Adverse Selection

Theory

The Adverse Selection is a concept in economics, insurance, and risk management, which describes a situation where market participation is affected by asymmetric information. Before proceeding, it is essential to clarify the concept of information asymmetry: it is a situation in which one party has more or better information than the other. This creates an imbalance of power in transactions that can cause different economic issues, some of them will be explained later on.

The term "adverse selection" was initially used in insurance to describe a situation where an individual's demand for insurance is positively correlated with the individual's risk of loss. The basic concept is that if the insurance increases policies' prices, part of the clientele may forgo signing the policy, which became more expensive. But, the waiver concerns the part of the policyholders that need less the insurance, because riskier customers have no convenience to change their choice even with a higher cost of the insurance. Therefore, insurance drives less risky customers not to sign the policies, resulting in an increase of the riskier clientele's percentage. The decrease in less risky customers implies that for equal premium received per customer, the average reimbursements per client increase. Thus, insurance, which has interest in ensuring a less risky and less expensive clientele, end up achieving the opposite result.

There are many other examples of Adverse Selection in other economic fields, such as in capital markets, contract theory and job market. In a market for tokens, adverse selection occurs when good items cannot be sold, while it becomes easier to sell bad ones.

Experiment

In the experiment conducted in week 17, each player participated in a market for tokens in the random role of a seller or a buyer. There were two types of tokens: high quality tokens and low quality tokens. In the first two markets, buyers did not know which type of token the sellers had.

According to the quality of the tokens, there will be different ways to make profit.

If it is good and and it is sold at P price:

- Seller makes a return of P – £20.
- Buyer makes a return of £30 – P.

If it is bad:

- Seller makes a return of P.
- Buyer makes a return of £10 – P.

Buyers can buy more than one token, but if they do not buy any tokens, the profit is 0.

Sellers can have two different cards: if it is red, it means the item is good; if it is black, the item is bad. They can sell only one token, if they do not sell any tokens, the profit is 0.

In the first two markets, there were 6 low quality tokens and 4 high quality tokens for sale.

Market 1

In the first one, 5 low quality tokens and 4 high quality tokens were sold. The average trading price was £18.78.

According to the following formula, where G indicates good items and B bad items for sale, the average trading value should be £18:

$$\frac{30G + 10B}{G + B} = \frac{(30 \times 4) + (10 \times 6)}{4 + 6} = 18.00$$

But a seller with a good item would only sell for more than 20, while a seller with a bad item would sell at any price. Furthermore, only 5 of 6 low quality tokens were sold. If we rewrite the formula with the number of tokens sold, we get this result:

$$\frac{30G + 10B}{G + B} = \frac{(30 \times 4) + (10 \times 5)}{4 + 5} = 18.89$$

This new result is very close to the one obtained in the experiment.

According to the theory, a buyer could choose not to pay more than 10 for any item, hampering people with a good item to sell, or take the risk and pay more than 20, relying on luck and mutual trust with the seller. In general, it is easier to sell a low quality token, because you make profit at any price, while it is difficult to sell a high quality token because you cannot sell it at less than 21, in order to make profit, and if the buyers are diffident, it is possible that no one will buy it; in this case, we have an adverse selection.

In the first market, adverse selection did not happen, because all the good items were sold at fair prices, though some bad items were sold at too high prices.

Market 1: Trades
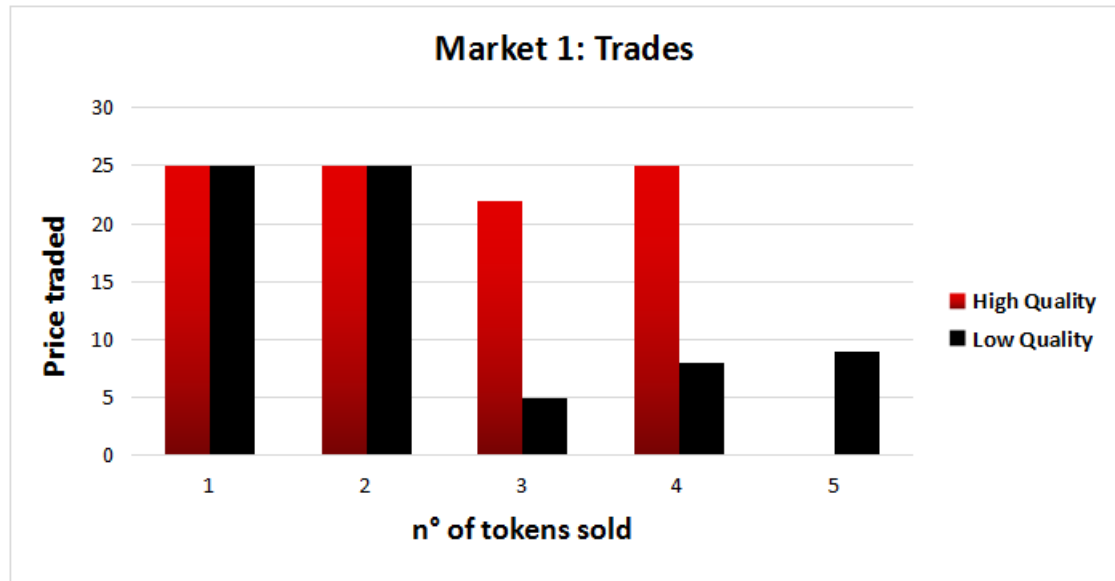
As we can see from this graph, two bad items were sold at the same price as the good items, this will obviously cause more diffidence in buyers in the next round.

Market 1: distribution
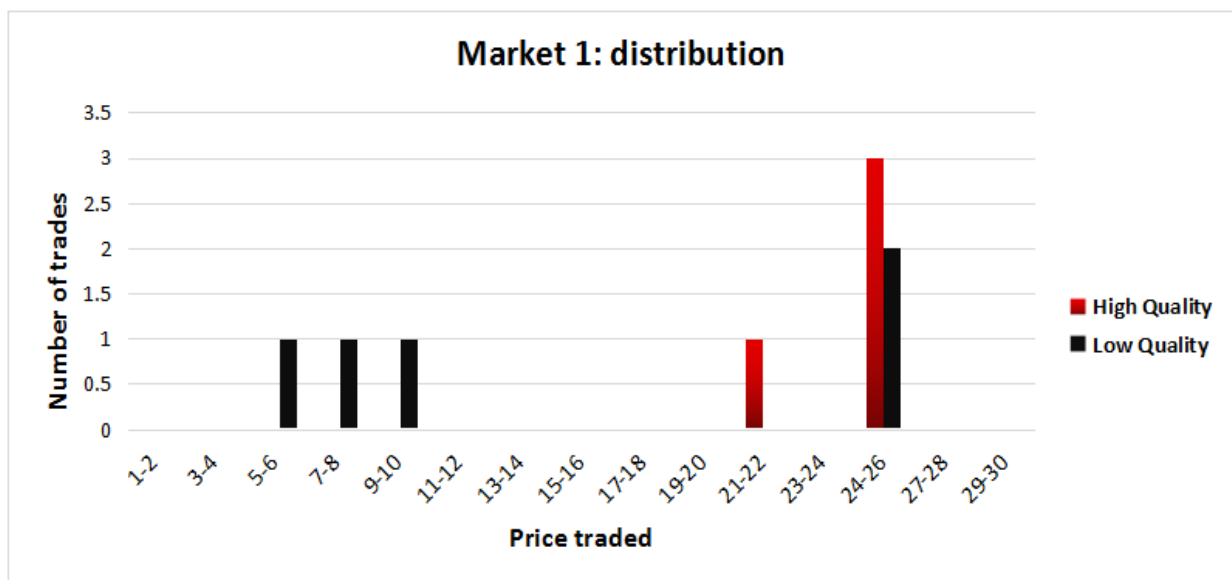
This graph shows the distribution of trades across various prices. The minimum price traded was 5 for a bad item, while the highest was 25 for both bad and good items.

Market 2

Now in this second market, players were more diffident, as a result of the previous trades, therefore only 2 of 4 high quality tokens were sold, while they were purchased 5 of 6 low quality tokens. The average price was 14.36.
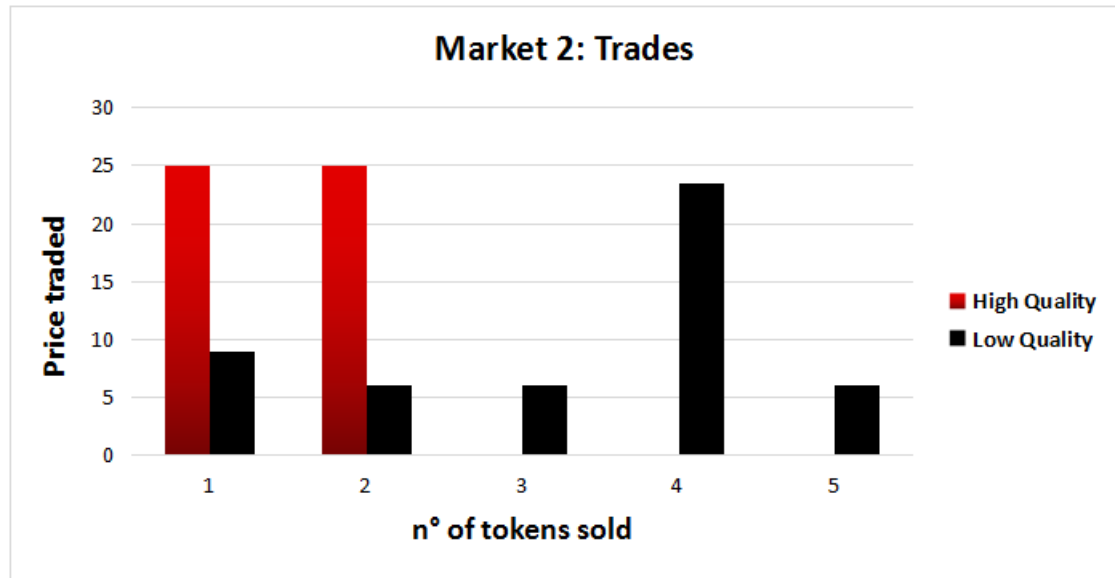
In this market we still do not have adverse selection, because, as we can see from the graph, event though the majority of buyers, in order to avoid a loss, has decided to buy at less than 10, there were 3 risk-lovers who actually bought tokens at higher prices and two of them bought good items.
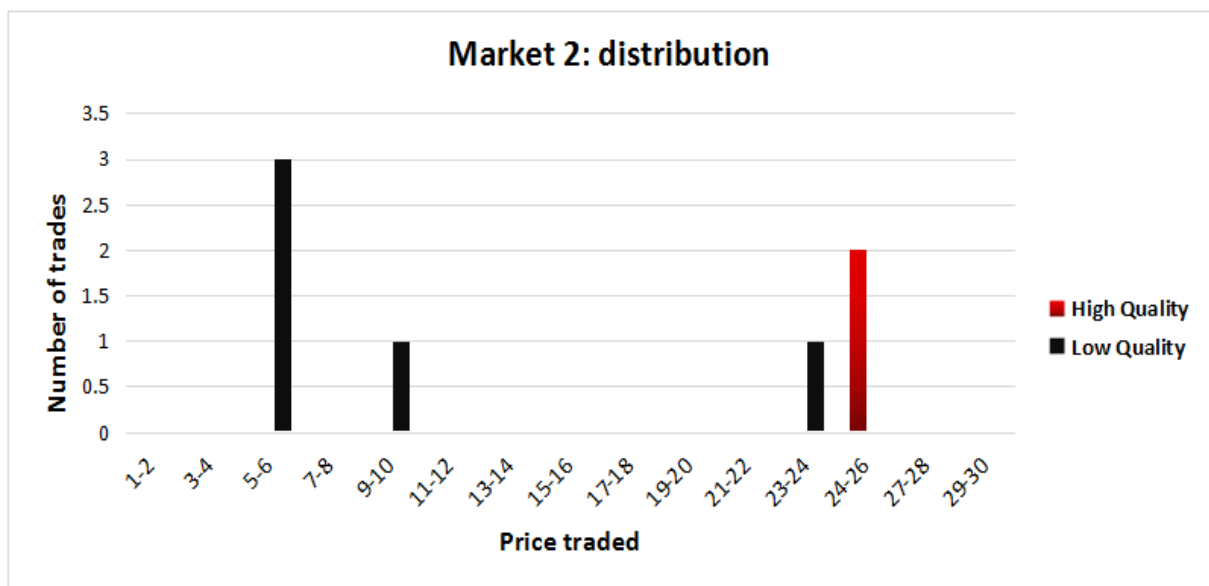

As we can see, 4 buyers were risk-averse and bought bad items at less than 10, while 3 risk-lovers bought at more than 20. Two of them were lucky and got good items, while one got a bad one.

Overall, we can assert that in the second market, adverse selection did not occur, but it was really close.
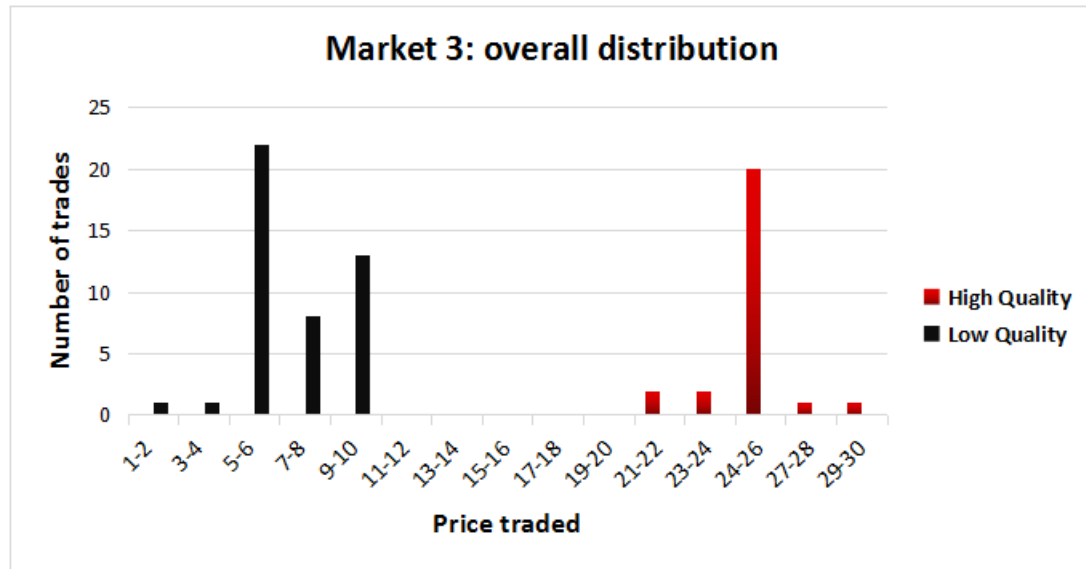
Market 3

In the third market there are many changes: first of all, sellers can prove to the buyers the quality of their tokens, so we do not have asymmetric information anymore, the number of the tokens was 7 for low quality and 3 for high quality and all of them were sold. In a situation of symmetric information, both party have the same information, therefore there is no imbalance of power in transactions and the market is perfectly efficient.
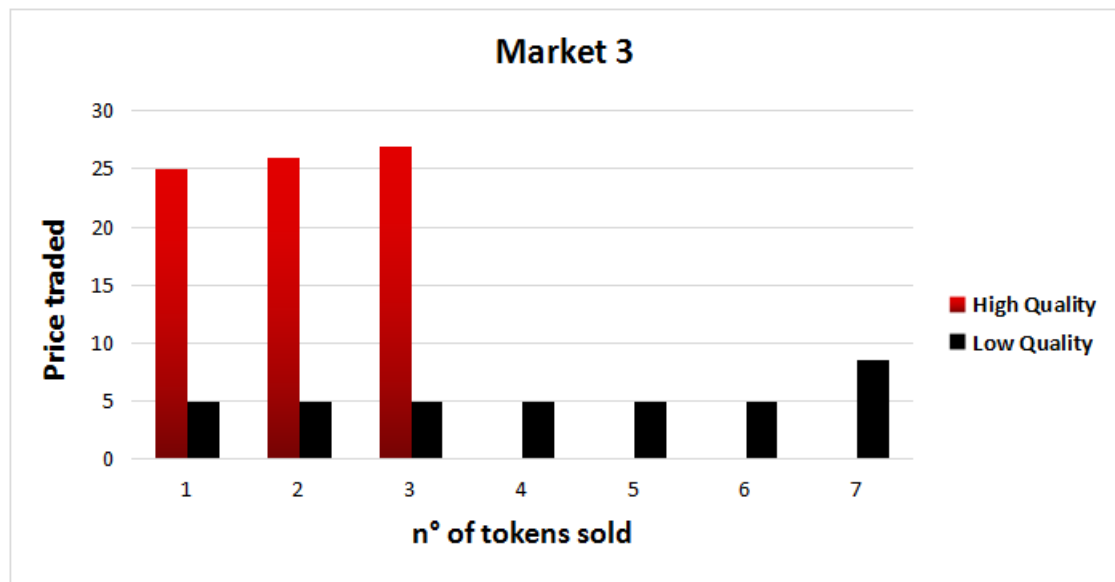

As shown in the graph, bad items were sold at less than 10, while good items were sold at more than 20.
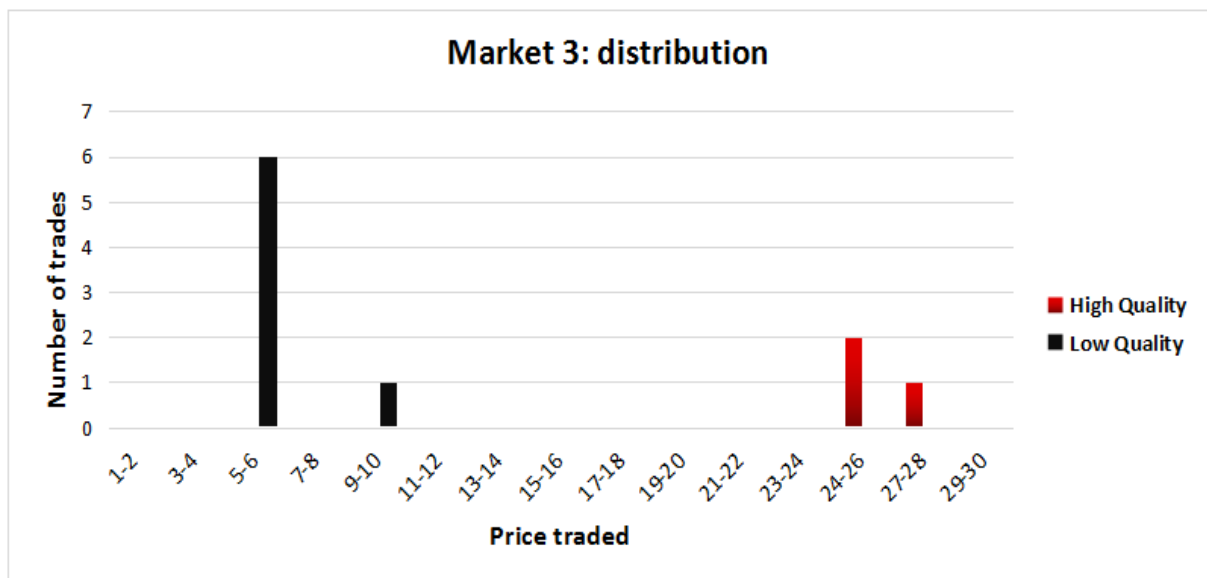
The space between 10 and 24 is empty, which means that the trades are perfectly distributed in two parts, according to the quality of the items.

Market 3: overall distribution

We can see a similar distribution putting together the data from all the seminars: also in this case, the space between 10 and 21 is empty.

Market 1: overall distribution

Market 2: overall distribution
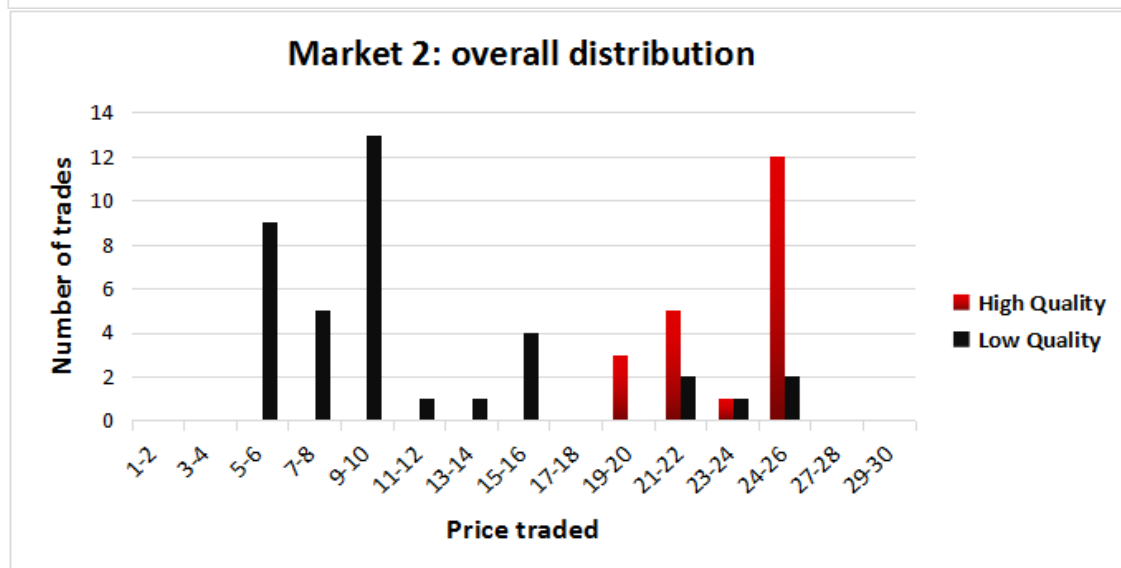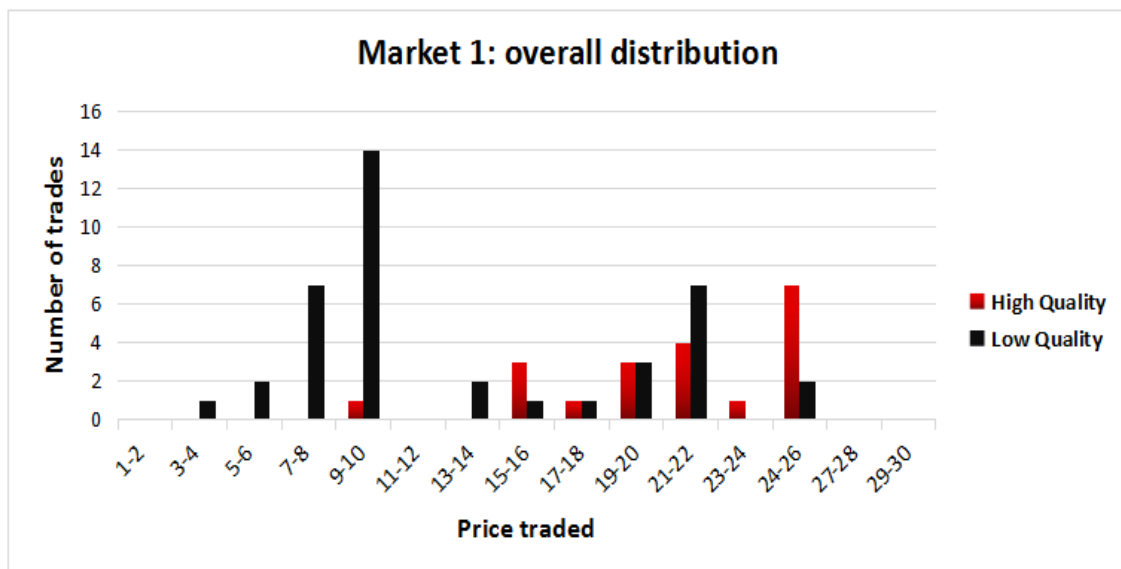
On the other hand, the overall distributions of the previous markets are imperfect, because of the asymmetric information, therefore the markets are not efficient. Anyway we cannot say that adverse selection occurred, because many high quality tokens were sold nonetheless.

Real life instance

Subprime mortgage crisis

One of the main causes of the great recession of December 2007-June 2009 was the sale of subprime mortgages. These types of mortgages existed long before the crisis of 2007, but, thanks to the United States housing bubble which peaked in approximately 2005–2006, they started becoming very popular in those years. The subprime mortgages are loans at high financial risk, given by lenders in favor of high risk debt's customers. But why did they lend money to customers who would hardly repaid their debts? Because in a scenario of "rising rates" and real estate prices growing steeply every year, the banks' secret hope was that, after a reasonably short time, the borrowers could not repay their debts and, therefore, could be legally possible to deduct their properties and resell them, as stated in the contracts. In this case we have two types of adverse selection: the first one, is caused by the asymmetric information of the "subprime" model, so banks do not know who they are lending money to, even though it is highly probable that the customer is a "bad" one. The second adverse selection is represented by the moral hazard that happens immediately after the loan. The moral hazard describes a situation where there is a hidden action that results from the transaction. In this case, banks undertakes a risky behavior, because they rely on the probability that the costs, associated with a negative outcome of their actions, will fall on the community. This is exactly what happened: the banks sold mortgages to companies specialized in the purchase of subprimes, with a return that was lower than the amount of the debt. Those companies did the same of the banks, because they did not want to risk a loss, so they sold those "bad quality" mortgages in the form of asset baked securities, and, more specifically, as collateralized debt obligations. By definition, a CDO is a promise to pay investors in a prescribed sequence, based on the cash flow the CDO collects from the pool of bonds or other assets it owns. Basically, they spread "bad quality" loans all over the world, passing them off as "good quality" loans and earned profits. The financial crash happened when the housing bubble burst, which led to a rise in interest rates, which decreased investment and therefore banks, that had financed 100% of the properties plus the costs of acquisition, went into a big loss. But, for the fact that the mortgages were sold all over the world, the crash was not only related to the banks, but also to the community itself. In this case, adverse selection occurred and was so widespread that damaged entire economies. If banks did not

base their profits on those types of contracts, instead of "prime" mortgages, this crisis would have never happened, but there are many mistakes that could have been avoided: banks should not have sold the debts to other companies and those companies should not have sold those debts passing them off as CDO, lying to the community, which was unaware of the quality of the product they were actually purchasing. The underlying problem is always the same: asymmetric information. There should have been more information and honesty, starting from the drafting of contracts. Banks could have made good profits also with prime mortgages, in a situation of information symmetry, without risking and, therefore, burdening on the community. In this case we have a pre-contractual opportunism, represented by the stipulation of the mortgage, which is an example of adverse selection, and the post-contractual opportunism, represented by the selling of mortgages, which is an example of moral hazard.

Reference:

- Government Publishing Office US, (2011). *The Financial Crisis Inquiry Report.* [online] Official Government Edition: Certify, p.663. Available at: https://www.gpo.gov/fdsys/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf