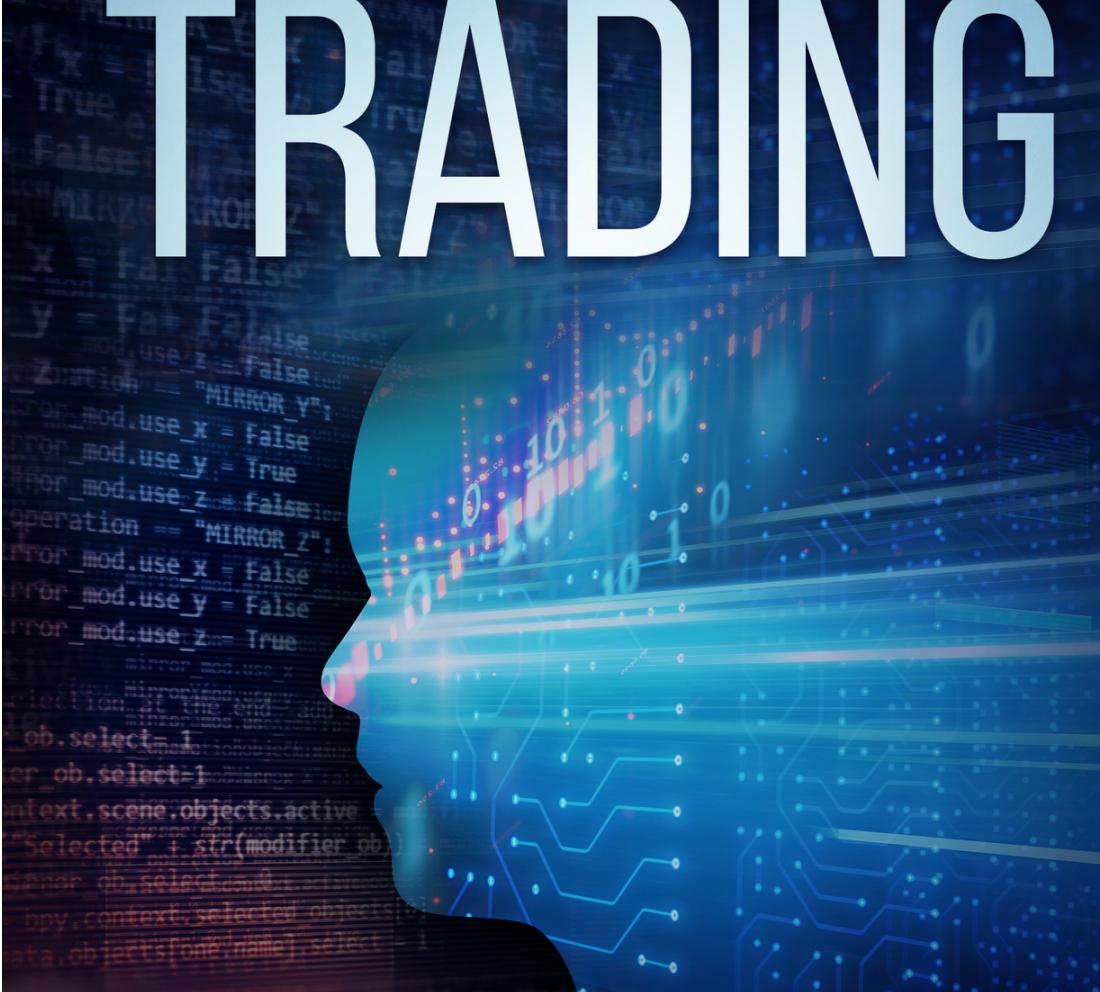


ALGORITHMIC TRADING

A BEGINNER'S GUIDE TO LEARNING THE FUNDAMENTALS
AND THE STRATEGIES OF ALGORITHMIC TRADING

JAMES JOHNSON

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Algorithmic Trading

A Beginner's Guide to Learning the
Fundamentals and the Strategies of
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Introduction

Congratulations on downloading “Algorithmic Trading”, and thank you for doing so. You will not regret your decision. This book is a basic review of the fundamentals of Algorithmic trading and gives you an insight into what it is, how to succeed and the importance of successful backtesting.

The objective of this book is to educate anyone interested in Algorithmic trading. It aims to introduce you to Algorithmic trading then takes you through the various concepts.

Trading the markets have been around for a long time, but you cannot appreciate where it has come from unless we look at the history, which is presented in the first chapters of the book. We go ahead to look at the different people that make use of the trading strategy and how they use it.

Each trading strategy comes with a real-world example to make sure you get the concept right. Thank you for reading.

Who Should Read this Book?

Algo trading encompasses trading, computer programming, and quantitative analysis. Thus, this book is aimed at all three areas. This should serve as a good introduction for any investor, seller, salesperson, and quant or software developer looking to get more information in these fields.

The book aims to take the reader from the ground up, so you don't need to have advanced knowledge of the markets to enjoy the book.

Chapter 1: Algorithmic Trading Intro



Algo trading is an essential tool for electronic trading of financial assets. Algorithmic strategies are also vital to the process of coming up with trading goals and investment strategies for many traders.

Currently, there is a wide array of assets that you can trade electronically from the comfort of your home or from an office. These range from stocks to bonds, cash to certificates and a variety of other assets that can be bought and sold at the tap of a button. The technology that is in place to achieve this is relatively new, though the fundamental market mechanics remain the same. Overall, trading is all about trying to get a buyer quickly and make a profit while at it .

Algorithmic trading, also called algo trading, black box trading or automated trading, refers to a technological advancement in trading that has been witnessed in the securities market. The process runs on a computer that has to implement a specific set of instructions (the Algorithmic) that you come up with. This Algorithmic places a trade that results in profits at a frequency and speed that isn't possible for human traders.

Algorithmic trading has taken the global market by storm. For most countries, Algorithmic trading is now the mainstream technique that traders use to trade faster and make profits. In fact, most traders that have used algo trading say that they cannot use any other method unless it offers better incentives than algo trading.

Algorithmic trading has taken precedence over other forms of trading and has been accepted by many countries, including the United States, the United Kingdom, and South Korea. The main features that make this trading method adopted by these countries are the liquidity and exceptional speed of trading that the method brings to the table.

This trading method is expected to be adopted more during the forecast period between 2018 and 2026. This is true due to the increased adoption in the use of cloud computing.

You might wonder why traders opt for cloud computing, yet it is known to be capital intensive. Well, traders can now utilize the computing technology to build their own data centers so that they can store their data, back it up and recover it. Cloud computing also allows traders to manage data in real time and network with other traders. It is also easier to rent space in the cloud as compared to developing a software infrastructure.

Statistics show that the cloud computing market is expected to grow to \$US 191 billion by 2020, up from \$58 billion in 2013. The increased adoption of cloud computing is attributed mostly to Algorithmic trading.

This type of trading offers numerous advantages besides the typical ability to come up with a strategy in advance. For one, you don't have to be emotionally involved with the trade at all, a fact that has been known to be the primary source of burnout for many talented traders. You end up saving a lot of manpower in the process as well.

Where Can Algo Trading Be Utilized?

- *Mid to long term investors* who deal in mutual funds, pension funds, and insurance can use algo trading systems to purchase stocks in considerable quantities to influence stock prices with significant volume investments. Trading via Algorithmic platforms needs the investors to first specify the trading goals in the form of mathematical instructions that can be simple or

highly sophisticated. After defining the instructions, the computers go ahead to implement these trades using the underlying commands.

- *Market makers, arbitrageurs, and speculators* can benefit significantly from automated trading by determining the right time to place a trade so that they do not make losses. These use computerized algorithms to provide the proper liquidity to the market. As such, the parties end up cutting costs of hiring additional traders. Additionally, these broker-dealers can use the algorithms to transact on behalf of their investor clients. The buy-side needs information from the sell-side on how much needs to be invested (capital and transaction costs) as well as point out any issues that might arise during execution.
- *Trend followers, pair traders, and hedge funds* can program their trading rules and allow the trade to run automatically. This saves them time and effort while giving them more returns on the same.
- *Company managers* can use Algorithmic in a wide variety of ways. They can use them to manage funds – index and mutual funds, quantitative funds, and pension funds, as well as hedge funds. Using these tools, they can go ahead to implement various investment decisions. The algorithms determine the best ways to make decisions – including the appropriate price, purchase time, and quantity of shares that can enter the market.

Algo Trading and Retail

Many retail traders get into the market knowing too well that the competition is high. The competition doesn't arise from other retailers but from wholesalers and multinational corporations with huge capital outlays .

The good news is that retail algo traders have the capacity to compete with other players on the market, though this comes with many disadvantages:

- *The capacity* – retail traders have greater freedom to trade in smaller markets. They get to generate more revenue in these spaces.
- *Crowded trades* – many funds suffer from high turnover, which means they don't have consistency in their trades.
- *Low capital base* – when playing in huge markets, retailers with low capital bases reduce the impact on the market significantly.

- *Liquidity* – many retailers don't have access to prime brokerages, instead, they have to do with “other” brokerages that aren't as efficient as the major ones.
- *Lack of information flow* – the biggest disadvantage for the retailer is the lack of access to news from their brokerage.
- *Poor risk management* - Retailers also have a different approach to risk management compared to the quant funds. Additionally, they don't have a risk management budget imposed beyond what they determine by themselves. They also don't have a department that enforces this.

Algorithmic Trading Statistics

To understand the role and position of Algorithmic trading in the economy better, it is vital to look at various statistics that define the model.

Algo Trading Dominates 80 Percent of the Stock Market

Studies show that 80 percent of all the daily trades in the US stock market is led by automation. This is due to the use of machines to come up with predictions based on real-time data releases.

At the start of the new millennium, Algorithmic trading consisted roughly 15 percent of the total trade volume in the country. However, this has changed, and at the moment, algo trading is widely used in huge institutional firms that command over 80 percent of the US market as indicated in the table below:

Percentage of volume traded using algorithmic trading

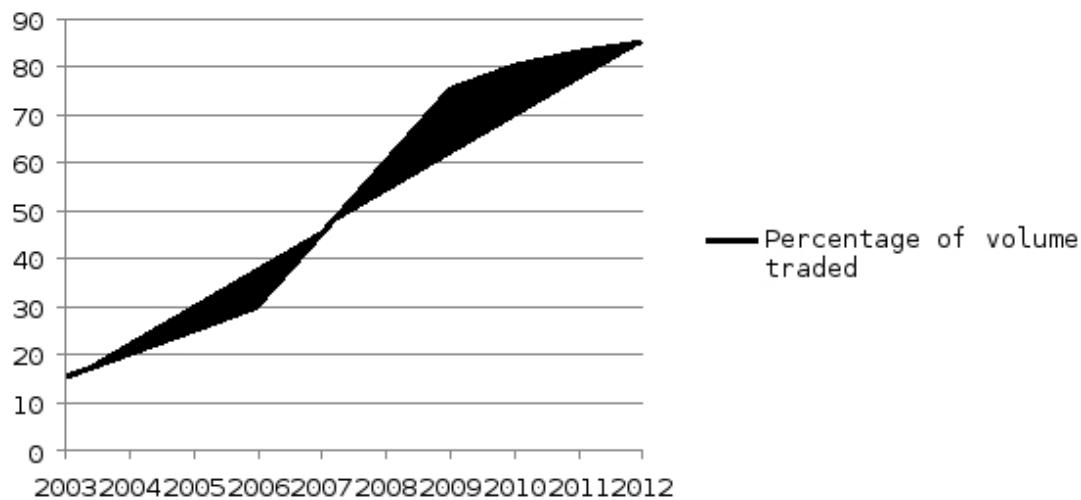


Table 1.0: *Percentage volume traded using algo trading between 2003 and 2012. Data courtesy of arno.uvt.nl*

All is due to the evolution of technology

The growth of Algorithmic trading is attributed to the rapid development of technology. Some of the most notable mentions include:

- The evolution and improvement in cloud services have revolutionized algo trading.
- The potential opportunities that have come up due to development of blockchain technology.
- The growth witnessed in artificial intelligence and the availability of machine learning in financial markets.
- The increase in research into technology.

A recent report shows that the use of Algorithmic trading systems will rise by 10.3 percent between 2016 and 2020. The trading market size is also expected to grow from 11.1 billion USD in 2019 to a staggering 18.8 billion USD in 2024. The major growth stimulators include the increasing demand for effective execution of orders and a reduction in transaction costs.

Funds traded using algorithmic trading (billions)

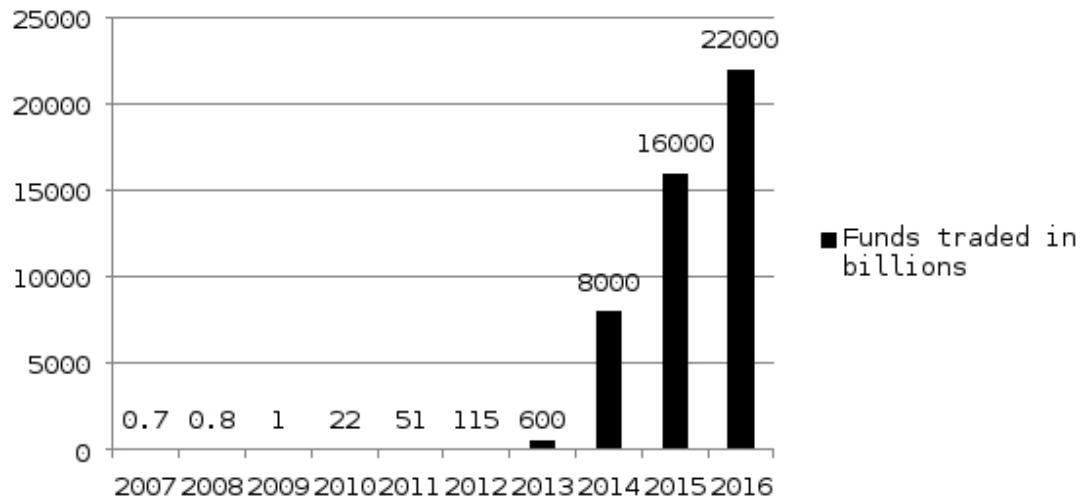


Table 2.0 Shows funds (in billions) traded over a period of time.

Differences between Algorithmic, Quantitative, and High-Frequency Trading

Let us look at the three trading aspects – Algorithmic, quantitative, and high-frequency trading.

Algorithmic Trading

As discussed in previous sections, this is simply the act of turning a trading idea into a trading strategy using an Algorithmic. The strategy created can be backtested to prior data to confirm whether it can give good returns when applied in real markets.

Since we shall look at Algorithmic trading on a deep level, we shall not delve so much into it but will look at the other two and point out the differences that arise.

Quantitative Trading

This form of trading relies on quantitative analysis that fully depends on number crunching and mathematical computations to come up with trading opportunities. The most common inputs used in this case are the price and

volume of assets. These two are then used to come up with mathematical models.

Major financial institutions, as well as hedge funds, use this trading strategy. Transactions, in this case, are usually large and involve the sale of thousands of shares. Individual traders are increasingly adopting this trading model as well.

Quantitative trading techniques typically have short-term investment horizons. The significant advantage of quantitative trading is that you get to use backtested data and eliminate decision-making based on emotions. However, the major disadvantage is that the method loses its effectiveness whenever conditions change.

The distinguishing feature of this form of trading is that it removes any subjectivity, which means the trading decisions are made based on information that can be quantified. As expected, the decisions that are made by the trader are based on a sort of statistical or mathematical model of the market behavior.

You can use one of the many models of market behavior; however, finding the right one that is accurate enough to give you the expected profits is not an easy thing at all. We can come up with models that are based on fundamental data, which refers to information that affects the direction of the market. Such information can be news releases or company information that gives you numbers to work with.

High-Frequency Trading (HFT)

This is a trading program that makes use of powerful computers to trade a large number of orders within seconds. The program utilizes complex algorithms that go ahead to analyze multiple markets and implement trades based on the prevailing conditions. The basis is that the faster the execution speed of the trade, the more profitable compared to traders that have slower execution times.

The major advantage of the strategy is that it has removed bid-ask spreads and improved liquidity.

The most significant disadvantage is that it replaces a number of human-intervention in trading and replaces them with mathematical models to

make decisions. Decisions happen so fast that most of the time, big market decisions can happen without any reason at all.

Additionally, it has been pointed out that large companies benefit greatly when they use the trading strategy at the expense of the smaller businesses.

HFT is largely signal-based, which means something has to occur to trigger a buy or sell signal.

Chapter 2: History of Algorithmic Trading

The word “Algorithmic” can be traced back to circa 820 AD when a Persian mathematician, Al Kwharizmi, who was living in the country, which is now known as Uzbekistan, came up with a treatise that became the foundation for calculating with Arabic numerals. The mathematician is also credited with coming up with the word “algebra,” which stands for “putting together.”

The initial term was “algorism,” but after numerous translations in the 12th century, became the common word that we know today as “Algorithmic.”

The term Algorithmic and the concept behind it refer to several disciplines that give the basis for the computation of numbers and the creation of programs. The ensuing disciplines are many, and discussing them can take the whole of this book. What we shall look at instead is a short history of the disciplines.

The earliest known surviving description of this concept is found in Euclid’s Elements that was published in 300 BC. The Algorithmic gives an efficient way to compute the greatest common divisor, which makes it one of the oldest formulas that are still in use.

With the Algorithmic in place, it was now easy to integrate it into trading systems. The first application of the Algorithmic can be traced back to the first hedge fund in the world, which was set up in 1949 by Alfred Winslow Jones. Alfred used algorithms to balance short and long positions simultaneously in 70:30.

This advanced and in the early 1960s, some technologists took advantage of the advent of computer technology to analyze price movement in trading on a long-term basis. In the late 1960s, Peter N. Haulan is credited to be the first person to analyze stock data using algorithms; he started using exponential moving averages to determine stock data. He went on to publish the Trade Levels Reports.

Come the 1970s, and the world saw the real beginning of Algorithmic trading. This is the time when “pair trading” came to the fore. This was the brainchild of a few scientists including Morgan Stanley, Nunzio Tartaglia, and Gerald Bamberger. Shortly after its inception, Pair Trading became so

profitable that nearly every trader on Wall Street was using it. These traders made use of computer technology to have a competitive edge over other traders in the market.

As computer technology took over the world, and more powerful computers came up, the use of Algorithmic trading became irresistible. After this, all major trading platforms were running trading algorithms.

To place them strategically to take advantage of algo trading, investors are adopting algo trading platforms faster. With computers able to digest large quantities of data and being more adept at running complex calculations and being able to react to changing marketing conditions, the algos are the best bet when it comes to real-time trading needs for the current challenging market climate.

Algo trading became more popular during the early 2000s. By the year 2005, the trading mechanism accounted for nearly 25 percent of the total trading volume. By 2009, the trading volume had grown threefold to 75 percent of the total trading volume. This was attributed to the increased difficulty that traders were experiencing when executing orders.

The decade between 2000 and 2010 was associated with changing investor styles as well as differing market participants. For instance, between 2003 and 2004, mainly asset managers, taking over 40 percent of the trade volume, ran the market volumes. In 2003, high-frequency traders had 10 percent in total market volume.

Things have changed since then, and many conditions have changed. This has seen the rise in algo trading. Many companies have come up with research materials on the same, though a huge chunk of the industry has come from broker-dealers who are in the thick of things.

Chapter 3: Basics of Algorithmic Strategies

Who Uses Algorithmic Trading Strategies?

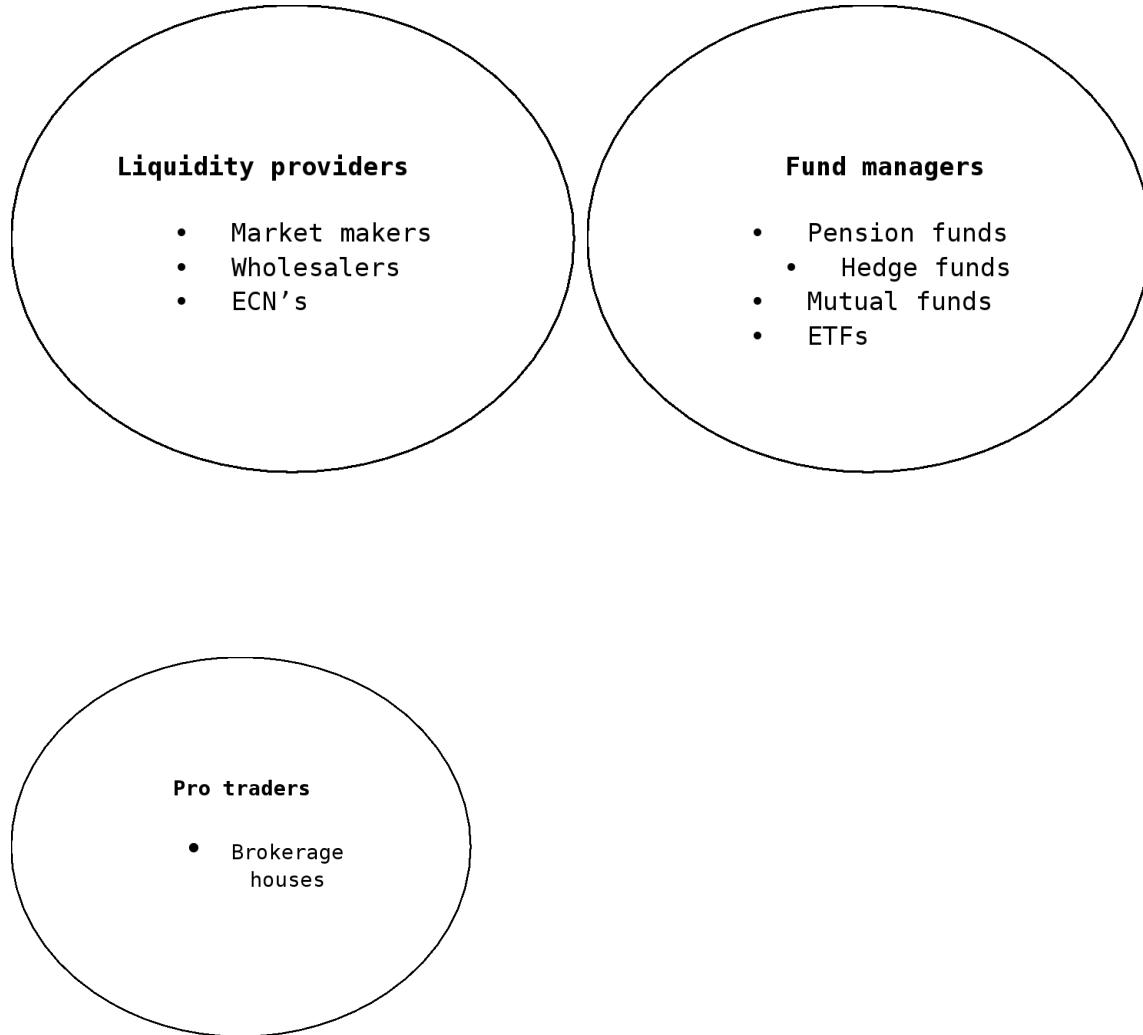


Chart 1.0: how the various users overlap.

As of 2019, Algorithmic trading has become a mainstay of the financial industry. Previously, the technology used to be exclusive for big brokerages

and banks, but now the use of the strategy is commonplace, with small brokerages taking advantage of this profitable strategy.

Secretive hedge funds form one of the biggest users of algos due to the competitive advantage the technology gives them over other traders. With little regulation towards their activities, these funds take advantage of the technology without having to divulge what they are doing.

The dream for every trader is to have an Algorithmic that works fast and gives a high return on investment, with a competitive advantage over their competitors. This means the hedge funds enjoy constant returns while they vigorously protect their secrecy.

Have you ever wondered what makes major hedge funds to produce extraordinary returns on their capital investment year in year out? Well, each of the hedge funds you see employs tens of statisticians, mathematicians, and physicists that run advanced computer software geared towards generating algorithms.

The second group that uses Algorithmic trading includes major brokerages and banks. The players in this group have recognized the value of Algorithmic trading. These firms have human and financial resources that make sure the Algorithmic runs the right way. These companies deploy whole teams made up of carefully chosen employees who are tasked with making sure they assess the situation, come up with Algorithmic strategies, and then analyze the results.

However, the information about successful algos isn't divulged to the public or rival companies. You will find that the algos used by the companies are a closely guarded secret. Each firm has algos that are specific to their operations, and they keep these algos in vaults with each user having his or her implementation to keep a secret .

However, the algos are in constant evolution and adaptation. Firms and companies are looking for better ways to use the increasing computer power and to make sure that they have a competitive edge over their rivals.

Individual traders aren't left out as well. However, there is very little data on the level of activity, the frequency, and the number of individual traders that use algos in their trading activities. Studies show that over 8 million

individual traders in the USA directly use the algos in trading. However, there aren't clear statistics to show how many people use the tools.

Why Have Algos Become Mainstream So Quickly?

This is a question that is running through your mind at the moment – why is algo trading becoming more and more common, and why is it growing stronger by the day?

Wall Street is known to quickly grab any possible edge to give them a competitive advantage. There have been trading methods in the past that have come so rapidly and in the same way, rapidly fizzled out. However, the adoption of algo trading came rapidly, but it has withstood the test of time with no indication of slowing down soon.

Let us consider the reasons for the explosion of the strategy. We shall first look at technical reasons then go ahead to consider conceptual reasons

1. Computational Power

This is obvious. Traditionally, you had to compute the trades manually, which took time and emotional drain. The computational power of algorithms has worked as per Moore's Law, and at the moment, you can process data faster. Individual computers have high computational power that makes them process data as fast as NASA equipment.

Additionally, computers can now process huge amounts of data fast, meaning that they can scan hundreds of markets at the same time while looking for trading opportunities. Human traders cannot keep up with such kind of workload.

Computers are also not prone to execution difficulties that are faced by humans – calculation errors especially form a huge obstacle for traders that rely on the human capacity to make decisions.

The computers have no emotional attachment to the market or trade, either there is a trade opportunity to take up or there isn't. They also have the capacity to execute commands continuously and consistently. Compare this to a human who is limited to only a few hours of running commands each day, who has a social life and suffers from fatigue time and again.

2. Growth of Telecom

Additionally, the telecom side has grown dramatically with the world being interconnected using fiber optics. The bandwidth has grown exponentially due to the growing requirements of computational power. When you have faster computational power and wider bandwidth, you can run your trading programs faster than ever.

3. Growth of Infrastructure Industries

The growth of infrastructure industries has also contributed to the stability and reliability of the increase in trading. Algorithmic strategies contribute to the success of the industries that focus on trading. With such companies in place, implementation of the strategy becomes easy.

Remember that to implement the trading, you need to make sure you have a healthy supply of capital and put together a team of technologists, traders, and market analysts to run the strategy. You also need a strong IT component that these industries can supply.

The industries give you the capacity to mold the Algorithmic into an operational component of the entire system. This wholesome component does not only deliver the tools you need for computation but also gives you the awareness for the process to operate so that it can adapt to changes. You thus keep ahead of the regulatory changes and the competition.

How the Algo Trading Team Works

Here is a scenario that is common among many implementation teams:

The Algorithmic designer comes up with a trading idea, however, complex it is. The strategy might need lots of thoughts, and he goes ahead to mull over it, at times for weeks or months. The design might be mulled over by a single designer or a team. It might be a team effort with each department being represented. At times, the CEO has a strong hand in the development of the vision.

When the designers are satisfied that they have something to offer, they turn the specification to the programmers who then convert it into software that can be executed. Execution is all about coding and optimization. The resultant software becomes fast and reliable.

After the coding, comes the dreaded testing to see how the new platform works. The team tests the Algorithmic on historical data to see how

different it would have run. The efficacy of this system is tested over weeks or even months, with the test results being compared to known benchmarks.

When it becomes evident that the system will work, it is further tested before it becomes “live.” The main aim is to make sure the algo does exactly what it is meant to do, and nothing else. This is true for all market conditions as well as circumstances that the algo can encounter.

Once the Algorithmic is ready, it is deployed to the trading department, and it is now able to carry out the various tasks fast, over the many thousands of stock. Therefore, the initial thought is taken; developed and packaged into an Algorithmic that is easy to use that results in accurate projection.

Deployment isn’t the final step though; the head of trade and CEO, as well as the whole team, get involved in refinements and further improvements as the marketing environments change.

Birth of
an idea

Deliberatio
n over the

Specificat
ion

Programmer
s convert
document
to

Testin

Execution

Chart 2: Flowchart showing the process of strategic design

Advantages of Algorithmic Trading

Algorithmic trading gives you a host of benefits that you can enjoy as a trader. Let us look at the benefits first

1. Reduce Time and Effort

If you are a beginner in the trade market, or you have been in the market for ages, you need to consider using Algorithmic trading to reduce the effort and time you have to invest in while enjoying maximum profits.

You cannot compare Algorithmic trading to any other service or a broker as the software tracks the trading market and can auto-trade while you are doing other chores or you are sleeping .

All the prices for various stocks and commodities are patterned in charts and graphs, meaning the system can easily predict the outcome of the market. However, if done manually, the process takes time, reducing the chance for brokers to act decisively on any project. Combining the algo platform and the analysis reduces any time wasted since the system automatically studies the patterns and makes recommendations in a shorter time, making it easier to grab opportunities.

2. Eliminates Emotional Trading

Many traders fail because they use emotions while trading, which is a bad practice. On the contrary, algo trading solutions follow the existing trends and react the way they are programmed. This means they focus on using facts to return massive profits. They run fast and respond in real time, thus don't miss any deals that might exist at that particular time.

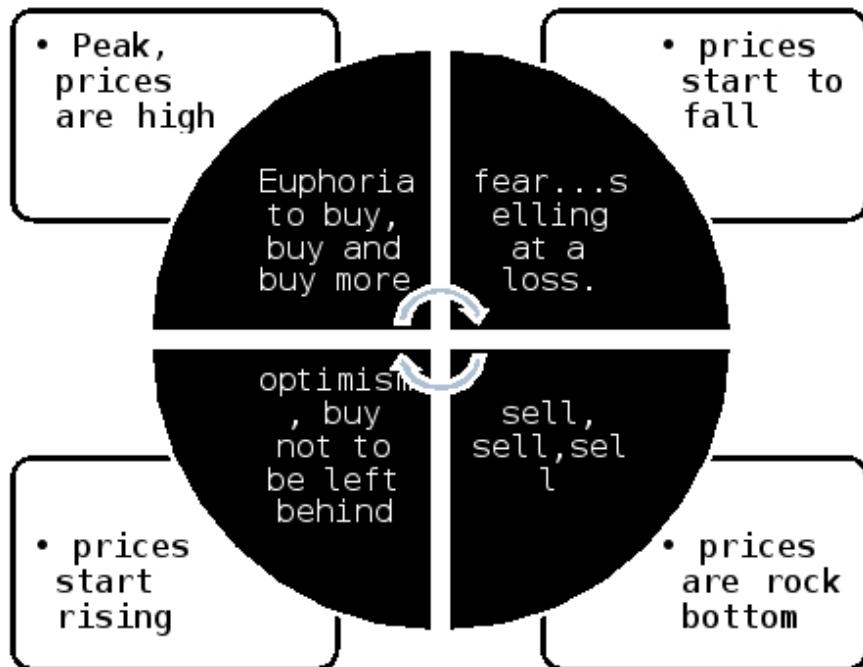


Chart 3: The various emotional reactions by traders

The systems keep track of the market 24/7, which is not possible for a human trader or broker. Accuracy is also a plus because they use inbuilt computational models to come up with the right forecast. This makes the systems reliable regardless of the trading environment.

3. Easy to Use

Many traders opt for the systems because they are easy to use and come with unlimited benefits to the trader. You don't have to sit up all night monitoring trends on the market, analyzing trends, and performing complex calculations all in the aim of implementing a trade. You don't have to decide when to buy or sell; instead, all you have to do is customize the options and then leave everything to the system.

The system is programmed to trade as per the instructions you give them. You get to program the system so that the rule of trading is always followers – to buy low and then sell high. Many traders and brokers are opting for trading because it gives them the best profitability while reducing the time that is spent on the whole operation.

4. Increased Efficiency

The other side of trading systems is the lack of emotional decisions that are a limitation of most traders. Even part-time traders get to do a fulltime job when using the system because it trades on their behalf. The trading system on which the algo is based makes sure that it removes any limitation of the human mind, which means increased efficiency .

It is almost impossible for a human mind to go through all the steps and every detail of each trade accurately. To ensure efficiency and accuracy, the systems are put in place. These systems are also efficient for multiple trades. You can now get into more than one trade while maintaining the necessary efficiency and accuracy.

5. Access to Real-time Data and Information

The algo trading system uses computers that utilize mathematical models to analyze data that it receives from various sources before executing the order (buy or sell). Technical analysis gives the information that is received from key indicators of Algorithmic trading.

Technical analysis is used to check for an existing pattern. The existing pattern arises from a view of the past movement of stock that are of interest to the company. Many brokers or traders believe that history tends to repeat itself, especially when it comes to trading. Therefore, many traders check at the history of the stock and past prices then come up with a forecast.

This information is used by the algo system to give you the current decision. Remember that a decision based on facts and trends is more valuable than any decision you can take based on emotions.

6. Accuracy of Results

Accuracy is an important aspect of any trading system. Accuracy results in better results when it is incorporated in the trading system. The use of computers in coming up with forecasts and placing trades helps reduce mistakes that are associated with running the activity manually.

If you are running a trade manually, the chances of buying the wrong currency pair or commodity for the wrong amount are very high. When using a computer Algorithmic, you have little or no time for making mistakes.

Many mistakes come about due to human emotions coming into play when placing a trade. Humans often get affected by their emotions that usually lead to making irrational decisions that lead to losses. With a system in place, you can remove any errors meaning you can start trading in a live market much faster.

Trading manually leaves a lot of room for a trader to be carried away by greed while being overwhelmed by fear.

7. Reduced Risk of Losing Cash

To trade the markets accurately, Algorithmic trading lets you run backtests. This is a huge task since, as a trader, you need to know the kind of technique that works or doesn't work for you. Algo trading allows you to backtest the systems and get to know what worked or what failed. This helps you make an income while reducing the risk of losing cash.

8. Reduced Costs of Operation

Finally, yet importantly, using algo trading reduces the chances of losing your earnings. You don't have to spend a lot of your time checking out the market since the trading can happen without your physical presence. The time you spend on monitoring the market is reduced drastically, allowing you to engage in many activities.

9. Historical Assessment with Future Prediction

This is the most vital advantage in creating an automated strategy. When you have an algo trading system in place, you can ascertain the performance of the market depending on historical data, which might be representative of future market processes. This process is technically known as backtesting. Backtesting allows statistical properties of any strategy to get determined, subsequently providing insight into the profitability of a strategy.

10. No Discretionary Input

Another major advantage is that you have no provision to modify the data at the point of execution or during the process in position.

11. Allows for Comparison

One of the major advantages of using an automated trading system is that you can determine the risk, equity growth, and trading frequency plus a myriad of other aspects. This allows you to compare various strategies such that you can allocate capital optimally .

12. Lower Commissions

Commissions that are paid during trading are much lower than traditional commission fees. This is because algo trading provides the investors with services that are related to the execution of the trade. However, the commission you pay varies from one provider to another.

13. Anonymity

Orders that you enter into the system and that you trade via computer are traded automatically. The orders don't have to be shopped across trading floors like before, which in turn maintains your anonymity.

14. Control over the Whole Process

Buy-side traders hold full control over the orders they execute. Traders have control over what to do – when to accelerate and when to reduce trading based on the objective of the investor as well as the prevailing market conditions. A trader can choose to cancel the order or modify the instructions in real time.

15. Minimal Information Leakage

The broker doesn't receive any information regarding the order or the intentions of the investor. The buy-side investor goes ahead and specifies the trading instructions by adding the necessary commands to the system.

16. Transparency

Investors can understand what happens regarding the execution of the order. Since the rules of the Algorithmic are given to the investor in advance, the investor knows how the tool will run and what to expect.

Disadvantages of Algorithmic Trading

Although algo trading provides a host of benefits to the trader, there are a few downsides you need to know as well. These include:

1. High Resource Demands

This is one of the biggest disadvantages of algo trading. You need to have technical resources to make it work for your company or firm. You need to have the following:

- *Software architecture* : this is the infrastructure that components providing the trading functionality is deployed and executed. The software system you install needs to be functionally operational. The software architecture should also meet user expectations. The architecture needs to get market data, define the trading strategy, and analyze the securities against the strategy.
- *Physical network constraints* . These factors constrain the physical architecture. The physical architecture is the one that holds the software that you run to implement trades. This includes computer hardware as well as network related components .
- Besides, you have to obtain data feeds for the intraday quantitative strategies, especially if you plan to use futures contracts.

2. *Regulatory Constraints*

These come by through laws and regulations. These laws and regulations are specific in various countries. Some countries will allow you to run your architecture while some will restrict a few features. The regulations are important because it influences the design and implementation of the algo trading system. The system you come up with needs to comply with the rules that have been put down by the relevant regulatory body within the country or state.

Some rules make it hard for you to run certain components of your Algorithmic, which means it won't work to its full potential.

3. *The System Makes You Fully Reliant on Technology*

While the Algorithmic trading system eliminates the negative effects of emotional trading, it also makes you reliant on technological systems. This might not be such a big issue, but challenges arise when the automated system that is in place is set up on a workstation in the office rather than on a server. In such an instance, any loss of internet connection or computer crash might prevent your trades from being executed, meaning that you miss vital market opportunities .

Even when the strategies are successfully integrated into online trading platforms and servers, you still need to at list monitor the trades to make sure they run fully.

4. Risk of Over-optimization

You also need to be aware of the risk of overoptimization, which might look great when presented on paper but fail to work in real market conditions.

With overoptimization, you end up spending a lot of time refining and cultivating the strategies based on results, only for you to find that the system in place isn't capable of performing real-time market implementations. This is the reason why test results need to be run carefully and then measured using your common sense as well as the happenings in the market as well.

5. Lack of Control

Another demerit of algo trading is the lack of control that comes with the systems. Since most of the trades are automated, then you do what the program asks you to do. You won't be able to control any losses that come your way. Additionally, the program needs to be tested extensively to avoid mistakes that might arise.

6. Amplified System Risk

Algorithmic trading, especially when it is high frequency, magnifies the risk of trading in various ways. First, it intensifies volatility, especially when the system tries to outfox the competition. Remember that the system is made in such a way that it reacts simultaneously to the existing market conditions. Due to this, the Algorithmic is forced to take some trading positions, or might even stop trading altogether leading to losses.

7. Complacency

Users can become complacent and go ahead to use the same Algorithmic strategy just because they understand it. They do this regardless of the market conditions and the order characteristics just because they are too familiar with the Algorithmic.

8. Lack of Consistency

Users need to make sure there is consistency across the Algorithmic platform and their investment goals. Making sure consistency is achieved is difficult, especially when the actual Algorithmic rule doesn't give the transparency you expect. Some of the Algorithmic strategies come with non-descriptive names, which don't give any insight n what they do.

9. Too Many Algos to Choose From

There are too many algos and too many names for you to consider. Some of the algos have a descriptive Algorithmic name that is understandable, while others aren't as descriptive, making them hard to understand. This means that investors need to understand as well as differentiate between so many Algorithmic strategies while keeping track of changes that occur in the various platforms.

Case Histories

Epro Corp Algorithmic Trading system for Stock Broking Industry

The Client

In this case, study, the client approached the firm to implement an Algorithmic system that would provide a trading solution for their clients.

The client wished to handle the following challenges:

- Come up with a system that can integrate into their existing order management system.
- To use the existing order management system standards and API to implement the algo trading system.
- To enter the market faster using the system.
- To come up with multiple priced feed as well as destination integrations to make sure the system works perfectly across various platforms and destinations.
- Through the system, the client wished to enjoy more profit.

Technology Used

Epro Corp used Swing, Java, advanced data structures, and TCP/IP to come up with the system .

The Solution Provided

- The company came up with an algo trading system that directly plugged into the existing order management system.
- The user interface was intuitive and easy to use.
- The configuration was able to handle difficult decisions regarding trading.
- The configuration sourced information from multiple sources.

Benefits to the Client

- The client was able to generate an Algorithmic trading platform that returned high profits than ever before.
- Trades became more profitable, and the system was able to handle a higher volume of trades.
- They got more referrals and expanded their customer base.

AlgoTrader Company

The company provides an Algorithmic trading software solution to clients that use its quantitative hedge funds. Clients use the software to automate complex strategies in Forex, equity, and derivative markets. It provides these needs on an everyday basis to make sure clients get the best from their trades. The company supports over 100 trading strategies and supports over 400 exchanges and brokers.

The Need

AlgoTrader approached XICOM to help come up with trading software based on an Algorithmic to help their clients to trade better.

The Challenges

XICOM met several challenges that included:

- The client has an old site that had an outdated design that had to be updated before it could use the advanced technologies that XICOM planned to provide. XICOM had to redesign the site to the best specifications.
- The client needed the website to be responsive so that it can work on any device.
- Xicom had to maintain the plugins that were already on the site.

- The site needed rigorous and extensive testing to make sure the system was perfect.

What Xicom did

- Xicom had worked on similar projects and showed earlier projects to the client so that they knew what to expect.
- The company came up with a template to show the client .
- Xicom came up with a mockup that was approved by the client before the system was integrated into the redesigned website.
- After the design, the system was thoroughly tested, and quality assurance made to deliver the best client for the website.
- The site was made to be responsive as per the needs of the client.

Results and Benefits to the Client

- AlgoTrader clients are now able to implement trades right from their mobile devices as well.
- The product was delivered to the client on time, making sure that it was integrated into the market on time.
- The client satisfaction level was increased, and the client base expanded.

Edge Financial Technologies

The company was approached by a client to help develop an Algorithmic trading solution for their client.

The Challenge

The client was looking for a way to integrate the Algorithmic trading application into their existing architecture, and then connect the application to multiple exchanges in a quick way.

The Solution

Edge Financial Technologies went ahead to come up with a solution that connected the system to an adapter API to allow exchanges in real-time.

The Benefits

After the connection, the client enjoyed various benefits that included:

- Ability to run multiple exchanges each day faster than before.
- The application was created in line with the regulations put down by the regulatory body.
- The solution was timely, and it allowed faster integration into the market and cost savings.

The growth and future of Algorithmic trading

Therefore, we all know that Algorithmic trading is set to change the future, but before we do this, it is prudent to understand who the changes affect. Here are the major players in Algorithmic trading:

- Retailers.
- Major trading firms.
- Brokerage forms .
- Multinational investment financial institutions with expansive investments.

Let us look at a case study on the role of algo trading in upcoming markets, specifically the cryptocurrency boom.

Case Study: Role of Algorithmic Trading in Cryptocurrency Markets

Just as an example, we want to look at how algo trading has affected trading in cryptocurrency markets. If you have been active in such a market, you must have heard of “bots” which are automated tools to trade the cryptocurrency markets.

While algo trading programs have helped shape the traditional market over the decades, it has also seen widespread adoption by crypto traders.

While these markets are still developing, they have great potential, and this is why they use these tools to realize unmitigated success in financial markets.

What is a Bot?

A bot is an automated, programmable system that monitors and shares information runs queries and performs a set of defined tasks. It is a short form for “robot,” and is widely used in technology circles. The use of bots in crypto trading can give traders more flexibility and time to handle other

projects and allow for rapid information handling. This, in turn, helps traders to enjoy more profits .

The use of bots in crypto trading started a few years ago, and these monitor prices as well as exchange rates, while sending user-alerts for trading volumes, and more.

For instance, these bots can help traders to buy and sell cryptocurrency faster than ever before. They can adhere to rules that you put down, for instance, to buy low and sell high, giving you profit from the difference.

The Need for Bots

The need for using bots is necessary due to the highly volatile nature of the crypto market. Under crypto trading, markets shift so fast that when a trader doesn't pay attention, there is a high risk of making losses on the investment.

To make money from the markets, it is vital that a trader monitors the current market constantly so that he can act fast when an opportunity arises. Bots work by providing updated information that will keep the trader in the know at all times. The bots act as RSS for updates for crypto markets.

In addition, these bots provide algo traders access to a wide range of algo trading strategies.

Example: Use of Bots in Arbitrage Trading

One of the top strategies that traders have come to appreciate and put in effect is arbitrage trading. The process involves purchasing assets in one market, then reselling them in another market at a profit. Bots are used to identify when to buy and when to sell off the asset .

Are There Risks Associated With The Use Of Bots In The Future?

Of course, there are a few disadvantages or risks associated with the use of algo bots in trading. If you program the bot to focus on certain trades and yet the particular trade is unprofitable, the bot will not realize the mistake – it will execute your instructions to the latter. This leads to losses. This is why it is a plus to use the bot when you have experience in trading, and have extensive working knowledge of the market rather than rely exclusively on the bot.

Some of the popular crypto trading bots include:

- *Haasbot*: this offers various actions that include price monitoring for the user to handling trading on behalf of the user. The bot offers a variety of plans for different users, depending on the strategy you aim for.
- *Tradewave*: this is a programmable platform that allows traders to implement a marketing strategy as well as Algorithms to define what the bot does and what it doesn't do.
- *Zenbot*: this is a unique bot on the market since it allows you to handle high-frequency trading, which is not a premise for most traders. The system utilizes an open source code that can be updated or modified by anyone.
- *Gunbot*: this offers the user a customizable strategy to fit the individual trading method. It runs with many exchanges and gives you the option of choosing a lifetime license.
- *Cryptotrader*: the system uses cloud computing so that you don't have to download and install the software.

These are just a few of the top bots that you expect to come across when you decide to jump into cryptocurrency trading automation.

Conclusion

We expect the future to have many aspects that will make trading faster and better. As illustrated above, bots will make the entire horizon more competitive. As the demand for more accurate and complex trading programs and bots is driven by traders and investors alike, it is most likely that we shall see better adoption of new trading technologies in various trading platforms.

Changes to Expect From Growth of Algorithmic Trading Faster Speeds

We expect faster speed of execution of orders due to the use of Algorithmic trading. Faster speeds mean that we get swift and efficient vigilance, a robust architecture, monitoring, and better security. The increase in knowledge and development of better languages to implement the systems makes it easy for better systems to come up.

Growing Career Opportunities

It is understood that even though these systems will become self-reliant, their functions and progress will need to be kept in check by experts, and constant evaluation will need to be performed on various dimensions. This gives rise to expanding career opportunities.

Jobs will come up in research analysis, derivatives trading, consultancy, software development, strategy analysis, risk management, trading, and electronic marketing.

Better Regulations

As at now, various regulatory bodies have come up with tenets to make sure the trading systems aren't abused at all. Regulations are there to eliminate any threats to a certain market. However, in doing so, the rules have had to stifle innovation and place checks in place to make sure the systems aren't misused.

We expect countries and various regulatory bodies to come up with strict regulations. However, the regulations will be made by experts who are well versed with the operation of these systems and that can modify the regulations as necessary.

The recent regulations in Europe have seen the encouragement of automation, regulatory improvements, and changes that have placed Algorithmic trading in good contention. This will pave the way for growth and proliferation of the systems.

Extensive Use of Machine Learning

Machine Learning (ML) adds a much-needed layer of intelligence atop the algorithm by making sure traders have powerful tools to extract trends and patterns from data that is processed across the globe. This gives you the ability to study data in real time and come up with conclusions.

Due to newer technologies becoming predominant, these intelligent machines will lead the trading evolution. ML is beneficial across various technologies that include:

- Quantum computing.
- Blockchain technology.

- Cryptocurrency.
- Cloud computing.
- Internet of Things
- Etc

The use of ML, in combination with other technologies, will make trading more beneficial. Some of the technologies that, coupled with ML, will make trading faster include:

- The use of nanotechnology in implementation of trades.
- The use of custom chips that allow high-frequency trading execution in nanoseconds. This can further evolve and attract investments in the Algorithmic trading market.
- Companies that make use of cryptocurrency will increase in number .
- Faster transmission of data that transmits information at the speed of light.

Better Trading Systems

As the trend improves and better systems come into focus, we expect better platforms to come up. These future systems will be able to study historical data much better, analyze it easily, and come up with trends that will work. It will also, using Artificial intelligence, teach itself to know what to expect in the future with ease. The systems will predict future markets easily while placing trades along multiple trades to spread the risk.

For instance, if the market isn't favoring the strategy that you have placed, the system will learn the Algorithmic and adjust your trading to other patterns that might alter the rules so that it matches the trading conditions.

Fewer Trading Errors

The system of the future will be able to check out multiple market conditions across the world simultaneously and save a lot of time. The system will eliminate any possibility of errors in the results it returns.

With fewer errors, we expect market crashes to be something of the past because the trading becomes accurate, and the system can realize the impact

of a trade that has gone wrong. We, therefore, expect to eliminate certain issues such as Flash Crashes.

Chapter 4: Classification of Algorithmic Strategies and Elements of Algorithmic Trading

Classification of Strategies

One of the top issues in the financial industry is the huge number of algos as well as the proliferation of Algorithmic nomenclature that has been used to name the trading algos. Brokers have come up with catchy names and phrases to make the algos stand out from others rather than come up with a naming convention that gives insight into what the Algorithmic is trying to do.

With some having descriptive names, others aren't as descriptive and make it hard for traders to use the algos. Today we look at one of the most common nomenclatures that classify the algos into three categories: aggressive, working order, and passive.

Aggressive/Hyper-aggressive Algorithmic Strategy

These algos are designed in such a way that they complete an order with a high level of urgency. They are meant to capture as much liquidity as they can at a specific price or higher for better profits. Such Algorithmic strategies use descriptive terms like "grab it" and more .

Working Order Algorithmic Strategies

These are a group of Algorithmic strategies that try to balance between cost and risk and make sure they use the appropriate limits when placing orders. They include VWAP/TWAP, Implementation Shortfall, POV, and more.

Passive Algorithmic Strategies

These Algo strategies include those that try to interact with order flow while leaving a market footprint. They use crossing networks and dark pools to execute their orders.

Types of Algorithmic Strategies

These include:

Single Stock

These types interact with the market after input of settings by the user. The aim is to take advantage of the best market conditions as best as they could.

They are independent of each other and the decision that is made based on how the decisions affect each order.

Volume Weighted Average Price (VWAP)

These participate with proportion according to the intraday volume curve. For instance, if 10 percent of the day's volume trades within the specific period, then the Algorithmic will transact 10 percent of the order within the same period.

Time Weighted Average Price (TWAP)

These algos execute their orders depending on the participation rate throughout the whole day. You need to note that most of the algorithms won't participate in the opening and closing auctions because there isn't a mathematical method to determine the number of shares to enter in such auctions.

Volume

Also called volume inline, percentage of volume or participation rate algos, they participate with the market volume at a pre-determined rate such as 10 percent and continue to trade until the entire order is executed. Due to this, the Algorithmic trades more during times of high liquidity and less during times of low liquidity.

Arrival Price

This term has different meanings for different brokers. Generally, it is a strategy that gets determined from optimization, which balances the tradeoff between the cost and risk. The investor takes time to specify a level of trading urgency or risk aversion.

Elements of Algorithmic Trading

Any trading Algorithmic consists of a set of components that you need to know about. This is consistent with the kind of markets that you wish to trade in, then go ahead to develop the logic with which you wish to trade the various markets and then define the parameters through with the trading logic gets triggered. Additionally, the system you choose needs to incorporate the cost of trading as well as the commission.

Today we look at the four elements that make the perfect Algorithmic trading:

Data

Algorithmic trading is a complex strategy that drives business investment decisions through the use of insightful data.

The use of data has made it possible for traders to perform a powerful analysis. The sad thing is that only a few traders have taken advantage of this fact.

Various strategies that are part of the Algorithmic strategy make use of data in real time to make sure they get the real analysis from the data.

Changes in any market are notoriously tough to the source because they can arise from anywhere – the use of data science techniques helps reduce this by allowing the traders to combine data originating from a wide variety of sources then examining historical data to help determine current or upcoming market situations.

Apart from combining the data from different sources. Another huge benefit of using data in algo trading is that of reproducibility. When you use the right data, you get to distill information that would otherwise be impossible for traders, however diligent, to achieve .

Algorithmic trading uses Big data, otherwise termed as large data sets. The data is used to identify trends, patterns, and predict the outcome of a wide variety of events in the market.

Data used in the market can be structured as well as unstructured. Data is usually defined in terms of the three Vs. – Volume, Velocity, and Variety. Volume refers to the amount of data that you collect and store while velocity is the speed at which you send and receive the data. Variety is the different formats of data on the market.

Based on the components of big data, retail traders, and financial organizations can enjoy a great deal of information to help them in their trading decisions. Various analytical tools are used to look at user behavior and to identify the various trends.

Predictive analysis forms a huge part of the use of big data. Data from various marketing platforms are crunched through the use of advanced

techniques of Artificial Intelligence and Machine Learning to predict the behavior.

Data can be supplied intraday, daily or monthly as defined by a particular user. With the growth in the sources of information, the techniques used to gather, analyze, extract, and categorize the information results in large returns, either positive or negative.

Either data input is provided to the system in a bundles form from the brokerage, or it is received from a specialist real-time tick resolution vendor. You have to decide on who supplies the data so that you are up to date on what you receive.

Usually, all the brokerage trading platforms come with a data feed that you can access then feed into spreadsheets easily. Other vendors provide tick historical data for stock definition and clustering.

Purchasing historic tick data is one of the best decisions you can make, but make sure you take time to get a longer lookback (at least three months) so that you achieve long-term patterns.

Trading platform

When using Algorithmic trading, you need to trust your hard-earned money to a specific trading platform to use. The right platform makes sure you enjoy both effective and accurate execution when you place the orders. Faulty platforms, or one that doesn't have the required features, might lead to huge losses.

There are two ways to access the platform – build or buy. Purchasing a ready platform gives you quick and timely access to operations while building your platform takes time though it allows you to customize the platform to your needs.

Ready-made platforms might be costly to purchase and might eat into the profit potential from your trading revenue. On the other hand, building your platform takes time, deep knowledge, and effort, and it might not be fully functional .

The risks involved in trading are high, the reason why you need to be familiar with the features that make the best platform. Let us look at a few of them:

- *Availability of data* : all trading platforms are meant to act on real-time data from the markets as well as price quotes. Any platform needs to have access to real-time data feeds. The data needs to be built into the system or should allow for integration from other sources.
- *Connectivity* : the platform should allow for connection to multiple markets. You need to understand that different markets provide different feeds in a wide range of formats. Another option to use would be to go for data vendors that aggregate data from different exchanges and give it to you in a uniform format. The platform you use needs to be able to process the different feeds as required.
- *Latency* : the platform should promote latency in such a way that there is a time-delay introduced in the shifting of data from one point to the next. The time needs to be in nanoseconds, which is fast enough to give you faster returns for every data that you analyze.
- *Customization* : the needs of one trader are different from the needs of other traders. To this end, you need to have a platform that allows you to customize the existing parameters. If you use a platform that doesn't give you this functionality, you will be constrained by the fixed functionality. Whether you plan to use the platform for buying or selling, the platform needs to have a high level of configuration and customization.
- *Ability to experiment* : go for a platform that allows you to write your platform. Some platforms allow you to experiment and try any concept that you develop. Go for a platform that offers to code in a programming language of your choice.
- *Backtesting feature* : backtesting allows you to test a strategy on historical data. The feature assesses the practicability of past data and certifies it for success. To achieve this, you need to have access to historical data that you can perform the backtest on.
- *Integration with a trading interface* : the platform you choose needs to have a trading interface in a language that you can understand. It needs to have connectivity to the broker network so that you can place a trade directly to the exchange as well as send trade orders.
- *Plug n play feature* : the platform needs to have easy plug n play integration for easier use. It should give APIs that can easily integrate into

various trading environments. This is ideal for scalability as well as faster integration.

Where should you begin?

Ready-made algo trading platforms offer a trial though it comes with limited functionality. Alternatively, you can get a trial period with full functionality but for a limited time. However, either way, you need to make sure you go through the documentation to make sure you know what you are getting into.

If you plan to build your platform from scratch, you need to have an online source to test and develop your platform. You can try out existing versions or write a completely new one.

Programming

One of the top questions is, “What is the best programming language for creating an Algorithmic trading platform?” The answer is that there isn't any best language for the task; instead, you need to look at the strategy parameters, the development, performance, resiliency, and the cost.

The major component of any Algorithmic trading system needs to be considered, such as the research tools, risk manager, portfolio optimizer, and execution engine. After this, you need to look at the various trading strategies and how they can examine the design of the platform. Here, you need to discuss the trading frequency as well as the trading volume.

Once you select the trading strategy, the next step is to make sure you design the entire system the way you need it to be. You need to consider the hardware, the operating system, and issues that might arise.

Before you decide on the programming language, you also need to ask yourself what the trading system will try to do. Is it going to be transaction or purely execution based? Will it require a portfolio construction module or risk management? Will it require a high-performance backtester ?

Before you go in for design and programming, you need to understand the kind of markets that will be traded, the connectivity to external data sources, volume, and frequency of the strategy.

You also need to consider the research systems, which typically involve automated scripting and interactive development. The latter often takes

place within IDEs such as R Studio, Visual Studio, and MatLab. The former involves extensive numerical calculations over data points and parameters. This gives you a guide on the kind of environment to choose.

Popular IDEs include Microsoft Visual C++/C# that gives you extensive debugging utilities, an overview of the entire project and code completion capabilities.

Brokers

The next aspect of any trading system is choosing a broker. You don't need just any broker but the right one to help you achieve your goals. When choosing the broker, you need to look at various aspects that include:

- The speed and efficiency of the trading platform.
- The types and number of segments the broker offers.
- The level of compatibility of the charting software with the platform.
- The type of brokerage available to you .
- Gateway APIs that are available to you.
- The margin and leverage requirements.

As a trader seeking to automate your trading process, it is vital that you execute your strategies the right way using charting platforms. These platforms connect you to a broker via the various APIs that are offered.

To succeed in trading using Algorithms, you need to understand what APIs are available to you and know how the APIs work.

System

As a trader, you know that you will have access and will be working with different platforms and applications, including programming tools, charting platforms, news feeds, and broker terminals. You also interact with huge data sets for backtesting and running trades on the live markets. It is therefore vital that you have the right computer system that will fulfill your needs.

Remember, automation aims to make sure you fulfill trades faster and smoothly without any emotions involved. Trading with your PC or laptop isn't reliable because of the restriction in performance. With limited capabilities, you will limit your trading capabilities. It is therefore prudent

that you use a high-end workstation with multiple monitors so that you don't keep on switching from one screen to another.

You need a machine that has fast processors and high RAM to allow you to multitask easily. You also need ample storage space to store files when necessary. To get the best system, you need to research the requirements or consult someone with sound knowledge on computer hardware systems.

Chapter 5: How to Become a Pro Algo Trader

Skills of Algorithmic trading

To be a successful Algorithmic trader, you need to possess a set of skills that will make you not only competitive in the market but also give you the kind of profits you desire. Algo trading involves automated buy and sell transactions, which involve financial instruments like stocks, bonds, and futures. It needs you to have an electronically networked connection, buy and sell parties, brokers and a platform to execute the buying and selling as well as other trading tasks such as supervision of market vulnerability and price movements.

To this end, you need to have a set of skills that will make it easy for you to execute these tasks.

Technical Skills

Algorithmic trading needs you to have two types of technical skills – domain knowledge and code development. Domain knowledge is all about knowing the stock trends in the various sectors. On the other hand, programming skills require you to have an effective command of the programming languages.

Numbers, Numbers, and Numbers

Any aspiring Algorithmic trader needs to be good with mathematics as well as quantitative analysis. For instance, if terms such as skewness, conditional probability, and kurtosis don't make any sense to you, then you still have a long way to become an algo trader.

In-depth knowledge of mathematics is essential because you need to perform research, test the results, and identify trade strategies. Understanding mathematics is vital because it helps you come up with foolproof strategies. With trade executions becoming faster and more efficient, you need to make sure that you understand all there is about numbers. Remember that a small mistake in the underlying code can lead to huge trading losses.

Core Skills

You also need to have at least three core technical skills: programming, risk management, and statistics. These are just the base skills that you need.

Aside from the core skills, you also need big data analysis, numerical optimization, and machine learning. These might not be as significant as the base skills, but they are still powerful enough to make your trading experience smoother.

Economic and Financial Knowledge

Knowing behavioral finance, market microstructure, and macroeconomics helps you make vital decisions and understand the market much better. Though they don't form a part of the minimum requirements, they help you make trading decisions that subsequently influence the outcome of your trades .

An Overview of the Core Technical Skills

Let us look at how the core technical skills help you achieve your Algorithmic trading goals.

Programming

You need to be familiar with analysis, data mining, research, and the use of automated trading systems.

Knowing about programming is essential as it allows you to perform useful research. Try to learn one or two C-based languages such as C++ or Java. Consequently, you need to concentrate more on data structures and Algorithms that give you a foundation in trading.

To enjoy better research, it is prudent that you become familiar with a higher-level programming language such as Python, R, or MATLAB. These languages are easy to learn as long as you get the right platform. One of the most common languages is Python. It is vital to learn the language because it helps you acquire data, process it, and manage it from various sources. It is also a great tool for research since it makes it easy for you to run analytics on data due to the various libraries that are available for the task.

Similarly, you can opt for R for data analytics and research because it is backed by a huge repository of libraries and functions. R was made with statistical analysis in mind, and it is a natural fit for the kind of work that is needed by the Algorithmic trader .

If you have some knowledge of engineering, then MATLAB is your best option.

You can go for any of these high-level languages, but it isn't essential to learn all of them because most of them come with crossover capabilities. With time, you get to know what language suits your needs.

Familiarity with spreadsheets and other concepts such as data structuring and big data is a bonus.

Speed, Accuracy, and Flexibility

These are skills that you need to have so that you can run your tasks fast and easily. To develop these skills, you need to undertake modeling tasks using a simulation environment. The simulation environment gives you capabilities that you can use to test the various tasks that you plan to execute.

You can have your simulation environment or use simulations that have been developed by other traders. Simulation helps you build and fine-tune these skills to develop trading strategies as well as perform actual research.

Statistics Knowledge

Having hands-on knowledge in statistics is a necessity for any Algorithmic trader that wants to be successful. Statistics form the basis of any task you deal with as a trader, right from performance measurement to risk management and development of strategies to decision making .

Statistics form the backbone of most of your Algorithmic trading ideas. Some of the statistical functions that you will run include correlations, statistical tests, and regression analysis.

For instance, you use statistical analysis to determine whether the market you are entering at any particular time is ideal for trading or not. You can also use regression analysis to test the ideas that pertain to different factors that influence the market.

Risk Management

This is a vital function for every Algorithmic trader. While placing orders on any market, you encounter various risk factors such as counterparty risk, infrastructure risk, and other risks that occur at portfolio and trade levels. The risk factors you encounter come in various forms, for instance, the risk of your servers going down due to various reasons, loss of your trading

account when a broker goes bankrupt or the inability of the counter-party to complete a transaction.

To mitigate the risks, you need to understand the fundamental principles of risk management. This is a complex area that requires you to understand the possibilities you have to mitigate the risks. To do this, make sure you learn Mean-Variance Optimization and Kelly Allocation.

Testing of Ideas

As a trader, one of the plans you need to have is progression. You need to move from one stage to another. To this end, you need to develop the habit of testing your ideas rather than having to rely on ideas that have been tested by other traders. To test your ideas, you need to perform high quality, objective research.

Research allows you to decide what to do to achieve your goals. You also need to come up with practical applications. Research allows you to understand the current trends in the trading market and how to implement them in your trading patterns.

By implementing the ideas that you have learned about, you get to sharpen your technical skills and develop a mindset and creativity that will make you succeed at Algorithmic trading.

To learn the different skills, it is vital that you assign sub-tasks to each one so that you master it much better. For instance, when learning Python programming, it is vital that you divide it into the various subtasks that include data types, loops, syntax familiarity, variables, functions, debugging, and object-oriented programming. You can further subdivide the subtasks into smaller tasks for easier learning.

Understand Common Trading Concepts

You need to discover and design your unique trading strategies as well as models from scratch. You also need to have the skills to customize established models. You need to know popular trading strategies.

Computer Usage

As an Algorithmic trader, you will need to implement your trades using real-time data containing commodity prices and quotes. You, therefore, need to be familiar with associated systems, especially terminals that

provide content and data feeds. You also need to be comfortable with analysis and charting software and be able to use broker-trading platforms to identify and place orders.

Soft Skills

As a trader, you also need to have soft skills to succeed in the market.

First, you need to have the right attitude. Remember, not everyone can behave like a trader. Successful traders are on the lookout for innovative ideas to handle trades, can adapt to the changing markets, and thrive under stress due to long working hours.

Secondly, you need to be able to accept failure. Some trading ideas might seem foolproof, but when you put them to the test, you realize that they aren't what you were looking for. Many aspiring traders fail solely because they believe fully in an idea and try to force it to work even when the market conditions aren't favorable. They find it hard to accept failure and aren't willing to let go of the concept they have adopted. On the contrary, successful algo traders know when an idea isn't working and let it go to try another strategy.

Third, you need to have an innovative mindset. The trading world keeps on changing day in day out, which means that a concept won't make money for you over a long time. With systems competing against each other, it is upon you to decide what will work for you and what won't work for you. Remember that the decisions you make regarding the right strategy will make you survive or fail. This is why you need to make sure that you look for innovative ideas that help you seize opportunities that might soon vanish.

Financial Marketing Acumen

Before you dive right into algo trading, you need to have a clear understanding of the financial markets. All the programming and statistical knowledge become useless if you don't understand what financial markets are all about. You need to understand the various technologies that are in use in the market to understand the reasons why price movement happens.

Problem-solving Capabilities

You need to have solutions to challenges that come up when you trade. It is not a guarantee that every trade you place will give you the returns that you desire – at times, you fail. Problem-solving capabilities help you to come up with the perfect trade ideas, as well as model the ideas to suit your particular objective. The right problem-solving skills give you the ability to come up with solutions.

Data Management

Having access to high-quality data is vital for any trader. While markets and vendors provide different kinds of data for different prices, it is hard to access historic intraday data. It is therefore vital that you understand data patterns across the various markets globally.

Once you have the data, the next step is to clean it and structuring it in such a way that it is uniform with the database. After this, you need to use the data to identify patterns, come up with, and optimize various patterns.

Understand System Architecture

Most of the trading activities will happen on a trading platform. Therefore, it is vital that you understand how a trading system works and how to use it. You need to know the various components of the system such as the adaptors, event processing engine, and more.

Compliance and Regulations

Every region has its own set of rules and regulations that you need to adhere to trade in the market. The rules relate to co-location, short selling, system approvals, and more than you need to know about.

For instance, some exchanges require you to perform approval at the overall system level, while others require approval to be performed at the strategy level.

Simple Trading Strategies

Once you have your mathematics and programming skills in check, the next step is to go for the real work. Placing orders is all about using a specific strategy that works for you, learn about the various strategies and the scenarios that they apply to know which strategy to choose for the type of trade.

The Mindset of the Pro Algorithmic Trader

Being a trader isn't all about formulating strategies and performing an extensive analysis of data, but it is all about coming up with a winning mindset. Various aspects separate the winning trader from one that constantly loses:

- Winning traders don't formulate better strategies for trading.
- They aren't any smarter than other traders.
- They don't undertake better market analysis.

The only thing that separates the winning trader from losing one is the psychological mindset that they adopt.

Most of the traders make the mistake of believing that all they have to do is to get a great trading strategy. What they think is that all they have to do is to get the strategy, log into the market each day and the market will start loading money into their account.

Unfortunately, this doesn't happen the way they thought. For your information, some so many people make use of intelligent, well-designed systems but lose more money than they gain at the end of the day.

Those traders that end up with money in their accounts are those that have developed the perfect mindset that allows them to win consistently. They follow certain beliefs, psychological characteristics, and attitudes that are ideal for conquering the trading world.

The Attitude

Many traders, especially the ones that end up losing, believe that the market is rigged against them. Such erroneous beliefs affect the ability to trade. If you look at the market and you think that it is operating against you, it is time you realized that there are a lot of people that are trading successfully on the same market as well.

Every market is neutral, and this is why you see more people signing up to it and using it to run their trades, day in and day out.

One of the best characteristics that many winning traders have is that of self-confidence. They believe that they can win the trades that they take part in.

Many losing traders, on the other hand, have self-doubt that they are cursed and this goes ahead to be a fulfilling prophesy. If you doubt your abilities, you often hesitate to initiate a trade that would have been profitable at the end. They also tend to cut the profits short, due to their beliefs that the market will soon turn against them.

Traders who win know that the market might at times go against their expectations, but they don't give up that easy. They undertake market analysis, but they know that even the best analysis might not match up with the price movements. However, they know when it is the right time to place a trade, and they go ahead to do it when the opportunity arises.

Characteristics of Winning Traders

Winning traders have characteristics that they possess:

- *They Take Risks*

Winning traders are comfortable with taking risks. People that are averse to risk-taking cannot be the best traders at all. Remember that losing is part of the trading game. Traders that are out to win can accept the uncertainty that comes with trading. They understand that trading is not like putting money in a savings account where you are guaranteed returns.

- *They Adjust To Changes Quickly*

Winning traders can adjust to changes fast enough. Many losing traders aren't able to let go of trades that once worked for them, and they go ahead to fall in love with their analysis of the market. For the winning traders, if the analysis shows that they need to change their stance on future price movements, they go ahead and do so fast.

- *They Are Disciplined*

These traders look at the market and any other aspect objectively, and regardless of how the market treats them, they don't change their stance or their goals. They operate with strict money management rules that allow them to calculate the potential risk and reward before they enter any trade.

- *They Are Not Emotional In Their Trade s*

As a trader, you know too well that the trade can go any way – up or down. The direction of the trade determines whether you win or lose. Winning traders don't have the time to get excessively excited when they win trades

or despair when they lose a trade. Instead, they control emotions instead of letting the events of trade affect them.

Apart from the mentality of the trader, they also have a few habits that make them winners all the time. These include:

- They regularly assess their performance and review it trade after trade or day after day. They know that trading is a skill that has to be mastered and built by embracing ideas that are working and casting aside the ideas that aren't working at all.
- They are flexible. These traders don't invest their egos in the trades they place. They view the market objectively and will cast aside any ideas that won't work for them.
- They take up risk when they see a genuine profit opportunity that is based on the trading strategy and market analysis. However, you will see that they don't risk their money recklessly; instead, they know the percentage of risk and the percentage of reward, which in turn drives their decisions .

They Know That the Market Cannot Be Predicted

Winning traders understand that the market changes day in day out, and it is unpredictable. They also know that there isn't any surefire method that can predict price movements perfectly. Due to this fact, they watch for signs that will show mistaken price predictions and then adjust their positions.

In contrast, a losing trader once he places a trade tends to look for actions in the market that confirm that they are right, and they minimize any market action that seems to go against their analysis. They most often end up losing trades and taking a lot of losses.

The Discipline of a Trader

Trading environments come without any boundaries, and the market is a free environment that you can use to buy, sell, enter, and exit whenever you feel like. You don't have to follow any rules of trade at any given price and time. Due to this fat, you have the freedom to make any decision you want whenever you feel like. It is upon you to decide the way to go – recklessness or discipline.

The best way to go about it is to make sure you come up with a set of rules to govern the trading and to be disciplined.

Self-discipline is critical to winning trades. Unfortunately, this is a hard thing for most people to understand and follow. Many people work well when there are rules from an external source rather than from within themselves. Many believe that since they made the rule, they have the freedom to break them. While it is technically true and possible, it is not a winning attitude.

Common Mistakes That Algorithmic Traders Do

One of the major issues to address as an algo trader is the mistakes that you make as a trader. These mistakes usually occur during the trading environment or the testing phase. Let us look at a few of them.

Failure to Understand the Differences between Long and Short Positions

Many times, the trader fails to differentiate between bullish and bearish markets, which in turn confuses him when it comes to taking up positions for sale (Short) and buy (Long).

The Need to Rely Solely On Technical Analysis Indicators

As you perform your research, you will come across a lot of literature that talks about indicators, and it is accompanied by numerous examples of their use in trading. Well, indicators can be used in trade algorithms, but the signals need to be checked out and confirmed with applications that can compute the outcome.

Failure to Match the Strategy to the Right Product or Group of Products

One of the top issues that arise when a trader loses is that they fail to choose the right product mix when it comes to trading. You need to check if your trading strategy is suited to a different product to the one you are trading at the moment. Doing this allows you to get more from your strategy.

Overtrading

This can mean many things. It can be too much leverage or simply risking too much on a single trade. It could also mean taking up too many trades that end up harming your performance.

When this happens, look for a way to reduce the number of trades. Be selective when picking a trade or go for higher timeframes so that instead of going for 1-minute trades, opt for 30 minutes or more.

System Interference

The intention of using the algo trading system is to let it do the work for you. You shouldn't think about it and what it is to do, don't tweak it when the trade is running or think of how to ramp it up. Just leave the system to run the way you programmed it to do.

Over-optimization

Many traders want to squeeze more money from the system in the shortest time possible. This concept can happen even when you don't know it at all, but you need to have the capacity to realize when the system is in overoptimization mode.

Going for Low Profits per Trade

Try to focus your strategies on a higher profit margin per trade. Anything less than \$50 is too low, and you will find yourself struggling to cover the commissions and other trading costs.

Going For Strategies That Have No Exit

You need to be careful about those strategies that don't give you a way out, especially those that don't have a money management system in place.

Failure to Anticipate the Unexpected

In algo trading, anything is bound to happen. The internet connection might go down, or the servers might crash, and you might lose any data that you were running. While unlikely, you might find yourself in these and many other situations that you never expected in the first place. This is why it is necessary to be ready for anything!

To mitigate this, you need to invest only what you are willing to lose and make sure you only take on a risk that the account can bear.

Not Including Commission and Slippage in the Backtest

Many traders fail to include transaction costs in their estimates such that when they get the returns, they realize that they are making losses because

all the profit is gobbled up by the transaction costs .

Overconfidence

One huge mistake that you need to avoid in trading is being overconfident. A few novice traders might hit it lucky the first time, and then they become too overconfident to the point that they take on too much risk. Remember that being humble and disciplined is the key to trading success.

Treating Your Trading Like a Hobby

Imagine telling people how you are making money in algo trading yet you don't have a record of the inventory, sales and more – people would think you are lying!

For the same reason, you cannot trade if you don't keep the right records. Using records allows you to know what works and what doesn't work. You need to note down various aspects of the trade, including how much you have put in, the positions to hold, etc.

Chapter 6: Strategies of Algorithmic Trading

There are various strategies of Algorithmic trading that you can opt for to make a profit. Let us look at each one in detail.

Arbitrage

This is the first type of trading that uses price differentials to give you risk-free profit. No trading strategy is free of risks, but when used properly, Arbitrage trading comes pretty close to being risk-free.

Arbitrage trading occurs when the asset in question deviates from a fair value that has been allocated to it. Typically, arbitrage trading means you purchase a security and sell it off the same security to enjoy the benefits of short-term market inefficiencies.

When arbitrage is correctly structured, the trade needs to be neutral in the sense that it eliminates the risk. The risk in this sense is a sharp move in the market that can result in the trade becoming disrupted.

The biggest risk in arbitrage trading is that the market isn't always consistent, and it is possible that the trades can go either way instead of moving in direct correlation. An example is when a large investor drives the stock disproportionately lower by selling off the entire stake that they hold in a company. This causes the price to fall temporarily .

Merger Arbitrage

This form of arbitrage trading is riskier to the trader. It involves purchasing shares of a company after an impending buyout then capitalizing on the difference between the buying price and the buyout price. This is possible because a company that is being bought out usually trades at a lower price to the buyout price.

Example

Say, company X announces a buyout of Company Y for \$20 per share; Company Y's share price might trade initially up to \$18.90. In such a situation, shareholders in company X might be unwilling to sit and wait for several months for the deal to finalize to get an extra \$1.10 if profit. They might decide to sell off their shares and get some profit now.

As an arbitrage trader, you see the \$1.10 profit as a goldmine, especially when there is very little risk involved in the whole deal. The risks might

include the merger being called off. You can make a large profit by buying the shares at \$18.90 and waiting for the deal to close then sell off the shares at a profit.

Financial Arbitrage

This refers to foreign exchange trading. It means going long and short simultaneously when exchanging two types of currencies. When you check out the prices of the currencies on the different exchanges, you realize that they differ. This means that you can buy the currency on one exchange and sell it on another to make a profit.

Example

Broker A offers the USD/EUR pair at 5/3 dollars per euro and another broker B offers the same pair at a rate of 5/4 dollars per euro, then you can convert 10 euro into USD with the former broker and then you can convert the USD back to EUR with broker B. this results in profit.

Statistical Arbitrage (StatArb)

The description of this form of arbitrage is way beyond the scope of the book, but you need to know that it is slightly similar to pairs trading but on a more expensive scale.

Those who trade using this form of arbitrage find thousands of stocks that are expected to move in similar ways according to statistical references but in opposite directions. To achieve statistical computations, the trader uses complex software for the task. They capitalize on the price movements by going for stocks that are in long and short positions, though this depends on the specific kind of commodity.

Example

If a trader thinks that Facebook stocks are overvalued, and Amazon stocks are undervalued, he can go for a long position on Facebook and a short one on Amazon, a concept known as pairs trading .

Dividend Arbitrage

This involves purchasing a certain amount of stock as well as the put options in the same amount of stock. This is ideally done before the expiry of the dividend date. When you collect the dividends, you exercise the put option.

However, you need to make use of dense mathematical formulas and a lot of expertise to make this work for you.

Example

Imagine that stock AB is currently trading at \$100 per share and pays out dividends at \$3 per share within a week. You can go ahead, invest in the shares, and enjoy a payout of the dividends in a week's time.

Retail arbitrage

Just the way you use arbitrage in financial markets, you can do the same with your usual supermarket for normal retail products. For instance, a look at eBay shows you a range of products that are sold at a low price in China but a higher price on a different platform.

Example

Buy an item on Wal-Mart and then sell them via Amazon or eBay at a profit.

Convertible Arbitrage

This refers to a process of buying convertible securities than selling the underlying stock in the security.

Example

Goodyear is selling its tires to clear stock at \$60. These tires are priced at \$90 on other markets. You can buy the tires and then enjoy the profits that come with it

Negative Arbitrage

Usually, this opportunity is lost because the interest rate that the borrower ends up paying on debt is higher than the associated interest rate at which the funds are invested.

Example

Let us assume that a council wants to build a new road and it issues bonds worth \$100,000,000 at 6% municipal bonds to pay for the construction costs. Due to the changes in the interest rates, the council ends up earning

only 3% in the accounts while paying the bondholders 6%, losing 3% to negative arbitrage.

Arbitrage opportunities usually occur in various scenarios:

- Stocks with multiple share classes.
- Stocks that feature on multiple exchanges. For instance, we might have a stock that is trading primarily in Australia but is listed in Canada as well .
- Stocks that are linked to specific future markets.

For the condition to take place there must be at least two equivalent securities but that have differing prices. This is the only situation that will give you profit due to the imbalance in the prices in differing markets.

Traders that engage in this form of trading are called arbitrageurs. The concept bases its operation on the market efficiency theory, whereby it states that for markets to be efficient, then there must be no arbitrage opportunities – all the equivalent securities ought to converge to the same price. This convergence of the prices is the true measure of market efficiency.

Perfect Example of Arbitrage Trading

When Warren Buffet was six years old, he saw that he could purchase a 6-pack of coca cola at 25 cents and then sell a bottle from the pack 5 cents, enjoying a profit of 5 cents in each pack. He saw that he could profit from the difference in the price pack compared to what the people were able to pay for each bottle.

Conditions Necessary for Arbitrage to Occur

Arbitrage can only occur when the following conditions are satisfied:

- *Presence of asset price imbalance* . This can be in various forms such as the same asset being traded in different markets, assets that have similar cash flow getting traded at different prices and if an asset with a known future price that is being traded at a price that is lower than the future cash price.
- *Simultaneous execution of trades* . Here, the buying or selling of equivalent assets needs to be executed simultaneously so that it captures the

price differences. If the trades don't run simultaneously, then the trade faces significant risks.

Arbitrage in Retail

While retail traders can take advantage of the financial instruments that occur across different brokers in different prices, it is hard to achieve. The huge competition in retail makes sure that the prices usually remain the same, with a few exceptions; this means that many brokers won't make a lot of profit on trades, which in turn restricts the trades. If you take the transaction costs into effect, you find that such opportunities in the industry are almost non-existent.

Another Example

Let us say that a stock company A trades \$20 on the London Stock Exchange, and a trader finds that the same stock is trading at \$20.80 on the New York Stock Exchange, then trader can simply buy the stock on the LSE and sell it at a profit on the NYSE, making \$0.80 on each stock.

However, you need to understand that you might not be the only investor that has identified this opportunity, and many traders will be after the same. Therefore, you need to use Algorithmic trading applications that identify the opportunity and grab it before anyone else can do so.

Remember that once the demand rises for the stock, then the lower priced stock will rise in LSE and the increased supply on the NYSE will push the higher-priced stock lower.

Currencies offer one of the most popular securities for arbitrage trading. Unlike asset trading, currencies don't have to be traded on centralized exchanges at all but can be handled on over the counter markets globally.

Advantages of Arbitrage Trading

- The biggest advantage of arbitrage trading is that it eliminates the risk. With the right research and identifying markets that sell the stock at a higher price, you are sure of making a profit from the trade.
- The popularity of arbitrage trading makes it possible for prices of securities across the market to stabilize. It helps keep the prices of securities across the markets at a stable price; therefore, end the price variances across the different markets.

- With this trading strategy, the financial markets become more efficient because it builds the confidence the investors have in the market.

Disadvantages of Arbitrage Trading

- Many traders ignore the aspect of transaction cost and only focus on the price aspect of the security. Transactions such as taxes and other hidden costs might give the wrong profit estimation, which in turn leads to losses as opposed to profits.
- You might not be able to enjoy many arbitrage opportunities as you might wish. Additionally, even if the opportunities present themselves, you need to have the latest trading software to identify the opportunities quickly and make profits. The expertise needed to take advantage of these opportunities aren't common to many people.
- You need a huge capital outlay to take advantage of arbitrage. The truth is most arbitrage opportunities give you profits in cents, which means you need to have more money to invest to enjoy the returns.

Momentum Trading

Momentum trading, just as the name implies, attempts to take advantage of the trends in securities - both upward and downward trends in the price.

Traders that use this style believe that the trend will continue in the same direction for a certain period due to the momentum that has been generated behind the security. Let us look at the different types of momentum that you need to look at to enjoy this trading .

Price Momentum

One of the best models to use in this type of trading is price momentum. If you plan to use this as your basis on making decisions, you need to look at stocks that have been going up each day, week after week, or maybe for several months. To this end, you need to have a lot of evidence that shows that the markets that are at a new high will maintain the highs for longer.

However, this type of momentum is more volatile than other strategies. This form of trading takes advantage of the volatility level of the market. Therefore, if you don't time the buys and sells the right way, you might end up with losses. You need to use some risk management techniques (such as stop-loss) to minimize losses.

You also need to have the right settings for the trading platform so that you can identify stocks that are trading at a high price over a long period.

Example

In the mid-2008, the oil and energy sector experienced a steady increase in the price of related securities. It became ranked among the top sectors that used the metrics based on 12 week and 24-week estimates. Even when the market was failing, it remained profitable for most of the traders due to the large gains.

As a trader, you need to be vigilant to spot trends early on. You might, therefore, want to include a short-term price change component in your calculation, for instance, a 2-week or a 4-week price measure.

To success as a momentum trader, you need to identify the right sectors fast and accurately. You can do this using the various manual screeners that are available.

How to Identify the Right Sectors for Momentum Trading

- Identify the stocks that you wish to trade in.
- Determine the number of stocks that are trading closer to their yearly highs.
- Sort the stocks depending on their performance from high to low.
- Come up with an entry strategy –choose whether you want to enter the market when the stock is showing the best strength or wait to buy on the weakness of the stock.
- Have an exit strategy. Know when to go into the trade and at what point you wish to get into the trade.

Tools to Use for Advanced Momentum Trading

You can use a variety of technical tools to achieve profits with the momentum trading approach. The tools include chart readers, moving averages, relative strength, and oscillators. These tools come with many of the trading platforms that you will join. However, take time to identify and choose the best tools that complement each other and give you the best results .

Generally, the momentum of any stock is strongest at the earliest stage of the trend and weakest just when the trend is near to reversal. We can use the example of a ball that accelerates fast when it leaves your hand and slows down just before the point of its final peak before it returns to the ground.

Additionally, to ride the wave of any momentum, you need to fine-tune the technical indicators that identify a particular stock that is worth investing in. Know when to exit, which usually is indicated by fading momentum.

Let us look at the technical analysis tools in momentum trading

The primary point of reference for most investors starts with technical analysis. This is all about trying to determine how strong each asset is in terms of prices. For any trader, knowledge of the key indicators forms a crucial part of the trading strategy.

1. Trend lines

This is a tool that is ideal for monitoring price movements. The trend line joins two successive points on a price chart. If the line slopes upwards, then the indication is that there is a positive trend, the perfect signal for the investor to buy shares. If the line is sloping downwards, the trend is negative and selling short is the best position to adapt.

2. Moving Average

The moving average helps traders to identify a prevailing trend while eliminating the irrelevant signals that come from insignificant price changes. When the price remains steady or moves above the moving average, then this indicates a positive trend. A negative trend usually occurs when the position is below the moving average.

3. Stochastic Oscillator

When you wish to compare the closing price to an asset and the prices over a period, then this is the perfect indicator. When the closing price occurs near a high, then the trend is positive, and if the closing price is much lower, then the trend is negative.

The values for this indicator range from 0 -100. Numbers between 51 to 100 indicate a positive trend, while numbers below 50 indicate a negative trend.

4. Average Directional Index

Abbreviated as ADX, this momentum indicator is the most popular because it is considered less likely to produce a false signal than the Stochastic Oscillator. This index is ideal for determining the presence of a trend and how strong it is.

The values in the index range from zero to 100. An index below 25 shows a directionless range, which means the market has no clear trend. Anything above 25 indicates the presence of a trend, and higher readings show a stronger trend. A value of 50 on the index is stronger than a value of 40 on the same index .

Things You Need to Focus on In Momentum Trading

Since momentum trading takes advantage of the short-term price action of a commodity, you need to make sure you focus on a few things that will determine the direction of the decision you take. Here are some things you need to look out for:

a. The stock Volume

This is the number of shares that get traded on the market. Since the aim of momentum trading is to get in and out of the position on the same day, it is vital that there are enough traders on the market for the commodity in the market. It is vital that you focus more on a stock that has high volume, which will allow you to get into a trade and get out faster. Additionally, stocks with high trade volume have higher liquidity, which means it can be traded quickly.

b. The Time Frame

Here, we look at the period that a stock moves. Typically, momentum trading requires short-term moves as opposed to the long-term moves. You don't care about what will happen a month or a year down the line. This is the main reason why momentum traders don't have the time to look at the reputation of the company because a terrible company can experience amazing price changes in such a short time and a great company might remain undervalued for years.

c. Volatility and Range

As a trader focusing on momentum trading, there is nothing that won't excite you like a stock that is volatile on the market. You aim to make sure you play significant moves on the market. A stock that is stuck at the same price for several hours gives you a little trading opportunity.

d. Technical analysis

While investors put a lot of care on the state of the underlying company, momentum traders, on the other hand, only care about the stock in question. All you need to look at is the price action because, in the world of momentum trading, the stock is the only product.

e. Catalysts

These are triggers that make the stock to break down or break out. You need to focus more not on the implications of the trigger, but the reaction the market has to the trigger. For instance, then there is a security issue in the country, the stock prices for many related companies skyrocket. The price movement might not be rational, but it did create many opportunities for traders. Understanding how the catalyst affects the market is the best way to determine the price movement of the stock.

f. The Risk vs. Reward

Many people take trading to be a form of gambling, and if you do them properly, you can get the same benefits. What separates the two is that the trader performs a lot of risk analysis to find the best way to move .

In everything you do, there is an associated risk or reward. With this said, we need to find ways to mitigate the risks while we amplify the rewards. In momentum trading, we look for commodities that have a favorable risk: reward ratio.

For instance, if you enter a trade without the right preparation, you have a 50/50 chance of making a profit, which is gambling. However, if you analyze the patterns and study technical analysis, you will find favorable setups that give you a lower risk.

g. Strength of the Sector

Certain industries run at different times. Some run when new laws are passed while others run when there are headlines about the industry. You need to understand these trends because they help you understand the

different movements in the sectors. It also gives you a better opportunity to find stocks to trade in the sector.

h. Stock Trends

It is vital that you focus on the trends of specific stocks. When you get a trend that is uptrending the whole day, you need to make the right decision so that you don't increase the risk.

i. Strength of the Market

You need to pay a lot of attention to the strength/weakness of the markets to better understand the momentum in these markets. You can do this by looking at the various indices on major vendors such as NASDAQ .

j. Trading Setups

Many traders have been found to neglect this factor when trading. Before you enter any position in a stock, you need to have a reason. You need to know why you are entering that stock at that particular price. The main reason shouldn't be because you thought the price would go up later, as this wouldn't make the perfect reason. You need a reason related to the risk: reward ratio or the chances of the stock breaking out.

The Risks of Momentum Trading

- There is no definite guarantee that the pressures of buying will push the price of the commodity higher.
- If many investors are already holding long positions in the stock, it is possible that existing positions will overpower new traders that come to the market, eventually forcing the prices down and resulting in losses.
- It is not a guarantee that the trend will continue. This is because something might not happen just because it happened yesterday, or the week before.
- If you don't know the indicators, you might miss the start of a trend. This means you miss out on the early profits as well.

Trend Following

Trend following aims to isolate trends and extract profits from them. There are a few ways you can do this, but remember that no single indicator can

give you the profits you deserve, because trading involves a host of many factors such as trading psychology, risk management, and others.

The basic tenet of trend following is that you ride the trend that exists at the moment – buy when the price is on an upward trend, and sell when the price is on a downward trend. You don't aim to forecast or predict what will happen; all you need is to keep an eye on different markets looking for emerging trends.

Why does Trend Following work? The reason is very simple – trading is run by emotions – greed and fear. This trading strategy has been profitable over the past 200 years due to various reasons.

Principles to Successful Trend Following

Behind the Trend Following methodology are five principles that will give you the success you need.

1. Buy High, Sell Low

You need to find securities that you can buy at a low price and sell them at a higher price to make a profit. The price difference is what constitutes profit. The prices for commodities on different exchanges vary, and this should be your mainstay. For instance, when trading stocks, always aim to buy at a low price and dispose them off when the price is high enough to give you returns .

2. Make Sure You Know Your Prices

You want to be on the right track all the time. It is always good to know you called the right price at the right time and made the right purchase.

However, there is a downside to this – when you begin making predictions, you tend to cloud your judgment, and you lose the objectivity that you went out to achieve. This can lead to refusal to take losses due to the need always to be right, averaging losses because you cannot go any cheaper now and revenge trading because you want to make back the money that you have lost.

What you need to do, as a trend follower is to make sure you follow the price and act accordingly. When you realize that the price is becoming lower and lower, then the chances are that there is an uptrend in the horizon and you need to go long. If you notice the price forming lower lows, then

the chances are that it is on a downward trend and you need to be looking to short it.

3. Learn How to Manage Risks

If you have a system that only gives you minimum profits however long you trade, then you need to know how much to put down so that you make profits. You need to make sure you come up with a winning strategy with proper risk management so that you recover from any losses that you encounter. To do this, you need to understand the percentage loss in the capital as well as the percentage of profits you need to gain to recover the loss.

For instance, if you lose 50 percent of the capital, it is prudent that you make back 100 percent of the capital, especially when you have a winning ratio of less than 50 percent .

4. Trade All Markets to Increase Odds

When you decide to run Trends, you are looking at a way to get more money on upward and downward trends. As a trend follower, you can trade anything ranging from currencies, metals, agriculture, energy, bonds, and indices.

Trend Following Indicators

To enjoy what trend following offers, you need to keep an eye on the market for emerging trends. These trends are visible using trend indicators. However, no single indicator can give you the perfect way to buy or sell a stock. However, a few are used commonly to give the perfect perspective and allow you to make decisions.

1. Moving Averages

This is a widely used indicator that can be used to arrive at a decision that isn't based on price fluctuations. The indicator makes use of a set of historical data that can be used to observe the price fluctuations for a given period. This data also depicts the general direction that the trend will take.

Using moving averages, you can decide whether to take a long or short position for any commodity. If the stock shows a downward trend, then you can decide to sell any stock that you are holding. On the contrary, if the

stock shows an upward trend, then you can buy more stock because of the expectation that the stock will rise higher.

Before you plot the moving average, you need to define the period and then choose the right stock to analyze.

2. Bollinger Bands

The indicators that are plotted on a single line show the price fluctuations of a particular stock. They have three lines: the upper, middle, and lower Bollinger band. The upper and lower Bollinger bands form two standard deviations from the mean average. They are used to determine the volatility of different price fluctuations.

Once you plot the bands, the next step is to use them to determine market volatility. When the market becomes more volatile, the distance between these two signals increases with the reverse being true for low volatile situations. When the volatility is high, you need to quit the trade.

3. Moving Average Convergence Divergence

Abbreviated ad MACD, this is a comparative analysis that looks at two moving averages for different datasets. Using the resulting bandwidth of the series, you can assess the price fluctuations for two datasets of time.

Comparing the moving averages for the data sets is performed based on convergence, dramatic rise, and divergence.

4. On Balance Volume

This is an indicator that measures the volume flow to determine the direction of the trend. The volume and rise in price are usually directly proportional. When the OBV rises, there is a high indication that the price also rises, and the vice versa is true.

5. Relative Strength Index

Abbreviated simply as RSI, you calculate the indicator using the following formula:

$$RSI = 100 - \frac{100}{(1+RS)}$$

RS in this sense means the average gain of up periods in a specified time frame. This indicator shows the speed and change in price fluctuations. It provides an idea of how security is performing in the stock market. It gives

you a value between 0 and 100 depending on the strength of the stock in the market.

Types of Trend Followers

Two types of traders use this system to make their profits:

Systematic Trend Followers

These use quantitative indicators to get in and out of a trade. Some of the common indicators used are MACt and moving averages. For example, a systematic trader will buy when the market goes beyond the 50 daily moving averages because he believes that the market is in an uptrend so long as it is beyond the 50-point mark. When the market falls below the 50-mark, the systematic trend follower decides to sell the security because they are stuck in a market that is in a downtrend.

Discretionary Trend Followers

These types of traders use the breakout and breakdown pattern to determine the decision. When the market breaks out from a resistance pattern, the trader buys and decides to sell when they think the market has broken down from a pattern.

Benefits of Trend Following

You Get To Keep Track Of All Movements

With the strategy, you will be able to take advantage of both small and big moves, making profits in the process. Whenever the market moves from down to up, the indicator will give you the signal to buy. If the movement is big, you stand to make huge returns on your investment.

Huge Profit Margins

The profit potential for this strategy, especially when you use the long-term trends, is much bigger. The advantage is that even when the probability of profits is less than 50 percent, you still stand to make profits on your investment. This is only possible if you increase the size of the winning trade as compared to the amount of losing trades. When done right, placing a single trade might be all that you need to generate profits to take you the whole year .

Save on Costs

Another benefit of choosing this strategy is that you can save on costs over a short time and by running more trades. Running trades over the long term reduces transaction costs as well.

Ability to Cut Losses

When you use long-term trends, you can use the prove concept of cutting costs while increasing your profits. This is possible when you stick to the trend for months or years.

The Disadvantages of Trend Following

Just like there are advantages to the use of this trading strategy, we also have the demerits of using the strategy.

More Losers than Winners

You will find that when using the trading method, you get more losing trades compared to winning ones. The big reason is that markets only trend 20 percent of the time.

Additionally, losses occur when you try to catch the beginning of a profitable trend, a very difficult practice. Additionally, since the market is chaotic most of the time, timing the end of this cycle can result in false signals before you make use of the opportunities.

Boredom

Since the market trends, only about 20 percent of the time, this can lead to boredom because as a trader, your main aim is to trade! As a trader, you wish to be involved in trading and make money. Sitting around with a low probability cannot be any fun.

This especially true for those traders who sit in front of computer screens for hours on end. The hours can go on without any proper signal, making it tough for you to decide at all.

Sitting on the computer all day can lead to distractions, and you might find yourself checking out emails or playing a video game, and when you check back on your screen, you find that you missed a great trade.

Factor Driven Trading

This is a trading system that is backed by academic research and top players in the markets. The system draws from the experiences that professional

investors have gone through. The system is simple, yet it gives you an approach that reduces your investment risks and gives you the best returns.

Like any other research, the finance market has undergone rigorous testing with a lot of data. The studies have stood against stringent peer review processes with the findings remaining consistent whenever other researchers go through the tests .

These facts and metrics can be taken to be proven beyond reasonable doubts and form the primary drivers for investors to use to get returns.

There are two types of factors that are used to drive decisions: style and macroeconomic factors. Macroeconomic factors look at broad risks within the various asset classes while the style factors focus on explaining the risks that occur within the asset classes.

Components of Factor Investing

Various components of factor investing include:

Value

This tries to capture how much returns you get from the stocks that have low prices relative to their original value. This is usually tracked by the dividends, price to earnings, price to value, and free cash flow.

Size

Size refers to the market capitalization of the stock. A look at historical figures tells you that small-cap stocks give you more profit compared to portfolios that have large-cap stocks.

Quality

Quality is stable earnings, low debt, strong corporate governance, consistent asset growth. Investors can identify high-quality stocks by utilizing common metrics such as debt to equity, return to equity, and earnings variability.

Momentum

It is known that stocks that have previously outperformed their expectations tend to show strong returns going forward. Momentum needs to be

monitored between 3 months to 12 months frame.

Volatility

When trading the market, you need to understand that the stocks, which have low volatility, earn better returns than assets with high volatility.

Steps in developing the perfect factor-based strategy include:

- Coming up with a trading idea or an investment strategy that you plan to use.
- Developing various factors to serve as your basis for making the perfect decision.
- Acquiring the relevant data.
- Analyzing the various factors and building the perfect strategy.
- Evaluating and backtesting the strategy.
- Implementation of the strategy .

Mean Reversion

Mean reversion works on the assumption that there is an underlying stable trend in the price of a security and that the price will fluctuate randomly around the trend. It also assumes that values, which deviate far from this trend, will always tend to reverse the direction and then revert to the initial trend.

Therefore, if the value is very high, we expect that the price will go back down and then if it is unusually low, it will go back up.

The main issue is, how do we identify the original trend value? This is the essence of the strategy that we discuss.

To get the underlying trend, we calculate a long-term moving average, say for 90 days and then use that as a stable trend. When the value falls below the underlying value, we expect the value to revert up. Therefore, if the price is too low, we expect it to spring back up, and it is the signal to buy.

Similarly, if the value goes way up, and we expect that the price will fall towards the underlying value, then it is the perfect signal for you to sell.

To make a successful sale, you need to make sure that you know your indicators. Here are a few indicators that you can use to determine when the time is right to make the sell or buy.

- Relative Strength Indicator (RSI)
- Bollinger bands.
- ConnorRSI .
- Moving Average Stretch.
- The number of days down.
- Rate of change.

When coming up with the strategy, you need to have targets. You can use many metrics to come up with the goals, but the most important one is the Compounded Annual Return.

Application of the Mean Reversion Strategy

To use the mean reversion strategy successfully, you need first to select the specific currency pair then comes up with an average price. Make sure you consider every trading range available, including long-term and short-term.

When using mean reversion, you take all the guesswork out of any trading. As a new trader, guessing is one of the things you do in the first few months of trading, and this usually results in losses. These losses go ahead to affect the faith of the trader in their trading abilities.

When a currency pair price holds way below the average price, this is the perfect indication to buy. This is a signal that the price will eventually raise. Alternatively, when the market price is above the average price, then it tends to revert to the mean, signaling the time to sell.

When Should You Use Mean Reversion?

Using mean reversion is ideal for short-term trades that are visible in highly volatile conditions. Don't use mean reversion with long term trades because you will lose money. The strategy is ideal for short-term trades that won't last more than a few minutes or hours.

When using the mean reversion strategy, don't use charts that have highs or lows. Such long dips aren't common, and they easily stand out. The presence of long dips indicates that the price will not revert soon.

The best trader for this type of strategy is one that is willing to take high risks for greater rewards. To enjoy what the strategy has to offer, you need to switch off any emotional influences and base your decision on facts.

The Benefits of Mean Reversion

These Mean reversion strategies have a very short period of between 3 and seven days. This means they perform well during high market volatility.

Demerits

During low volatility, the trades remain in cash, something that can be frustrating. These work best without stops, and it means you have to wait for the price to bounce back.

It can also be hard to place a trade because the charts usually look congested.

Scalping

Scalping represents one of the most common strategies that are ideal for short-term retailers and institutional traders. Rather than going for huge gains from single trades, scalping opts to optimize the win-to-loss ration by spreading them across many trades. This process uses small trades that give small profits that you add up to be huge eventually.

The trading strategy is ideal for traders who run short-term trades but who have access to a huge capital outlay. To be successful, you need to have a high level of discipline, especially when you aren't using any automated trading platforms to buy and sell securities.

The Benefits of Scalping

Limited Risks

These strategies are designed to reduce risks in a great way. Single trades have a high risk; therefore, it is prudent to spread the risk across different smaller trades so that you don't lose all your investment on a single trade.

No Need to Wait for Direction

This non-directional strategy won't require a specific stock to move towards a given direction for you to benefit. So, you can easily profit from movements to either side – up or down.

Easy Automation

These strategies are easy to integrate into a trading system of your choice. The main reason behind this is that the strategy is based on clear-cut technical data that is easy to be computed .

Drawbacks to the Scalping Strategy

Requires a Higher Minimum

This strategy requires you to have higher minimum account values so that you can comply with trading rules and generate profits to achieve your goals.

Higher Costs

Since you are running more than one trade at the same time, you stand to pay more trading costs eventually.

Need for Control

This strategy requires a lot of leverage to make enough profit. This makes it necessary to have a high level of control so that you avoid losses.

Implementation of the Scalping Strategy

When you decide to use the scalping strategy, you have to follow a few tried and tested strategies:

- Determine the technical indicators that you plan to use and define how you plan to use them.
- Run a backtest so that you see how the strategy would have performed when used in the past.
- Paper trade the strategy you have chosen using broker quotes .
- After choosing the strategy, go ahead to make any necessary revisions to the strategy o that you reduce the risk that is involved.
- Once the strategy is in place, the next step would be to start using the strategy while you monitor the results. Make sure you keep abreast with any news that might affect the market.

Sentiment Analysis

Sentiment analysis is a certain way to understand the attitude of traders, and it is considered a top strategy for many people. This premise works because every trader has his or her opinion regarding the way things are working in

the market. Using the sentiment, the trader decides which direction to trade – whether to buy or sell.

Every trader has thoughts and opinions, and these are expressed through the position that they take in a trade. This helps form the market sentiment regardless of the information out there.

The only problem is that as a retail trader, no matter how strong you feel about any trade, you cannot move the market in your favor. For instance, if you feel that the dollar will rise or the price of a stock will soon double, yet everyone else isn't of the same thought, you don't have much to do about it.

As a trader, it is up to you to perform sentiment analysis. It is up to you to determine what the market is feeling, whether it is bearish or bullish, then you have to incorporate this perception into your trading strategy.

You can choose to ignore the market sentiment, but remember that it is your choice, and you might end up losing. Remember what matters is not what you feel or think, it is what is a consensus by the market, and this is what decides the price of the security.

The market sentiment can be positive, negative, or neutral. The basis is based on world events, macroeconomic reports, technical analysis, fundamental analysis, and non-economic reports.

There are two types of sentiments:

Bullish Sentiment

The sentiment is bullish when the attitude of the market is positive. In a bullish market, it happens when the prices are expected to rise.

Bearish sentiment

The sentiment is bearish when it is negative. In a bear market, it happens when the prices start plummeting.

However, the sentiment trading can also be mean reverting or contrarian, whereby it is opposite to the sentiment in the market. The theory works on the basis that when there is intense crowd behavior regarding a certain trade, then it gives rise to exploitation and the resulting trade will be followed by a fall or a rise in prices due to corrections and vice versa.

Sentiment Indicators

Sentiment indicators are the signals that tell you where the market opinion lies. The indicators can be qualitative such as opinion polls. Many companies offer the information you need that is gleaned from marketing and trading professionals. These conduct polls, surveys, and go ahead to publish them.

The polls that the companies conduct are done on a regular basis, and the reports are posted or sold as a package. They are compiled in graphs and visualization to make sure you understand each sentiment.

Additionally, you can also use quantitative market data such as trade volume, security price, and open interest. Some of the indicators include:

- Arms Index
- Put/Call Ratio
- VIX
- Mutual funds cash position
- Margin debt
- Short interest ratio

Machine Learning-Based Trading

In this form of Algorithmic trading, Artificial Intelligence takes center stage when it comes to predicting the range of price movements, usually offer a short time. The advantage of using this method is that humans develop the initial platform, and the AI develops the trading model and improves the same over time.

Most of the models that have been used before have been static, meaning they don't change with the conditions in the market. ML-based models get to analyze a huge amount of data at very high speeds and then improve the system depending on what happens.

Some of the models used in trading include:

Bayesian Networks

This is a form of machine learning that is used to predict the trends in the market while utilizing various machines. The network uses a form of computation that runs across hundreds of computers and machines to get the right computation.

The AI can come up with a random collection of stock traders and then go ahead to test the performance historically. After this, it then looks for the best-performing systems and creates a set of traders. The system then repeats the process several times then ends up with a digital trader that can fully operate on its own.

Smart Beta Trading

Beta means a measure of the volatility of a portfolio or security, as compared to a broader market. In a market such as the stock market, individual stocks get ranges according to how much they deviate from the beta.

The first smart beta exchanged traded fund came on the market in 2003, and after this, the number of products available to the market grew exponentially. The main reason is that many investors are looking for various free alternatives that are low priced to give them an alternative to active fund management.

This strategy offers you the chance to run passive investments, with the focus being lowering costs and making a profit.

The trading pattern is away from the traditional indices that weigh down the constituents by the size on the market. A smart beta index might be titled towards smaller companies that tend to outperform eventually. The main stocks that benefit from this approach are value-based earnings, those that have momentum and those that are less volatile on the market.

The response of the traders was immense, and there has been a proliferation of these products on the market, which means more and more investors are investing in the indices.

Smart beta indices differ from traditional trading strategies in the sense that they apply a series of objective rules to each index in the company. Companies then get ranked based upon how they score on the specific factors .

One of the major benefits of using smart beta ETFs is that it mitigates the challenges that result from trading market cap-weighted ETFs. Therefore, instead of screening companies depending on their size, the smart beta uses screens that are based on the ability of the company to achieve more.

Many of the traders that opt for this trading method are those looking for factor diversification. However, not all smart beta strategies are alike. Investors ought to carefully consider the various ETFs and assess what indexes and biases each use, with the sole aim of choosing the best as per the goals in hand. To develop the index's underlying holdings, traders use low volatility, quality, momentum, size, and value to determine this.

Chapter 7: Backtesting

Nearly all the research that is related to algo trading is empirical. This means based on past observations and experience in the market. This is in contrast to the theoretical research that is based more on assumption, logic, and mathematical frameworks.

Backtesting involves testing a trading strategy that you are considering by simulating it on historical data to gauge how effective the strategy is in the present times. Conducting the test is an integral part of coming up with the right trading technique and in the development of the best trading system for your goals.

Backtesting works on the theory that whatever worked before will most certainly work in the future. The vice versa is true – if a system failed in the past, then it will most likely fail at the moment.

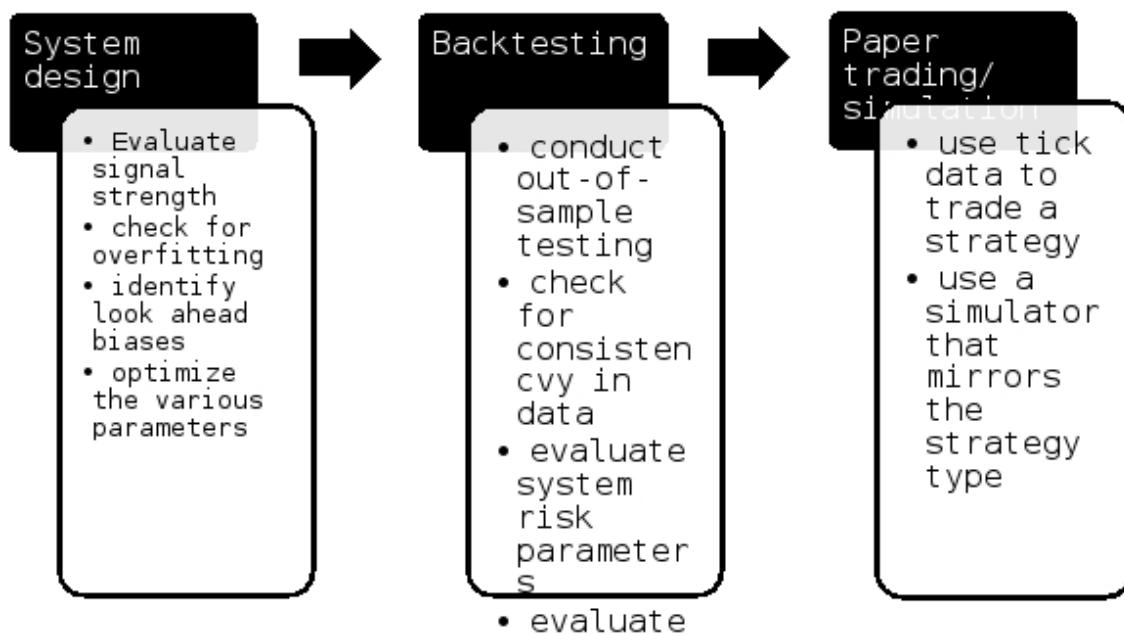


Chart 3: The position of backtesting in trading Algorithmic development

Comparing statistics from a historical perspective, you can determine if a strategy you are considering will be effective if you put it in use. If it isn't effective, you have a chance to identify gaps in the strategy, then go ahead and customize it to suit your needs.

Remember though that backtesting analysis takes time, especially if you need genuine results. Before you can come up with the right results, you need first to assemble a huge amount of data from genuine sources.

Backtesting is vital in that it allows us to test numerous variations of models or ideas quickly, effortlessly, and therefore provide immediate feedback on how the various systems performed in the past.

Reasons for Backtesting an Algorithmic Strategy

Filtration

Filtration involves setting up a strategy pipeline so that we can filter any strategy that doesn't meet the set down criteria. Backtesting provides the trader with a filtration mechanism because we get to eliminate any strategies that don't meet certain performance needs.

Modeling

Backtesting allows the trader to test new models in a certain market, for instance, order routing, transaction costs, liquidity, latency, and many more.

Optimization

It is a well-known fact that strategy optimization comes with a lot of biases, but backtesting allows the trader to increase the performance of a strategy through modification of the quantity or values of various parameters that are associated with the strategy.

Verification

When you filter the strategies, you end up with ones that you think work best. However, some aren't correctly implemented, which requires that you use a strategy to eliminate these. Backtesting can make sure the strategy has been properly implemented according to set criteria.

Before we can proceed any further, we need to look at the advantages you stand to gain when you perform backtesting.

The Advantages of Backtesting

Ability to Test before Deployment

Backtesting strategy tests the technical analysis of a strategy to be applied in the trading. By using this method, you can test the capability of any given strategy and check whether similar results were achieved in the past.

Once you have the results that you are looking for, you can compare with current figures so that you can determine whether the strategy gives you a predictive value or not .

Builds Confidence

Backtesting your trading strategies help build up confidence among a trader regarding a designed strategy before you can implement it in the current market. It works on the premise that if the strategy has worked before, then, it can work successfully in the future.

Adds Value to a Proposition

Properly executed backtesting identifies whether an idea has a persistent edge or not, and under what conditions it can manifest. By controlling the different parameters, you get to test how robust the idea is. From these, the trader is able to identify any specific market conditions where the edge is tradable or significant.

Helps You to Understand the Win-Rate Percentage

Backtesting reveals the likely win-loss percentage and tells you the maximum winning and losing percentages

Know the Expected Results Beforehand

Understanding the various issues regarding the Algorithmic helps you to determine under what conditions the idea is tradeable.

Limitations of Backtesting

One of the top limitations of backtesting is that it can give you overconfidence due to the way the system performed in the past. There is always a danger when you believe that a system will work the way you expect it to do only for it to fail. Remember the market is a very complex system that will never show traders the same results twice. Even if you perform the perfect backtest with the ability to forecast into the future, you will most likely see a discrepancy between the actual results and the backtest results when you go live.

Factors to Consider before backtesting

Before you go ahead and start the backtesting method, you need to consider various points.

1. Past Results May Not Guarantee Future Success

Backtesting focuses fully on historical information to predict what will happen in the future. However, you need to understand that the results that are achieved in the past don't necessarily guarantee success in the future as well. Markets are volatile and might change anytime, which might affect the performance of the results that have been derived using backtesting.

2. The Results Aren't Exact

In any market, for example, the Forex market, there are so many variables that affect the way the trades run. For instance, the use of different spreads by traders might influence the results. Volatility also affects the results because you are using two similar strategies in different contexts. The good thing is that when you use the Algorithmic method in trading, you end up with fewer errors compared to doing everything manually .

3. Running Live Trades Is Different

Running live trades in the present market is different from working with historical data. There is a huge possibility of the trader reacting too slowly or committing many mistakes to catch up with the current marketing environment.

4. Variable Results

These come up when you decide to trade large amounts. This is because trading large often yields different results every time. Additionally, large orders have the uncanny habit of moving the price of given security either way.

Additionally, backtesting is fraught with a lot of biases. Let us look at a few of these biases in the next section.

Types of Backtesting

There are two types of backtesting strategies that we can try out – automated and manual backtesting. Automated backtesting works on a code that is developed by the user, whereas the trades are automatically placed depending on certain criteria. On the other hand, manual backtesting requires you to study charts and conditions manually and then place the trades according to the rules that you come up with.

If you understand programming languages, then you can undertake automatic backtesting. However, you need to keep in mind the prevailing market conditions and tune your strategy and code to fit the conditions. Failure to do this might lead to erroneous results due to changes in the market conditions .

Key Pointers to Consider when Coming Up With the Right Backtesting Strategy

Before you come up with the right backtesting strategy, you need to make sure you consider the following points:

- *Pick the Right Market Segment*

You need to choose the right market segment so that you come up with the perfect backtesting strategy. You need to consider various factors that include the risks that you are willing to take as well as risks that are in the market. You also need to consider the profit you are after as well as the time you will be investing in the market.

Look at the period you plan to invest – short term or long term so that you decide the assets that will be suitable for your trading method.

- *Consider the Data*

The prices prevailing in the market are vulnerable to various factors and keep on changing depending on the situation going on. These factors include monetary policies, annual company reports, inflation rates, and more.

The main thing that you need to consider is that the market will not always behave similarly and this is the reason why you need to test the strategies so that you understand how it will perform in different conditions .

- *Get the Right Platform to Code*

There are various platforms that you can use to perform backtesting on the data. We shall look at the platforms later on, but briefly, you need to know how compatible the platform is to the kind of data you choose.

- *Compare the Platform with Benchmark Parameters*

Backtesting is performed in line with how a trading strategy will perform on future data. This is done by measuring the performance of the strategy

on historical data. After this, you need to gauge the performance of the strategy based on various parameters such as the success ratio, and more.

The Process of Backtesting

After you consider the points discussed above, the next step is to create a trading strategy that is based on historical data. You can build your model using VBA or Python and then test it later using R. Testing the model on a simulator is ideal because it gives insight into any issues that were faced a few years ago. The simulator acts as a real exchange that can be configured to suit different market conditions.

Backtesting platforms

Apart from visual basic, you need backtesting platforms that are specific for a given strategy. Let us look at the different platforms that give you the capability to run quick backtesting functions .

TradeStation

In this day and time, it takes more than just having flashy software to trade the markets successfully. Instead, you also need to have access to data and the right investing strategy to give you an edge over other traders. These can be helped by using TradeStation, an investing platform that helps you when you decide to perform backtesting.

TradeStation focuses mainly on helping traders get the right trading strategy. It leverages technology and access to data to help you as a trader make the best decisions. However, it might not be a walk in the park for newbies, and it can turn out to be very confusing.

The minimum investment amount on this platform is \$500, and you have to pay a commission of \$5 per trade. You can invest in Penny stocks, stocks, mutual funds, EFTs, futures, and bonds. The types of accounts that you can open include IRA, Taxable, custodial, and trusts.

The platform makes money when you place a trade. Each trade costs \$5.00 per equity you trade. The platform needs you to be an active trader to make it work. As a trader, you must make at least 50 trades each month or trade more than 5,000 shares each month, or maintain a minimum balance of \$100,000 or you stand to be hit with huge fines.

The funding minimum for the accounts varies depending on the trading class. For EFTs, you need a minimum of \$500 to use the platform. Options

require a funding of \$2000 .

When you log into the platform (via the web or downloadable platform) shows you featured videos, the economic calendar, links to workspaces and the company's Twitter feed. You can download the extensively customizable desktop platform. The web platform has most of the features and is easy to customize to your liking.

All the data streams on the platform are in real time. You get to place, modify, or cancel a trade using keyboard shortcuts. Customizing the trade is easy, all you need to do is hover your mouse over a bid, and you will use a trade ticket that you can modify before submitting the order.

The Advantages of Using TradeStation

Easy Coding Language

Traders that want to have the edge over their competitors need to learn a programming language. The good thing is that TradeStation uses EasyLanguage, a simple coding language that you can easily master. It is a mix of HTML and SQL. It becomes easier if you have prior coding skills.

Instant Market Updates

TradeStation's RadarScreen gives you access to real-time data sets on 1000 symbols. This gives you an edge similar to all other technical traders. The platform focuses so much on high-quality market data to help you get the perfect trading strategy. Their platform is also stable and will remain available in market changes .

Technical Analysis

This platform has more than 40 years of historical data available for you to use in your simulations. This means it is perfect for backtesting several strategies using the data. You can also utilize the access to this data to study any technical trends. You can develop your automated trading system using the technical analysis tools the platform offers. You also get to generate income using the fully paid stock lending system and grow your trading skills with the extensive training options.

It Is Fast

The speed of execution of commands makes it an ideal platform for traders looking to perform backtesting on their strategies. It also gives you accessibility to indicators that you can modify depending on the strategy in focus.

Discussion Forums

If you are looking for some support and answers to questions, you can ask them on the active forum that TradeStation offers. This platform has integrated a forum in the whole ensemble. Some of the discussions that go on in the forum are helpful and based on experience.

Disadvantages

Requires Programming Skills

For you to take advantage of the platform better than other traders, you need to have some basic programming skills. Although they offer various out of the box solutions, take time to learn some programming, and you will see returns.

Lack of Expert Analysis

If you expected to get expert analysis for the stocks, then you will be disappointed. The platform doesn't give you any analysis to help you pick the right stock; instead, it emphasizes more on using indicators to help you get the right decision. This means even those traders that are serious and need to use value-based strategies might not get what they need on the platform.

Expensive Courses

Most of the tutorials that the platform offers are free, but it also offers some expensive courses that might not be affordable for most newbies.

NinjaTrader

This came into being in 2003, and it offers brokerage and software services to active trader seeking to test this system or run active trades. You can use the platform for free, especially when you want to perform market analysis, charting, and trade simulation. However, you need to have a license when placing real trades and accessing the premium features such as placing advanced order types, backtesting, and automated trading. You can decide to lease or purchase the software. The features that allow you to analyze

trade activity using volume bars, order flow, and market depth need you to have a lifetime license.

On the flipside, you don't have a lot of options when it comes to buying and holding trades and investments since the platform doesn't give you so much in terms of research.

The platform is ideal for active traders that plan to trade in Forex and futures. This platform gives you great options for real-time technical analysis, charting, and customizable technical indicators.

NinjaTrader gives you a chart-based order execution tool and thousands of apps as well as third-party add-ons for you to use. While it was meant for traders looking to trade futures, this company has also partnered with other brokerages so that you can trade options, Forex, stocks, and CFDs.

NinjaTrader gives you a platform with clean, fully customizable charts. You can easily change the colors of the charts, bar spacing, fonts as well as the layout of the chart windows. You can easily add strategies, technical indicators, and drawing tools that are easily added within the chart. The charts also support different bar types, including tick, time-based, range, and volume bars. It also gives you a wide range of chart styles to choose from – OHLC, candlesticks, Mountain, and Kagi Line.

The platform gives you easy to use interfaces. One of the notable interfaces is the Chart Trader, which allows you to manage and plan your charts right from the chart. You can handle all types of order types from the platforms including limit, market, stop limit and stop market orders, as well as one-cancel orders.

If you are a fan of automated trading, this platform gives you semi-automated features that you can use to manage your positions, or you can decide to automate your engagements using the Automated Trading Interface entirely.

Real-time data is available at a cost, and it depends upon the kind of data feeds that you require. You pay for the data in a monthly cycle. You can replay the data on a tick-by-tick basis using the platform's replay option. This is ideal for trade practice, backtesting, and other kinds of research.

The platform is easy to download and free to install. The installation process is simple and straightforward, and once you launch the platform,

you can add charts, indicators, and customize the colors. The process can be tedious for some people, especially if you are used to fully automated platforms.

Using the system is easy, and you have access to a huge number of tools and resources. The good thing is that the platform hosts free webinars to get you started.

One of the best features of this platform is it gives you the capacity to simulate trades. This ability comes with a demo account and a profit/loss summary. This can be ideal for backtesting as well as for new traders who are looking for a platform to practice what they have learned.

Apart from market depth tools and charting, the platform offers limited resources to research within the platform. However, due to its focus on active futures trading, you get all the tools for these trading. You can customize the indicators; the platform, as well as other features, can be customized to a granular level. Sadly, there are no essential tools available for you, notably missing are news, financial statements, and data that are ideal for such a professional platform.

Advantages of NinjaTrader

- This platform gives you excellent technical analysis and charting tools to help you get the necessary insight into the trades.
- You have access to over 1000 apps and add-ons that make your trades easy and fast.
- You can sign up for a demo account so that you try the platform and understand what you are getting into.

Disadvantages

- The platform charges high fees to sign up, which might be an obstacle for newbies.
- The platform gives you easy setup, and the only downside is that you have to use another broker to run other trades.
- You don't have access to news feeds, fundamental data, and research which are missing on the platform.

- It only has a narrow focus and only supports Forex trading and futures. However, you can use its partners to trade stocks and other securities .

AmiBroker

If you are a trader looking to run backtesting on a strategy, you might have heard of AmiBroker. It is a comprehensive platform that gives you a host of backtesting options, charting tools, and much more.

The platform offers some of the best backtesting tools that you will ever come across. Monte Carlo simulations and walk-forward testing are just a few of these tools that you can use to develop new strategies for your trading needs. Additionally, the built-in programming language makes this platform a versatile one for traders that have some knowledge in coding.

However, the platform is available for Windows OS, though Mac users can use it via windows VM.

The platform offers various pricing options depending on the package that you choose. The standard version of the platform costs \$279 though it comes limited to 1-minute charting intervals that might not be ideal for intense trading. The version also comes limited to two CPU threads and only comes as a 32-bit program.

If the standard version isn't ideal for you, then go for the professional plan that costs \$339 and gives you unlimited real-time trading and data as well as intra-day charting intervals. This license also gives you access to the 64-bit version of the program.

For \$499, you get access to the ultimate pro pack that comes with other types of software to make your trading experience more realistic. Here, you get to download real-time data, and you can create custom code for your strategy.

AmiBroker Features

Technical Charting

You get access to highly versatile charting capabilities. You can add a variety of analyses to the charts and switch between multiple interfaces. You also have the option of customizing the chart appearance as you wish.

You also have access to a variety of drawing tools that you can use within the charts, such as Fibonacci patterns and regression channels.

The Formula Editor

You have access to the AmiBroker formula Language (AFL) that allows you to use templates with an in-built variable rather than adding actual values. This is ideal for experienced traders who need a quick reference as they design a formula. However, newbies will find the going hard because of the lack of basic formulas to use.

The editor allows you to check the code that you have before you execute it. This is made possible by the in-line syntax verifier that makes everything easier for you. Additionally, you can use the drop-down list of functions that make it easy to add to any code that you are running .

To assist you in making decisions further, you can ask questions in the online support forum, especially for advanced functions.

Technical Analysis

Once you have your formulae set up in the editor, you can use the various analysis functions that the platform offers. This is what makes the platform ideal for backtesting because you can run scans at a very fast speed on a single CPU. The results of any analysis are displayed in an excel table that you can export to a spreadsheet.

You also can define backtesting data such as the portfolio size and sub-portions. The downside is that these settings can be hard for newbies who need a steep learning curve to understand them.

Backtesting Features

For traders looking to run backtesting on a strategy, the presence of various features makes the whole operation fast and simple. Using a screener in the platform, a trader can easily identify potential trades using a formula-defined trading strategy. This is ideal for end-of-the-day traders as well as swing traders. The scan quickly allows the trader to locate trades, buy and sell them or to follow signals that have been defined in a formula.

Among the features, you will find that the walk-forward and parameter optimizer portions make the platform very powerful for backtesting. With the code already set up, you have the option of defining multiple parameters, each requiring various values.

The optimize analysis helps you determine a profitable combination of parameters for a formula. This is invaluable for developing new trading strategies.

Layout

Even with the affordable pricing, you find that the platform isn't used widely even by moderately experienced traders. This is because the learning curve towards beginning to use the platform is steep and requires several days and tutorials. The sad part is that there is little that has been done to help traders master the interface, for instance, you might not be able to know where to start the process of conducting an analysis or designing a formula. You don't have access to predefined formulas and functions to get you started.

Instead, you have to sink several weeks of your time into learning the coding language so that you can design multiple parameters. Failure to learn the language makes it hard for you to use the platform to design and test new strategies.

This isn't made easier by the layout at all, because the interface is crowded, and the menu buttons are small, which makes it hard for you to know the available options. This layout means you have to move from one screen to the next unsuccessfully.

The platform has been designed with advanced traders in mind. The platform is suitable for developing and testing new trading strategies, which is usually limited to experienced traders. Using the platform requires a well-developed knowledge in technical analysis and coding.

Advantages of AmiBroker

- The platform is surprisingly affordable, considering the analysis power that comes with it.
- You have access to handy technical charts.
- The scans, walk-forward tests, and backtests are incredibly fast.
- You can use up to 32 CPU threads.
- You can optimize a strategy using multiple parameters.

Disadvantages of AmiBroker

- The layout is jumbled up, and it doesn't provide any guidance. The menus are also small, making it hard to navigate.
- It has a steep learning curve for the built-in coding language.

Backtesting Parameters to Use to Evaluate a Trading System

Before the trading system comes into force, you need to understand what parameters you need to test. Here are a few to consider .

1. Total Profit or Loss

Total profit or loss helps you to determine whether the trading strategy in question led to profits or losses. You get to understand how much profit or loss can be achieved through the strategy. This is attributed to analyzing the historical data that the strategy was tested upon.

2. Average Profit or Loss

This denotes the level of profit or loss that you can incur in a certain unit – days, minutes, or hours or over a specified period.

3. Maximum Drawdown

This can be used as a measure of the risk in a trading strategy. It denotes the maximum drop in the value of an asset from its peak value. This, in turn, helps us to assess the kind of risk involved and the loss that we can incur from the trading strategy. Through this, you get to decide whether the risk is worth taking or not.

4. Success Ratio

This refers to the number of trades that you won or profited from concerning the number of trades that you lost or incurred a loss on. The ratio is an important indicator that allows you to understand how well the trading strategy is working for you and to what extent you need to optimize or update it to reap maximum benefits.

5. Sharpe Ratio

When you have two strategies that you are assessing, and you find that they give you equal returns, then the less risky strategy can be considered better than the other does. Such a measure is referred to as a risk-adjusted return, and you use the Sharpe Ratio to calculate it.

Backtesting is one of the biggest features of Algo trading because it allows you to test strategies before you deploy them in the market.

Common Backtesting Mistakes to avoid

While backtesting is one of the best aspects of Algo trading, it is not always successful. The results of these errors mean that you will skew your performance from the actual results. Let us look at the common pitfalls of backtesting and what you can do to avoid them.

1. Survivorship Bias

When you run your backtest, you tend to leave out some companies that no longer exist in your selection. Remember that after building your strategy, you go ahead to try and run the test within a specific period in the past. However, the sad thing is that most of the platforms you use to run the test will fail you at this point, leading to this bias.

The test you run will only include the companies that are available at the moment and exclude the ones that aren't in operational or the ones that have gone bankrupt. This means that the results you get won't be as complete as you expect them to be .

By excluding the companies, you find that the results that you return will be skewed much higher than the expected results.

To solve this mistake, you need to find a platform that doesn't support this bias. The platform will make sure the test includes all the companies that were there even in the past.

2. In-Sample Bias

When building the ultimate strategy, most traders only focus on a single period and ignore the rest. You take this period to be the perfect time to alter all the rules and parameters of the strategy so that you can make it perfect.

Issues arise when you use the period and ignore other periods for testing purposes. For instance, when you decide to test in a bull period, your strategy will only work in a bullish market.

It is, therefore, best to refine the strategy and test it over many periods. Try to run the tests in times of low volatility as well as high volatility, bear and bullish markets, and when you are out of range as well.

3. Lookahead Bias

This is a big mistake that many traders fall into. It is easy to look into the future when, in fact, you have all the necessary data seating in front of you.

When running your backtest, make sure you look at the relevant trades that you can use for the day. For instance, if you are making trades on the closing price, you might not be able to make trades until the following day.

4. Missing Out On the Little, Important Things

The use of backtesting is good because it allows you to set up the strategy that you wish to test, click on a couple of buttons then calculate the best results. However, it isn't the same thing when you are trading live. You have to look at various aspects of algo trading, such as feasibility, liquidity, and transaction costs.

It becomes hard to get the right position when you try to buy too much stock that lacks a lot of volume. Backtesting won't identify the anomalies, which means you have to set up the framework to consider the size you are running on the market.

Many traders ignore the transaction cost, forgetting that this cost builds up over time. This is entirely true if the trading strategy you choose aims to enter and then exit a lot of positions very fast.

5. Factor Mining

Given the access to a lot of data and computing power at the moment, you can get the best strategy that works with the backtest platform you have chosen. Additionally, when you use highly correlating data, you end up not adding any diversification to the current portfolio; thus; you end up with an erratic performance.

6. Limited Data

The more the data you have access to create and test the model, the better the results you expect to get. Longer data history improves the stability of the model by cutting down on reliance on market conditions that are usually prevalent over a short period. The robustness of the model increases when the data you are using covers multiple business cycles.

7. Ignoring Market Impact

You need to know that any act of trading directly affects the market price. However, historical data doesn't include all trades, and therefore, it is not an accurate representation of the price that you would get when trading.

So, be sure to anticipate that the price will move against your expectations whenever you trade.

8. Trusting Complex Models

Many traders put their trust in complex models that are often overfitted models. Simple modeling approaches that are woven from basic ideas usually provide the best models. So, strive to come up with a strategy that is built from a few factors that are combined with simple rules so that you get a result that is less sensitive but robust rather than a model that considers many factors.

9. Overlooking implementation costs

Many traders overlook the cost of implementing the strategy and end up stuck. You need to consider these costs in their entirety. For instance, make sure you account for the commissions, expenses, bid/ask spreads as well as the market impact.

10. Not Writing Down and Following the Process

For success in anything you do, you need to have a well-defined process in place. This begins with writing down the trading system. You need to note down a set of parameters that include the name of the strategy, the pairs you plan to test the strategy on, the indicators that are used complete with their settings, the timeframe, the risk per trade and the entry and exit signal.

Apart from the main parameters, make sure you add some optional parameters to use. Failure to do this means you won't know how well the rules you have work.

11. Giving Up even before you Begin

Many people drop their test when they fail to make the profit they set out to achieve. Once they realize that something isn't going their way, they stop the current test right in the middle of the data and then try a new set of rules or jump to a completely new system. Big mistake!

When you stop the test in the middle, you don't get a true reflection of the potential of the system at all. The reason the test might be failing might be due to changes in the market that you failed to capture in the new system.

12. Failure to Track Your Results

It is important that you track your results and know exactly where you are at any given time. You need to see the total return on across all your trades. Many people check out a single trade and end up being discouraged. However, when you consider the total trades, the results will impress you.

13. Hindsight Bias

If you are moving past the entry to signal and peeking at what will happen in the next step, then you are cheating. This affects your results and will give you a wrong misconception about the whole system because it looks better than it is. The only way to appreciate the results you get on a backtest is to use simulation whereby it is as if you are trading on a live platform.

14. Using inaccurate data

Inaccurate data gives you false predictions that will end up messing up the system. The results you get will be jacked, and these can be inaccurate timestamps, bad ticks, or other bad data.

It is vital that you get data from a genuine vendor. Comparative analysis of the different vendors is also a good idea because you get to know the values that you need to accept and the ones that are way out of range .

15. Using Poor Testing Tools

Using the right tools gives you the expected results from your backtesting effort. When you don't use the right tools, you end up with wrong assumptions. If you are a serious trader, you need to be ready even to spend some money to get the right tool.

Chapter 8: Developing an Algorithmic Trading Strategy

The most successful strategies are based on a mix of both technical and fundamental factors. Building a successful Algorithmic strategy needs a lot of patience and time, as well. Let us look at the various tools and methods to help you come up with the right strategy.

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Chart 5: Developing an Algorithmic trading strategy follows a set of dynamic steps.

First, we have to understand the market conditions and then look at the features of the various assets we would like to trade. Next, we need to set the strategy that represents the best fit for the trading background that we have identified. After this, we have to backtest the strategy so that we evaluate how it might have performed in the different conditions in the past. After the backtest, we go ahead to adjust the strategy based on the backtesting results, after which we implement the strategy .

Here is a rundown of the various steps to plan and implement the strategy.

Ideation Phase

This is more like finding an incentive that will drive your Algorithmic behavior. The Algorithmic might be aimed at running trades or identifying

the best trade to pick – at the end of the day, you need an incentive that will drive the project towards a certain direction. Are you looking for more successful trades? Higher returns? Higher satisfaction? How can you measure the results? These are questions you need to answer earlier in the process so that it guides you the entire process.

Here, you wish to determine the type of trading strategy that will be ideal for you. There are endless opportunities that you can experiment with depending on your goals. These include market marking, spread capture, arbitrage, and more. In all these, there is no better strategy than the other; it all depends on the risk vs. reward profile and how best you implement and test the system.

This phase is the easiest and best place that requires broader input from a number of sources. Talk to your staff, consult with managers and talk to experts to find out how you can achieve your goals.

There are various places to find ideas, including quantitative finance papers and trading websites. Some of the most popular include Quantart, Wilmott, Quantopian, QuantConenct, and SSRN.

Steps:

- Identify the need for the Algorithmic
- Establish any Algorithmic incentives
- Discuss the optimizations and measurements that relate to the incentives
- Communicate your objectives to data scientists.

Expected outcomes

- Considered intentions
- Clear research and design objectives

Research and Development (R&D) Phase

This is the stage whereby you go from the idea to identifying the specific Algorithmic that you have the capacity to implement. This stage is vital to the whole process and though it might seem obvious to you, it isn't that direct since you cannot move from the ideation phase direct to the

prototype. If you move fast, you will end up with an Algorithmic that easily breaks, so you need to take your time.

For each strategy, you have various viable options to use as well as well-documented implementations of each stage. The best performing strategy is also the one that will take most of your time. Additionally, what might work with one strategy might not work with the next one. The only thing you need to do is to iterate, evaluate the results and adapt.

Steps

- Identify the right R&D process to identify various Algorithmic strategies.
- Constrain the parameters of the process so that you focus your intentions on a specific strategy.
- Present your findings to the development and product team.
- Evaluate the performance of the chosen Algorithmic with the whole team.
- Using the initial idea, select the best-performing Algorithmic.

Expected outcomes

- Choose the best Algorithmic to implement
- Share the information you have on the chosen Algorithmic across programmers, development and product teams

Product Development

When you have run the R&D phase successfully, you now have all it takes to come up with the Algorithmic. You now have the specific objectives that can be used to create the system. You are taking the product features then mapping them to the technical requirements.

At this point, you have two documents: the initial idea as well as a trial implementation of the desired Algorithmic. Here, the development and product teams have enough contexts to come up with the system.

However, they need to maintain a lot of quality in the Algorithmic the whole time.

Generating trade Signals

When you come up with the strategy, you need to know when you will enter the market and when you will exit it. These are the entry and exit signals, respectively.

It is easier when you are holding one position, but when you are handling multiple positions, it becomes harder and complicated because you have to try and not contradict yourself. Entry signals are much easier to create, and the strategy will give you the trigger to allow you to trade. On the other hand, the exit signals are much trickier because you need to take smaller wins. The decision to exit depends on how long you hold the position.

Steps

- Connect the Algorithmic to the desired system architecture.
- Create the required user stories.

Expected outcome

- Algorithmic design

Implementation phase

This is where the development team takes over and implements the whole process and makes it into a product. Make sure you have good communication between the development and product team during the phase so that there is consistency and the quality is maintained.

Steps

- Implement the various objectives
- Evaluate and adapt

Expected outcomes

- Development of the Algorithmic code

Testing Phase

Once the new Algorithmic is in place, you need to test it against the initial incentives. This means you need to test the implementation and see if it actually does what you want it to do. The evaluation needs to be subjective, with the aim of tuning the parameters and fixing any bugs that might arise. This is the time you also involve the users .

Backtesting the Model's Parameters

Backtesting means that you test the model against historical data from way back before you trade with the strategy live. Backtesting, as discussed above, involves simulating the results in a controlled environment to see how the model performs in various conditions. You can also experiment with the parameters; for instance, you can choose to use five lag periods instead of one and see how the results look like.

For you to get the perfect profitable strategy, you might be forced to run many iterations and configurations. You have to change many factors to get what you need. Remember that small changes to the parameters can usually lead to large and unexpected impacts. This is the reason why you need to collect the data, test the models against the data, and then update the strategy depending on the new data.

Look at the various risk factors

No model can perfectly predict the future. The model that you are coming up with is simply a representation of what is happening in the market. You also need to look at the transaction costs because it can mute the profitability of the strategy, especially if you didn't account for transaction costs the right way.

Assess the Benchmark returns

You need to evaluate the magnitude of the returns because profits are usually higher when you invest in bigger positions. Many traders use the Sharpe Ratio to benchmark. The ratios assess your strategy and place it into the larger context, telling you how much volatility and risk you took to get the returns you are getting now. The bigger the Sharpe ratio, the better because it means the returns are high and the volatility is low.

Other factors you need to look at include the average returns per trade, drawdown for tail end risk and the average holding period.

Conclusion

Trading takes many forms, and it is dynamic as well. Times change and with the change, markets and operational methods also change. With the advent of computers, it was logical that trading would become better and faster. This came to pass, and traders now have the capacity to trade on the go and use programs that make trading easier.

One of the best methods to use to run trades with more confidence is Algorithmic trading. This makes use of mathematical calculations to help you predict trading actions. When you do this, you eliminate various errors including the emotional aspect of trading that tends to affect the outcome of trades. Success is all about knowing when to place a trade, how much you need to invest and the right platform to use for trading.

While you can come up with your own system, it takes time and the best way can be going for a ready-made system that gives you the capability you are looking for. We have discussed the various systems that you can use and the advantages of each system. Most of the systems give you a trial period that you can explore before you make the decision to take it up or not.

Finally, we looked at backtesting. Backtesting is an ideal way to use historical data to come up with assumptions about the future. Since you are using facts to determine the future, you stand to reduce many errors in future trades.