PART 3. HEALTH INSURANCE

Chapter 11.
Adverse Selection, Cream Skimming and Compulsory Insurance

Chapter Summary
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Chile Goes Mixed Public-Private

In 1981, Chile underwent a major reform in its financing of healthcare services. Before then, under Chile’s system of compulsory coverage, workers were required to pay into one of two public health insurance plans: one for blue-collar workers, the other for white-collar workers. But in 1981, Chileans were given the additional option of purchasing health insurance from one of several private health insurance companies called ISAPREs. In the public system, called FONASA, all enrolled individuals paid a premium equal to 7 percent of their income. In the private system, enrolled individuals paid a community rated insurance premium based upon age, sex, and family size.

Chile’s new system was widely criticized as unfair. While FONASA did provide benefits that were graduated according to income, critics saw the ISAPREs as an escape hatch for the rich, who could pay their way to get better medical care and avoid the long waiting lists of FONASA. What’s worse, claimed critics, the private ISAPREs skimmed the cream for the healthiest individuals, thus leaving the public sector with all the sick people.

Faced with concerns about access to high-quality care in the public sector, Chile in 2005 established a system of Universal Access and Explicit Guarantees (AUGE), which required all healthcare providers to offer minimum package of health services for any one of approximately 60 diseases and conditions. More recently, the country’s highest courts have ruled that the ISAPREs’ system of differential insurance premiums based on age and sex contradicted the fundamental constitutional right of equal access to healthcare. Compliance with these court decisions may result in a reverse migration of low-risk individuals back to FONASA as a result of adverse selection.

The coexistence of public and private healthcare sectors is the norm for many countries. In some cases, the public sector dominates, while the private sector plays at most a complementary role. In Australia, Spain, and the United Kingdom, for example, the private sector covers some services not covered in the public sector. In France, the private sector covers the copayments charged by the public system. In the Netherlands, those individuals excluded from the public sector have a private plan available. In the United States, the delivery of healthcare services is almost entirely private, while the financing of healthcare services involves both the public and private sectors.

But what about Chile’s mixed model? Are the fundamental rights to equality of access incompatible with the coexistence of public and private sectors? Let’s begin to develop the economics tools to answer this question.
Asymmetric Information

Let’s review the basic model of the insurance market that we set up in Chapter 10. A community consists of a large number of risk-averse individuals. Each individual has an independent 50-percent probability of contracting a serious illness that would entirely wipe out his $20,000 in savings. An insurance company offers full coverage at an actuarially fair premium of $10,000. Under these conditions, every individual will buy the insurance company’s policy, and the company will almost certainly break even.

Now let’s introduce a twist. It is no longer the case that everyone has the same 50-percent probability of contracting the disease. In fact, half of the people have only a 25-percent probability of getting sick, while the other half have a 75-percent probability of getting sick. The former group belongs to the low-risk category, while the latter group belongs to the high-risk category. Each individual knows his risk category. Now what happens in our insurance market?

The answer hinges critically on what the insurance company knows about its potential customers. If the insurer knows who is low-risk and who is low-risk, the outcome will be essentially the same as in Chapter 10. The only difference is that the company will sell two different insurance policies. Engaging in experience rating, the company will determine the separate premiums to be charged to the two risk categories. The low-risk policy will provide full coverage at an actuarially fair premium equal to the expected loss of $20,000, which equals $5,000. The high-risk policy will provide full coverage the corresponding actuarially fair premium of $15,000. Since they are all risk-averse, both the low-risk and the high-risk individuals will buy their corresponding insurance policy, and the insurance company will once again almost certainly break even. It’s as if our community actually consisted of two separate communities of equal size, each of which had its own insurance market.

What happens, however, if the insurance company doesn’t know and cannot easily determine an individual’s risk category? In that case, we have a situation that health economists describe as asymmetric information. The individual consumers know something that the insurer does not.

Let’s continue to assume that the company sells insurance policies with full coverage and that it does not incur any administrative costs. Since the company cannot discriminate between risk categories, it charges the same premium to everyone. When we use the word “discriminate” in this context, we are not referring to unlawful discrimination against any legally protected group. As health economists, we’re simply saying that the insurer cannot quote a different premium on the basis of any observable characteristic of any individual.

If the insurance company has to quote a non-discriminating or uniform premium to everyone, what price will it charge? The answer will depend on who ends up buying insurance. Let’s assume for the moment that everyone will buy coverage. In that case, the insurance company will estimate the probability of getting sick in the entire population to be 50 percent. That’s just
the average of 25 percent for the low-risk individuals and 75 percent for the high-risk individuals.

Here’s another way to look at the insurer’s calculation of the insurance premium. Let’s say our community has 40,000 individuals, of whom 20,000 are low-risk and 20,000 are high-risk. If everyone had coverage, then $25\% \times 20,000 = 5,000$ low-risk individuals would get sick and make a claim, while $75\% \times 20,000 = 15,000$ high-risk individuals would also get sick and make a claim. The total number of claims for the two groups combined would be $5,000 + 15,000 = 20,000$. Since a total of 40,000 individuals have coverage, that means $20,000/40,000 = 50\%$ of the insured individuals on average will get sick and make a claim. Since each claim pays $20,000, the insurance company will set the premium at the expected loss of $50\% \times $20,000 = $10,000$.

Will the individuals in our community buy full coverage at a premium of $10,000$? From the insurance company’s standpoint, the premium is actuarially fair. It’s the expected loss for the entire population. But from the standpoint of the individual consumers, the premium is not actuarially fair. For the high-risk individuals, the expected loss is $75\% \times $20,000 = $15,000$. So a premium of only $10,000$ for full coverage would be a bargain. For the low-risk individuals, however, the expected loss is only $25\% \times $20,000 = $5,000$. They’re being asked to pay a premium of $10,000$, which is substantially above their expected loss. That’s no bargain at all. So will the low-risk individuals buy the policy? That depends on how risk-averse they are.

**Efficiency and Equity**

Let’s summarize what we’ve learned so far. If the insurance company cannot discriminate between low-risk and high-risk consumers, it will offer one policy to everyone in the community. The company will charge a premium equal to the expected loss among all subscribers, that is, all individuals who purchase the policy. Assuming that everyone in the community will buy coverage, the company will quote a premium of $10,000$. High-risk individuals will purchase full coverage at this premium, which is below their expected loss of $15,000$. On the other hand, low-risk individuals may or may not purchase coverage, as the $10,000$ premium exceeds their expected loss of $5,000$.

If low-risk individuals are sufficiently risk-averse, they will purchase the policy offered by the company at a premium of $10,000$. In that case, everyone will be covered, just as in the case where the insurer can discriminate between risk categories. The only difference is that the low-risk individuals will pay more and the high-risk individuals will pay less. There is no change in economic **efficiency**. The insurer offers full coverage to everyone in the community, and everyone buys the coverage. But there is an impact on economic **equity**. Low-risk individuals are now **cross-subsidizing** the high-risk individuals.
When the insurer can discriminate between risk categories, the 20,000 low-risk individuals in our community will pay a total of $20,000 \times $5,000 = $100$ million in premiums, while the 20,000 high-risk individuals will pay a total of $20,000 \times $15,000 = $300$ million in premiums. If the insurer cannot discriminate between risk categories, and if the low-risk individuals are sufficiently risk-averse that they would still buy coverage at a premium of $10,000, then each group will pay a total of $200$ million in premiums. That’s a transfer of $100$ million from the low-risk group to the high-risk group. Whether such a transfer is equitable entails a value judgment about which group is more deserving.

To provide some context to the notions of economic efficiency and equity, let’s assume for the moment that the high-risk individuals are poor while the low-risk individuals are rich. The community has enacted a law that bars the insurer from charging different premiums, even if it could observe who is high-risk and who is low-risk. That is, the law prohibits experience rating of insurance premiums based upon observed risk category and instead requires community rating of insurance premiums. By law, everyone in the community will have to pay a uniform premium of $10,000. If the low-risk individuals are willing to purchase coverage at that premium, then there is no loss of economic efficiency. In terms of equity, however, the question is whether it is fairer that the richer low-risk individuals pay more and the poorer high-risk individuals pay less.

**Adverse Selection**

Let’s continue to assume that the insurance company cannot discriminate between low-risk and high-risk individuals, and thus offers a uniform premium of $10,000 for full coverage to everyone in the community. As we know, this premium exceeds the expected loss of the low-risk individuals, which is only $5,000. We’ve already considered what will happen when the low-risk individuals choose to buy coverage, but what happens when they do not?

The solid curve $OABC$ in Figure 11-1 shows the graph of the utility function of a typical individual in our community. The horizontal axis shows the individual’s payoff in thousands of dollars, while the vertical axis measures utility in arbitrary units of “utils.” The figure closely resembles Figure 10-5 in the last chapter. Thus, the utility of zero dollars is 0 utils, as indicated at the origin $O$, while the utility of $20$ thousand is 100 utils, as indicated at the point $C$. Just as in the previous chapter, we’ve drawn a cord connecting the points $O$ and $C$, as indicated by the magenta dashed line $OGFC$. In contrast to the previous chapter, however, we’ve separately calculated the expected utilities of both the low-risk and high-risk individuals, as well as the maximum insurance premium that each type would be willing to pay.

Let’s start with a high-risk individual. Without insurance, his expected loss is $15,000$ or, equivalently, his expected payoff is $20,000 - $15,000$, which equals $5,000$. The point along the cord corresponding to this expected payoff is $G$. Following the dashed line from $G$ back to
the vertical axis, we see that the high-risk individual’s expected utility without insurance coverage is 25 utils. In mathematical notation, we have \(75\% \times U(0) + 25\% \times U(20) = 25\). The horizontal line through \(G\) crosses the graph of the utility function at the point \(A\), which corresponds to a payoff of $1,250. That’s the certainty equivalent for a high-risk individual. In other words, a high-risk individual is willing to pay up to $20,000 – $1,250 = $18,750 for full coverage. This quantity is identified as the High Risk Maximum Premium in Figure 11-1. Since the Premium Charged is $10,000, the high-risk individual will purchase the policy.

![Figure 11-1. Low-Risk Individuals Are Unwilling to Pay $10,000 Premium.](image)

Now let’s turn to the low-risk individual. His expected loss is $5,000 or, equivalently, his expected payoff is $15,000. The point along the cord corresponding to this expected payoff is \(F\). Following the dashed line from \(F\) back to the vertical axis, we see that the low-risk individual’s expected utility without insurance coverage is 75 utils. In mathematical notation, we have \(25\% \times U(0) + 75\% \times U(20) = 75\). The horizontal line through \(F\) crosses the graph of the utility function at the point \(B\), which corresponds to a payoff of $11,250. That’s the certainty equivalent for a low-risk individual. In other words, a low-risk individual is willing to pay up to $20,000 – $11,250 = $8,750 for full coverage. This quantity is identified as the Low Risk Maximum Premium in Figure 11-1. Since the Premium Charged is $10,000, the low-risk individual will not purchase the policy.

Now what happens? The insurance company has thus far supplied 400,000 full-coverage policies for everyone in the community at a premium of $10,000 per policy. But only the 200,000 high-risk individuals are willing to buy the insurance policy at the price charged. So the supply of insurance exceeds the demand, and the market for insurance is not in equilibrium.
In our study of equilibrium in the market for heroin in Chapter 2, we learned that when supply exceeds demand, there is generally downward pressure on price. But that’s not what will happen in this case. With the low-risk individuals out of the market, the insurer will recalculate the expected loss for the remaining 200,000 high-risk individuals who still want insurance. Their expected loss is $15,000 per insured person, which is exactly what the insurance company will charge. At the new premium, all 200,000 high-risk individuals will purchase coverage, and the insurer will almost certainly break even. The demand for insurance will equal the supply, and the market will be in equilibrium.

Health economists have a name for the paradoxical outcome that we have just described. They call it **adverse selection**. As a result of asymmetric information, the market has selected high-risk individuals (those with **adverse risks**) to receive coverage. The low-risk individuals (those with **favorable risks**) have been eliminated. Because the insurer cannot discriminate between risk categories, the adverse risks end up driving the favorable risks out of the market. While supply equals demand, the market equilibrium yields an **inefficient** outcome. The low-risk members of the community demand insurance, and they would have a higher expected utility if they could in fact purchase coverage. But the market doesn’t offer them what they want. There is **market failure**.

The idea that asymmetric information is the underlying cause of adverse selection has had an enormous influence in the field of economics. The first clear articulation of this idea is widely attributed to a 1970 article by George Akerlof, who subsequently received the Nobel Prize in Economic Sciences.1 Akerlof did not write about the market for health insurance. In fact, he used the market for used cars as an example. The owners of used cars offer them for sale in the market. The owners know their cars’ performance problems, as well as their repair and accident records. They know whether their cars are poor-quality **lemons** or high-quality **creampuffs**. Prospective buyers cannot distinguish between lemons and creampuffs. The sellers of creampuffs can’t get the price they want for their used cars. They drop out of the market and simply hold onto their cars. Only lemons end up being sold. As a result of asymmetric information, the used cars with adverse performance push the used cars with favorable performance out of the market. It’s adverse selection all over again.

**Demand and Supply of Insurance Under Adverse Selection**

Figure 11-2 further investigates the market demand and supply of health insurance when adverse selection prevails. The horizontal axis measures the number of policies issued in the community, which ranges from 0 up to a maximum of 400,000, that is, one policy for every individual. The

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vertical axis measures the premium charged by the insurance company, measured in thousands of dollars. The horizontal axis thus measures the **quantity of insurance**, while the vertical axis measures the **price of insurance**. Keep in mind that the insurance company must charge the same price for insurance to everyone. It cannot charge different prices to different individuals, because it doesn’t know who is high-risk and who is low-risk. We can now construct the market demand and supply curves in this quantity-price plane, just as we did for market for abortions in the U.S. in Chapter 3.

![Figure 11-2. Market Demand and Supply Curves for Insurance under Adverse Selection.](image)

Let’s start with the market demand curve. The high-risk individuals are willing to pay a maximum of $18,750 for full coverage, while the low-risk individuals are willing to pay a maximum of $8,750 for full coverage. So, if the premium for the policy exceeds $18,750, nobody will buy coverage. That corresponds to the vertical line segment $AB$ in the figure. If the premium is less than $18,750 but greater than $8,750 per policy, then the 200 thousand high-risk individuals will buy coverage, but the remaining low-risk individuals will not. That gives us the vertical line segment $CG$, which represents a separate part of the market demand curve. Finally, if the premium is below $8,750, all 400 thousand individuals will buy coverage. That generates the vertical line segment $JK$. Taken together, the vertical line segments $AB$, $CG$ and $JK$ constitute the market demand curve.

When we counted the number of individuals willing to purchase coverage at different prices, we lined them up in a specific order. The first 200 thousand policies in Figure 11-2 went to the high-risk individuals, while the remaining 200 thousand policies went to the low-risk individuals. When we construct the market supply curve, we need to preserve the same order.
Now let’s work on the market supply curve. The insurance company sets the premium equal to
the expected loss for those consumers who receive coverage. The first 200 thousand policies
issued will go to high-risk individuals. Whether the number of policies supplied is 2 thousand, 20
thousand or 200 thousand, the expected cost will be the same, that is, $15,000. So the market
supply curve up to 200 thousand policies is the horizontal line $EF$ at the level of $15,000.
However, as we start selling additional policies to low-risk individuals, the expected cost for
the entire population declines, as indicated by the curve $FH$ in the figure. For example, with a total
of 250 thousand policies are sold, there will be 200 high-risk and 50 thousand low-risk
policyholders. The expected cost will be $(200 \times $15,000 + 50 \times $5,000)/250$, which comes out
to $13,000. When the total number of policies reaches 400 thousand, all of the high-risk and low-
risk individuals will be enrolled, and the expected cost will be $10,000, as indicated by the point
$H$ in Figure 11-2.

We can now see that there is only one point in the quantity-price plane where the demand and
supply curves intersect, namely, the point $F$. Under adverse selection, the equilibrium is where
200 thousand high-risk individuals buy coverage at a premium of $15,000, and none of the
remaining 200 thousand low-risk individuals are insured.

**The Death Spiral**

In Figure 11-2, we ended up with a market equilibrium where only half the inhabitants of our
community got health insurance coverage. But that was just an example of what can happen
when there is asymmetric information in the insurance market. It is possible, in fact, that almost
*nobody* will end up with insurance coverage. This extreme case of adverse selection is
commonly known in health economics as the **death spiral**.

Figure 11-3 explains how it is possible that nobody ends up with insurance coverage. As in
Figure 11-2, the horizontal axis measures the number of individuals with insurance coverage,
while the vertical axis measures the insurance premium. Once again, we have graphed the
demand and supply curves in the quantity-price plane. In contrast to Figure 11-2, however, the
supply curve $ABCEF$ lies *above* the demand curve $AGHIK$ except at their point of contact A
along the vertical axis. Although we won’t go through the mathematical details, we constructed
this example by making two modifications to our basic model in Figure 11-2. First, we assumed
that there was a continuum of risk groups. Some individuals had no chance of getting sick.
Others had a 1-percent probability. Still others had a 2-percent probability, and so on up to a
100-percent probability. The number of individuals at each level of risk was assumed to be the
same. That is, there was a uniform distribution of risk types. Second, we assumed that the disease
would cause a loss of $15,000 in an afflicted individual. We continued to assume that everyone
had the same utility function shown in Figure 10-1.

To get started, we’ll assume that every one of the 400 thousand individuals in our community
wants coverage. To achieve that level of demand, the premium would have to be zero, that is,
coverage would be free, as shown at point $K$ on the demand curve. But if everyone had coverage, the expected claims would come to $7,500$ per individual, as shown at point $F$ on the supply curve. But the number of individuals willing to buy coverage at a premium of $7,500$ would come to $232,500$, as indicated by point $J$ on the demand curve. However, in order to break even selling $232,500$ policies, the insurer would have to charge a premium equal to expected claims of $10,640$, as shown at point $E$ on the supply curve.

![Figure 11-3. The Death Spiral](image)

Except for point $A$, the market demand curve lies below the market supply curve. To insure all $400,000$ individuals, the insurer must charge a premium of $7,500$ (point $F$). But at that premium, only $232,500$ individuals will demand coverage (point $J$). To insure these individuals, the insurer would need to charge $10,640$, and the spiral continues inward until nobody has coverage.

We won’t belabor the point with more calculations. The points in the quantity-price plane will continue to spiral inward from point $E$, to point $H$, to point $C$, to point $G$, to point $B$, and so on, until the entire market collapses at point $A$. At that point, the last remaining individual with a 100-percent risk of getting sick will pay an actuarially fair premium of $15,000$. That is, he’ll just pay the insurance company what it would cost him anyway.

You may object that these examples seem far-fetched, to say the least. But they starkly illustrate the key point that in the presence of asymmetric information, the lowest risk individuals will find insurance too expensive and thus opt for remaining uninsured. Health economists regard the phenomenon of adverse selection as one of the most important explanations for the lack of universal insurance coverage in health insurance markets with voluntary enrollment.

**Imperfect Information**

Let’s return to our core model in which there are just two risk categories. There are $200,000$ high-risk and $200,000$ low-risk in our community of $400,000$. We’ve assumed so far that the
insurance company cannot discriminate among risk categories. But suppose instead that the insurer had imperfect information about individuals’ risk categories. Then what happens?

In Chapter 7, we studied diagnostic tests for a strep infection in a patient who called your office complaining of a sore throat. In Chapter 8, we studied screening tests of major depression. In each case, we considered tests that were imperfectly informative, that is, tests that did not have 100-percent sensitivity and 100-percent specificity. Let’s take advantage of the tools we developed to study an imperfectly informative test for being a high-risk individual.

To add some context, we’ve displayed a stylized demographic map of our 400,000-person community in Figure 11-4. Our community is divided into two non-overlapping districts: the East Side and the West Side. Each cyan figure containing an L represents 50,000 low-risk individuals, and each magenta figure containing an H represents 50,000 high-risk individuals.

A total of 300,000 individuals reside on the East Side of whom 200,000 are high-risk and 100,000 are low-risk. All 100,000 individuals residing on the West Side are low-risk.

The insurance company has no perfectly informative test that can distinguish between low-risk and high-risk individuals. But the company can ascertain which district an individual lives in. Taking advantage of this information, it could set different insurance premiums for residents of the East and West Sides. In essence, the insurance company could use an individual’s residence as an imperfectly informative test of his risk category.
We now have a residence-based screening test for being high-risk. The test is positive if an individual lives on the East Side and negative if he lives on the West Side. Among those individuals who are high-risk, 100% live on the East Side and thus will have a positive test. That is, the insurer’s screening test has a sensitivity of 100%. Among those individuals who are low-risk, 50% live on the West Side and thus will have a negative test. That is, the insurer’s screening test has a specificity of 50%.

What premiums will the insurer charge for the residents of the two districts? Let’s consider the West Side first, since that case is more straightforward. Everyone residing in the West Side is low-risk, so the premium charged by the insurer will equal the low-risk individual’s expected loss of $5,000. Now let’s turn to the East Side. Two-thirds of the individuals will actually be high-risk. That’s the positive predictive value of our screening test. The remaining one-third of East Side residents will be low-risk. So the premium charged by the insurer will equal the weighted average \((2/3) \times \$15,000 + (1/3) \times \$5,000\), which comes to $11,667.

We know that low-risk individuals will pay up to $8,750 for full coverage, while high-risk individuals will pay up to $18,750 for full coverage. Since the West Side premium is $5,000, all of the residents of the West Side will buy coverage. On the East Side, only the high-risk individuals will be willing to pay the premium of $11,667 based upon residence. The low-risk individuals will therefore drop out. With the low-risk residents of the East Side no longer in the market, the insurer will have to recalculate its East Side premium. Since only high-risk residents remain, the recalculated premium will equal the expected loss of $15,000. All of the high-risk residents will pay this premium and obtain full coverage.

Accordingly, with the residence-based screening test in place, all low-risk residents of the West Side will obtain full coverage at a premium of $5,000, while all high-risk residents of the East Side will obtain full coverage at a premium of $15,000. As a result of adverse selection, the low-risk residents of the East Side will not obtain coverage.

How does this new market equilibrium compare to the case where the insurer simply charges the same premium to everyone? With residence-based premiums, 300 thousand individuals obtain coverage, as compared to 200 thousand with a uniform premium. That’s an improvement in economic efficiency. The additional 100,000 low-risk residents who obtain coverage will pay only $5,000 for insurance. The 200,000 high-risk residents of the East Side will obtain the same insurance and will pay the same premium of $15,000. The remaining 100,000 low-risk residents of the East Side will go without coverage, just as they did before. The use of the residence-based screening test thus resulted in a Pareto improvement where some residents are better off and none are worse off. There is an improvement in economic efficiency without any adverse consequences for economic equity.
Movement Between Plans

But that’s not the end of our story. Once word gets out that premiums are lower for West Side residents, people will have an incentive to move. Let’s assume that a total of 50,000 high-risk residents and 50,00 low-risk residents do so. These population movements are indicated by arrows in the demographic map of our community, as shown in Figure 11-5.

![Map with population movements](image_url)

Figure 11-5 Demographic Map with Population Movements. As indicated by the magenta arrow, 50 thousand high-risk individuals move from the East to the West Side. As indicated by the cyan arrow, 50,000 low-risk individuals also move from the East to the West Side. After these movements, there will be 200,000 residents in each side of the community. Three-quarters of West Side residents will be low-risk while one-quarter of East Side residents will be low-risk.

After the migration, there will be 200,000 residents on both sides of the community. On the East Side, three-quarters of the remaining residents will be high-risk and one-quarter will be low-risk. So the expected loss among all remaining residents will be $\frac{3}{4} \times 15,000 + \frac{1}{4} \times 5,000$, which comes to $13,750$. That’s still more than a low-risk individual would be willing to pay for full coverage. So the remaining 50,000 low-risk residents on the East Side will not purchase coverage. Accordingly, in equilibrium, the 150,000 high-risk residents of the East Side will purchase full coverage at a premium of $15,000.

On the West Side, one-quarter of the residents will be high-risk and three-quarters will be low-risk. The expected loss among all West Side residents will be $\frac{1}{4} \times 15,000 + \frac{3}{4} \times 5,000$, which equals $7,500$. Since a low-risk individual is willing to pay up to $8,750 for full coverage, all 200,000 residents of the West Side will purchase a policy at a premium of $7,500.

After the migration, the premium on the East Side will still be $15,000, but the number of policyholders on the East Side will drop from 200,000 to 150,000. By contrast, the premium on the West Side will increase from $5,000 to $7,500, but the number of policyholders on the West Side will remain at 200,000.
Side will rise from 100,000 to 200,000. Among the 100,000 new arrivals to the West Side, 50,000 low-risk individuals will get insurance that could not obtain before the migration, while 50,000 high-risk individuals will continue to purchase insurance, but at a lower premium.

Accordingly, the migration resulted in an increase in insurance coverage from 300,000 to 350,000 individuals. The gain in coverage, however, was not a Pareto improvement. Those individuals who moved from the East to the West Side will be better off, provided their costs of moving are not too high. But the 100,000 low-risk individuals who have resided in the West Side all along will now have to pay a higher premium for the same coverage. We may or may not regard this additional burden as unfair. Accordingly, the improvement in economic efficiency resulting from the migration will need to be balanced against the potentially negative consequences for economic equity.

Imagine the announcement issued by the insurance company after the migration takes place: “This year, the premium for full coverage of West Side residents will increase from $5,000 to $7,500.” Imagine the outcry from permanent residents of the West Side, who will protest that premiums have increased by a whopping 50 percent without any underlying change in the healthcare costs. Large, abrupt changes in premiums are in fact commonplace in health insurance markets when individuals can sign up for and drop coverage or move between different plans.

**Cream Skimming**

So far, we’ve assumed that there is just one insurance company that sets its premiums equal to expected losses. In the absence of administrative costs, such a pricing rule permits the insurer almost certainly to break even. Our insurance company has essentially served as a nonprofit monopoly. Its principal objective has been to insure as many individuals as possible subject to a breakeven constraint. In many ways it resembles the Social Marketing Company of Bangladesh, the nonprofit monopoly that we studied in Chapter 1.

Now it’s time to relax the simplifying assumption of a single nonprofit insurer and study the consequences of competition among multiple profit-maximizing insurance companies. To keep things simple, let’s assume that the community leaders decide to permit competition only on the West Side. The nonprofit monopoly will continue to cover residents of the East Side.

If each of the competing insurers is unable to distinguish between high-risk and low-risk individuals, the outcome will be no different. After the migration, there are 150,000 low-risk and 50,000 high-risk individuals on the West Side. The expected loss for all West Side residents combined is $7,500 per person, and all West Side residents, including the low-risk individuals, will buy coverage at this price. If any competitor quotes a premium greater than $7,500 for full coverage, it will lose all its customers to the remaining insurers, who will continue to quote a premium of $7,500. If any competitor quotes a premium less than $7,500, it will indeed attract
many customers, but will end up losing money when its subscription income does not cover its claims. The competitive price of insurance coverage on the West Side will still be $7,500.

But there is a critical difference. Each profit-maximizing competitor has a strong incentive to identify and exclude the high-risk residents of the West Side. If an insurer could reduce the proportion of high-risk individuals from 25 to 20 percent, for example, its expected loss would drop from $7,500 to $7,500 - (20% × $15,000 + 80% × $5,000) = $7,000. That’s a profit of $500 per policy sold. The nonprofit monopoly does not have an incentive to exclude the high-risk residents on the West Side. To the contrary, the nonprofit insurer is content selling policies to all 200,000 West Side residents, who each pay a premium of $7,500.

Haven’t we assumed that no insurer can distinguish a high-risk from a low-risk individual? How then can a profit-maximizing insurer manage to prevent the high-risk individuals from buying its policies? The answer is that the insurer will try whatever it can to identify and exclude high-risk individuals. Here are some possible ways to do so. The insurer can try to determine if high-risk individuals reside mostly in certain postal codes within the West Side, and then discreetly avoid enrolling residents of those postal codes. Or the insurer can offer a free gym membership for anyone who subscribes to its policy. The idea is that only healthy low-risk individuals will be attracted by the promotional offer. Or the insurer can market its policy to employee groups only. The idea is that people who are well enough to work are more likely to be low-risk types. Health economists describe the strategy of seeking to enroll low-risk individuals and exclude high-risk individuals as cream skimming.

*Germany’s Sickness Funds*

In order foster competition among the country’s multiple health insurance companies, which are called “sickness funds,” the German government in 1996 permitted individuals to freely choose among funds. Initially, the government allowed sickness funds to set different premiums according to age, gender, and documentation of a work disability. But these risk adjustment criteria proved to be too restrictive and, as a result, competing sickness funds had a strong incentive to engage in cream skimming. While each sickness fund was officially nonprofit, failure to attract the lowest risk individuals would result in high premiums that would drive down demand and could push the company into insolvency. In 1991, before competition was introduced, there were more than 1,200 sickness funds. By 2001, the number of funds was down to about 400, and by 2008, the number had dropped to about 200. In 2009, the government revised the risk-adjustment formula, allowing funds to set insurance premiums according to broad disease categories. The impact of these reforms remains unclear. By 2011, the number of funds had dropped below 150.

By law, sickness funds cannot reject an applicant outright. Still, they have a variety of techniques to attract low-risk individuals and dissuade high-risk individuals from enrolling. To attract low-risk individuals, for example, they can offer more extensive coverage for services that low-risk
individuals seek, such as checkups and early cancer diagnosis. To dissuade high-risk individuals, they can delay in responding to inquiries in order to give the impression of poor quality of service. In an experimental study carried out in 2010, researcher Sebastian Bauhoff of the RAND Corporation sent fictitious applications with varying postal addresses to 47 different sickness funds. Applicants who lived in high-cost areas, particularly in West Germany, were more likely to encounter delayed responses and less likely to receive follow-up inquiries.

**Compulsory Coverage**

In our analysis of adverse selection, we have assumed that individuals can freely choose not to buy insurance coverage. When health insurers set premiums that do not adequately distinguish between risk categories, low-risk individuals may voluntarily drop out of the insurance market. But what happens when everybody is required by law to obtain insurance coverage?

Let’s return to our story of population migration in Figure 11-5. After the migration of 100,000 individuals to the West Side, the East Side was left with a total of 200,000 individuals, of whom 150,000 were high-risk and 50,000 were low-risk. If everyone remaining on the East Side purchased insurance, the company would charge a breakeven premium of $13,750. That was more than the maximum of $8,750 that a low-risk individual was willing to pay. So the low-risk residents on the East Side voluntarily chose not to purchase coverage.

With compulsory coverage, however, the remaining low-risk residents on the East Side will be required to buy the policy at a premium of $13,750. Buying coverage at that price will reduce each low-risk individual’s expected utility in comparison to remaining uninsured. So compulsory coverage will make each low-risk individual worse off. At the same time, compulsory insurance will lower the premium that each high-risk individual pays from $15,000 to $13,750. So each high-risk individual will be better off.

If compulsory coverage may make some individuals worse off, why would a government want to impose such a requirement? There are a variety of reasons. First, there is an argument based on **externalities**. As we’ll discuss in the next chapter, insurance coverage not only protects an individual against financial risk, but also increases his demand for healthcare services. The resulting improvement in the individual’s health has social as well as private benefits.

Second, there is an argument based on **cross-subsidies**. As we discussed above, when there is asymmetric information and low-risk individuals buy coverage, they cross-subsidize the high-

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risk individuals. If the community regards high-risk individuals as particularly vulnerable or deserving, it may view the equity gains resulting from the cross-subsidy as worth the efficiency losses. Third, compulsory coverage can be combined with other governmental interventions that mitigate the losses of low-risk individuals. The government of our community could mandate that low-risk individuals on the East Side purchase coverage, and then offer to subsidize the premiums of those who could least afford it. Or it could offer low-risk individuals partial coverage, which we’ll discuss in more detail in the next chapter.

Fourth, there is the argument based on insurance market failures. We’ve already discussed in the last chapter how insurance can break down when there are thin markets, correlated risks or large loadings on premiums due to administrative costs. At the top of the list is insurance for extremely costly illnesses, such as chronic hepatitis, advanced cancers and genetic diseases that are treatable with very expensive, patented medications.

Finally, there is the argument based on contracting. In our stylized community, everyone first decides to buy insurance then finds out whether or not he gets sick. This simple sequence of events was built into the decision tree of Figure 10-5 in the last chapter. In reality, insurance markets don’t offer policies that cover individuals against illness over long periods of time. Instead, health insurance policies are generally purchasable and renewable annually. That gives low-risk individuals an extra incentive to forego insurance coverage now and buy coverage if they get sick later. Compulsory coverage forecloses this possibility.

**Health Insurance Reform in Massachusetts**

In 2007, the State of Massachusetts in the United States mandated health insurance for all its residents. During a phase-in period from July–November 2007, uninsured residents were encouraged to enroll in a recently established, publicly sponsored insurance program called Commonwealth Care. Fines were imposed on residents who remained uninsured after December 2007. Residents with incomes below 150% of the official federal poverty level were permitted to enroll free, without having to pay any premium. Those with incomes between 150 and 300% of the poverty level had to pay insurance premiums that were subsidized by the state.

Prof. Amithab Chandra at Harvard’s Kennedy School and his colleagues looked at the demographic profiles of the enrollees in Commonwealth Care before the mandate, during the phase-in period, and after insurance mandate was fully effective.4 They focused on enrollees with incomes between 150 and 300% of the poverty level. The average age fell from 45.1 years before the mandate, to 43.3 years during the phase-in, to 41.3 years after the mandate was fully

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effective. The proportion of enrollees with hypertension, high cholesterol, diabetes, asthma, arthritis, gastritis or an affective disorder fell from 35.5% to 29.6%, to 23.9%. Average monthly healthcare spending among the same groups of enrollees fell from $518 to $454, to $356. These patterns are exactly what one would expect in the presence of adverse selection. As insurance enrollment expanded, more previously uninsured low-risk individuals signed up.

**Back to Chile**

The performance of Chile’s mixed public-private system of health insurance depends critically on how individuals sort themselves between plans. Figure 11-6 is a stylized depiction of what has happened. Although the public sector (FONASA) and the private sector (ISAPREs) are not geographic areas as in Figures 11-4 and 11-5, the same idea of migration between the two sectors applies. In Figure 11-6, we continue to label low-risk individuals as L and high-risk as H. But we have added another dimension: rich (R) and poor (P). With two dimensions, an individual can be rich and high-risk (RH), rich and low-risk (RL), poor and high-risk (PH), or poor and low-risk (PL). Rather than pack each one of these distinct types of individuals into our map, we have simply noted that the public sector is dominated by high-risk (H) and poor (P) individuals, while the private sector is dominated by low-risk (L) and rich (R) individuals.

Some critics of the Chilean system have maintained that cream skimming on the part of private insurance plans is the primary explanation for the sorting of individuals by income and risk.

![Figure 11-6](image-url)
category. Before the recent court rulings, premiums in the private plans were community rated according to age, sex and family size. Within these groups, private plans still had plenty of room to attract the low-risks and dissuade the high-risks from enrolling. Now that the highest courts have ruled that rating premiums according to age and sex is unconstitutional, they maintain that the incentives for cream skimming are even greater.

But as Prof. Claudio Sapelli of the Pontificia Universidad Católica in Chile has pointed out, it is entirely plausible that the rules for determining insurance premiums themselves created the incentives for individuals to migrate between the two sectors. While there are limits on individual premium payments, the annual insurance premium in the public sector is essentially proportional to one’s income. The premium in the public sector does not depend on an individual’s risk category. On the other hand, the annual insurance premium in the private sector is essentially proportional to one’s probability of getting sick. The higher the risk of illness, the more one has to pay.

Figure 11-7 shows how individuals will sort themselves between public and private plans when they seek to purchase the plan with the lowest premium. The horizontal axis measures the probability that an individual will get sick. The vertical axis measures an individual’s income. On the basis of these two characteristics, every individual can be located somewhere on the plane. If he is located in the gray region above the solid black dividing line, he will prefer private coverage. If he is located in the yellow region below the dividing line, we will prefer public coverage. If he is located on the dividing line, he will be indifferent between the two options.

![Figure 11-7. Sorting of Individuals between Private (ISAPRES) and Public (FONASA) Sectors in Chile.](image)

The public premium is given by the formula: \[ \text{Public Premium} = A \times \text{Income} \], where \( A \) is a proportionality factor equal to 7%. The private premium, by contrast, is given by the formula: \[ \text{Private Premium} = B \times \text{Probability of Getting Sick} \], where \( B \) is a separate proportionality factor. An individual will enroll in the private sector when his private premium is lower, that is, when \( B \times \text{Probability of Getting Sick} < A \times \text{Income} \). That corresponds to the gray region in the figure. An individual will enroll in the public sector when his public premium is lower, that is, when \( B \times \text{Probability of Getting Sick} > A \times \text{Income} \). That corresponds to the yellow region in the figure. The individual will be indifferent between insurance in the two sectors when the premiums are equal, that is, when \( B \times \text{Probability of Getting Sick} = A \times \text{Income} \). That corresponds to the solid black line separating the two regions.

Figure 11-7 is at best an approximation to actual sorting of individuals in the Chilean system. The premiums quoted by the private ISAPREs have not been fully adjusted for all risk characteristics, and therefore are not exactly proportional to the individual’s probability of getting sick. In the extreme case where the Chilean courts barred all risk adjustment, the dividing line in Figure 11-7 would simply be horizontal, with individuals below a certain income opting for public coverage. But even in those cases, the migration of individuals between plans is plausibly a natural consequence of the incentives built into Chile’s premium pricing formulas.

**Where Do We Go From Here?**

We have addressed the phenomenon of adverse selection. But we still have to deal with one more critical feature of health insurance markets. Let’s say that you’re at risk of developing diabetes. You know that you could stave off the disease if you exercised regularly, ate a healthy diet, and maintained an ideal weight. But if you have health insurance, the medications required to treat your diabetes will be fully covered. So you just stay sedentary, eat lots of high-calorie foods, and let yourself get fatter. Or let’s say that you and your spouse have been trying unsuccessfully to conceive a child for nearly two years. Your have been advised that you would be a candidate for in vitro fertilization. But you and your spouse will go forward with the procedure only if it’s covered by your health insurance.

In the first case, the presence of insurance coverage influences the probability that you will develop a particular medical problem. In the second case, the presence of insurance coverage influences the amount of healthcare you will seek in the event that you have a medical problem. In both cases, health insurance affects incentives. Both cases describe a phenomenon that health economists call **moral hazard**. Let’s see how it works.