

**Economics of Banking and Finance Markets**  
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**Lecture - 21**  
**Selection Problem in Finance Markets - I**

Welcome to this session. In the previous session, we have discussed the basic concept of asymmetric information. There, we talked about how asymmetric information leading to market failure and selection bias, by using the examples of used car market.

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**Problem of individual insurance**

- Consider situation where people can purchase individual health insurance policy
- Problem for insurance companies
  - ↳ They do not know who has the highest risk of expenditures ✓
  - ↳ People themselves have an idea whether they are a high-risk person or not
- Asymmetric information

16

In this session, we will see how this kind of market failure would happen in various types of finance markets.

Let us start with the how this would happen in individual insurance market. So, individual insurance market, for the sake of simplicity, let us take it individual health insurance market. Consider a situation where people can purchase individual health insurance policy.

So, in an individual health insurance market, the problem for insurance companies is that they do not know who has the highest risk of health expenditure or what are the potential health risk of the potential purchaser or potential consumers or potential insured. As compared to insurance companies, you know that people themselves have an idea whether they are a

high-risk person or not. If you just think about yourself, whether you are going to buy a health insurance or not, and if you not, you know the reason, right.

Because you think that you are healthy, and you think that the probability for or the propensity to consume healthcare products in the next 1 year may be very less. Your forecast is thing that you may not be needing any hospitalization. So, why would you simply buy a health insurance product. However, at the same time, if someone having any health risk or very chronic disease conditions and anticipate that he or she is going to get hospitalized. And, then the person will be more motivated or incentivized to purchase a health insurance product. In this case, what we have seen that between insurance companies and prospective customers, there is asymmetric information about the health risk.

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**Market failure in Insurance Market**

- Asymmetric information can lead to poor performance in the private insurance market
- Selection Bias: Actions by insurers and consumers to exploit unpriced risk heterogeneity and break pooling arrangements;

The outcome of these actions:

- 1) Adverse selection
- 2) Cream selection

17

Health risk is the parameter where we can see observe that there is an asymmetric information. Because of this asymmetric information, it can lead to market failure in insurance market. It can lead to a poor performance in private insurance market.

So, let us explain, let us discuss how asymmetric information is going to result the poor performance or poor working of private insurance market. So, we introduced the concept called selection bias in the used car market where we had discussed the market will be overrepresented by poor quality car. That means, at the end, there will be only poor-quality car, and finally, the used car market will collapse.

The proper definition for selection bias is that actions by insurers and consumers to exploit unpriced risk heterogeneity; that is the health risk and break pooling arrangement. So, when we talk about insurance, insurance is a pool of high risk and risk pool of people; with a different risk that the high risk, medium risk, low risk. So, it should be a mix of all kinds of risk involved.

Suppose in a country for example, with a 1 billion population, that is 100 crores, suppose we see that only 1 crore population needing a hospitalization in the next year. Then, remaining 99 core cores would not need any hospitalization. Also assume that this is the based-on data about the hospitalization.

In this context, we know that 1 crore is high risk population, and 99 crores are low risk right. So, accordingly, we know that out of this only 1 percentage of the population is needing hospitalization. So, how an insurance company will underwrite the policy? It will be based on this information; that means only 1 percentage is requiring hospitalization and remaining 99, they do not need hospitalization. So, if they assume that the entire population, that is, all the 1 billion population is joining the insurance, they need to pay the claim only to this 1 percentage.

So, what they will do? So, they will be calculating the risk premium in a way that what will be the total expenditure, for example, this 1 crore will be needing for example, 10 billion dollars. That is, 10 billion dollar is the total health expenditure for this 1 crore population. You know that then the remaining 99 needs only 0 expenditure.

When the insurance company do the pricing, you know that, if their assumption is that all the 1 billion population will join the policy, accordingly the total health expenditure is 10 billion, 10 billion only. So, you know that its only 10 billion; that means, 10 billion divided by the entire population that is 1 billion. Accordingly, you know that the risk premium is going to be 10 dollars only for this policy.

To calculate the premium, they will add the operating cost plus profit on the risk premium. Assuming that this is 2 the per unit policy, you can see that per person must pay dollar 12 as premium to buy this policy, given this is the health risk profile of this population.

But you know that not all these 1 billion populations is going to buy the policy.

Note that this proportion that the 1 percentage is high risk, this 99 is low risk. But what is going to happen really in the market? We know that the insurance company cannot clearly identify out of this 1 billion or out of this entire population who are this 1 percentage, that is, who is having high risk, who are this 99-percentage population who are having low risk; that insurance company cannot directly identify those people.

But, among this 1 billion, the most of them from the 1 percentage may be knowing that about their health condition, that is, they are high risk population. So, this information asymmetry, we are going to see that the actions by insurers and consumers, the potential consumers they are going to exploit this unpriced risk heterogeneity.

And, as a result, this is going to break the pooling arrangements, that the pooling means insurance means this risk pooling, risk pooling that risk of this low risk and high risk, this pooling together. Because of this information asymmetry, it would lead to adverse selection problem that we are going to discuss shortly. In contrast, if insurers have some other kind of information, if they do something else to overcome this adverse selection; it would also lead to cream selection problem.

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Let us see the case of adverse selection issue. So, suppose that when the risk pooling is going to overrepresented by a high-risk population. Suppose we saw that in this population, we know that 1 percentage is high risk and remaining 99 percentage is low risk. But, due to the information asymmetry we know that since the joining to insurance policy, that is, buying is a

voluntary decision of prospective customers. So, you see that if it is the those who are feeling that they need more health care consumption or they are going to fall sick and needing hospitalization, they are going to join more.

The red color smiley; let us call them the high risk. This is the high-risk population, high risk and this light blue color we are going to call as the low risk. That is, 1 percentage of high risk and 99 percentage of low risk. In practice, what is going to happen that this market is going to be overrepresented by high-risk people.

So, in this case what you can see that when an insurance policy is sold out in the market, it will be overrepresented by high-risk population; that means, high risk customers. So, those who needing hospitalization. So, in this case, here you can see from this the figures, it is overrepresented by high-risk population red smileys.

In the next circle when the insurance company is underwriting the policy, they know that this market actually overrepresented by high risk population, as a result they will be redoing this calculation and the premium is going to increase.

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**Adverse selection**

- Individuals themselves know much about their health condition than insurance companies;
- People who insure themselves are those who are increasingly certain that they will need health insurance and buy more insurance.
- Those purchasing insurance are a non-representative portion of the population.
- A situation of buying of health insurance by high risk people and the resulting of overrepresentation of such high risk people in risk pool.

19

What you can see that since individual themselves know much about their health condition than insurance companies. People who insure themselves are those who are increasingly certain that they will need health insurance and buy more insurance as compared to

individuals who think that they do not need insurance. As compared to low-risk people, people with the high-risk people will get insurance coverage.

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**Adverse selection**

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- Those purchasing insurance are a non-representative portion of the population.
- A situation of **buying** of health insurance **by high risk people** and the resulting of overrepresentation of such high risk people in risk pool.

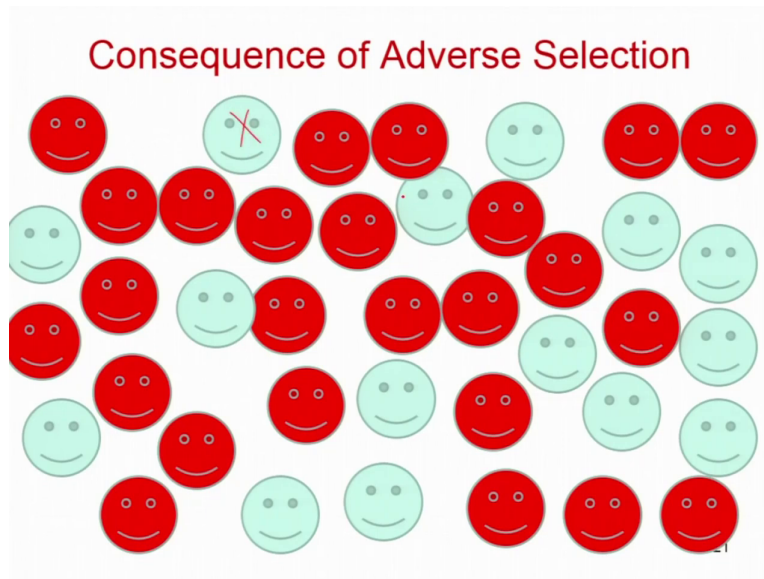
*Handwritten notes: \$12 ↑ (\$200)*

20

So, those purchasing insurance are a non-representative portion of the population. This would lead to a situation of buying of health insurance by high-risk people and this resulting of overrepresentation of such high-risk people in the pool. Now, let us see if this scenario happens, what is going to happen in this market? The premium is not going to be these 12 dollars at all. This is going to increase.

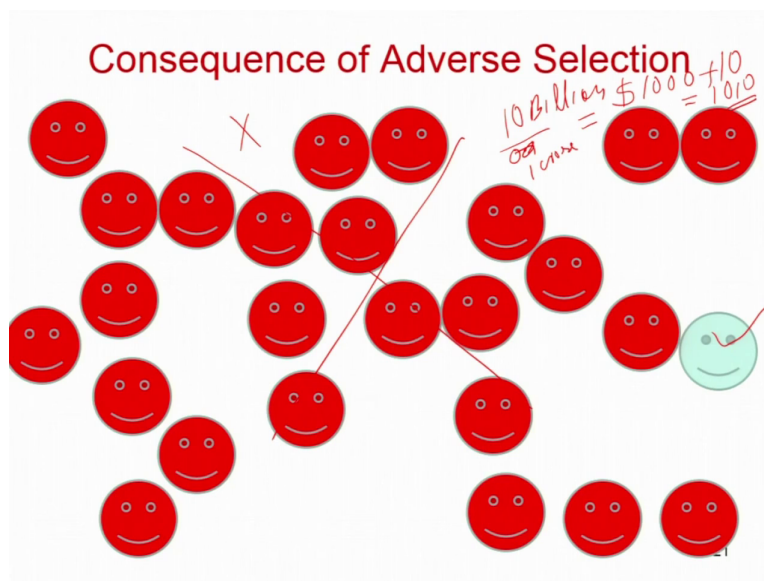
The new premium maybe for example, based on this calculation, the new premium for example, is going to be 200. So, in this example, we know that though it is overrepresented by high-risk population, we can also see some low-risk population as well here. But, if the premium increase because of this adverse selection, the premium must be increased accordingly.

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Now, let us see what is going to happen. So, when the premium increases, some more people, for example, began think that what is the point of giving 200. So, they eventually leave the market, maybe when at the time the renewal of this policy, those who did not use health insurance coverage, who did not make any claim; we know that they are healthy, low risk. What will they do? They will eventually leave the market.

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When they leave the market, the premium has increased and again in the subsequent circle, we are going to see that the market will be overrepresented by high risk people only. So, in



this case now if the insurance companies are going to do the underwriting through to the actuarial calculation, they are going to see that this population only represented by this high risk. And the premium will be the average of the total health care expenditure.

So, in this case the premium is almost equal to the average of the hospitalization expenditure, then what is the point? This market is now only with the high risk. The operating cost for this for each of the policies for example, then it is for example, 10. then is going to be this much. This is going to be the new premium. So, what overall what you can see that this market this is now more with high-risk people, and you can see that this is nothing, but adverse selection.

So, what we are going to see that this kind of market will not exist, even this person also will leave, will think that why should I pay 1000 premium because I am not using it. I do not need insurance policy; I am feeling myself healthy. So, this will be more with unhealthy people; that means, is an adverse selection in insurance market.

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It means, this market will collapse. This is called a kind of market failure in insurance market. And, to overcome this, you know sometime insurance companies will do a cherry picking. They will exclude those who with previous health histories, health problems, or had previous hospitalization.



Those who are having chronic diseases, like for example, heart disease or having some chronic risk factors like diabetes, hypertension; they will not be given the health insurance policy. They deny insurance coverage to older people, elder population. And they only give insurance coverage to, for example, with those with a age group of 18 to 40 or 45 for example.

Now, suppose they sell insurance only to low-risk population, then you can see that there is cherry picking in this market. They deny insurance coverage to unhealthy population and those for example, elderly because elderly, once you grow old you know that after certain years, your health stock start deteriorating, then, to restore your health you need more consumption of healthcare products, thus, healthcare expenditure increase.

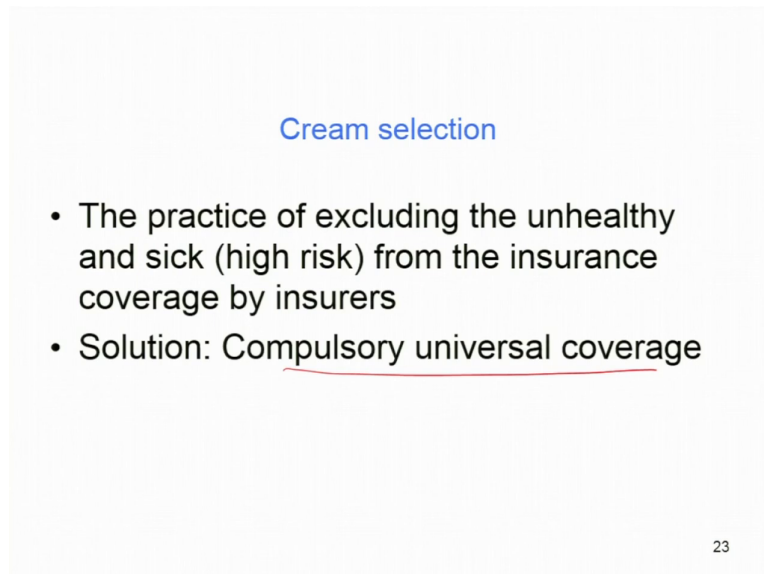
So that means, age is an indicator for screening. Age is an indicator to identify high risk. Similarly, those who had earlier health expenditure, hospitalization episodes and with the chronic disease condition, all of them will be excluded. And this market will be overrepresented by cream selection.

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This is another case of market failure. Here, the purpose of insurance is not being served as it is only with low-risk population.

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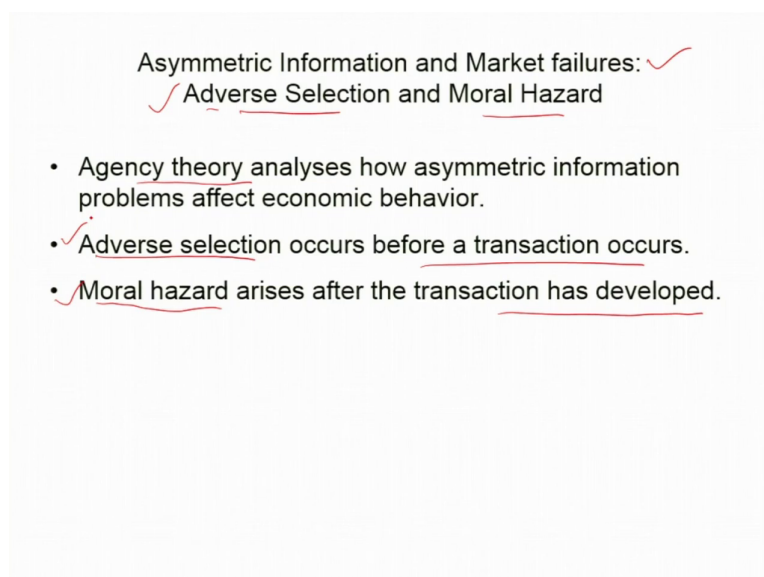
Cream selection

- The practice of excluding the unhealthy and sick (high risk) from the insurance coverage by insurers
- Solution: Compulsory universal coverage

23

This is the cream selection. The definition for this one is the practice of excluding the unhealthy and sick from the insurance coverage by insurers. So, the solution here is compulsory universal coverage; that means, government come up with the regulation that there should be compulsory universal coverage.

(Refer Slide Time: 19:22)



Asymmetric Information and Market failures: ✓  
✓ Adverse Selection and Moral Hazard

- Agency theory analyses how asymmetric information problems affect economic behavior.
- ✓ Adverse selection occurs before a transaction occurs.
- ✓ Moral hazard arises after the transaction has developed.

Because of this asymmetric information, we found that the market failure happens.

In short, there are mainly two types of market failure; one is selection bias with either the adverse selection or cream selection which we already discussed.

The second one is moral hazard issue, which we will discuss in some in next session.

So, this issue can be better understood by agency theory which analyses how asymmetric information problems affect economic behavior. So, the point which we discussed the selection problem, that is adverse selection or cream selection occur before a transaction take place.

The second kind of market failure due to asymmetric information, that is, moral hazard, arises after the transaction has already taken place.

Let us now see how adverse selection influences the financial structure.

(Refer Slide Time: 20:27)

**The Lemons Problem: How Adverse Selection Influences Financial Structure**

- If quality cannot be assessed, the buyer is willing to pay at most a price that reflects the average quality.
- Sellers of good quality items will not want to sell at the price for average quality.
- The buyer will decide not to buy at all because all that is left in the market is poor quality items.
- This problem explains fact 2 and partially explains fact 1.

Fact # 2 [Issuing marketable debt and equity securities is not the primary way in which businesses finance their operations]  
Fact 1 [Stocks are not the most important sources of external financing for businesses]  
On supply side of stock: due to asymmetric information, some good companies may be afraid that stock might not get its full economic price (though IPOs) as buyers of the IPO can not distinguish the quality of the companies

If quality cannot be assessed, the quality of bonds, the quality of stocks, the buyer is willing to pay at a at most a price that reflects the average quality. And sellers of good quality items will not want to sell at the price for average quality.

And, then the buyers will decide not to buy at all because all that is left in the market is of is poor quality items.

We are going to see that whether adverse selection problem is there; because of the asymmetric information, it is a reality. Asymmetric information is leading to adverse selection or lemons problem, and it explains fact number 2 and partially explain fact number 1, which we discussed.

So, what is fact number 2? Issuing marketable debt and equity securities is not the primary way in which businesses finance their operations. And the fact number 1 is stocks are not the most important sources of external financing for businesses. So, in this case, what you can see, for example, fact number 2 and fact number 1; due to asymmetric information, some good companies may be afraid that stock might not get its full economic price. So, the companies with the strong economic fundamentals, that is, having a strong good financial project going to succeed and going to earn huge profit. Therefore, they expect that they expect a high IPO, the unit price of their share.

But, because of the asymmetric information, the prospective buyers of their stock may not be knowing whether this company is in good financial condition, or they are in low risk or not. So, as buyers of the IPO cannot distinguish the quality of the companies, the prospective buyers cannot clearly know which firm is of is good quality.

If the buyers cannot clearly distinguish which company is of good quality, which is the peach and which is the lemon, if they cannot distinguish, you know that they are going to pay only the average of quality price. And eventually you also know that the market will be overrepresented by low quality. Because, good quality companies want a high IPO price, but they will not be getting it.

Similarly for the bond; the same issue. There may be the companies with a good economic fundamental who want to borrow from the market. They expect to borrow at a low rate of interest, as we had discussed previously that high quality and low risk firm should be able to borrow at a low interest rate from the market. But that will not happen because of asymmetric information.

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**Lemons in Stock Market**

- ✓ **Good Firm (peach):** High expected profit and low risk
- ✓ **Bad Firm (lemon):** Low expected profit and high risk
- ✓ **Investor's WTP** = Price of the average quality ✓
- ✓ **Asymmetric Information:** Managers of good firms know more about their firm than investors, so less WTA the average price for their stock (IPOs)...bad firms happy with average quality price...
- ✓ **Investors:** Do not want to buy stock of bad firms...end up with collapse of the equity market (mainly in the primary market)

*Equity*

*Adverse selection ->*

Let us apply this one, the lemons in the stock market, in the bond market as well.

So, you know that good firms, namely, peach, they have high expected profit and low risk. And bad firms that is lemons, you know that they have low expected profit and high risk. You know that the investors willingness to pay is going to be the price of the average quality. Then, what is going to happen in this market? The managers of good firms know more about their firm than the potential investors.

As the managers of good firms know more about their firm than investors, the good firms have less willingness to accept the average price for their stock, that the IPOs. They are not willing to accept the average price, the price for the average quality though the investors willingness to pay will be the average. So, what is going to happen?

At the same time, this is about the managers of good firms; that means, high quality firms. How about the low-quality firms? That means, about the lemons, you can see that the bad firms, they are in fact happy with the average quality price. You know, why? Because, obviously, they are getting more than they deserve. So, this is the case because of the asymmetric information. Then, how about the investors? They do not want to buy stock of bad firms.

The investors want to earn dividend and they also want to earn capital gain in the future. So, they do not want to buy the stock of bad firms. In practice, this market will be overrepresented by the bad firms. This market is going to be only with a bad firm, which is nothing but adverse selection in the stock market.

Adverse selection the equity market would lead to the collapse of equity market. Because investors finally, because it will be overrepresented by bad firms, then investors do not want to buy the IPOs of bad quality firms.

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## Lemons in Bond Market

- . Default risk
- . Investors: be compensated with risk premium interest rate
- . High default risk firm vs Low default risk firm
- . Investors WTA= the interest rate of average default risk
- . WTP of interest rate by Low default risk firm? (WTP is only low interest rate, hence, unlikely to borrow at the higher rate)
- . WTP of interest rate by High default risk firm? (more likely to borrow)

In the next session, we will continue this discussion and at that time we will discuss the lemons in bond markets.

Thank you.

**Keywords:** information asymmetry, adverse selection, lemon, peach, collapse of financial market, equity market, bond market