assess risk and not insure people with pre-existing conditions
  - Insurance companies can assess risk and charge different premiums based on risk (separating equilibrium) – "bulk markup"
  - There is a mandate that requires people buy health insurance (with a meaningful penalty and enforcement)
  - There are subsidies that prevent the healthy (low risk) from dropping out of the insurance pool
  - People missperceive risk or don't act on this information
- The death spiral will exist if an insurance company cannot discriminate based on pre-existing conditions, must charge the same price, and must insure anybody who wants to buy the policy

Evidence: adverse selection

- Adverse selection is not a hypothesis or a theoretical result oddity. There is plenty of evidence
- Even going back to the RAND HIE. Participants were asked to make predictions about their health care costs and willingness to buy supplemental insurance
- Those who were in high(er) deductible plans and thought they will need more health care wanted to buy a hypothetical supplemental policy
- And they, accurately, had higher costs the following year
- Remember too that more people dropped out of the experiment in the highest deductible plan

Evidence: adverse selection

- Think about your own needs
- I'm switching insurance next period because I need to use more care. My current insurer makes me spend two hours a week traveling far to get allergy shots
- I swear they do it on purpose to get rid of me and others (of course I don't know if this is correct). There is no convenient location to get shots in the Denver area
- **Cream skimming** perceived business practice of a company providing a product or a service to only the high-value or low-cost customers of that product or service
- **If you were an insurance company, would you offer** a) subsidies to buy gym memberships or b) subsidies to buy glucose monitors and strips?

Classic example: Harvard switch

- There is a classic Cutler and Reber (1998) paper based on a change Harvard made to their subsidies. The paper **focused on vouchers and competition**, but it highlights adverse selection (an additional explanation of the situation is in Cutler and Zeckhauser, 1998)
- I'll follow your textbook, but the textbook presents a simplified version. There were more choices for employees; 5 HMO's for example
- Harvard is a large employer and has a large of pool of people so they can negotiate with insurance companies; as many companies, they attract employees with generous benefits
- Depending on the pool of employees, some large corporations decide to become an insurance company themselves (ERISA-covered plans) – although they tend to contract the operation to an insurance company
- Cheaper than paying an intermediary. Which companies would prefer this option?

Classic example: Harvard switch

- Simplifying, in 1994, Harvard offered only **two** plans both administered by the same insurance company:
  1. **HMO plan**: lower cost, managed access (referrals needed), cheaper plan. Lower premiums
  2. **Preferred provider organization (PPO)**: more flexibility to choose doctors, no gatekeeper primary care doctor. Usually higher costs and copays. Higher premiums
- **Confusion alert**. There are also Point of Service Plans (POS) plans. "A type of managed care plan that is a hybrid of HMO and PPO plans. Like an HMO, participants designate an in-network physician to be their primary care provider. But like a PPO, patients may go outside of the provider network for health care services."
- Lots of details that depend on the fine print. Do you read that stuff? Me neither. Adam Smith's hand depends on you and I reading it (exhibit A; Texas debacle with electricity surge pricing)

Classic example: Harvard switch

- Why would people choose an HMO versus PPO plan?
- Several reasons. One is paying more for choice. The other is having more health care needs. If you are a young-invincible, spring chicken, why bother paying more for PPO?
- Regardless, the type of people in HMO vs PPO at **baseline** are not needed in this story. What matters is the *change* that happened after many years of stability
- In 1994 (baseline), 18% of Harvard employees were in PPO plans; 82% were in an HMO
- To make the story simple, let's say HMO premium was \$0 and PPO premium was \$361 (it wasn't 0, but easier to discuss)
- The PPO subsidy was large; the premium Harvard paid the insurance company was close to \$800, not \$361. In other words, the PPO premium was a lot higher than the HMO premium
- Think about it this way: Harvard was *encouraging* the use of PPO by lowering its price

The change

- Harvard had budget problems due in part because to health care costs (or so they argued)
- So they stopped subsidizing the PPO plan so heavily. In 1995, the large subsidy ended and the PPO premium jumped to $731, which was closer to the actual premium paid by Harvard
- What happened? We already know a lot of things to make predictions
  - First, the **law of demand** tells us that fewer people will choose the PPO plan. The prices goes up, quantity demanded goes down
  - Second, **adverse election** tells us that the people are not going to switch plans at random
- In 1995, PPO enrollment dropped by 22.2% percent (from 18% to 14%) or a 4% percentage points decline. That's the law of demand
- Who left PPO plans? Those who needed less health care – the healthy
- A union opposed the change, so there was a type of "control" to make comparisons

The change

- Leaving the plan was not random

	1994 to 1995		1995 to 1996	
	Stayed	Left	Stayed	Left
Under 40 y/o	21%	31%	15%	30%
Over 60 y/o	18%	13%	19%	10%
Spending next year	6% more		9% more	

Figure: Numbers from BHT Chapter 10

- What do you think insurance company did with PPO premiums?

Premiums

- After the change, the insurance company increased premiums 1995
- And then it increased premiums in 1996
- There are other examples in the literature (see textbook)
- But the Harvard case is prominent in its clarity
- **Don't lose track of the mechanism**. Had the insurance company or Harvard charged more based on age or other factors, it would be a different story

Favorable selection or advantageous selection

- There is evidence on **advantageous selection** or favorable selection as well
- The mechanism is that healthier people are also more risk averse, therefore they buy more insurance
- Or some other factor prompts the healthy (or the sick) to make different choices
- This has happened in Medicare Part C plans, or Medicare HMO (Medicare Advantage)
- At least at the beginning, when Part C was implemented. Healthier people chose Medicare Advantage
- (You can see it as adverse selection into FFS or favorable selection into HMO)

Favorable selection or advantageous selection

- From Newhouse et al. (2012):

  "Favorable selection means beneficiaries who cost less than average, after adjusting for certain demographic and clinical characteristics ("risk adjustment"), disproportionately enrolled in MA [Medicare Advantage], while those who cost more than average have disproportionately remained in Traditional Medicare (TM)[also called Medicare fee-for-services, FFS].

  "It results in higher federal spending because MA payments are tied to risk-adjusted spending for the average TM beneficiary in an area. If the method of risk adjustment inadequately explains differences in costs between MA and TM enrollees, the government pays more for MA enrollees than if they had enrolled in TM."

Why?

- In Medicare, one reason was the way the system worked
- "The ability to opt out monthly facilitated favorable selection, because MA beneficiaries with a mid-year health shock could move almost immediately to TM with its wider selection of physicians and hospitals."
- Yet another example that incentives matter
- Models assume rationality and optimal decisions, but we can get similar findings if only on average people behave this way

Moral hazard

- Origin of term is in the insurance trade
- **Natural hazards**: a hurricane, a tree falling into your car, lightning
- **Moral hazards**: playing with fire, careless driving, surgeon disputing a parking ticket via Zoom while in the operating room (true story)
- In our context: "lack of incentive to guard against risk where one is protected from its consequences, e.g. by insurance."
- "An entity has an incentive to increase its exposure to risk because it does not bear the full costs of that risk."

Moral hazard

- Moral hazard in a story:
- You **face a risk** that might result in a **costly consequence**
- You **buy insurance** to protect you from the risk
- The insurance **protects you from the consequences** of the risk, which means that the **risk is not as costly**
- Therefore, your behavior might change because **incentives have changed**
- Extreme example: no insurance company will sell a life insurance policy that pays out in the case of suicide (Death of a Salesman, by A. Miller)
- Health care: more nuanced
- Health insurance also distorts *others*. Think about this for the homework

Standard story

- A person mentally calculates the marginal cost and marginal benefits of eating a hamburger
- If this person eats a lot of hamburgers, he will need expensive medications to lower cholesterol
- He gets insurance coverage that lowers the cost of the medications to about \$20 in copays. Therefore, he eats more hamburgers *than without insurance*
- Note the connection with the law of demand: price goes down, quantity demanded goes up... But now we are talking about the price of the consequence, not the price of the hamburger
- I find this story convoluted and muddled

Avoiding too much utilization

- The part that is not convoluted and muddled is this: **if the price a person pays for health care goes down because of insurance, people will consume more health care than otherwise**
- So one proposed solution to avoid excessive utilization is to increase the price we pay for care
- The standard tools are:
  1. **Coinsurance**: Enrollee pays a **percentage** of bill
  2. **Copays**: Enrollee pays a fixed amount per episode
  3. **Deductibles**: Insurance does not cover the first amount $X in spending
  4. **Gatekeeping**: Controlling access to care (HMOs in-networks)
- Problem is of course getting it right: we know that people will reduce both necessary and unnecessary care with more cost sharing

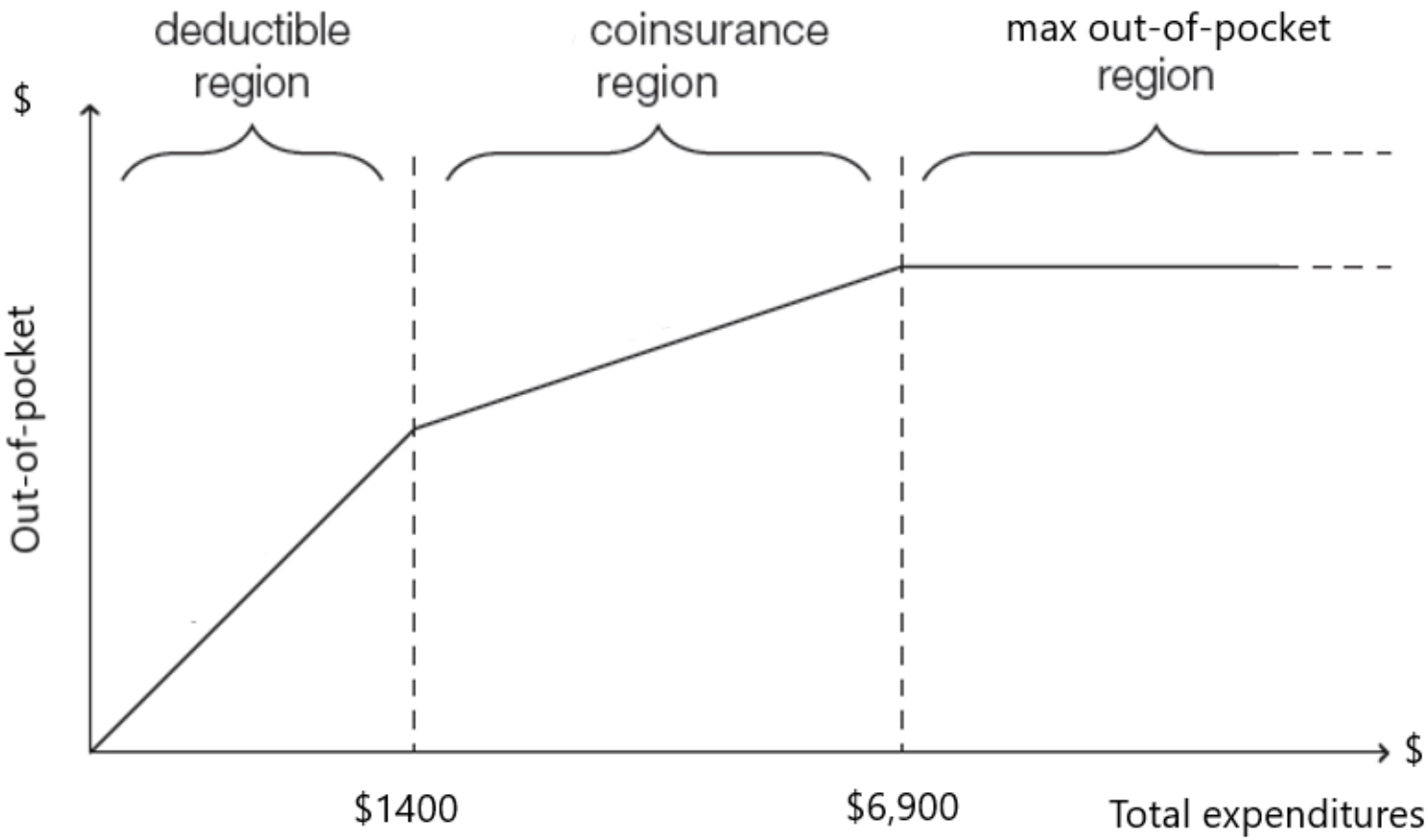
Deductibles

- You are probably familiar with deductible plans because of your car insurance. Most have deductibles
- In health care, high deductible plans have regions of co-insurance, copays, and maximum out-of-pocket levels
- **High-deductible plans** ("consumer directed plans") have become more common
- IRS definition:

  "For 2020, the IRS defines a high deductible health plan as any plan with a deductible of at least $1,400 for an individual or $2,800 for a family. An HDHP's total yearly out-of-pocket expenses (including deductibles, copayments, and coinsurance) can't be more than $6,900 for an individual or $13,800 for a family. (This limit doesn't apply to out-of-network services.)"

High-deductible health plan

- For the first \$1,400, a person covers pays all the cost; then a portion. After \$6,900, zero



Deductibles

- Why is the IRS telling us this? Because you can tie a HDHP to a **health savings account** (similar to a **flexible spending account**, but you don't have to spend the money)

  "Health Savings Account (HSA): A type of savings account that lets you set aside money on a pre-tax basis to pay for qualified medical expenses. By using untaxed dollars in a Health Savings Account (HSA) to pay for deductibles, copayments, coinsurance, and some other expenses, you may be able to lower your overall health care costs. HSA funds generally may not be used to pay premiums."

  `https://www.healthcare.gov/glossary/health-savings-account-hsa/`

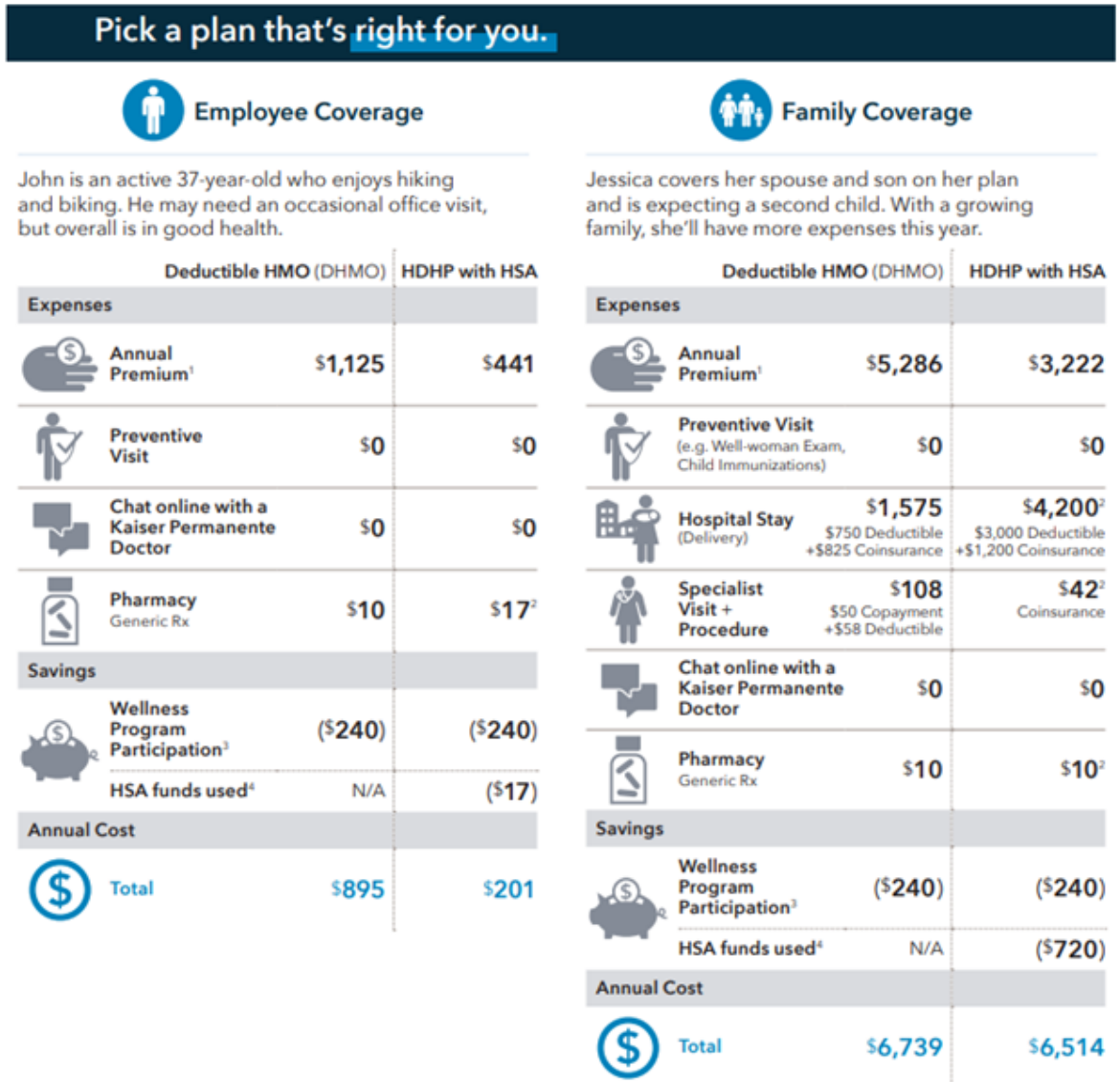
What is the selection?

- Who gets a HDHP? Follow the money...
- Monthly premiums are lower than other plans, so you may not be surprised to learn that your employer is sort of pushing you (nudging?) towards a HDHP
- **A healthy person has a clear incentive**: you pay lower premiums, you can set aside pre-tax money, and you have a cap on out-of-pocket expenses
- Your employer is happy too; they pay lower premiums. Some help with contributions to health savings accounts
- Because of the Affordable Care Act, **preventive care is free**, so you can see your primary care doctor with a copay rather than counting towards the deductible
- If you have an accident or need surgery, your max out-of-pocket is capped

Example, CU

PLANS	CU Health Plan - Exclusive	CU Health Plan - Extended	CU Health Plan - High Deductible	CU Health Plan - Kaiser
ELIGIBILITY	Faculty University Staff Classified Staff Non-Medicare-eligible retirees Non-Medicare-eligible Surviving spouses	Faculty University Staff Classified Staff	Faculty University Staff Classified Staff Non-Medicare-eligible retirees Non-Medicare-eligible Surviving spouses	Faculty University Staff Classified Staff Non-Medicare-eligible retirees Non-Medicare-eligible Surviving spouses
TYPE OF PLAN	Health Maintenance Organization (HMO)	Preferred Provider Organization (PPO)	Preferred Provider Organization (PPO)	Exclusive Provider Organization (EPO)
PROVIDER	Anthem Blue Cross Blue Shield	Anthem Blue Cross Blue Shield	Anthem Blue Cross Blue Shield	Kaiser Permanente
MONTHLY COST	Employee: $52.50 Employee + Spouse: $188.50 Employee + Child(ren): $118.50 Family: $245.00	Employee: $77.00 Employee + Spouse: $234.50 Employee + Child(ren): $154.50 Family: $308.00	Employee: $0 Employee + Spouse: $15.00 Employee + Child(ren): $14.00 Family: $19.00	Employee: $109.00 Employee + Spouse: $296.50 Employee + Child(ren): $188.50 Family: $378.50
COVERAGE AREAS	Colorado Out-of-state dependent coverage may be available.	Colorado and nationwide	Colorado and nationwide	Colorado Out-of-state dependent coverage may be available.
DEDUCTIBLE(S)	Individual: $250 Family: $750	Individual: $750 Family: $1,500	Individual: In network: $1,500 Out of network: $3,000 Family: In network: $3,000 Out of network: $6,000	$0

"Subtle" nudge? From Colorado government



Pick a plan that's right for you.

Employee Coverage

John is an active 37-year-old who enjoys hiking and biking. He may need an occasional office visit, but overall is in good health.

	Deductible HMO (DHMO)	HDHP with HSA
Expenses		
Annual Premium[1]	$1,125	$441
Preventive Visit	$0	$0
Chat online with a Kaiser Permanente Doctor	$0	$0
Pharmacy Generic Rx	$10	$17[2]
Savings		
Wellness Program Participation[3]	($240)	($240)
HSA funds used[4]	N/A	($17)
Annual Cost		
Total	$895	$201

Family Coverage

Jessica covers her spouse and son on her plan and is expecting a second child. With a growing family, she'll have more expenses this year.

	Deductible HMO (DHMO)	HDHP with HSA
Expenses		
Annual Premium[1]	$5,286	$3,222
Preventive Visit (e.g. Well-woman Exam, Child Immunizations)	$0	$0
Hospital Stay (Delivery)	$1,575 $750 Deductible +$825 Coinsurance	$4,200[2] $3,000 Deductible +$1,200 Coinsurance
Specialist Visit + Procedure	$108 $50 Copayment +$58 Deductible	$42[2] Coinsurance
Chat online with a Kaiser Permanente Doctor	$0	$0
Pharmacy Generic Rx	$10	$10[2]
Savings		
Wellness Program Participation[3]	($240)	($240)
HSA funds used[4]	N/A	($720)
Annual Cost		
Total	$6,739	$6,514

- (The state deposits $720 in the health savings account)

How people choose?

- The cognitive burden is large
- So is the uncertainty. Does anybody know what is the price of anything?
- Once has to go with gut feeling almost, but on average it's likely that we get it more or less ballpark correct
- But it's an empirical question

Moral hazard is not a bad word

- Health insurance gives us two very important things that we highly value:

  1) It protects us from uncertainty

  2) It has an income effect
- Without insurance, we may not use care when we need it. Prevention is a good thing in the long run. **Don't be an overconfident male**: go to the doctor for preventive care
- For some catastrophic diagnoses, we could lose our savings and wealth. Insurance makes us **wealthier** than otherwise
- There is some fine-print theoretical discussions related to this point (see section 11.6 in textbook)

Forest and trees

- There is a strong consensus among policy experts and economists that moral hazard exists
- Full insurance in a market does not exist; it's never optimal
- This has a lot of policy implications. For example, universal free (from the point of view of the user) would be considered a bad idea
- It would lead to overutilization and other forms of gatekeeping, like long wait lists and underfunding
- But not necessarily universal insurance with some form of cost sharing