

I had a career as an actuary for three days. To become a full-fledged actuary, you have to pass a series of exams. In 1970, I passed the first two of these, and I got a summer job as an actuarial trainee at US Life Insurance Company in New York City, a couple of blocks from Wall Street. Things got off to a shaky start. The first day, I got called into my boss's office. I wasn't wearing a tie, and he wanted to know why. I explained that I didn't really like ties, and I didn't even own a tie. He replied that he hated ties, and that at US Life Insurance Company in New York, everyone had to wear a tie. The next day, I wore a tie. The next day, I also realized that my job for the entire summer was going to be calculating policy premiums for the following year. I was going to have to recalculate, like, hundreds or thousands of these. This is something that these days a computer can do in a fraction of a second. The next day, I quit, and I got a job in the transportation industry. You know, even though I didn't last as an actuary, I've always found insurance fascinating, especially the risk management side, and in this video, I want to talk briefly about how insurance works.

We live in a world full of risk. Houses burn down. People get in car wrecks or get disabled and can't work for a while. These things don't happen to everyone, and they certainly don't happen on a strictly predictable schedule. But when they do happen, one thing is predictable. They can cost us a lot of money. Insurance protects us from being wiped out financially by big losses. One big loss is that of your home burning. How do you protect yourself? Well, I keep this around, especially when I'm working with hot lights, but, you know, I also have homeowner's insurance. What would you have done in the days before homeowner's insurance?

Let's say you live on a farm in rural America, and one day some coals fall out of your fireplace onto the wood floor. And your house burns to the ground. What are you going to do? If you're lucky, you live in a community of friends and family, and you and your family moved in with a parent, a sibling, or a close friend. And when the work of farming is slow, the people in your small, close-knit community help you to rebuild. That works pretty well for some people. But what if your house burns down, and you don't have anyone who can take you in? Or what if it's harvest season, and nobody in your community has spare time or money to help you rebuild? This system put a big burden on neighbors, while leaving some farmers homeless.

So in the 1800s, some American farmers in the same townships joined together to form mutual fire insurance companies. Each company was owned by the policyholder, the farmers, themselves. Let's imagine a mutually-owned fire insurance company with a total of 100 farmers who are policyholders. Each farmer has a home that would cost \$100,000 to rebuild. Now, the farmers know from experience that every year, on average, one of the 100 farmers loses his house to a fire, so each policyholder makes an annual payment, called a premium, of \$1,100. The company receives 100 premiums of \$1,100, for a total of \$110,000 each year, enough to rebuild one home plus \$10,000 to cover expenses or to make a profit, and the unlucky farmer whose house burns down that year is not wiped out. Of course, some years two houses might burn down, so the insurance company would need some extra reserves on hand.

Insurance works best when it protects people against expensive losses that are unlikely, predictable in frequency, but mostly not linked to each other. There are situations and risks that insurance companies don't like to cover, and insurance for these tends to be expensive or limited. For example, they don't like to insure risks that are likely to result in a lot of claims at the same time. These are sometimes referred to as correlated risks.

A good example of correlated risk is earthquake damage. I live about 300 feet from the Hayward Fault. That's that red diagonal line right there, and the roof of my house is right here in the lower, left-hand corner of the screen. Now I know how a weatherman feels, pointing at things that he really can't see. There hasn't been an earthquake on the Hayward Fault in many, many years, but when the big one strikes insurance companies are going to get swamped with billions of dollars of claims, all at once. This makes it difficult for them to manage the risk of not being able to pay all of the claims.

Insurance companies are also concerned about what's called moral hazard. Moral hazard is when one person decides how much risk to take, and another person bears some or all of the consequences when things go wrong. Insurance companies worry that if people are fully insured, they may take more risks than they otherwise would. Suppose, for example, that you own an expensive diamond necklace, and you've got no insurance for it. You would probably keep it well hidden or in a safe, but what if it were insured for 100% of its value? You know, you might leave it out on the kitchen table and not bother to lock the doors. You figure that if it gets stolen or lost, you're not going to lose any money. So you decide to take a little more risk, and the insurance company bears the consequences. So how do insurance companies handle moral hazard?

Well, one way is with explicit conditions. Your insurer might require that you have a safe and that you put your diamond necklace in the safe at night. They might also ensure your necklace for less than 100% of its full value. They figure if you've got to bear some of the loss yourself, you're going to be a little more careful.

Insurance companies also worry about something called adverse selection. That's when people who are at the greatest risk by insurance, and those at low risk don't. For example, if life insurance were sold to everyone at the same price, smokers, people with heart conditions, and the elderly would buy a lot of life insurance, while the young and healthy would not. Life insurance companies make a great effort to determine how big of a risk each policyholder represents. They then charge people at higher risk, such as smokers, more money for life insurance. In some cases, they may simply refuse to sell life insurance to someone who's too great a risk.

Now, can you think of other types of insurance with correlated risks, like earthquake insurance? What about some types of insurance with potential moral hazard, which is insurance that could cause people to take risks they wouldn't otherwise take? And what about types of insurance for which there might be adverse selection, you know, people at greater risk buying more insurance than people at low risk? I'd like you to pause the video for a moment and try to think of examples of each of these three.

So what did you come up with for insurance with correlated risk? Some good examples are insurance for hurricanes, floods, damaged crops. We don't usually think of something like life insurance as having correlated risk, but an outbreak of a major illness such as the 1918 flu pandemic could result in a lot of correlated deaths. Insurance actuaries have pretty tricky jobs, don't they?

What about moral hazard? That is people taking more risk because they're insured. Moral hazard is greatest when the insurance company completely eliminates the negative consequences of risk taking, but with a lot of types of insurance, that's just not possible. For example, health insurance might cover the financial cost of being treated for lung disease, but it can't eliminate the pain or guarantee you'll survive. So very few people take up smoking simply because they have health insurance. Moral hazard is pretty low because insurance can't eliminate all the negative consequences to you of taking more risks with your health.

One type of insurance with high moral hazard is unemployment insurance. You can get private supplemental unemployment insurance, but usually it only covers the difference between your state unemployment benefits and about half of your former salary. Why not 100%? Well, insurance companies figure that if you're going to get the same income whether you're working or not, you're more likely to lose your job, but if you're going to lose half your income, you'll try harder to keep it.

While farmers formed insurance companies to protect against losses from fire, they didn't insure themselves against the loss of a chicken in their coupe or a cow in their barn. Why not? Because these were smaller losses that most farmers could sustain without too much outside help-- sure, the loss of a cow might set the farmer back, but not so much that it warranted getting an insurance company involved in paying regular premiums. And this is an important point to keep in mind when you think about insurance for you. In the long run, it's going to cost you more to insure against relatively small losses, whether it's a chicken dying or your TV breaking. Insurance companies charge premiums that are high enough to cover their claims and give them a profit.

For small items, such as an extended warranty on a TV, companies charge proportionally higher fees and make higher profits. For example, I recently purchased a Fitbit as a present for a friend. This is a Fitbit. You carry it in your pocket, and it counts how many steps you take each day. When I got it, the cashier asked me if I wanted to buy a one-year extended warranty for \$11. The warranty covered manufacturer defects and normal wear and tear. I didn't buy the warranty, but when I got home I looked up the manufacturer's warranty. It turns out that Fitbit has a 45-day satisfaction guaranteed return policy. If you don't like the Fitbit, you can return it within 45 days for a complete refund, no questions asked. On top of that, Fitbit also comes with a 365-day manufacturer defect warranty, so the \$11 warranty the store was offering to sell me was basically just insurance against the risk that my friend would walk so much in one year that he wore out his Fitbit. My friend likes to walk, but that's not going to happen. Now, I know \$11 doesn't seem like much money, but it's more than 10% of the cost of the Fitbit and far more than the fair value of insuring in it. If you pay for warranties on every consumer product you buy, something's going to break occasionally, and you're going to collect on the warranty. But in the long run, you're going to pay out way more than you get back, so don't insure the small stuff. Keep your money in your pocket.

You know, an actuary's job is to manage risk. I quit my job as a life insurance actuarial trainee to drive a yellow cab. I still have my old cab-driving license. If I had been thinking like an actuary, I would have made a different choice. During the first 7 months of 1970, 3,000 New York cab drivers were robbed, and seven killed. I was one of the 3,000 robbed. To the best of my knowledge, no actuaries were robbed or killed on the job that year. When it comes to managing risk, the odds are in their favor.