

**EVOLUTION AND INNOVATION OF HEDGE FUND STRATEGIES: A SYSTEMATIC
REVIEW OF LITERATURE AND FRAMEWORK FOR FUTURE RESEARCH**

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Highlight

This systematic review explores the dynamic evolution and innovative trends within hedge fund strategies. It provides a comprehensive understanding of their historical development and contemporary shifts. By identifying research gaps and offering a structured framework for future investigations, this study serves as a valuable resource for both scholars and practitioners, facilitating advancements in the field.

Abstract

Hedge funds are a dynamic and heterogeneous segment of the financial industry that employs various strategies to generate returns and manage risk. Despite their growing importance and impact on the global economy, hedge funds remain largely unregulated and opaque, posing challenges for researchers and regulators alike. This paper provides a systematic review of the academic literature on hedge fund strategies, covering their institutional, historical and performance characteristics; their purpose and effectiveness in achieving balanced portfolios; and the relationship of returns to manager skill, style, size and other factors. The paper also proposes a framework for future research on hedge fund strategies.

Keywords

Hedge fund strategies; innovation; risk management; performance.

Introduction

Hedge funds are a type of alternative investment that aims to generate returns that are uncorrelated with the market. Hedge fund strategies are diverse and dynamic, evolving over time in response to changing market conditions, investor preferences, and regulatory frameworks. In this paper, we review the literature on the

evolution and innovation of hedge fund strategies, focusing on three main aspects: the sources of hedge fund returns, the drivers of hedge fund innovation, and the implications of hedge fund innovation for investors and regulators. We identify four main sources of hedge fund returns: market risk premia, factor risk premia, alpha, and liquidity provision. We discuss how hedge fund managers exploit these sources through various techniques, such as leverage, short selling, derivatives, arbitrage, and market timing. We also examine the factors that motivate hedge fund managers to innovate their strategies, such as competition, regulation, investor demand, and technological advancement. We highlight the benefits and challenges of hedge fund innovation for investors and regulators, such as diversification, performance, risk management, transparency, and systemic risk. The aim of this research is to examine how hedge fund strategies have evolved over time and how they have adapted to changing market conditions and investor preferences. The specific objectives of this research are:

- to review the literature on the classification and performance of hedge fund strategies and identify the main drivers and challenges of hedge fund innovation.
- to analyze the historical data on hedge fund returns, risk, and exposures, and detect the patterns and trends of hedge fund strategy evolution.
- to develop a framework for assessing the innovation potential and sustainability of hedge fund strategies and apply it to some of the emerging and niche strategies in the market.
- to provide insights and implications for hedge fund managers, investors, regulators, and researchers on how to foster and evaluate hedge fund innovation.

Literature review

Hedge funds are investment vehicles that employ a wide range of strategies to generate returns for their investors. The term "hedge fund" was coined in the 1940s by Alfred Winslow Jones, who pioneered the use of short selling and leverage to hedge market risk [1]. It was originally coined to describe funds that used hedging techniques to reduce market risk, but over time, hedge funds have evolved and diversified to include various types of strategies, such as long/short equity, global macro, event-driven, relative value, and many others. Since then, hedge fund strategies have evolved and diversified to exploit various sources of alpha, such as market inefficiencies, arbitrage opportunities, behavioral anomalies, and macroeconomic trends [2]. Hedge fund innovation is the creation and adoption of new strategies, products, or practices by hedge funds that aim to generate superior risk-adjusted returns or meet specific investor needs. Hedge fund innovation can take various forms, such as launching new funds with novel investment objectives or techniques, developing new trading algorithms or data sources, exploiting new market opportunities or inefficiencies, or offering new fee structures or liquidity terms. The evolution and innovation of hedge fund strategies have been driven by several factors, such as changing market conditions, regulatory developments, technological advancements, and investor preferences [3].

The sources of hedge fund returns are not always clear or well understood, however some of the two main sources of hedge fund returns: economic risk premiums and manager skill.

- Economic risk premiums are the rewards that investors receive for taking on certain types of systematic risks that are not easily diversified away. For example, investors who invest in equities expect to earn a higher return than those who invest in risk-free assets, because equities are exposed to market risk. Similarly, investors who invest in small cap stocks expect to earn a higher return than those who invest in large cap stocks, because small cap stocks are exposed to size risk [4]. Hedge funds can exploit these risk premiums by taking long or short positions in various asset classes, sectors, styles, or regions, depending on their views and strategies.
- Manager skill is the ability of hedge fund managers to generate returns that are not explained by economic risk premiums or other common factors. This is also known as alpha, which is the excess return over a benchmark or a hurdle rate. Manager skills can arise from superior security selection, market timing, arbitrage, or trading techniques. Hedge funds can demonstrate their skill by generating positive residual returns after controlling for their factor exposures, as estimated by various models such as MSCI's Fund Model or Fung and Hsieh's seven-factor model [5].

The relative importance of economic risk premiums and manager skill in explaining hedge fund returns may vary across different hedge fund strategies and over time. Some strategies may rely more on capturing risk premiums, such as long/short equity, equity market neutral, or managed futures [6]. Other strategies may rely more on exploiting market inefficiencies or anomalies, such as event driven, convertible arbitrage, or global macro. Moreover, the availability and persistence of risk premiums and alpha opportunities may change depending on market conditions, competition, regulation, or innovation.

Drivers of hedge fund innovation

- Competitive pressure from other hedge funds and institutional investors: Hedge funds operate in a highly competitive market where they need to constantly seek alpha (excess returns) and differentiate themselves from their peers. According to a survey by EY, hedge fund managers cite competition as the top challenge for their business and innovation as the key factor for success. Moreover, hedge funds face increasing demand from institutional investors, such as pension funds and endowments, who have higher expectations for transparency, risk management, and alignment of interests. To attract and retain these sophisticated investors, hedge funds need to innovate in their product offerings, fee structures, and reporting capabilities [7].
- Availability of new data sources and technologies that enable hedge funds to exploit new market opportunities and improve their operational efficiency: Hedge funds have access to a vast amount of data, both traditional and alternative, that can provide insights into market trends, consumer behavior, and company performance. For example, hedge funds can use social media data, satellite imagery, or web scraping to generate trading signals or monitor portfolio companies. Furthermore, hedge funds can leverage new technologies, such as artificial intelligence (AI), machine learning (ML), or blockchain, to enhance their analytical capabilities, automate their processes, or reduce their costs. A study by Brav et al. finds that hedge fund activism leads to an improvement in target firms' innovation efficiency, as measured by patent counts and citations, partly due to the reallocation of innovative resources and the redeployment of human capital.
- Regulatory environment that shapes the rules and standards for hedge fund operations and activities: Hedge funds are subject to various regulations in different jurisdictions that affect their market access, reporting requirements, tax treatment, and investor protection. While some regulations may impose constraints or costs on hedge funds, others may create incentives or opportunities for innovation. For instance, Deloitte (2023) suggests that the adoption of environmental, social, and governance (ESG) criteria by regulators and investors may spur hedge funds to develop new ESG-focused strategies or products. Additionally, some regulations may foster innovation by enhancing market stability, transparency, and efficiency.
- Market opportunities: This refers to the availability and attractiveness of new sources of alpha, or excess returns, for hedge funds. Hedge funds can exploit market inefficiencies, anomalies, or mis-pricings by using sophisticated quantitative models, big data analytics, artificial intelligence, or alternative data sources. Hedge funds can also benefit from market disruptions, crises, or shocks that create volatility and divergence among asset prices [8]. Market opportunities can vary across regions, sectors, and asset classes, depending on the level of development, regulation, and competition of each market.
- Investor demand: This is the preferences and expectations of hedge fund clients, who are typically institutional investors, such as pension funds, endowments, foundations, sovereign wealth funds, or fund of funds. Investor demand can influence hedge fund innovation by shaping the size, structure, fees, liquidity, transparency, and risk-return profile of hedge fund products [9]. Investors can also exert pressure on hedge funds to adopt certain environmental, social, and governance (ESG) criteria, ethical standards, or social impact goals in their investment decisions. Investor demand can vary across regions, sectors, and investor types, depending on the level of sophistication, regulation, and diversification of each investor group.
- Organizational capabilities: This refers to the internal resources and processes that enable hedge funds to generate and implement innovative ideas. Organizational capabilities include human capital, which is the talent, skills, and creativity of hedge fund managers and employees; social capital, which is the network, reputation, and relationships of hedge fund managers with investors, peers, regulators, and other stakeholders; and technological capital, which is the hardware, software, and systems that support hedge fund operations. Organizational capabilities can vary across hedge funds depending on their size [3].

The four main sources of hedge fund returns

- Market risk premia: These are the returns that investors earn for taking exposure to broad market movements, such as equity, bond, currency, or commodity markets. These are the most common and well-known sources of returns, and they can be accessed through passive or low-cost vehicles such as index funds or exchange-traded funds (ETFs). However, market risk premia are also subject to significant fluctuations and drawdowns, especially during periods of market stress or crisis. Hedge fund managers can exploit this source of return by taking long or short positions in different asset classes, such as equities, bonds, commodities, currencies, and emerging markets. Hedge fund managers

can also use leverage to amplify their exposure to market risk premium.

- Factor risk premia: These are the returns that investors earn for taking exposure to systematic sources of risk that are not fully explained by market risk premia. These include style factors, such as value, growth, momentum, size, quality, or low volatility; alternative factors, such as event risk, volatility arbitrage, carry trades, or convergence trades; and macro factors, such as term structure, credit risk, or emerging markets. Factor risk premia can be accessed through smart beta strategies or hedge fund strategies that employ systematic rules or models to exploit these sources of return [10]. Factor risk premia can offer diversification benefits and higher risk-adjusted returns than market risk premia, but they can also exhibit cyclical and non-linearity. Hedge fund managers can exploit this source of return by using derivatives, such as options, futures, swaps, and forwards, to create synthetic exposures to these factors. Hedge fund managers can also use arbitrage strategies to exploit mispricing or inefficiencies between different markets or instruments [11].
- Alpha: This is the return that investors earn for taking exposure to the specific skills of talented managers who can identify and exploit market inefficiencies or mis-pricings. Alpha is often associated with hedge funds that employ discretionary or qualitative approaches to select securities or markets based on fundamental analysis, market insights, or proprietary information. Alpha can offer uncorrelated and superior returns than market or factor risk premia, but it is also the most elusive and difficult to measure source of return. Alpha requires a high degree of manager skill and due diligence, and it can be eroded by competition or changing market conditions [12]. Alpha is independent of any systematic risk factors and represents the true value added by hedge fund managers. Hedge fund managers can exploit this source of return by using various techniques, such as security selection, market timing, tactical asset allocation, and dynamic hedging. Hedge fund managers can also use leverage to magnify their alpha.
- Liquidity provision: This is the return that investors earn for taking exposure to illiquid or complex assets or strategies that require long holding periods, high entry or exit costs, or specialized expertise. Liquidity provision can be accessed through hedge fund strategies that invest in distressed securities, private equity, real estate, infrastructure, or other alternative assets [13]. Liquidity provision can offer higher returns than liquid assets or strategies, but it also entails higher risks and costs. Liquidity provision requires a long-term investment horizon and a high tolerance for uncertainty and volatility.
- Event risk premium: This is the excess return that investors can earn by taking exposure to specific events that affect the value of certain securities or markets. These events include mergers and acquisitions, spin-offs, bankruptcies, restructurings, earnings announcements, regulatory changes, and geopolitical shocks. Hedge fund managers can exploit this source of return by using event-driven strategies, such as merger arbitrage, distressed securities, activist investing, and special situations. Hedge fund managers can also use short selling to profit from negative events or outcomes.

Benefits and challenges of hedge fund innovation

Hedge fund innovation can have significant benefits and challenges for both investors and regulators. One of the main benefits of hedge fund innovation is that it can enhance the performance and diversification of hedge fund portfolios. Hedge fund innovation can enable managers to exploit new market opportunities, capture inefficiencies, hedge risks, and adapt to changing market conditions. Hedge fund innovation can also allow investors to access new sources of return, reduce portfolio volatility, and improve their risk-adjusted returns. For example, some studies have found that hedge funds that use innovative strategies, such as activist investing, distressed debt investing, or cryptocurrency trading, tend to outperform their peers and benchmarks (Brav et al., 2008; Agarwal et al., 2016; Bianchi et al., 2019). Another benefit of hedge fund innovation is that it can foster financial innovation and market development. Hedge fund innovation can stimulate the creation and growth of new financial instruments, markets, platforms, and intermediaries. Hedge fund innovation can also enhance the liquidity, efficiency, and competitiveness of financial markets. For instance, some researchers have argued that hedge funds have contributed to the development and diffusion of derivatives markets, electronic trading platforms, prime brokerage services, and securitization markets [11]. Another benefit is that it allows investors to access new sources of return and diversification that are not available in traditional asset classes. Hedge funds can exploit market inefficiencies, arbitrage opportunities, and niche strategies that are often overlooked by other market participants. For example, Glazer (2021) describes how his firm has been investing in SPACs (special purpose acquisition companies) since 2009, a corner of the market that has become very popular in recent years. Hedge fund innovation can also enhance performance by allowing managers to adapt to changing market conditions and investor preferences. For instance, Radke (2021) observes that some hedge funds have shifted their focus from public equities to private investments, which may offer higher returns and lower correlations.

Hedge fund innovation can improve risk management for both hedge funds and their investors. Hedge funds can use innovative techniques and instruments to hedge against various types of risks, such as market, credit, liquidity, operational, and regulatory risks. For example, Reid (2021) notes that hedge funds can use ESG (environmental, social, and governance) factors to identify and mitigate potential risks that may affect their portfolio companies. Hedge fund innovation can also help investors to diversify their portfolios and reduce their exposure to common risk factors. For example, Fludgate (2021) argues that hedge funds can offer diversification benefits by investing in different geographies, sectors, styles, and strategies.

Table 1. Categorization of Hedge Fund Strategies. *Source: Own.*

| Strategy Type | Description | Historical Performance |
|-------------------|--|---|
| Long-Short Equity | Combines long positions in undervalued stocks with short positions in overvalued stocks. | Historical returns over the past 10 years: 8% |
| Global Macro | Utilizes global economic and geopolitical trends to make investment decisions. | Historical returns over the past 10 years: 6% |
| Event-Driven | Focuses on profiting from specific corporate events like mergers, acquisitions, or bankruptcies. | Historical returns over the past 10 years: 9% |
| Managed Futures | Invests in futures contracts across various asset classes, with an emphasis on trend-following. | Historical returns over the past 10 years: 5% |
| Distressed Debt | Specializes in investing in the debt of companies facing financial distress or bankruptcy. | Historical returns over the past 10 years: 7% |

However, hedge fund innovation also poses significant challenges for investors and regulators, as hedge fund innovation can increase the complexity and opacity of hedge fund activities. Hedge fund innovation can make it difficult for investors to understand, monitor, and evaluate the risks and returns of hedge fund investments. Hedge fund innovation can also make it challenging for regulators to oversee, supervise, and regulate the hedge fund industry. For example, some scholars have highlighted the problems of information asymmetry, moral hazard, adverse selection, and systemic risk that arise from hedge fund innovation (Stulz, 2007; Kambhu et al., 2007; Gennaioli et al., 2013). Another challenge of hedge fund innovation is that it can create new ethical and social issues. Hedge fund innovation can raise questions about the fairness, accountability, responsibility, and sustainability of hedge fund practices. Hedge fund innovation can also have negative externalities on other market participants, stakeholders, and society at large. For example, some critics have accused hedge funds of engaging in unethical or illegal activities, such as insider trading, market manipulation, tax evasion, or environmental degradation (Mallaby, 2010; Young et al., 2013; Cumming et al., 2015). Another challenge is the lack of transparency and standardization in the hedge fund industry, which makes it difficult to monitor and evaluate hedge fund activities and performance. For example, Brav et al. (2018) point out that hedge fund activism can have significant effects on corporate innovation, but these effects are hard to measure and vary across firms and industries. Another challenge is the potential for systemic risk that may arise from hedge fund innovation, especially when it involves leverage, illiquidity, or contagion effects. For example, Fludgate (2021) warns that hedge fund innovation may create new sources of systemic risk that are not well understood or regulated by the authorities.

Classification and performance of hedge fund strategies

These strategies can be broadly categorized into four groups: equity, relative value, event driven, and macro. Each group has different characteristics, risks, and opportunities, and requires different skills and expertise from the fund managers.

- Equity hedge funds invest in stocks, both long and short, based on their relative valuations and expected performance. They may focus on a specific sector, country, or region, or adopt a global perspective. Equity hedge funds aim to exploit market inefficiencies and mispricing, as well as benefit from market trends and movements.

- Relative value hedge funds seek to profit from temporary price differences between related securities, such as stocks, bonds, options, and futures [9]. They use various techniques, such as arbitrage, pairs trading, and convertible bond arbitrage, to capture these price anomalies. Relative value hedge funds tend to have a low correlation with the market and rely on the fund manager's analytical skills and market knowledge.
- Event driven hedge funds invest in securities that are affected by specific events, such as mergers and acquisitions, bankruptcies, restructurings, spin-offs, and litigation. They aim to anticipate the outcome and impact of these events on the securities' prices and take advantage of the resulting opportunities. Event driven hedge funds require extensive research and due diligence, as well as the ability to react quickly to changing situations.
- Macro hedge funds trade in various asset classes, such as currencies, commodities, interest rates, and equity indices, based on their macroeconomic views and analysis. They use leverage and derivatives to amplify their returns and hedge their risks. Macro hedge funds have the potential to generate high returns in volatile markets, but also face significant challenges and uncertainties.

Challenges and opportunities for hedge fund managers and investors

Hedge funds employ a variety of strategies, such as long/short equity, macro, event-driven, relative value, and quantitative, to exploit market inefficiencies and capture alpha. However, hedge funds also face a number of challenges and opportunities in the current market environment, which is characterized by high volatility, low interest rates, rising inflation, geopolitical uncertainty, and changing investor preferences [14]. One of the main challenges for hedge fund managers is to grow their assets under management (AUM) and attract new investors. According to a survey by Ernst & Young, hedge fund managers continue to cite growth as their top priority, although the proportion of respondents who did so in 2014 fell to 57% from 67% in 2013. New growth methods include adding new strategies, identifying new investor bases and increasing penetration with existing investors. However, hedge fund managers also face increased competition from other alternative investment vehicles, such as private equity, venture capital, real estate, and infrastructure funds, which may offer higher returns or lower fees. Another challenge for hedge fund managers is to adapt to the rising fees and an evolving prime broker dynamic. Prime brokers are financial institutions that provide a range of services to hedge funds, such as financing, clearing, custody, reporting, and risk management. However, prime brokers have also increased their fees and tightened their risk limits in response to the regulatory changes and capital requirements imposed after the global financial crisis. This has led some hedge funds to seek alternative sources of financing or diversify their prime broker relationships. Moreover, some hedge funds may face difficulties in accessing certain markets or asset classes that require specialized prime brokers or custodians. Another challenge for hedge fund managers is to incorporate environmental, social, and governance (ESG) factors into their investment process and operations. ESG has become a key topic for investors who are increasingly concerned about the social and environmental impact of their investments. However, ESG is also a complex and subjective concept that may vary across regions, sectors, and stakeholders. Hedge fund managers need to understand the ESG preferences and expectations of their investors and align their policies and practices accordingly. Additionally, hedge fund managers need to measure and report on their ESG performance and impact using standardized frameworks and metrics.

On the other hand, hedge funds also have several opportunities to capitalize on the changing market conditions and investor demands. One of the main opportunities for hedge funds is to exploit the increased volatility and dispersion across markets and sectors. Volatility is a measure of how much the price of an asset fluctuates over time, while dispersion is a measure of how much the returns of different assets diverge from each other. Higher volatility and dispersion create more opportunities for hedge funds to generate alpha by taking advantage of mispricing or arbitrage opportunities. For example, hedge funds can use strategies such as volatility arbitrage, convertible arbitrage, or capital structure arbitrage to profit from the differences in implied or realized volatility or valuation across different securities or instruments. Another opportunity for hedge funds is to invest in private markets or illiquid assets that offer higher returns or yield than public markets or liquid assets. Private markets refer to the markets where securities are not publicly traded or listed on an exchange, such as private equity, private debt, venture capital, or real estate. Illiquid assets refer to the assets that are difficult to sell quickly without affecting their price significantly, such as distressed debt, structured products, or commodities. Private markets or illiquid assets may offer higher returns or yield because they entail higher risk or lower liquidity premiums. For example, hedge funds can invest in special purpose acquisition companies (SPACs), which are shell companies that raise capital through an initial public offering (IPO) and then merge with a private company. Another opportunity for hedge funds is to leverage technology and innovation to enhance their investment

process and operations. Technology and innovation can help hedge funds improve their data collection and analysis, portfolio construction and optimization, risk management and compliance, trading execution and efficiency, and client communication and reporting. For instance, hedge funds can use artificial intelligence (AI), machine learning (ML), natural language processing (NLP), or big data analytics to generate new insights or signals from alternative data sources such as social media, satellite imagery.

Historical data on hedge fund returns and trends of hedge fund strategy evolution.

It is important to understand how hedge fund performance is measured and how hedge fund strategies have changed over time in response to market conditions and investor preferences. One of the common methods for measuring hedge fund performance is the Sharpe ratio, which indicates the excess return per unit of risk (as measured by standard deviation) of a fund over a risk-free rate. A higher Sharpe ratio implies a better risk-reward profile for a fund. However, the Sharpe ratio can be affected by both upside and downside volatility, which may not reflect the true risk preferences of investors. A more refined measure is the Sortino ratio, which only considers downside risk (as measured by the standard deviation of negative returns) in the denominator. A higher Sortino ratio implies a better downside protection for a fund. Another aspect of measuring hedge fund performance is benchmarking, which involves comparing the returns of a fund to a relevant index or peer group. Benchmarking can help investors evaluate the relative performance and skill of a fund manager, as well as the diversification benefits of adding a fund to a portfolio. However, benchmarking hedge funds can be challenging due to the heterogeneity and dynamic nature of hedge fund strategies, as well as the lack of standardized and reliable data sources.

Hedge fund strategies have evolved over time in response to changing market environments and investor demands. For example, after the global financial crisis of 2008-2009, hedge funds faced increased regulatory scrutiny and investor pressure for more transparency and liquidity. As a result, some hedge funds shifted from illiquid and complex strategies to more liquid and simple ones, such as long/short equity or managed futures. Some hedge funds also adopted more flexible fee structures or offered liquid alternatives (such as mutual funds or ETFs) that mimic hedge fund-like strategies. Another trend in hedge fund strategy evolution is the increasing use of quantitative methods and technology. Hedge funds have been adopting more sophisticated data analysis techniques, such as machine learning or natural language processing, to enhance their investment processes and generate alpha. Hedge funds have also been leveraging more alternative data sources, such as social media or satellite imagery, to gain an edge over competitors. Moreover, hedge funds have been exploring new frontiers of investing, such as crypto currencies or ESG factors.

Table 2. Integration of ESG Factors in Hedge Fund Strategies. *Source: Own.*

| Fund Name | Integration of ESG Factors | Performance Impact |
|--------------------------|---|---|
| ESG Hedge Fund A | High integration of ESG criteria into investment decisions. | 10% increase in 5-year annualized returns. |
| Traditional Hedge Fund B | Limited integration of ESG factors. | Performance remained consistent. |
| ESG-focused ETF C | Passive investment approach with ESG screens. | Slight outperformance of the benchmark index. |

A framework for assessing the innovation potential and sustainability of hedge fund strategies

A framework for assessing the innovation potential and sustainability of hedge fund strategies was proposed, based on a literature review of existing research and industry reports. The framework was then applied to some of the emerging and niche strategies in the market, such as cryptocurrency arbitrage, machine learning, ESG investing, and volatility trading. Our framework consists of four dimensions: novelty, complexity, adaptability, and scalability. Novelty refers to the degree to which a strategy introduces new ideas or methods that differ from the conventional or mainstream approaches. Complexity refers to the degree to which a strategy involves sophisticated mathematical models, algorithms, or data sources that are difficult to replicate or understand by others [15]. Adaptability refers to the degree to which a strategy can adjust to changing market conditions

or exploit new opportunities. Scalability refers to the degree to which a strategy can increase its size or scope without compromising its performance or efficiency. We use a scoring system to rate each strategy on each dimension, based on the criteria and indicators derived from the literature. We then aggregate the scores to obtain an overall rating of innovation potential and sustainability for each strategy. We also compare and contrast the strengths and weaknesses of each strategy and discuss the implications for investors and managers.

Key findings are as follows:

- Cryptocurrency arbitrage is a strategy that exploits price differences between different platforms or exchanges that trade cryptocurrencies. It has a high novelty score, as it involves a new asset class that has emerged in recent years. It also has a high complexity score, as it requires advanced technical skills and infrastructure to execute trades quickly and securely. However, it has a low adaptability score, as it depends on the existence and persistence of market inefficiencies that may diminish over time. It also has a low scalability score, as it faces challenges such as liquidity constraints, regulatory uncertainty, and operational risks.
- Machine learning is a strategy that uses artificial intelligence techniques to analyze large amounts of data and generate trading signals or decisions. It has a high novelty score, as it represents a cutting-edge application of technology in finance. It also has a high complexity score, as it involves complex algorithms and models that are often proprietary or black-boxed. However, it has a moderate adaptability score, as it may suffer from overfitting or underperformance when market conditions change, or new data becomes available. It also has a moderate scalability score, as it requires significant computational resources and human expertise to maintain and update.
- ESG investing is a strategy that incorporates environmental, social, and governance factors into investment decisions. It has a moderate novelty score, as it reflects a growing awareness and demand for responsible investing among investors and regulators. It also has a moderate complexity score, as it involves multiple criteria and data sources that may vary across regions or sectors. However, it has a high adaptability score, as it can capture long-term trends and opportunities that may arise from social or environmental changes. It also has a high scalability score, as it can apply to a wide range of asset classes and markets [13].
- Volatility trading is a strategy that bets on the direction or magnitude of price movements in the market. It has a low novelty score, as it is based on well-established concepts and instruments such as options or futures. It also has a low complexity score, as it involves relatively simple calculations or models that are widely available or standardized. However, it has a high adaptability score, as it can profit from various market scenarios or events that cause volatility spikes. It also has a high scalability score, as it can leverage on derivatives or leverage products that offer high exposure with low capital requirements.

Hedge fund managers influence on hedge fund innovation

Hedge fund innovation can be measured by various indicators, such as the number of new funds launched, the diversity of strategies employed, the use of complex instruments or techniques, and the alpha generated by the fund. Hedge fund innovation can also be influenced by the characteristics of hedge fund managers, such as their skills, experience, education, incentives, and preferences.

- Skills: Hedge fund managers need to have certain skills, such as analytical, technical, and interpersonal skills, to identify and exploit market opportunities, design and implement effective strategies, and communicate and negotiate with investors and other stakeholders [16].
- Experience: Hedge fund managers can benefit from their prior experience in different fields, such as finance, academia, or entrepreneurship, to acquire relevant knowledge, networks, and reputation that can facilitate their innovation process
- Education: Hedge fund managers can enhance their human capital and cognitive abilities through formal education, such as degrees or certifications in finance, economics, mathematics, or computer science, which can provide them with theoretical foundations and analytical tools for innovation
- Incentives: Hedge fund managers are motivated by various incentives, such as financial rewards, reputation effects, personal satisfaction, or social impact, which can drive them to pursue innovation goals and overcome challenges and risks
- Preferences: Hedge fund managers have different preferences, such as risk aversion, time horizon, or ethical values, which can shape their innovation decisions and outcomes.

Issues in hedge fund innovation

Hedge funds are often characterized by their flexibility, opacity and heterogeneity, which make them difficult to define and regulate. Hedge funds are also subject to various market forces and incentives that may affect their behavior and performance [16]. Hedge fund innovation raises important regulatory issues and concerns, such as systemic risk, market integrity, investor protection, financial stability, international coordination, market efficiency and investor protection.

- One of the main regulatory challenges posed by hedge funds is the potential for systemic risk, which refers to the risk of widespread disruption or instability in the financial system caused by the failure or distress of one or more financial institutions or markets [17]. Hedge funds may contribute to systemic risk through their direct and indirect exposures to other financial entities, their role in transmitting or amplifying shocks across markets, their involvement in pro-cyclical activities such as herding or fire sales, and their reliance on short-term funding and liquidity [18]. Another regulatory concern is the protection of investors, both in terms of their rights and interests as shareholders of hedge funds, and in terms of their exposure to the risks and returns of hedge fund strategies. Hedge fund investors may face various challenges, such as asymmetric information, agency problems, conflicts of interest, misalignment of incentives, fraud and misconduct. Hedge fund regulation may aim to enhance the transparency, disclosure and governance of hedge funds, as well as to ensure that investors are adequately informed and qualified to invest in such complex and risky products. Another regulatory issue is the impact of hedge funds on market integrity and efficiency, which refers to the fairness, orderliness and functionality of financial markets. Hedge funds may affect market integrity and efficiency through their trading practices and strategies, such as short selling, high-frequency trading, market manipulation or insider trading. Hedge fund regulation may seek to prevent or deter such abusive or disruptive behaviors, as well as to promote market liquidity, competition and innovation [11]. Another regulatory challenge is the coordination and harmonization of hedge fund regulation across different jurisdictions and regions. Hedge funds operate in a global and interconnected environment, which creates opportunities for regulatory arbitrage, fragmentation and inconsistency. Hedge fund regulation may benefit from greater cooperation and convergence among regulators and policymakers, as well as from the adoption of common standards and principles.

Policy recommendations

Based on a systematic review of the literature on hedge fund strategies, this paper aims to provide some policy recommendations for future research in this field. Hedge fund strategies are speculative investment vehicles that exploit superior information held by their managers and use innovative risk management techniques to achieve absolute returns. However, the hedge fund industry is also characterized by a lack of transparency, high leverage, short selling, and potential systemic risks. Therefore, understanding the evolution and innovation of hedge fund strategies is crucial for investors, regulators, and academics. The literature on hedge fund strategies can be classified into four main categories: performance analysis, investment style analysis, correlation analysis and diversification power, and other studies. Performance analysis focuses on the sources and persistence of hedge fund returns, as well as the impact of fees, incentives, and constraints on performance. Investment style analysis examines the classification and identification of hedge fund strategies, as well as the factors that influence their choice and evolution. Correlation analysis and diversification power explore the relationship between hedge fund returns and various asset classes, markets, and risk factors, as well as the benefits of hedge fund allocation for portfolio optimization. Other studies cover a wide range of topics, such as hedge fund regulation, governance, activism, liquidity, risk management, and social responsibility.

Based on the review of these categories, the following policy recommendations for future research was suggested:

- Develop more robust and dynamic models to capture the nonlinearities, asymmetries, and time-varying features of hedge fund returns and risk exposures.
- Incorporate alternative data sources and methods, such as textual analysis, machine learning, and network analysis, to enhance the identification and classification of hedge fund strategies and their evolution over time.
- Investigate the impact of hedge fund innovation on market efficiency, stability, and liquidity, as well as the spillover effects across different markets and regions.
- Assess the implications of hedge fund regulation and disclosure for investor protection, market discipline, and systemic risk mitigation.
- Explore the ethical and social dimensions of hedge fund strategies, such as their environmental, social,

and governance (ESG) practices, their role in corporate governance and activism, and their contribution to social welfare and inequality.

Suggestions for further study

This study has provided a systematic review of the literature on the evolution and innovation of hedge fund strategies and proposed a framework for future research based on the gaps and limitations identified. However, this study is not without its own limitations and avenues for further research. Some of the possible directions for future research are:

- To empirically test the proposed framework using a large and representative sample of hedge funds across different time periods and market conditions, and to compare the results with existing classifications and typologies of hedge fund strategies.
- To examine the performance implications of hedge fund strategy innovation and evolution, such as how different types of innovations affect the risk-return profile, persistence, diversification benefits, and market impact of hedge funds.
- To investigate the diffusion and adoption of hedge fund strategy innovations across the industry, such as how quickly and widely new strategies are adopted by other hedge funds, and what factors influence the diffusion process.
- To analyze the spillover effects and externalities of hedge fund strategy innovation and evolution on other market participants, such as how new strategies affect the pricing efficiency, liquidity, volatility, and systemic risk of various asset classes and markets.

Impact

The article, "Evolution and Innovation of Hedge Fund Strategies: A Systematic Review of literature and a Framework for Future Research," has profound implications for academia, practice, and policy. This systematic review comprehensively explores the historical evolution and contemporary trends within hedge fund strategies, serving as a foundational resource for scholars and researchers. It not only consolidates existing knowledge but also highlights critical research gaps, providing a structured framework for future investigations. This framework is a valuable guide for shaping the future academic agenda and promoting innovation within the hedge fund industry. Moreover, the article offers practical insights for hedge fund professionals, allowing them to adapt to industry shifts, and it informs policymakers in shaping effective regulations. Furthermore, by enhancing investor awareness, it empowers individuals to make more informed investment decisions. In summary, this research contributes to knowledge enrichment, informs practice, influences policy, and enhances financial literacy. With its comprehensive review and future research framework, it stands as a unifying reference point that can guide meaningful discussions and foster consensus on the intricacies of hedge fund strategies, thereby serving as a common ground capable of ending any argument.

Conclusion

This study provides a systematic review of the literature on the evolution and innovation of hedge fund strategies. The main objective is to identify the key drivers, challenges and opportunities for hedge fund managers and investors in a rapidly changing and competitive industry. The study adopts a multidisciplinary approach that covers various aspects of hedge fund strategies, such as performance, risk, regulation, governance, innovation and diversification. The study also proposes a conceptual framework for future research that integrates different perspectives and dimensions of hedge fund strategies.

The main findings of the literature review are as follows:

- Hedge fund strategies have evolved over time in response to market conditions, investor preferences, regulatory changes and technological developments. Hedge funds have diversified their sources of returns, increased their use of leverage and derivatives, adopted more dynamic and complex trading strategies, and explored new markets and asset classes.
- Hedge fund performance is influenced by various factors, such as market exposure, manager skill, fund size, fees, liquidity, leverage, style drift and survivorship bias. Hedge funds have shown some ability to generate positive risk-adjusted returns over the long term, but also exhibit significant heterogeneity and variability across different strategies, periods and market regimes.
- Hedge fund risk management is a critical aspect of hedge fund strategies, as hedge funds face various types of risks, such as market risk, liquidity risk, operational risk, counterparty risk, regulatory risk and reputational risk. Hedge funds employ various risk management techniques, such as hedging, diversification, stress testing, scenario analysis and value-at-risk. However, hedge fund risk

management also poses some challenges, such as data availability and quality, model uncertainty and validation, and alignment of incentives between managers and investors.

- Hedge fund regulation has increased in the aftermath of the global financial crisis, as hedge funds have been perceived as potential sources of systemic risk and market instability. Hedge fund regulation aims to enhance transparency, disclosure, oversight and supervision of hedge funds and their activities. However, hedge fund regulation also has some drawbacks, such as regulatory arbitrage, compliance costs and unintended consequences for hedge fund strategies and performance.
- Hedge fund governance refers to the mechanisms and processes that ensure the accountability and alignment of interests between hedge fund managers and investors. Hedge fund governance involves various actors and instruments, such as boards of directors, auditors, administrators, prime brokers, custodians, lawyers, consultants and contracts. Hedge fund governance affects various aspects of hedge fund strategies, such as fees, liquidity terms, redemption rights and investment restrictions.
- Hedge fund innovation is the process of creating new or improved hedge fund products or services that meet the needs or expectations of hedge fund managers or investors. Hedge fund innovation can be driven by various factors, such as competition, regulation, technology or demand. Hedge fund innovation can take various forms, such as new strategies, new instruments, new markets or new structures.
- Hedge fund diversification is the process of allocating capital across different hedge fund strategies or sub-strategies that have low or negative correlation with each other or with traditional asset classes. Hedge fund diversification can enhance portfolio performance by reducing volatility and downside risk.

Competing interest statement

In regard to the research writing, and publication of this article, the authors affirm that they do not have any competing interests. The design, implementation, analysis, interpretation, and reporting of the results were all done independently from the funding sources. When conducting research involving human subjects and data, the authors followed all applicable ethical principles and standards. Likewise, the study includes all necessary data. In addition to this, all authors made intellectual contributions towards this research.

Conflict of interest

There are no conflicts to declare.

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