The Market for “Lemons:”
Quality Uncertainty and the Market Mechanism

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Background

Akerlof explains his motivation for writing “The Market for Lemons” by arguing that microeconomic theory models in the 1960s were characterized by their generic nature—they dealt with perfect competition and general equilibrium. Situational and specific considerations were left out (such as information asymmetries). By the 1990s more specific theory models became important. Now, economic models are custom, describing important features of observed situations. Since “Lemons” exemplified this new style, it was an integral part in the transformation of how theory was presented and discussed.

Akerlof notes that investigations of the car market were driven by his interest in macroeconomic issues such as the business cycle and unemployment. He wanted to know what caused the business cycle—noting that at the time this was related to the significant variation in new automobile sales. He wondered why this fluctuation existed for new cars, and attempted to understand why people bought new cars, rather than renting or buying used ones. Akerlof noticed that the presence of information asymmetries served as an explanation “as to why people preferred to purchase new cars rather than used cars” noting “their suspicion of the motives of the sellers of used cars.”

Extensions of this paper can be made to virtually any situation in which asymmetric information exists. This can happen in any market where the true quality of goods is difficult to perceive. This paper uses the automobile market as an explanatory example. But the explanatory capacity of the Lemon Principle are enormous.

Ironically, this theory was rejected on multiple accounts. According to Akerlof himself: “By June of 1967 the paper was ready and I sent it to the American Economic Review for publication...Fairly shortly...I received my first rejection letter from the American Economic Review. The editor explained that the Review did not publish papers on subjects of such triviality...Michael Farrell, an editor of the Review of Economic Studies,...had urged me to submit Lemons to the Review, but he had also been quite ex-

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plicit in giving no guarantees. I submitted Lemons there, which was again rejected on the grounds that the Review did not publish papers on topics of such triviality. The next rejection was more interesting. I sent Lemons to the Journal of Political Economy, which sent me two referee reports, carefully argued as to why I was incorrect. After all, eggs of different grades were sorted and sold (I do not believe that this is just my memory confusing it with my original perception of the egg-grader model), as were other agricultural commodities. If this paper was correct, then no goods could be traded (an exaggeration of the claims of the paper). Besides - and this was the killer - if this paper was correct, economics would be different.”

**Variables & Notation**

- \( q \) proportion of good cars produced (probability of purchasing good car)
- \( (1 - q) \) proportion of bad cars produced (probability of purchasing bad car)
- \( Q_d \) quantity of used cars demanded
- \( Q_s \) quantity of used cars supplied
- \( p \) price of used car
- \( \mu \) average quality of used cars in the market
- \( U_1 \) utility of group one
- \( U_2 \) utility of group two
- \( M \) consumption (and total expenditure) of all goods other than used cars
- \( n \) number of used cars consumed by an individual
- \( x_i \) quality of the \( i \)th used car (consumed by the individual)
- \( N \) number of cars intially possessed by group 1
- \( Y_1 \) income of group 1
- \( Y_2 \) income of group 2
- \( D_1 \) group 1 demand for used cars
- \( D_2 \) group 2 demand for used cars
- \( S_1 \) group 1 supply of used cars
- \( S_2 \) group 2 supply of used cars
- \( D \) market demand
- \( S \) market supply

**Model**

Assume the used car market has two quality “types” – good and bad, but the quality is undistinguishable to the buyer at time of purchase. Buyers only know the proportion of good and bad used cars in the market, so they can ascertain the probability that they will purchase a good or bad car. \( q \) represents the proportion of good cars in the market and \( (1 - q) \) represents the proportion of bad cars in the market.
Quantity of used automobiles demanded \((Q_d)\) is a function of price \(p\) and average quality of used cars in the market \(\mu\):

\[
Q_d = D(p, \mu) \tag{1}
\]

This demand is the sum of the demand of two separate groups of individuals in the market (group 1 and group 2, which will be defined subsequently).

Quantity of used automobiles supplied \((Q_s)\) is a function of price \(p\):

\[
Q_s = S(p) \tag{2}
\]

Average quality \(\mu\) of used cars on the market is a function of price \(p\):

\[
\mu = \mu(p) \tag{3}
\]

Quantity demanded and quantity supplied must be equal in equilibrium:

\[
Q_d = Q_s \quad D(p, \mu(p)) = S(p) \tag{4}
\]

Assume the market is divided into two different groups of people. Group 1’s utility function is given by:

\[
U_1 = M + \sum_{i=0}^{n} x_i. \tag{5a}
\]

Group 2’s utility function is given by

\[
U_2 = M + \sum_{i=0}^{n} \frac{3}{2} x_i. \tag{5b}
\]

In both (5a) and (5b), \(M\) is the consumption of all goods other than used cars in the economy. It can also be viewed as the total expenditure on goods other than used cars, because here we assume that the price of \(M\), \(p_M\), is equal to one. \(n\) is the number of cars consumed by the individual and \(x_i\) is the quality of the \(i\)th car.

Assume that (5a) and (5b) are von Neumann-Morgenstern utility functions (i.e. they possess the expected utility property; traders maximize expected utility). Assume that group 1 has \(N\) used cars and group 2 has zero. The \(N\) cars possessed by group 1 have uniformly distributed quality \(x\), where \(0 \leq x \leq 2\).

Let \(Y_1\) denote the income of group 1 and \(Y_2\) denote the income of group 2. Note that group 1’s income is derived from selling both used cars (since
they have $N$ cars) and other things. Group 2's income is only derived from “other” things since they have zero cars initially.

Note that marginal utility of additional cars also reflects the price that seller/ buyer is willing to sell/ buy cars.

Things to note about the utility functions: (1) they’re linear, (2) using linear utility functions allows a focus on only the effects of asymmetric information, and (3) the utility functions are “odd” because the addition of the second (or even $k$th) car adds the same amount of utility as the first car consumed.

Summary of important assumptions: (1) traders maximize expected utility (utility functions are VNM), (2) group 1 has $N$ cars and group 2 has none, (3) price of $M$, $p_M$, is one, and (4) goods are divisible.

**Symmetric Information**

In the symmetric information case, both seller and buyer know the quality of the cars. Since quality is uniformly distributed on $[0, 2]$, their average quality of car is 1. Group 1 is willing to sell their car if their reservation values for their cars are lower than the price. Group 2 has reservation price $\frac{3}{2}x$ for a car that has quality $x$. Since the quality is observable, selling price will be in between $x$ and $\frac{3}{2}x$. We know that the average quality is 1 ($x = 1$), it is equivalent to say that the selling price is between 1 and $\frac{3}{2}$. However, the unknown value of $N$ causes equilibrium to be assessed in every range of price. Figure 1$^2$ and Table 2 show the detailed demand and supply for every range of price.

Table 2: Demand and Supply in Symmetric Case

<table>
<thead>
<tr>
<th>Price</th>
<th>Demand</th>
<th>Supply</th>
<th>Equilibrium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
<td></td>
</tr>
<tr>
<td>$p &gt; 3/2$</td>
<td>0</td>
<td>0</td>
<td>$N$</td>
</tr>
<tr>
<td>$p = 3/2$</td>
<td>0</td>
<td>$\frac{Y_2}{p}$</td>
<td>$N$</td>
</tr>
<tr>
<td>$1 &lt; p &lt; 3/2$</td>
<td>0</td>
<td>$\frac{Y_2}{p}$</td>
<td>$N$</td>
</tr>
<tr>
<td>$p = 1$</td>
<td>$\frac{Y_1}{p}$</td>
<td>$\frac{Y_2}{p}$</td>
<td>$N$</td>
</tr>
<tr>
<td>$p &lt; 1$</td>
<td>$\frac{Y_1}{p}$</td>
<td>$\frac{Y_2}{p}$</td>
<td>0</td>
</tr>
</tbody>
</table>

$^2$This figure was borrowed from last year’s presentation of this paper
There is no equilibrium when price is above $3/2$, because group 1 is willing to sell their car, but no group is willing to buy, since the reservation price of group 2 is only $3/2$ and group 1 is only 1. When price is $3/2$, only group 2 wants to buy the car, because price is still above the reservation price of group 1. Therefore, the equilibrium when $p = 3/2$ is $N < Y_2/3$. The same logic also applies in the other range of price, as is shown in table 2. However when price falls below 1, the equilibrium doesn’t exist since group 1 doesn’t want to supply/sell their cars.

The derivations of symmetric demand and supply equations can be done by applying the method employed in the next section of this packet on asymmetric information. We did not include it here because it is straightforward.

**Asymmetric Information**

In this case, the seller knows more about quality of the car than the buyer does. Buyers behave based on their expectations/beliefs about quality. It is reasonable for the buyer then to estimate the quality of car offered in the market using the average quality of all cars ($\mu$). Buyers only want to buy the car if $\mu$ is above the price, therefore buyers from group one only want to buy the car if $\mu > p$, while buyers from group 2 only want to buy the car...
if $3/2\mu > p$.

Assume that the initial average quality of cars in the market is $\mu$, and the price in market is $p$ (where $p > 0$), and sellers/buyers have the reservation value for their cars measured by $v(\mu) = p$. In this case, only sellers whose cars with quality lower than $\mu$ are willing to sell, and sellers whose cars with quality higher than $\mu$ leave the market. Under the assumption that the quality has uniform distribution, $N/2$ sellers leave the market, so the supply becomes $(N/2) * p = \frac{p}{2}N$. In this case,

![Demand Curve for Asymmetric Case](image)

Figure 2: Demand Curve for Asymmetric Case

This contrasts asymmetric information—this causes the buyer to uncertain about the quality of cars. They estimate that the average quality of cars is only a half of the offering price. Based on the buyer’s estimation, group 1 only wants to pay at $p/2$, while group 2 only wants to pay at $3/4p$, therefore no cars will be sold at price $p$. As a result, the price would go down, which further drives some sellers out of the market and further lowers down the average quality of cars, leading to the shrinking of the market. To conclude, there will be no equilibrium outcome where asymmetric information exists.

Figure 2$^3$ shows the demand curve of cars at price range based on average price and Figure 3$^4$ show the supply curve of cars. Table 3 shows the demand and supply in the symmetric case. Recall that group 1 only wants

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$^3$Again borrowed from last year’s Lemons presentation.

$^4$See previous note.
to buy cars if $p < \mu$ and group 2 only wants to buy cars if $p < 3/2\mu$.

![Supply Curve for Asymmetric Case](image)

**Figure 3: Supply Curve for Asymmetric Case**

**Table 3 Demand and Supply in Asymmetric Case**

<table>
<thead>
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<td>0</td>
<td>$Y_2/p$</td>
<td>$pN/2$</td>
</tr>
<tr>
<td>$p &gt; 3/2\mu$</td>
<td>0</td>
<td>0</td>
<td>N</td>
</tr>
</tbody>
</table>

Below are the derivations of the asymmetric group 1 demand and supply, group 2 demand and supply, and market demand and supply.

**Group 1 Demand**

Consider group 1. Since (5a) is a linear utility function, we cannot implement the usual Lagrangian multiplier method, because we must account for corner solutions (recall that the only unique solutions that exist in the case of linear utility and a linear budget constraint are corner solutions). Consider Figure 1:
To find a point of tangency between this linear indifference curve and the linear budget constraint \( Y_1 = M P_M + \sum_{i=0}^{n} p x_i \), noting that \( p_m = 1 \), we compare the slope of the budget constraint (the price ratio \( \frac{p}{p_M} = p \)) to the slope of the indifference curve \( \frac{MU_{xi}}{MU_M} \), or the marginal rate of substitution, MRS). The point of consumption for an individual in group one will occur where the budget constraint and the indifference curve are tangency to one another.

If the budget constraint is steeper than the indifference curve (i.e. \( p > \frac{MU_{xi}}{MU_M} \)), then the tangency point will be where the individual is consuming only “other goods” and buying no used cars. They spend the entirety of their income \( Y_1 \) on \( M \) and thus consume \( \frac{Y_1}{P_M} = Y_1 \) units of \( M \). This is demonstrated in Figure 2, below:

The individual will consume at point A.

If the budget constraint is flatter than the indifference curve (i.e. \( p < \frac{MU_{xi}}{MU_M} \)),
then the tangency point will be where the individual is consuming only used cars and buying no “other goods”. They spend the entirety of their income \( Y_1 \) on \( x \) and thus consume \( \frac{Y_1}{p} \) cars. This is demonstrated in Figure 2, below:

The individual will consume at point B.

How do we derive what price group 1 consumers are willing to pay for a used car? Since they cannot pay a car’s true value because they cannot observe the true quality, the consumer will use average quality of used cars in the market (\( \mu \)) as a statistic of value. They will compare the price of cars \( p \) to the average quality of cars \( \mu \). \( \mu \) can be thought of as the price they are willing to pay. If \( \mu < p \), then no used cars will be demanded. If \( \mu > p \), then only used cars will be demanded. The reservation price (the highest possible price a group 1 consumer will pay for the car) is a price equal to the average quality of a car on the market. If the consumer were only to buy used cars, he or she would only get utility from consuming cars. An individual car of quality level \( x \) would give him or her \( x \) utility. Thus, if the buyer can only estimate a car’s quality as \( \mu \), buying that car will give the consumer \( \mu \) additional utility—he expects to obtain additional utility equal to \( \mu \) from purchasing a car in the market. If the car costs \( p = \mu \), the person is indifferent between buying or not buying the car.

Thus, group 1’s demand for used cars \( (D_1) \) is

\[
D_1 = \frac{Y_1}{p}, \quad \mu > p \\
D_1 = 0, \quad \mu < p
\]

(6)

*Average Quality*
Although quality of cars $x$ initially possessed by group 1 are uniformly distributed on $[0, 2]$, not all $N$ of these cars will be traded in the marketplace. Only cars with a price less than a seller’s value will be traded (this is the only time a seller will be willing to give up his or her car). Thus, the cars traded on the market are uniformly distributed on $[0, p]$. The expected value of a uniform distribution is equal to $\frac{1}{2}(a + b)$, where $a$ is the lower bound (here, 0) and $b$ is the upper bound (here, $p$). The average quality $\mu$ is then

$$\mu = \frac{1}{2}(0 + p) = \frac{p}{2}.$$

(7)

Group 1 Supply

The range of possible prices that can be charged is between 0 and 2. Again, if we use quality $x$ as a statistic for how much an individual values a car, no cars will sell for more than 2 since no individual values a car that much. Only the sellers who value their cars less than the market price $p$ will be willing to give up their cars. They will only give up their car if its quality $x$ is less than the average quality in the market $\mu$. To find the proportion of cars that are less than the average market quality, we use the cumulative distribution function (CDF) of the uniform distribution. Recall that a CDF of a randomly distributed variable (in our case $x$) gives the probability that an $x$ will be less than or equal to a given value. We want to know that probability that quality is less than or equal to the average quality on the market ($x \leq \mu$). Note that a seller will be indifferent between selling his car or keeping it when $p = \mu$. The CDF of a uniform distribution is given by:

$$\begin{align*}
0, & \quad x \leq a \\
\frac{x - a}{b - a}, & \quad a \leq x \leq b \\
1, & \quad x \leq b
\end{align*}$$

(8)

where $a$ is the lower bound of the region, $b$ is the upper bound of the region, and $x$ is the given value for which we are interested—the CDF will tell us the probability that we will find an $x$ that is less than or equal to this given $x$. 

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Consider the following figure:

Cars with quality less than $x > \mu$ won’t be traded. The probability that a car will be of lower quality than $\mu$ is then

$$\frac{x - a}{b - a} = \frac{\mu - 0}{2 - 0} = \frac{\mu}{2}$$

(9)

Recall that at $p = \mu$ a seller is indifferent between selling and keeping his or her car. By substitution, we have the proportion of cars that are equal to or less than quality $\mu$ as $\frac{\mu}{2}$. When this is multiplied by the total number of cars possessed by group 1, $N$, we have the quantity of cars supplied by group 2:

$$S(p) = \frac{p}{2}N$$

(10)

Group 2 Demand

Group two values quality more than group one, as demonstrated by their utility function (5b), while group one obtains a marginal utility of $x_i$ from the quality of the $i$th car, group two obtains a marginal utility of $\frac{3}{2}x_i$. Again, we compare $\text{MRS} = \frac{MU_i}{MU_M} = \frac{3}{2}$ with the slope of the budget constraint, $\frac{p}{p_M} = p$. If $p < \frac{3}{2}$, then the individual will spend all of his income on cars and no
units of $M$ (and consume $\frac{Y_i}{p}$ units of $x_i$. Conversely, if $p > \frac{3}{2}$, then the individual consumers zero cars and spends income only on $M$. When deciding whether or not to buy a car, the individual compares the marginal utility he would obtain from purchasing the car ($\frac{3}{2}x=\frac{3}{2}\mu$ for the average car in the market) with the price of cars. Thus, group demand can be summarized as:

$$D_2 = \frac{Y_2}{p}, \quad \frac{3}{2}\mu > p$$
$$D_2 = 0, \quad \frac{3}{2}\mu < p$$

(11)

Group 2 Supply

Group two initially has zero cars, so group two supply is given by:

$$S_2 = 0$$

(12)

Total Supply and Demand

Aggregate demand is the total demand when group one demand and group two demand is combined. From $p = 0$ to $p = \mu$, both groups will purchase cars. From $p = \mu$ to $p = \frac{3}{2}\mu$, only group two will purchase cars. At prices above $\frac{3}{2}\mu$, neither group one or two will purchase cars.

$$D(p, \mu) = \frac{Y_1 + Y_2}{p}, \quad p < \mu$$
$$D(p, \mu) = \frac{Y_2}{p}, \quad \mu < p < \frac{3}{2}\mu$$
$$D(p, \mu) = 0, \quad p > \frac{3}{2}\mu$$

(13)

Recall that the average quality of cars in the market is $\mu = \frac{3}{2}$. Comparing this with market price $p$, we can see that the third line of equation (13) is correct—price is higher than $\frac{3}{2}\mu$, so no cars will be purchased by either group, even though there are sellers willing to sell (in group one) and buyers willing to buy (group 2).

Applications

Health Insurance

In this paper, Akerlof treats the health insurance market as a lemons market. The lemons in this story are those elderly people (65 and older) who
know more about their health and are more likely to become ill. These individuals often have trouble purchasing medical insurance. This is because (1) age is a common indication of weakness and its associated high medical expenditure; and (2) in the competitive market, the prevailing insurance rate is lower than expected medical care cost for these people, so insurance providers have no incentive to include the elderly in their target market. Thus, insurance companies do not raise their prices to attract this demographic. To understand why we can examine the case when insurance companies open the market to these people and increase prices.

The above flow chart depicts how shrinking insurance markets occur as a result of adverse selection. Under information asymmetry, insurance providers cannot discern between types of applicants (the healthy vs. the unhealthy, namely, the low risk and high risk, respectively). Those who know that they will need insurance are willing to pay a much higher price, but the relative healthier groups are not. The rising price will still attract the former type (riskier individuals), but dis-incentivize the latter type, leading to higher level of risk in the market (higher likelihood of becoming sick). Thus, it is more reasonable to exclude those people from the market and not offer them insurance.

Recall that this idea is consistent with the ideas in “Credit Rationing in Markets with Imperfect Information,” in which Stigliz and Weiss prove that borrowers in the credit market change their behavior in response to an interest rate change, and higher interest rates attract riskier projects. Another related point is the possible solution to this problem—in another paper from this course (Rothschild and Stigliz, 1976), two equilibriums in the insurance market are compared: the separating equilibrium and the pooling equilibrium.

The result of this is that adverse selection can lead to three types of inefficiencies: (1) prices to participants do not reflect marginal costs, hence on a benefit-cost basis individuals select the wrong health plans; (2) desirable risk spreading is lost; and (3) health plans manipulate their offerings to deter the sick and attract the healthy.

Possible solutions could include group insurance, because “adequate health is a precondition for employment.”
The definition of adverse selection in the insurance market can be extended in two ways. (1) the key assumption in this example is that insurance providers can only set one common price, but in reality multiple insurance plans could be offered: a general plan and a more moderate plan. Individuals who expect high health care costs prefer more generous and expensive insurance plans; those who expect low costs choose more moderate plans. This is also an adverse selection, and the corresponding result is separating equilibrium. (2) If most insurance companies begin to utilize group insurance, then this means that insurance is not available to those individuals that exhibit a greater need for it.

**Minority Employment**

Employers might not hire certain minorities in some cases simply because they are exhibiting profit maximizing behavior. Akerlof suggests that “race may serve as a good statistic for the applicant’s social background, quality of schooling, and general job capabilities.” Kenneth Arrow first discussed the theory of statistical discrimination, which argues that despite the fact that agents behave rationally and also do not exhibit prejudices, demographic groups still are “unequal” when compared to other demographic groups. The fact that some demographic groups are preferred to others is because employers make judgments about the average behavior of an observable group of people. If an employer cannot know an applicant’s true productive capacity or skills, he or she will hire based on the qualities about the applicant that he or she can observe. This could potentially be a stereotype about the demographic group to which the person belongs. This is similar to Spence’s discussion of job market signaling.

Quality schooling may be a substitute for this statistic. Workers with high ability have lower costs of pursuing attainment of education at higher levels, which can act as a signal of their productive capacity. Workers without schooling could have innate talent, however “these talents must be certified by [a credible] educational establishment before a company can afford to use them”.

**Dishonesty Costs**

In the used car market example, there was a utility cost of units per car in the market with asymmetric vs symmetric information, and it was determined that eventually the number of cars $N$ that would be available for sale eventually approached 0. As a result it is conceivable that the losses

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incurred due to dishonest trades under asymmetric information are quantifiable under certain circumstances.

In the example for the used car market there is an incentive for the sellers to offer lemons at the market price. This lowers the expected quality of a good from the perspective of consumers; this drives legitimate goods out of business. This dishonesty (selling known lemons at prices above their actual value) as a result drives the whole market out of business, so the costs associated with dishonesty are not only with the amount lost by charging consumers more for lemons, but also the cost incurred from losing the entire market.

Empirical evidence suggests that developing countries are subject to much greater variations in quality. In such a market it would be possible to capitalize on the difference between the buying prices of two traders (caused by asymmetry) the merchant (an entity that capitalizes on such differences) could then act as screening agent.

**Credit Markets in Underdeveloped Countries**

Credit Markets in developing countries often show indications of suffering from asymmetric information. The problem from asymmetry arises foremost when considering entry to the market. The paper considers as an example the almost extortionate interest rates that local moneylenders charge their clients in India. Consider the already existing local moneylender. The lender is typically a member of the community with close personal ties to his clients. As a result he is able gain more insight into the character of his client an important factor in determining the riskiness of a loan. In order to combat the growing landlessness of the poorer classes, as a result of failing to repay secured loans, the government attempted to displace the local lenders in the “Cooperative Movement.”

Consider two lenders: Lender A, a local lender with existing ties to the community and Lender B a new lender entering the market. Suppose a Lender B has just joined the market. The Lender A was originally charging monopoly rates because they are the only players in the market. When a Lender B joins they may have to adjust rates to compet however they have more information about their clients than the new entrant. Lender B is unable to observe the riskiness of the borrowers to the same extent as the existing lender. So, similar to the market for lemons, the Lender B can only offer rates using assumed average qualities to determine the riskiness of the borrower. As a result individuals who would have gotten poorer rates at the Lender A would now flock to the new lender. However, the reason they received worse rates at the local lender was because the local lender was able
to determine that they were risky borrowers. The good borrowers would stay with the Lender A because the A would be able to offer them better rates than B because B would not know that they were good borrowers. As a result, Lender A would retain all the borrowers below a threshold of riskiness, and Lender B would find itself strapped with all the higher risk borrowers, or in this case “lemons”. The result would be that Lender A would face many more defaulted loans and could presumably be driven out of business (The example makes more sense if you consider unsecured loansas in the Cooperative Movement where the goal was to keep peasants from losing their land).

Knowing this as an outcome would prevent Lenders of type B from entering the market at all, or after multiple periods of competition would result in Lender A being the only competitor remaining in the market, allowing them to then readjust and charge monopoly rates. The paper also notes Sir Malcolm Darling’s interpretation of the village moneylender’s power (page 499), who are thus able to maintain an informational advantage, as well as be a preferable avenue for acquiring a loan, due to sheer convenience.

The above example with Lender A and B also applies if a third party attempts to arbitrage between the lower city lending rates and the local rates. He would attract all the lemons. A difference from the example with the market for used cars is that in this case the pressures from Asymmetric information don’t drive the whole market out of business, rather it creates a barrier for entry in the market. Another example that indicates the existence information asymmetry at work in developing countries is the concept of “Managing Agencies”in South Asia. Promoters of a venture seeking investment take their proposal to a Managing Agency. If the Agency green-lights the venture, then it is able to attract investment, simply by way of being certified by said agency. This works because the Agency would have established a reputation of credibility, can effectively act as a “screening”agent, much like Stiglitz and Weiss (1981).

The prevalence of these types of institutions suggests information asymmetry. Why? If there were symmetric information, investors would immediately know whether or not a venture was worth investing in, and there would be no need for additional spending on a managing agency to draw in more investment.

These managing agencies are necessary especially in the markets where investors are unable to determine whether a deal will be legitimate or not. The Managing Agencies are either able to maintain their status by either (1) building up a reputation of honest dealings, or (2) the “outside” investment is limited to contributions from communal groups which leverage social structure to encourage honest dealings.
Pickup Truck Market

Bond tested whether bad products drive out good products in the market for used pickups, a similar market to the used car market. If this model is accurately reflected by empirical data, we would see a high number of lemons in the market, as compared to high quality trucks. The amount of maintenance required on a truck is used as a measure of truck quality. If a truck requires more maintenance than the average, it is considered a lemon. He uses two approaches for testing the model: (1) evaluation of statistical data; and (2) estimation of a logit model representing the relationship between mileage and required maintenance (for both used and new trucks) and then hypothesis testing both the constant and slope parameter estimates to see if they were statistically different. First, Bond examines the frequency of truck maintenance on both used and new trucks by looking at the 1977 "Truck Inventory and Use” survey. He found that both new and used pickups need similar engine maintenance—thus a used pickup cannot be classified as a lemon. He also finds that only a small number of used pickups are in the inferior category, some of that in the superior category (at a 10% level of significance test). From the second means of testing, Bond finds that neither the slope or constant terms significantly differ at the 5% level between used and new pickups. This further disproves the lemons model.

Bond doesn’t find numerous lemons in the used truck market. However, the lack of numerous lemons in the market is consistent with the fact that owners sell vehicles when maintenance becomes too expensive. One potential reason is people who have high maintenance costs for pickups sell their gods to those who can maintenance them by themselves (have lower maintenance costs). This could be why not much data exists on used pickup truck maintenance.

Solutions to Information Asymmetry

Guarantees

 Guarantees of a good’s average quality helps reduce buyer uncertainty regarding quality. This shifts risk-bearing from the buyer to the seller.

Brand names

Brand names serve as an indicator of quality and allow for consumer retaliation (i.e., no longer purchasing that brand) in the case that the true quality of a good fails to reflect the expected quality of the good.
**Chains**

Similar to brand names, these allow nonlocal consumers who are unfamiliar with a geographic area and the things it offers to be able to expect a level of quality from a certain type of good, such as restaurant food or hotel accommodations. These people don’t want to take the risk of getting a “low” quality product (something that doesn’t meet their expectations).

**Licensing**

Licensing for skilled workers signal to market participants that those possessing licenses have reached a certain level of education, training or skill.