

Since the beginning of capitalism there has been one golden rule which says that if you want to make money you have to take risks. Then came the attempt to find a mathematical way to break that rule.

In a stock market there are things such as currency derivatives, interest rates and whose prices are constantly fluctuating. The job of a trader is to guess what prices will be next year, next week or even in 10 seconds and doing this thing many times a day. You can see that the risks are enormous.

The academics found that the prices moved at random and they tried to control risk through probability. By measuring how much prices moved in the past they calculated the probable range the price would fluctuate in the future but they needed a result that was much more accurate. In 1955 an academic discovered that there had been someone that already thought of it. The academic found a thesis of a French student who also found that stock prices moved at random but also found a way to get rid of the risks. The solution was a financial contract called option. He believed that if someone could discover a formula that uses this contract and will be widely used, traders could make their predictions without any risk. But the student died before finding a formula.

After this, the academics started to study the option in order to find the formula. The risk is that if you buy a stock today, the price could drop in the future. But if you pay for an option contract this gives you the right to wait and buy the stock if it reaches an agreed price somewhere in the future. But there is no obligation because if the price doesn't reach the sum you said, you can drop out and you will lose only the cost of the option. The only problem was how much a person should pay for such a contract.

The academics tried to build models depending on the confidence of the traders, like the level of satisfaction, for reasonableness and aggressiveness and kept adding more and more variables that didn't help them at all.

In 1968, Myron Scholes and Fischer Black decided to tackle the problem of options. They knew that the price of a stock can only go up and down so the price of the option would do the same. What they wanted to find was a formula that could decide the price of an option at any time just by knowing the current price of the stock. They followed the other models of academics and did something new. They dropped every single symbol of the model that seemed to be unmeasurable and who didn't affect the calculations at all. The only symbols that remained were: stock price, the volatility, the interest rate, the duration of the contract and the level of risk. Only the level of risk was unmeasurable and they needed to make the level of risk less significant. The solution was like this: everytime the stock price moves upwards or downwards, the option price should move in the opposite direction in order to balance things and this solution is called dynamic hedging. So the risk is dropped out of the equation.

There was a practical problem with their idea. It will take a lot of time to calculate the dynamic hedging and while trying to compute it, the stock would move ahead and their calculations could not be up to date. What was needed was a way to immediately recalculate the option price. Luckily, they found someone able to help them and his name was Robert Merton. He studied the model of a Japanese mathematician who faced a similar problem as the one of Black and Scholes, but regarding rocket science. In order to plot the trajectory of rockets you needed to know exactly where the missile was all the time. This Japanese guy

divided time into infinitely small parts smoothing it out until he got it continuum, so the trajectory could be constantly updated. Robert Merton studied this model and adapted it for the Black and Scholes formula.

Finally, using the notion of a continuous time, the value of the option could be constantly recalculated and risk eliminated.