An Introduction to Algorithmic Trading: Opportunities & Challenges within the Systematic Trading Industry

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Abstract

In what follows we present systematic trading and discuss the benefits. We evaluate contemporary trends, the opportunities arising from machine learning and the operational cost challenges faced, leveraging on the history of the industry to demonstrate why maintaining a competitive edge is paramount to its continued success.

Keywords: Algorithmic Trading, Systematic Trading, Efficient Market Hypothesis, Trading Systems, Fundamental Analysis, Technical Analysis, Machine Learning, Social Media, Alternative Reference Data, Operational Costs, Hedge Funds, Assets Under Management, High Frequency Trading, Trade Execution, Market Prediction, Risk Management

Introduction

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1 What is Algorithmic Trading?

Systematic trading (or algorithmic trading) refers to the automation of the trading process, through the creation of predefined rules (the 'trading system') and their strict application when executing financial market transactions. The automated trading system benefits from being repeatable and testable, unlike discretionary trading, which potentially has different rules for every transaction.

Classical finance theory such as the Efficient Market Hypothesis [1], suggests it is impossible to consistently beat the market without taking additional risk(s). Systematic traders attempt to do just that, using fundamental and technical analysis, and suggest this is how the markets actually become efficient. Such trading systems are predominantly employed by Hedge Funds, currently with USD 2.9 trillion of assets under management (AUM) [3], who create alternative investment portfolios uncorrelated with the market using leverage and shorting techniques. Similarly High Frequency Trading firms use this method to make markets, seek liquidity rebates, market inefficiencies and arbitrage from investor bias, such as gambler's (mean reversion) and hot-hands (momentum) fallacies.

Systematic trading potentially offers better market prediction, trade execution and risk management for investors. Furthermore, they remove human emotion, introduce discipline and rigour. However they do not necessarily remove human bias from the implementation of the trading rules themselves, as exemplified in 1998 with the collapse of Long-Term Capital Management (LTCM) with USD 500bn AUM when its unhedged investments in Russian Government Bonds defaulted [2].

2 Machine Learning Opportunities

The world is changing with major and rapid advancement in new technologies such as machine learning, artificial intelligence, big data, quantum and cloud computing, making the transfer of information faster, seamless and efficient.

Human behaviour is evolving with these new technologies and heavily influenced by social media trends, which are rapidly accelerating the dissemination of information, fake news, propaganda and misinformation. Systems that can both process and cleanse the vast amounts of financial and alternative data from social media have a distinct edge over systems and discretionary traders that cannot and have the opportunity to generate superior returns.

3 Operational Cost Challenges

The Operational costs required to maintain a competitive edge are a significant challenge for the systematic trading industry. Systems need to evolve, be continually tested and optimised in an increasingly transient and evolving market to ensure they remain profitable.

Predatory systems seek to exploit inferior systems. Amaranth Investors epitomise this challenge, despite having a profitable system 14 out of 15 years, in 2006 they made losses of USD 6 billion in a fortnight as natural gas futures prices plunged and they were unable to liquidate their positions fast enough to meet their margin calls [4].

Increased competition, trading volumes and market sophistication with more informed counterparties is reducing bid-offer spreads and profit margins from market-making. Whilst the fixed cost maintaining an agile technology stack to keep pace with evolving markets is a major challenge.

4 Conclusion

In conclusion the systematic trading industry is faced with the opportunity to benefit from machine learning and new technologies to generate superior returns. However increasing operational, research and development costs present a persistent challenge.

Strategies that fail to incorporate the latest trends and information are likely to become generators of market inefficiency rather than exploiters, which is why maintaining a competitive edge is paramount to the systematic trading industry's continued success.

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