# Key Takeaways From
# “Against the Gods: The Remarkable Story of Risk” by Peter L. Bernstein

- The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature
- The free economy has brought humanity unparalleled access to the good things of life
- Our understanding of risk enables us to make decisions in a rational mode
- The satisfaction resulting from any small increase in wealth will be inversely proportionate to the number of goods previously possessed
- The word "risk" derives from the early Italian risicare, which means "to dare."
- Risk is a choice rather than a fate
- If human nature felt no temptation to take a chance… there might not be much investment merely as a result of cold calculation
- Time is the dominant factor in gambling
- The more uncertain the outcome, the greater may be the value of procrastination
- The Greeks believed order is to be found only in the skies
- Before a society could incorporate the concept of risk into its culture, change would have to come, not in views of the present, but in attitudes about the future
- Up to the time of the Renaissance, most of people's decisions were driven by instinct
- When the conditions of life are so closely linked to nature, not much is left to human control
- The past and the future- far from being a matter of concern- were wholly implicit in the present
- Without numbers, risk is a matter of gut
- Equations like a + bx = c are known as Diophantine
- Zero makes the whole structure of the numbering system immediately visible and clear
- A man is nothing but his mind; if that be out of order, all's amiss, and if that be well, the rest is at ease
- Probability means the degree of belief or approvability of an opinion
- Galileo believed probability was how much we could approve of what we were told. Leibniz said it was how much credibility we could give the evidence

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THE PROBABILITY OF EACH SUM WHEN ROLLING A PAIR OF DICE

| *Sum* | *Probability* |
|---|---|
| 2 | 1/36 |
| 3 | 2/36 or 1/18 |
| 4 | 3/36 or 1/12 |
| 5 | 4/36 or 1/9 |
| 6 | 5/36 |
| 7 | 6/36 or 1/6 |
| 8 | 5/36 |
| 9 | 4/36 or 1/9 |
| 10 | 3/36 or 1/12 |
| 11 | 2/36 or 1/18 |
| 12 | 1/36 |

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- The probability of an outcome is the ratio of favorable outcomes to the total opportunity set
- The odds on an outcome are the ratio of favorable outcomes to unfavorable outcomes
- The laws of probability are the most powerful tools of risk management



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1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

- The first thing which we must consider is that the money the players have put into the game no longer belongs to them… but they have received in return the right to expect that which luck will bring them. In the event that they decide to stop playing before the game is over, they will reenter into their original ownership rights of the money they have put into the pot
- Decision theory is the theory of deciding what to do when it is uncertain what will happen. Making that decision is the essential first step in any effort to manage risk
- A decision- a choice in which the value of the outcome and the likelihood that it may occur will defer because the consequences of the two outcomes are different
- Sampling is essential to risk-taking
- Fear of harm ought to be proportional not merely to the gravity of the harm, but also to the probability of the event
- The value of an item must not be based on price, but rather on the utility that it yields
- Any decision relating to risk involves two distinct and yet inseparable elements: the objective facts and a subjective view about the desirability of what is to be gained, or lost, by the decision
- Expected values are computed by multiplying each possible gain by the number of ways in which it can occur, and then dividing the sum of these products by the total number of cases
- The utility is dependent on the particular circumstances of the person making the estimate

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- If everyone valued every risk in precisely the same way, many risky opportunities would be passed up
- The utility resulting from any small increase in wealth will be inversely proportionate to the quantity of goods previously possessed
- Risk is no longer something to be faced; risk has become a set of opportunities open to choice
- In a rational world, we would all rather be rich than poor, but the intensity of the desire to become richer is tempered by how rich we already are
- If the satisfaction to be derived from each successive increase in wealth is smaller than the satisfaction derived from the previous increase in wealth, then the disutility caused by a loss will always exceed the positive utility provided by a gain of equal size
- In a mathematical sense a zero-sum game is a loser's game when it is valued in terms of utility
- Reality is a series of connected events, each dependent on another, radically different from games of chance in which the outcome of any single throw has zero influence on the outcome of the next throw
- Games of chance reduce everything to a hard number
- The Law of Large Numbers states that increasing the number of throws of a coin will correspondingly increase the probability that the ratio of heads thrown to total throws will vary from 50% by less than some stated amount, no matter how small
- Risk as a chance of loss: the risk of losing any sum is the reverse of expectation; and the true measure of it is, the product of the sum adventured multiplied by the probability of the loss
- The standard deviation is critically important in judging whether a set of observations comprises a sufficiently representative sample of the universe
- In a normal distribution curve, approximately 68% of the observations fall within 1 standard deviation of the mean of all the observations, and 95% of them fall within 2 standard deviations of the mean
- Uncertainty means unknown probabilities
- Order is impossible to find unless disorder is there first
- Observations that are truly independent provide a great deal of useful information about probabilities
- Unless we observe the rules of probability, we cannot get a clear idea of the precision of measurements made in the sciences of observation… or of the conditions of leading to the success of commercial enterprises



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- Since we never know exactly what is going to happen tomorrow, it is easier to assume that the future will resemble the present than to admit that it may bring some unknown change
- No matter how the market moves along the way, returns to investors should average out around some kind of long-term normal
- We cannot understand current phenomena without systematic examination of earlier events which affect the present and will continue to exercise profound effects tomorrow
- The world is full of desirable things, but the amount that people are willing to pay for them differs from one person to another
- The more we have of something, the less we are willing to pay to get more
- Nature has placed mankind under the governance of two sovereign masters, pain and pleasure
- Utility is the property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness… when the tendency it has to augment the happiness of the community is greater than any it has to diminish it
- Value depends entirely upon utility
- The more refined and intellectual our needs become, the less they are capable of satiety
- If everything is a matter of luck, risk management is a meaningless exercise
- Until we can distinguish between an event that is truly random and an event that is the result of cause and effect, we will never know whether what we see is what we'll get, nor how we got what we got
- When we take a risk, we are betting on an outcome that will result from a decision we have made
- The essence of risk management lies in maximizing the areas where we have absolutely no control over the outcome and the linkage between effect and cause is hidden from us
- The more extraordinary the event, the greater the need of it being supported by strong proofs
- The mathematical expectation of the speculator is zero
- Chance is only the measure of our ignorance
- Chaos Theory is the theory that states much of what looks like chaos is in truth the product of an underlying order
- The fear of loss constrains our choices
- We are never certain, we are always ignorant to some degree



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- Uncertainty is present in the decision-making process, not so much because there is a future as that there is, and will be, a past
- The ability to extrapolate from experience is what differentiates adults from children
- No event is ever identical to an earlier event
- When once the facts are given which determine our knowledge, what is probable or improbable in these circumstances has been fixed objectively and is independent of our opinion
- As we make decisions we do change the world
- Game Theory states that the true source of uncertainty lies in the intentions of others
- Do not take more risk than you need to generate the return that is offered
- Performance means seeking to get better than average results over a fairly long period of time-consistently
- Each investor's return depends on what other investors will pay for assets at some point in the uncertain future
- Higher risk should in time produce more wealth, but only for investors who can stand the heat
- Diversification is the best weapon against variance of return
- In a diversified portfolio, some assets will be rising in price even when other assets are falling in price
- Investors always want to own securities that represent the best at the price
- The expected return of a portfolio made up of such securities will be the mean of the expectations for each of the individual holdings
- Reward is a more effective teaching tool than punishment
- Emotion often destroys the self-control that is essential to rational decision-making
- When the choice involves losses, we are risk-seekers, not risk-averse
- It is not so much that people hate uncertainty, bur rather they hate losing
- It is not how rich you are that motivates your decision, but whether that decision will make you richer or poorer
- You never get poor by taking a profit
- Investors must expect to lose occasionally on the risks they take
- Worldly wisdom teaches us that it is better for reputation to fail conventionally than to succeed unconventionally
- The use of derivatives, a hedge against the risk of unexpected price fluctuations, arose from the need to reduce uncertainty



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- The value of an option depends on four elements: time, prices, interest rates, and volatility
- The willingness to take risk is essential to the growth of a free market economy



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