

# Information and Prices

by O. Emre Ergungor and Joseph G. Haubrich

Thornton Wilder wrote that we live in “a cloud of ignorance,” and that’s perhaps especially true in the world of buying and selling. Economic transactions usually involve people with unequal access to information. A doctor knows more about medicine than do her patients. A used-car seller knows more about the condition of his car than the buyer. A company’s managers know more about the value of their firm’s assets than does their banker—or their shareholders. These sorts of “information imbalances” can have costly consequences. When used-car buyers can’t tell the difference between quality cars and lemons, they may find it hard to purchase a quality used car. In the financial world, investors, unable to distinguish between creditworthy businesses and money-losing ventures, put their money in T-bills, and business funding dries up.

Why information imbalances should lead to such consequences was once quite puzzling to economists. In theory, the price of a good—be it a used car or company stock—would adjust until the demand for it equals the supply. A business looking for a bank loan should always be able to find credit if it is willing to pay enough for it. Or, thinking about it from the perspective of the bank, if a bank denies credit at a particular interest rate, it should be willing to lend to the business at a higher rate. That a business might be completely shut out of the credit market does not conform to the story told in introductory economics classes.

The struggle to understand why markets behave this way has brought some key insights, however, and in 2001 the Nobel Prize honored George Akerlof, Michael Spence, and Joseph Stiglitz for their work on this problem. They show that

imperfect information—such as unknown asset quality—is the culprit behind the costly mistakes and malfunctioning markets described above. Furthermore, they showed that many puzzling features of actual markets can be explained as responses to information problems. Often, market participants have found ways to mitigate information problems by using additional prices or other signals to help clear the market. One price is enough to match the buyers and sellers in the Econ 101 case, but with information problems, it takes more than just that.

Taking the used-car market, home insurance, and bank lending as a backdrop, this *Commentary* explains how information deficiencies interfere with establishing prices and describes how some well-known features, such as warranties and deductibles, help to get around these problems.

## ■ Pricing Problems in the Used-Car Market

More than 30 years ago, George Akerlof wanted to understand the surprisingly large price difference between new cars in showrooms and those that have just left the showroom. Most people at the time explained this as the joy of owning a “new” car. Akerlof thought there was more to the story. He thought the problem was that buyers could not tell the difference between high- and low-quality used cars. In other words, they did not know whether the car’s owner was selling his car because he needed cash or because he had found a hidden problem too costly to fix. If buyers can’t identify “lemons,” the uncertainty drives down the price of all used cars and can even mean that only bad cars get sold.

**Information problems pervade the economy. This *Commentary* describes the challenges they create and the clever solutions markets find to overcome them.**

For example, suppose you are shopping for a used car. You find a car that looks fine but you cannot judge its mechanical condition. A good car is worth \$2,000, but a lemon only \$1,000. Unfortunately, both types look the same to you; only the owner knows the true quality. You believe there is a 50 percent chance that the car is high quality. How much should you offer for it? If you offer \$2,000, the owner will accept your offer, but there is a 50 percent chance that you purchased a lemon and overpaid. Another plausible strategy is to offer the average price, which in this example would be \$1,500. In this case, the owner will reject your offer if his car is worth \$2,000, but he will accept it if the car is a lemon. You definitely overpaid this time by shelling out \$1,500 for a \$1,000 car. In fact, you will always overpay unless you offer \$1,000 and get the inferior car. In other words, you will not be able to buy a “good” used car in this market.

There are ways around this problem, however. One response is a warranty. A high-quality-car seller might offer a warranty with the car. The high-quality car is now worth more, say \$2,100 in our example, because the seller pays for repairs. Since a good car is unlikely to break down, the expected cost of this warranty to the seller is low—say only \$100. The poor-quality-car owner can also sell his car for \$2,100, but since it is a junker, the expected warranty costs may very well exceed \$1,100. It is no

longer worth passing the lemon off as a good car: the warranty means he'll most likely pay more than the \$1,100 profit in repair bills. Better just to tell people it's a lemon and take the \$1,000. With the introduction of a warranty, both high- and low-quality cars are simultaneously able to sell in the marketplace.

### ■ Insurance Markets

Akerlof's insight applies to other markets as well. Another market with information problems is insurance. How can a home insurer provide insurance if it can't differentiate between careful (safe) and careless (risky) homeowners? It's really the lemons-market story all over again. Charge a premium high enough to cover the average risks, and only the risky homeowners sign up. Charging an average premium with only risky homeowners means the insurance company will lose money. So in the end, the only solution is that the insurance company charges a high premium and gets the risky homeowners. The safe homeowners fail to get insurance—even though the company would like to insure them!

Once again, though, while a single price will not clear the market, using another approach can. Think about how home insurance actually works. You pay a regular premium, and in the event of a theft, you can get the stolen articles replaced after paying a fixed deductible. A careless homeowner is willing to pay a high premium in return for a low deductible because he's most likely going to leave the door unlocked and end up paying this deductible. A careful homeowner, however, would reduce her premium in return for a high deductible that she is unlikely to pay.

The key point in getting this two-part pricing to work (and why a single price won't) is making sure that each homeowner likes his or her insurance deal better than the other's. Even though the careless homeowner can reduce his premium payment by switching to the other insurance deal (lower premium, higher deductible), once the theft occurs, he will end up paying the higher deductible. As he is more likely to leave the door unlocked, the money he saves from a lower premium is small compared with the higher expected deductible payment. So, he sticks with his original contract. Likewise, the careful homeowner wouldn't want the high premium.

### ■ Commercial Loans

Joseph Stiglitz observed similar pricing problems—and a similar solution—in commercial bank lending. Firms borrow from banks to finance themselves: to build factories, pay workers, and ship goods. Because the likelihood of default varies from business to business, the bank needs to learn about the firm's risks in order to set the correct interest rate. Financial statements and annual reports provide substantial information, but they are still inadequate because they are nothing more than a picture of the firm taken at a particular point in time. Just by looking at a picture of a person, can you tell whether or not that person is a smoker, follows a low-fat diet, or has a gene that predisposes him to heart disease? No. Similarly, by looking at a financial statement you cannot always tell whether or not a firm is undertaking risky investments that earn a high return but also entail a high default risk. A risky firm that expects to earn a high return must also pay a higher rate on loans, just as junk bonds pay a higher interest rate than T-bills.

The problem is that the bank cannot tell which firm is riskier just by looking at the financial statements. If the bank decides to offer an average interest rate—like the average price in the used-car example—the loan may be too expensive for a safe firm, which expects to earn a lower return. Then, only the high-risk firm accepts the offer, and the bank loses money. But if the bank offers a loan with a high interest rate so it does not lose money, only the high-risk borrower accepts the offer and many good, safe projects go unfunded. In other words, risky firms drive safe firms out of the loan market.

Does the problem sound familiar? Once again, as in the used-car market and the insurance industry, a “lemons problem” arises. As before, the source of the problem was that the price alone could not separate good cars from bad, or safe homeowners from risky ones. In the lending case, the interest rate—the price of the loan—cannot by itself separate the low-risk borrowers from the high-risk ones. What should the bank do?

### ■ Loan Commitments

Just as the used-car market used warranties and homeowner's insurance used deductibles, it shouldn't be surprising that the bank can solve the problem with a loan contract that uses something beyond price to screen borrowers. The bank has a device that makes its loan offer to one type of borrower unattractive to the other type, and thus lets both get loans.

Banks offer something called a loan commitment: This guarantees future funding at a preset rate. How should the bank price this in a way that separates risky borrowers from safer ones? Just as in the home insurance case, while one price won't do, two prices—a regular premium and a deductible—will. A loan commitment has an up-front fee (called a “commitment fee”) that borrowers pay when a credit line is established. Later, if the borrower decides to get a loan (or “take it down”), it pays the agreed-upon interest rate. The interest rate and commitment fee are like the premium and deductible for insurance. Just as low-premium/high-deductible home insurance is preferred by careful homeowners, a line of credit with a low up-front fee (premium) and a high interest rate (deductible) is preferred by the safe firm. The total cost of this credit line (fee plus interest) is low enough for a safe firm to want the loan, even though it is more expensive than if the bank could identify the safe firm.

For the high-risk firm, the bank offers a high upfront fee and a low interest rate, similar to the high-premium/low-deductible home insurance preferred by careless homeowners. The safe firm does not expect to use the line of credit and therefore won't pay a high up-front fee; nevertheless, it wants guaranteed access to funds in the event that the credit market dries up. The risky firm, however, does expect to use the line of credit, so it is willing to pay a high up-front fee. Each contract is tailored by the bank to the insurance needs of a specific type of firm.

Because a loan commitment is a tailor-made insurance contract, it must be purchased before the uncertainty about the credit need is resolved. In other words, after your house burns down, no one will sell you home insurance to cover your loss because it no longer matters whether you were careful or not.

Similarly, when a firm starts looking for a loan in the spot market, a bank can no longer distinguish between safe and risky borrowers by using a fee and an interest rate because, in the absence of the funding uncertainty, both types will go for the cheapest loan. If a credit line is not prearranged, the pricing structure is ineffective in separating borrowers.

Bank loan commitments may be less familiar than warranties or deductibles, but they are hardly less common. Well over three-quarters of all commercial loans in the United States are made under loan commitments, and loans made under commitment total over \$700 billion.

### ■ Two-Part Pricing

Information problems show up in many markets. These problems can make it difficult to buy a used car, get insurance, or take out a loan. The heart of information problems is that a single price is not enough to clear the market. One powerful solution adopted in many markets is for firms to offer their customers several alternatives, each designed to induce a given type of customer to be truthful about its risks. Two-part pricing, with a premium and a deductible, is one such solution that shows up in areas as diverse as insurance and loan commitments. Such contractual solutions to information problems are essential to the operation of markets.

### ■ Recommended Readings

*A good place to start for more information on the work of Akerlof, Spence, and Stiglitz is their Nobel lectures:*

George Akerlof, "Behavioral Macroeconomics and Macroeconomic Behavior," *American Economic Review*, June 2002, pp. 411–433.

Michael Spence, "Signalling in Retrospect and the Informational Structure of Markets," *American Economic Review*, June 2002, pp. 434–459.

Joseph Stiglitz, "Information and the Change in the Paradigm in Economics," *American Economic Review*, June 2002, pp. 459–501.

*The discussion of lemons, bank loans, and loan commitments is based on:*

George Akerlof, "The Market for Lemons: Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 84, 1970, pp. 488–500.

Arnoud Boot, Anjan V. Thakor, and Greg F. Udell, "An Economic Rationale for the Pricing Structure of Bank Loan Commitments," *Journal of Banking and Finance* 11, 1987, pp. 271–289.

Joseph Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review* 71, 1981, pp. 393–410.

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*The views expressed here are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland, the Board of Governors of the Federal Reserve System, or its staff.*

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