# ADVERSE SELECTION

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*In economics it is often too readily assumed that full information is available uniformly throughout a market. David O'Cinneide examines a more realistic scenario – that of asymmetric information. He refers to the classic work of Akerlof, Spence and Stiglitz to determine the nature of this market failure and subsequently outlines two ways in which the information gap may be bridged, namely 'signalling' and 'self-selection'.*

## Introduction

In theory, economics provides a reliable framework for analysis. A perfectly competitive market maximises the gains from trade to both producers and consumers, thus society is better off. The conditions that describe this perfect market (buyer and seller atomicity, product homogeneity, free entry and exit for firms), ensure that goods sell for the lowest price and are produced efficiently, to be enjoyed by the perfectly informed consumer who values it most. However, the assumptions intrinsic to the perfectly competitive market do not always apply in the real world. In particular, full information is not always available to *all* agents in the market. To account for this, economists have relaxed the unrealistic assumption of perfect information and uncovered new ways of looking at market failure and also new ways to counter it.

The theory of markets with asymmetric information was formally recognised as a cornerstone of modern economic thought when, in 2001, George Akerlof, Michael Spence and Joseph Stiglitz were awarded the Nobel Prize for Economic Sciences. The ground-breaking work of these academics brought economic theory closer to economic reality. Akerlof's classic paper, *The Market for Lemons: Quality Uncertainty and the Market Mechanism*,[1] has been described as "the single most important contribution to the literature on economics of information," (Nobel press release, 2001:2).

[1] While Akerlof's ideas are now recognised as groundbreaking, his lemons paper was rejected by two major journals before being published in the Quarterly Journal of Economics in 1970. (Riley, 2001)

This work was first to identify the concept of adverse selection, or the so-called 'lemons problem'. This phenomenon exists when an information imbalance characterises a market and can stop the gains from honest trade being realised. In order to maximise social welfare, this information imbalance must be remedied. The work of Spence and Stiglitz recognized how this might be accomplished. Spence's research focused on how the informed economic agent can send credible signals to the uninformed agent in a way that can be trusted, therefore ensuring mutually beneficial trade. Stiglitz's 'solution' approaches the problem of adverse selection from the other side of the transaction; the uninformed party screens the informed party to obtain the deals which are advantageous to both, i.e. the uninformed does not adversely select an unfavourable transaction. In this paper, I shall explore the work of these three economists and discuss the wisdom they have imparted on the economics of information.

## Information & When Markets 'Go Bad'

As is often the case in market transactions, one agent has an information advantage over the other. The seller of a used car is well aware if his car is a cherry, plum, peach or lemon.[2] The entrepreneur seeking capital in the form of a bank loan is in a better position to judge his level of risk. This uncertainty can cause the market mechanism to fail.

Consider a certain E. Knievel endeavouring to obtain motorcycle insurance. Mr. K knows if his actions are fraught with risk[3] (i.e. whether or not he has a high probability of having an accident) as compared to his insurance company, who can only judge the observable characteristics of Mr. K, i.e. age, gender, type of vehicle. These observable characteristics are the basis on which the insurance company sets the premium rate for Mr. K's cohort. Those with low risk will find this average rate too expensive to cover their expected loss and thus find it more attractive to seek insurance elsewhere or even self insure. Those with high risk, through the weighting of the group rate, force those of low risk out of the market. This exodus of low risk individuals causes an increase in the average risk of the entire group. In order to counteract the losses incurred due to the unexpected large number of claims (which in itself is due to the initial adverse selection of bad risks) the

[2] These fruity colloquialisms describe the quality of the car. Cherries, plums and peaches are high-quality cars, lemons are inferior cars.

[3] A distinction here must be made between the two classic problems of markets with asymmetric information. Adverse selection occurs when information concerning product quality is denied an agent, forcing a bad economic decision. Moral hazard is when the agents' actions affecting the quality of the product are unobserved by the other side of the transaction.

insurance company must raise premiums further, pushing more individuals out of the market. The proportion of good risks changes adversely as the premium is raised[4]. In his paper, Akerlof (1970) compares adverse selection to a kind of 'generalised' Gresham's law, the good trades in the market driven out by the bad.

The following is a basic illustration of adverse selection. Consider a good available in two qualities, high and low. The high-quality good represents a proportion $\mu$ of all goods to be traded. To the buyer, a high quality good is valued at $v^H$ and the low quality good $v^L$, $v^L < v^H$. To the seller, a high quality good is worth $w^H$ and the low quality good $w^L$, $w^L < w^H$. In a market characterised by perfect information, i.e. the buyers and sellers both know the quality of the good, then there exist two markets, one for each quality type. The low quality good sells for $v^L$, and high quality goods for $v^H$, thus assuring societal welfare is maximised. However, if there exists imperfect information, as is often the case in the real world, the buyer only offers the expected value of the good:

$$\omega = \mu \, . \, v^H + (1-\mu) \, . \, v^L$$

If $w^H > \omega$, then only sellers of low quality goods would find trade beneficial. Sellers of high quality goods would find it more attractive to hold onto their products and leave the market, leaving only the low quality goods for sale – adverse selection occurs!

## Sending the Right Signals

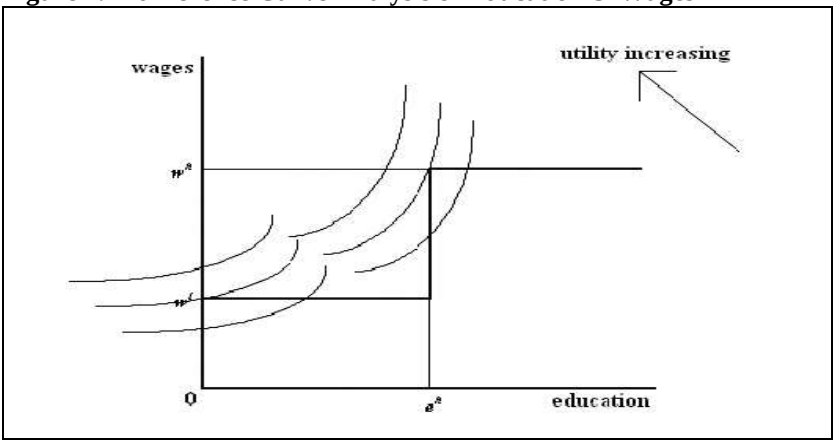
As shown above, markets with asymmetric information fail through the inability of both sides of the market to communicate information that they can trust. How can this information gap be bridged? Any cunning businessman can claim to own a high-quality product, but as the adage goes: talk is cheap. Another adage could aid us here: actions speak louder than words. Actions communicate. It was through the use of actions as a signal that Michael Spence approached the adverse selection problem.

[4] The father of modern economics, Adam Smith touched on the concept of adverse selection in his great work The Wealth of Nations (1776): "If the legal rate …was fixed so high… the greater part of the money which was to be lent, would be lent to prodigals…who alone would be willing to give this higher interest. Sober people, who will give for the use of money no more than a part of what they are likely to make by the use of it, would not venture into the competition." (Smith 1776, as cited in Stiglitz , 2001: 4).

For example, when you buy a pair of Campers, these hard-wearing shoes come with a two year warranty. This implies that the company has confidence in the quality of their product. On the other hand, if you buy flip-flops from someone carrying their wares in a blanket, there is no guarantee that they will last an hour on your feet. The warranty from Camper sends a signal to the consumer concerning the quality of the product. The very fact that the shoes will be replaced, no questions asked, leaves the impression that replacement won't in fact be necessary! Similarly, a used car salesman will undertake long-term investments such as large elaborate car showrooms to demonstrate their dedication to the business. By showing they are not 'flightly', in the parlance of the economist, they are playing the 'lemons' game repeatedly, thus building a reputation for selling quality cars. Signalling is costly and different 'senders' have different signalling costs. Sellers of poor quality shoes would not be able to bear the cost of a two year warranty, as they'd be replacing shoes far more than selling them!

In his paper *Job Market Signalling*, Spence explores education as a signal in the labour market.[5] Uncertainty arises because of the lack of information the employer (as the buyer of labour), has on the productivity of the seller (the job applicant). Education however, may be a signal as to whether this productivity is high or low. Spence assumes that employers believe applicants with an education level $e^h$, have a high productivity and are therefore paid a wage, $w^h$, all other education levels being paid $w^l$. An indifference curve framework illustrates the preferences of the applicants.

**Figure 1. Indifference Curve Analysis of Education & Wages**




[5] Isn't this the real reason behind university: To signal to a prospective employer how clever we are?

Moving in the northwest direction corresponds to higher utility levels, as higher wages are 'good' but costly education is 'bad'.[6] The flatter indifference curves represent the low-productivity individuals who find education more costly to obtain. The high productivity job applicants are satisfied with a wage-education combination ($w^h$, $e^h$), reflecting the preference that the costly education is worth the higher wages. Those to whom education is more costly, prefer the lower wage and no education, that is a "higher wage does not compensate for their high cost of education" (Nobel press release, 2001:6). Employers therefore know (under rigid but plausible assumptions) that in general, more productive workers will have higher educational attainment. Thus instead of the low productivity workers being adversely selected by employers, high productivity workers signal their abilities and participate in the labour market. Society is better off, thanks to information being indubitably transferred.[7]

## Standing Out From The Crowd

If the informed party can reliably signal to the uninformed party, then adverse selection can be overcome. Is there another way the uninformed party can manage trade with the informed side of the market to ensure that selection makes maximal benefits accrue? Stiglitz, using the insurance market as his main emphasis, tried to see how the ignorant insurance company (i.e. without full information) could "force customers to make market decisions in such a way that they both reveal their characteristics and make the choices they would have wanted them to had their characteristics been publicly known" (Stiglitz, 1976). "If those who are more able, less risk prone, more credit worthy acted in some observable way, then it might be possible to design a set of choices which would result in those with different characteristics in effect identifying themselves through their self selection" (Stiglitz, 2001). This 'self-selection' mechanism is the focus of Stiglitz and Rothschild's influential paper *Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information*.

In order to induce this 'self-selection', the uninformed party has to get the economic incentives right. Equilibrium must be *separating*, i.e. different types of customer select different types of contracts, rather than

[6] Purely from an economic cost minimisation perspective, of course!

[7] Although sometimes there is in fact no information transfer at all, except for the fact that the signal was extremely expensive to make. This is how some economists explain advertising (Hartford, 2006).

p*ooling*, when differing types choose the same contract. This is accomplished by the deductible.

In the Stiglitz and Rothschild model, an insurance contract is represented by the vector ***(p, c)***, where ***p*** is the premium and *c* is the compensation paid in case of income loss ***L***. When ***c=L***, we say there is full coverage. If ***c<L***, then the difference, ***d=c-L***, is said to be the deductible, that is, the amount of the loss that the insured must pay from his own pocket before reimbursement from the insurance company begins. By pairing the high premiums with the low deductibles, the insurance company ensures that the policy buyers purchase the correct contracts that the company wants them to.

The high risk customers, those who are highly prone to accidents, while tempted by the lower premiums, do not relish the prospect of paying the high deductible that accompanies it. They would prefer to accept the high premium in return for no deductible. Conversely, the low risk group, those who 'take care', gladly pay the lower premium with the larger deductible because, if you accept that the probability of an accident is extremely low, then so is the probability of paying it. Thus, through offering different contracts, insurers 'screen' their customers and motivate them to choose policies which confirm their riskiness and so bad risks are not adversely selected.

On the other side of the coin, instead of the bad risk being chosen adversely, Hemenway (1990) proposes a source for *favourable* selection in markets with asymmetric information he calls 'propitious selection'. In particular, again using insurance markets, different customers have different attitudes towards risk. Those who are 'risk avoiding' might both buy insurance and drive carefully, while those who are 'risk seeking' may be disinclined to buy insurance, drive carefully, or even wear their seatbelts.

## Conclusion

By thoroughly understanding why adverse selection can cause markets to breakdown, economists can better understand ways to correct the problem Economic agents can be seen to be using the ideas of these Nobel Laureates in their everyday interactions; how many questions must be answered and tests passed before an insurance company will offer a quote? How many graduates wear their finest suits and push their best exam result to the top of their CVs in job interviews? In market transactions, information can benefit society as a whole as a perfectly competitive market with perfect information maximises social welfare. Understanding how economic agents

use that information is crucial for real world markets to approach this theoretical ivory tower.

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