INCREASE IN PASSIVE OWNERSHIP AND MARKET INEFFICIENCY: FOCUS ON LIQUIDITY AND CRISIS

BY

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THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Science in Finance & Investment Banking
in Grenoble EM, 2025

Paris, France

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ABSTRACT

Passive management has undergone significant expansion in recent years, propelled by various advantages, including low costs and simplicity. However, an increasing body of literature cautions against several sources of inefficiencies associated with passive management. The objective of this paper is to address a facet that has been insufficiently examined to date: liquidity. Utilizing daily volume data for American companies, this study will demonstrate that the growth of passive management results in an overall decline in trading volumes during trading sessions, coupled with an increase in after-hours trading volumes. Furthermore, it will be underscored that inclusion in the S&P 500 does not exert a discernible impact on trading volumes. This paper also seeks to recommend several strategies for regulating the growth of passive management to prevent any negative impact on market efficiency.

KEYWORDS

MARKET FINANCE, PASSIVE OWNERSHIP, FINANCIAL MARKET, ECONOMIC CRISIS, EXCHANGE-TRADED FUNDS, MARKET EFFICIENCY, LIQUIDITY

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Acknowledgments

Before diving into the core of this final thesis, we find it essential to start by expressing our heartfelt gratitude to everyone who contributed, whether directly or indirectly, to the completion of this work.

We would like to thank our companies and colleagues for their invaluable guidance, critical insights, and unwavering support throughout this project. Their expertise and availability were crucial in shaping our research.

We also extend our thanks to Rébecca Cardot, whose course, Advanced Research Methods, provided us with a solid and structured methodological framework that significantly supported our work.

We extend our heartfelt gratitude to the entire faculty of Grenoble École de Management for three years of enriching, rigorous, and transformative education. Their instruction has provided us with valuable skills and a profound academic and professional outlook.

We also want to thank our loved ones for their proofreading and advice; the quality of this thesis would not have been the same without their keen eye.

This thesis represents the culmination of a shared journey marked by commitment, curiosity, and ambition to create work that meets the high standards of our school. To all those who supported us along the way, we express our most profound appreciation.

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Introduction

"I can't help likening the ETF—a cleverly designed financial instrument—to the renowned Purdey shotgun, supposedly the world's best. It's great for big-game hunting in Africa. But it's also great for suicide."[1] - John C. Bogle, founder of Vanguard Group and pioneer of index investing.

With this blunt metaphor, John Bogle, often celebrated as the father of passive investing, expressed his discomfort with the evolution of exchange-traded funds (hereafter referred to as "ETFs"). Originally conceived as profitable, long-term investment tools, their aggressive use has progressively turned them into vehicles for high-frequency speculation, strategic asset rotation, and exposure to leverage. This ironic twist, where instruments rooted in stability and simplicity can now contribute to systemic risk, is at the heart of a growing academic and regulatory debate.

Over the past two decades, passive investing has significantly reshaped global capital markets. In the United States, assets under management in passive mutual funds and ETFs surpassed those of active funds for the first time in 2019, marking a symbolic milestone that signifies a deeper transformation of investment paradigms. According to our study, passive management now accounts for over 30% of U.S. market capitalization[2]. Their growth is expected to continue unabated, as in 2024, passive management posted net inflows totaling $885.94 billion, while actively managed funds recorded net outflows of $165.36 billion. At the heart of this trend are ETFs, which are growing in popularity due to their structure that offers intraday liquidity, tax efficiency, and broad exposure to an index, all at reduced fees. However, their impressive rise has raised concerns about the potential unintended consequences of their widespread adoption.

The rise of passive investing has often been portrayed as a triumph of financial innovation. Supported by the Efficient Market Hypothesis (EMH) and driven by the tarnished performance of active managers, passive strategies offer investors an affordable, disciplined way to "own the market." Vanguard's first index mutual fund, launched in 1976, was initially called "Bogle's folly," but its fundamental philosophy (i.e., to minimize costs, avoid market timing, and embrace broad diversification) gained traction. The launch of the first U.S.-listed ETF, the SPDR S&P 500 ETF Trust (SPY), in 1993, further democratized this approach, enabling investors to trade real-time passive exposure to equity markets.

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[1] Bogle, J.C. (2007). The little book of common sense investing. https://s3.amazonaws.com/appforest_uf/f1548678496593x485255667442610300/Little%20Book%20Of%20Common%20Sense%20Investing%20%28%20PDFDrive.com%20%29.pdf

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However, as Bogle pointed out in his later years, the evolution of passive investing has taken a more complex, and arguably riskier, turn. The expansion of ETFs has been accompanied by a proliferation of more esoteric instruments, including leveraged and inverse ETFs, thematic and sector products, and highly synthetic structures. Additionally, the implications of ETFs for market microstructure, particularly their role in price discovery, volatility transmission, and liquidity dynamics, are being increasingly observed.

One of the main concerns is whether ETFs contribute to financial market instability. Unlike traditional mutual funds, ETFs allow for continuous redemption and creation by authorized participants (APs) through an arbitrage mechanism known as the "creation/redemption in kind" process. While this feature promotes intraday liquidity, it can also lead to feedback loops during market downturns, as ETF price dislocations can prompt authorized participants to unwind their positions, intensifying selling pressure on the underlying assets. Additionally, the increasing predominance of passive flows can amplify the correlation between securities, as index portfolios mechanically adjust to changes in index composition or market capitalization.

A significant contribution by Ben-David et al. has demonstrated how ETF ownership is linked to increased volatility, high turnover, and distorted price efficiency of the underlying stocks. Similarly, research by Israeli, Lee, and Sridharan has examined how index inclusion can result in coincident stock returns that go beyond fundamentals, reflecting the growing influence of sentiment and liquidity-driven trading. More recently, a Federal Reserve discussion paper identified four transmission channels through which the transition from active to passive investing could create systemic risks, including sector concentration and distorted valuation signals.

This academic debate has direct implications for financial stability, particularly when ETFs enter traditionally illiquid markets such as corporate bonds, emerging markets, or small-cap equities. During periods of turbulence, such as the massive sell-off of COVID-19 in March 2020, ETFs have experienced significant price deviations from their net asset values (NAVs), raising concerns about their reliability as price anchors and their sensitivity to arbitrage breaks. While some analysts believe that ETFs acted as a "shock absorber," providing liquidity when other segments dried up, others argue that they transmitted stress and accelerated the momentum of fire sales. Academic research has already examined the impact of passive management on financial markets in the areas mentioned above. However, insufficient attention has been paid to the issues of volume and liquidity, which are *sine qua non* of financial market stability.

Against this backdrop, this thesis investigates the impact of passive ownership on market liquidity, focusing specifically on US equities. The empirical analysis focuses on companies listed in the S&P 500 and examines various financial crises since the early 2000s, including the 2008 global financial crisis, the 2011 sovereign debt crisis, the 2020 pandemic crash, and the 2022 inflation-induced liquidation. By integrating FactSet's financial and market data with internal financial indicators, we aim to evaluate how increased ETF ownership affects the overall market stability.

The central research question is: **To what extent does an increase in passive ownership impact market efficiency, focusing on the volatility and crisis periods?**

The contribution of this thesis is to establish a link between the significant growth in passive management over the past 20 years and the reduction in liquidity of equities included in the main US index. This will be complemented by the evolution of back-office orders. Given that passive management, particularly ETFs, rebalance their positions by buying or selling stocks outside of market hours, we will also provide the necessary results to demonstrate a migration of liquidity from regular market hours to post-market hours. Furthermore, we will determine the role played by the development of passive holding during financial crises by analyzing daily trading volumes over a defined period surrounding the low points of various crises.

Literature Review

I] Origins and growth of passive investing

The emergence and subsequent dominance of passive investing is considered a defining transformation in the structure of global financial markets. While its foundations trace back to the formalization of the Efficient Market Hypothesis (Fama, 1970, hereafter EMH), the practical manifestation of passive investing has evolved through decades of institutional, regulatory, and technological developments. In this section, we will retrace the intellectual roots of passive investing. We will comment on its presence in the financial trajectory and explore the structural drivers behind the rapid rise of passive strategies, whose proliferation is now reshaping how capital is allocated in financial markets.

Intellectual origins: from theory to implementation

The theoretical underpinnings of passive investing are closely tied to the academic work that challenged the effectiveness of active portfolio management. The EMH introduced by Eugene Fama in the 1960s states that asset prices incorporate all available information, making it impossible for investors to consistently achieve superior returns through active management by selecting stocks or attempting to time the market. In an efficient market, any new information is quickly and accurately reflected in stock prices, rendering active management both ineffective and costly due to management fees (Fama, 1970).

Paul Samuelson was one of the earliest proponents of applying this academic insight to real-world investing. In his 1974 paper "Challenge to judgment," he famously advocated for the creation of a fund that would "simply buy the market" instead of trying to outperform it. He argued that most portfolio managers failed to beat the market, not due to a lack of effort or knowledge in finance, but because of the intrinsic randomness and competitiveness of financial markets. Samuelson's call was soon answered by John C. Bogle, who launched the first retail index fund in 1976. Through his company, Vanguard Group, he introduced what is now known as an ETF, designed to replicate the performance of the S&P 500. The US financial market was the first to be targeted by passive ownership. The fund was initially derided as "Bogle's folly," collecting just $11 million of the $150 million initially targeted. However, this creation planted the seeds of a revolution.

The concept of indexing, with the promise of lower fees, transparency, and broad diversification, provided an interesting and compelling alternative to actively managed funds. By eliminating the need for costly research and frequent trading (which also incurs fees), index

funds offered a pragmatic solution to the growing dissatisfaction with active management's inconsistent performance. Over time, investors began to recognize the empirical shortcomings of active funds, accelerating the transition toward passive solutions.

The institutionalization of passive investment

While the 1980s and early 1990s witnessed gradual growth in index mutual funds, the institutionalization of passive investing accelerated in response to various macro-financial and regulatory trends. First, institutional investors, particularly pension funds and insurance companies, began adopting indexing strategies as a core element of their asset allocation framework. The publication of the Brinson, Hood, and Beebower study (1986), which demonstrated that over 90% of portfolio performance variance could be attributed to asset allocation decisions rather than security selection, reinforced the strategic rationale for passive investing.

Secondly, regulatory changes have significantly influenced the landscape. The U.S. Pension Protection Act of 2006 promoted low-cost default options in employer-sponsored retirement plans, favoring target-date funds and lifecycle strategies typically constructed with index funds for their simplicity and long-term affordability. Additionally, the global rise of defined contribution plans has spurred a shift in decision-making from institutions to individuals, who often lack the time or financial knowledge, making index funds an ideal choice for pension investments.

Third, technological innovation, particularly the growth of online brokerages and data-driven portfolio construction tools, facilitated the broader accessibility of passive products. By automating asset allocation and rebalancing, digital financial platforms embedded indexing at the core of mass-market investment services. At the same time, the declining cost of financial data and computational power made it easier for investors to compare fees and performance, further eroding the appeal of high-cost active funds.

The ETF revolution

The launch of the first listed exchange-traded funds in 1990, the SPDR S&P 500 ETF, marked a significant inflection point. ETFs combined the cost efficiency and diversification benefits of index mutual funds with the intraday liquidity and tradability of individual stocks. This hybrid nature allowed investors to gain broad exposure to markets while maintaining the

ability to execute tactical allocations, hedge positions, or implement complex strategies through a single instrument.

The ETF structure introduced significant innovations in market design. The use of in-kind creation and redemption processes between issuers and Authorized Participants (also referred to as APs hereafter) minimized taxable events and supported price stability by aligning ETF prices with net asset values. This mechanism, although later shown to be vulnerable during periods of market stress (Marshall et al., 2013 and Broman et al., 2019), was regarded as a breakthrough in reducing friction in fund management.

From fewer than 100 products in the early 2000s, the number of ETFs has grown exponentially, exceeding 10,000 globally in 2024. According to data from the Investment Company Institute, total ETF assets under management grew from less than $100 billion in 2000 to more than $12 trillion in 2024. In the US equity market, ETFs now represent more than 35% of the market's daily trading volume. ETFs also hold about the same amount of large-cap stocks' float.

The ETF model has also expanded beyond broad-market indexing. Sector ETFs, smart beta strategies, thematic products, and leveraged/inverse ETFs have diversified the market and blurred the line between passive and active management. Yet, even these “rules-based active” products share the key features of indexing: predefined rules, low turnover, and mechanized portfolio construction, often with low divergence against their benchmark.

Structural consequences of passive growth

The rise of passive investing is not merely a shift in investor preferences; it constitutes a structural transformation of market behavior. First, the growing dominance of index-linked flows means that capital is allocated not according to firm-specific fundamentals but based on index membership and weighting methodologies. This leads to reflexivity, as firms seek inclusion to attract capital, and as inclusion itself creates price momentum (Wurgler, 2011).

Second, passive strategies reduce the marginal share of active investors who perform price discovery, corporate governance, and risk monitoring functions. As Grossman and Stiglitz (1980) warned, the viability of an efficient market depends on the presence of informed traders willing to incur research costs. If the share of passive capital becomes too large, the system risks losing its feedback mechanisms.

Additionally, passive investors tend to be long-term holders, often contributing to stability in normal markets. However, in periods of stress, their mechanical rebalancing and synchronized flows can exacerbate volatility. As shown during the Covid-19 crisis, ETFs linked to illiquid

assets (such as corporate bonds or emerging markets) experienced sharp deviations from net asset values and elevated turnover. This revealed hidden fragilities in the indexing model (Ben-David et al., 2021).

Finally, the concentration of passive AUM among a handful of providers, primarily BlackRock, Vanguard, and State Street, to enumerate the biggest ones, raises concerns about market power, common ownership, and systemic risks. These firms now hold a dominant position in thousands of publicly listed companies, raising questions about their influence on governance, competition, and long-term capital allocation (Azar, Schmalz & Tecu, 2018 and Appel, Gormley & Keim, 2016).

II] The active vs passive management debate: empirical evidence, theoretical tensions, and systemic stakes

The rise of passive investing has not only disrupted fund flows, but it also has ignited one of the most significant debates in modern finance: Can active management justify its costs, or is passive management the optimal long-term strategy? This question is foundational from the investment strategy perspective and central to broader inquiries about market efficiency, capital allocation, governance, and systemic stability, as mentioned in the previous section. In this section, we will critically examine the empirical and theoretical literature comparing active and passive strategies. We will discuss the persistent underperformance of active funds compared to their benchmarks when appropriately defined. We will also explore the paradoxes inherent in market efficiency theory, the role of active management in incorporating news into stock prices, and the implications of passive dominance for market stability.

Empirical evidence against active outperformance

A substantial body of academic research has consistently demonstrated that most actively managed funds fail to outperform passive benchmarks on a net-of-fees basis. These findings persist across geographies, asset classes, and time periods.

The seminal study by Carhart (1997) extended the Fama-French three-factor model by adding a momentum factor and found that the average actively managed U.S. mutual funds underperformed a passive benchmark after deducting fees and transaction costs. A large body of literature analyzed survivorship bias and revealed that alpha was statistically

indistinguishable from zero for most funds. Alpha is defined as the difference between the return of a portfolio and the benchmark return.

Berk and van Binsbergen (2015) introduced an important refinement to this literature by distinguishing between gross alpha (before fees) and net alpha (after fees). They found that while some active managers may generate gross alpha, the extraction of management fees tends to fully absorb that outperformance, resulting in net returns that are inferior to passive alternatives. Their model suggests that in equilibrium, investors will herd to managers perceived to deliver alpha, which then dissipates due to scale diseconomies and increased competition.

International studies have reached similar conclusions. Cremers et al. (2016) examined mutual funds across 27 countries and reported widespread underperformance once costs were deducted. Even among those funds that outperform their benchmark, persistence in performance is rare. This conclusion is also supported by studies conducted by Bollen and Busse (2001), who found that even if actively managed funds can achieve short-term performance, it dissipates quickly. These findings have eroded confidence in the value proposition of active management, leading investors to favor lower-cost, rule-based passive vehicles to invest their money.

The challenge of persistence and the myth of skills

A key argument put forth by proponents of active management is that certain managers have skills and that theoretical outperformance indicates future success. However, research has indicated that such persistence is rare and difficult to detect reliably.

Fama and French showed that among US mutual funds, the distribution of alpha was tilted toward only a minority of high performers. However, they argued that distinguishing true skill from luck remains nearly impossible without an extremely long track record. In other words, even if some managers outperform, investors cannot reliably identify them *ex ante*.

Kosowski et al. (2006) offered a more favorable view, suggesting that a small subset of managers does display genuine skill, especially in extreme market conditions. However, their analysis also implied that such managers are uncommon and that identifying them requires significant due diligence, often available only to large institutional investors.

From the investor's perspective, the "search costs" associated with identifying skilled managers may outweigh the benefits. These findings have bolstered the argument for passive investing as a more consistent and predictable solution.

Theoretical tensions: Grossman-Stiglitz and the efficiency paradox

The debate between active and passive strategies is rooted in a deeper theoretical paradox articulated by Grossman and Stiglitz (1980). In their model, perfect market efficiency is self-defeating: if all investors adopt passive strategies, no one will invest resources in acquiring information. Yet, without informed investors, the market cannot remain efficient. Therefore, a certain degree of inefficiency must exist to reward active investors for the costs they incur in researching and analyzing financial information about companies.

This framework implies a co-dependence between active and passive participants. Active managers play a critical role in price discovery, identifying mispricing and valuation, and correcting them, thus addressing market inefficiency. Passive investors, by design, do not engage in these activities. They merely "ride along," benefiting from the informational work done by others.

As passive investing grows, a concern arises: will the diminishing share of active capital reduce the market's ability to incorporate new information? In equilibrium, the market needs a minimum critical mass of active participants to remain informationally efficient. The precise threshold is unknown, but academic contributions such as Kyle and Obizhaeva (2016) suggest that beyond a certain point, the marginal value of informed trading may decline sharply, triggering systemic fragility.

Some recent contributions have deepened the Grossman-Stiglitz paradox by introducing more nuanced equilibrium conditions. Buffa, Vayanos, and Wooley (2022) developed a general equilibrium model in which asset managers operate along a spectrum from active to passive mandates. In their study, deviations from benchmarks are limited either because of contractual conditions or implicitly due to reputational concerns. These constraints limit the ability of managers to counteract noise trader-induced mispricing. As a result, the share of capital that actively seeks and acts upon mispricing, referred to by the authors as "effective arbitrage capital," is reduced. In active management terms, this is called "active share." It is the fraction of a fund's holdings that differ from the benchmark.

This last point complicates the assessment of the real size of passive management. A major debate focuses on managers with a very low active share, as these are similar in every respect to passive management.

Active management in times of crisis: a conditional advantage?

Although active management typically underperforms in a normal market environment, several studies suggest that it may provide benefits during periods of stress.

Kacperczyk, Van Nieuwerburgh, and Veldkamp (2016) propose that active managers have an information advantage during volatile periods when passive rules-based strategies fail to adapt to new conditions. Their study shows that during the 2008 financial crisis, certain active managers were able to reduce exposure to distressed sectors and limit drawdowns. Similarly, a study published by the investment firm Neuberger Berman entitled 'The Overlooked Persistence of Active Outperformance' analyzed the performance of active funds during two major stock market crises: the internet bubble (2000-2003) and the global financial crisis (2007-2009). The results show that during these stressful periods, most active funds outperformed their benchmark indices after fees, particularly in the small-cap and international equity segments. This outperformance is attributed to the ability of active managers to dynamically adjust their portfolios and avoid the most vulnerable stocks. A bear market is defined as a prolonged period of falling share prices, often accompanied by widespread pessimism among investors. When the general index of a stock market, such as the S&P 500, falls by 20% or more from its recent peak, the market is considered "bearish."

In contrast, passive funds are what we could call forced holders: they must continue to hold securities regardless of changing fundamentals, as long as those securities remain in the benchmark index. In periods of volatility, this rigidity can exacerbate procyclical behavior, leading to selling into falling markets during rebalancing or being exposed to bubbles through index momentum.

These findings suggest that the value of active management is state-dependent: passive investing may be optimal in tranquil periods, while active investing is exposed in the binary framing of the debate. Highlighting this underscores the potential complementarity of the two approaches under certain conditions.

Governance, engagement and the passive dilemma

Another criticism of passive investing arises from its effect on corporate governance and long-term stewardship. Unlike active investors, who might engage with management, vote strategically during general meetings, or exit positions in response to underperformance or undesirable changes in corporate strategy, passive investors typically hold securities as long as they remain in the index, with little regard for corporate governance.

Appel, Gormley, and Keim (2016) demonstrated that increased passive ownership correlates with decreased shareholder activism. In another study, Azar, Schmalz, and Tecu (2018) argued that common ownership by the passive giants we previously mentioned (Blackrock, Vanguard, and State Street) reduces competition among firms and creates incentives for managerial complacency. While these firms have made efforts to improve governance through stewardship teams, critics argue that their scale and scope make meaningful engagement difficult.

Active managers, in contrast, can exert disciplinary pressure through their investment decisions or comments to board members during meetings or annual assemblies. They can signal disapproval by underweighting or divesting from firms that pursue value-destructive policies. By doing this, they can influence capital costs and corporate strategy, a role that passive investors cannot achieve.

This governance engagement gap has systemic implications. In a world dominated by passive capital, companies may have fewer incentives to innovate, control costs, or align executive compensation with performance, which can be detrimental to long-term shareholder value, potentially leading to a minority position in the company's shareholder structure.

The complementarity argument: a new fragile equilibrium

Instead of viewing the active-passive dichotomy as mutually exclusive, we should expand on a point we touched upon in a previous section and that recent contributions have suggested: a complementary equilibrium. In this ideal world, both strategies play interdependent roles.

Galeanu and Pedersen (2018) developed a general equilibrium model in which informed asset managers coexist with uninformed investors. This generates an endogenous degree of market inefficiency. In their study, market efficiency arises not from universal information but from the optimal trade-off between the costs of acquiring information and the benefits it brings. Active managers are rewarded for their research and supposed expertise through fees, while uninformed investors can either accept lower expected returns or incur search costs to identify skilled managers. As a result, price efficiency is maintained at an equilibrium level determined by the balance between informed trading and noise allocation. Passive investors in these market conditions implicitly benefit from the informational work performed by a minority of active participants. This market structure supports, according to them, the coexistence of both strategies under stable conditions.

This perspective was also supported by Choi (2017), who empirically investigates the joint impact of passive and active investment on stock price efficiency. Using the annual reconstitution of the Ressel indexes as a quasi-natural experiment, Choi found that an exogenous increase in passive investment enhances price efficiency, particularly in stocks that are heavily held by mutual funds. This improvement is attributed to increased analyst coverage and reduced forecast dispersion. This suggests that passive investment can amplify the informational role of active managers. These findings underscore the symbiotic relationship between passive and active investing: passive funds benefit from the price discovery facilitated by active managers, while the presence of passive vehicles provides liquidity and stability that can enhance the effectiveness of active strategies. Maintaining this balance is crucial, as excessive dominance by passive investing could undermine the incentives for active management, potentially impacting market efficiency.

However, this equilibrium is fragile, and its conditions are not clearly defined so far. If passive investing continues to grow unchecked, there is a risk of functional erosion: a situation where active managers are no longer economically viable, leading to diminished competition, distorted pricing, and voids of governance.

III] Risks induced by the expansion of passive investing

As the strategy of passive investing becomes dominant, a growing body of literature warns of systemic risks emerging from their scale and structure. These risks are often subtle, operating through indirect mechanisms that are not immediately apparent to the average investor or policymaker.

In this section, we will provide a comprehensive and accessible overview of the major risks documented in recent academic work on passive investing and ETFs. We will strive to make concepts that are often very abstract understandable to most people.

Price distortion

One of the most foundational risks associated with passive investing lies in its potential to distort asset prices. In a traditional market setting, asset prices are assumed to reflect firm-specific fundamentals and outlooks, such as future earnings, risk exposure, and capital efficiency. Prices serve as a decentralized information-processing mechanism, guiding capital towards its most productive uses: funding firm growth when needed. However, the expansion of passive strategies, particularly those that replicate market-capitalization-weighted indices,

has introduced flows that are independent of valuation considerations, altering how prices evolve.

Unlike active managers, who buy or sell based on intrinsic value assessments following deep analysis and projections, passive funds allocate capital in a mechanical manner. When a stock's market capitalization increases, it gains a higher weight in the index, triggering additional inflows from index-tracking vehicles. This generates a positive feedback loop, where rising prices attract further capital, which in turn pushes prices higher, regardless of whether the fundamentals justify such movements.

Empirical research supports this dynamic. Harris and Gurel (1986) first identified the "index inclusion effect." They explained that stocks newly added to the S&P 500 experienced abnormal price increases unrelated to news or earnings revisions, which often drive daily market performance. More recent work conducted by Wurgler (2011) and Chang et al. (2015) confirms that passive flows can induce non-fundamental demand shocks, which are not arbitraged away due to the inelastic nature of passive allocation. Nowadays, these movements are generally anticipated by active managers. The latest example is Coinbase, which gained more than 10% on the announcement of its integration into the S&P 500. Thus, the massive purchases generated by this announcement have a dual effect. First, active managers buy this news and anticipate new inflows into the stock. Second, structural purchases replicate the benchmark index.

These distortions are not merely academic curiosities. They can lead to capital misallocation, whereby overvalued firms receive excessive funding while undervalued ones are overlooked. Over time, this degrades market efficiency and weakens the link between valuation and resource allocation. Essentially, price becomes a reflection of portfolio mechanics, rather than economic merit. This represents a subtle but significant shift in the role of financial markets, according to the literature.

Comovement

A growing body of empirical literature suggests that the rise of passive investing, particularly through ETFs, has introduced a structural shift in the behavior of asset prices, notably amplifying comovement among securities. In classical asset pricing theory, individual stocks are not expected to reflect idiosyncratic information, moving in response to firm-specific fundamentals. However, as more capital is invested in broad-based passive index products, stocks are increasingly subject to flow-based demand, leading to synchronous price movements across unrelated firms.

This phenomenon has been extensively documented. Ben-David et al. (2014) demonstrated that ETF ownership correlates with increased return volatility and reduced pricing efficiency. Da and Shive (2018) showed that stocks more heavily owned by ETFs exhibit stronger pairwise correlations, even after controlling for sector, size, and style factors. Israeli, Lee, and Sridharan (2017) went further. They provided evidence that a one-percentage-point increase in ETF ownership is associated with a four-percent increase in the synchronicity of stock returns, a striking erosion of firm-specific price signal.

The underlying mechanism is as follows: ETFs trade entire baskets of securities simultaneously. Consequently, unrelated firms are bought and sold together at the same time, not due to shared fundamentals but because of common index membership. This flow-driven comovement undermines the informational content of prices and distorts the covariance structure upon which risk models and diversification strategies depend.

From a systemic perspective, elevated comovement poses several risks. It weakens portfolio diversification, increases vulnerability to market-wide shocks, and diminishes the disciplining role of prices in guiding capital toward productive firms. In effect, passive flows render asset prices less discriminating, replacing market-based signals with mechanical capital allocation.

Arbitrage frictions

One of the foundational mechanisms behind the ETF structure is the arbitrage process that links the ETF's market price to the net asset value of its underlying holdings. In theory, authorized participants can create or redeem ETF shares to profit from price-NAV discrepancies, thereby ensuring that ETF prices remain closely tied to fundamentals. However, recent empirical evidence suggests that this arbitrage mechanism is both fragile and highly dependent on current market conditions.

During periods of heightened volatility or underlying market stress, authorized participants may be more reluctant to engage in arbitrage due to inventory risk, capital constraints, or illiquidity in the constituent assets. Marshall et al. (2013) and later Broman et al. (2018) documented substantial and persistent price dislocations in bond ETFs, particularly during the Covid-19 massive selloff in March 2020. During this period, several ETFs traded at significant discounts to net asset values on multiple trading days.

These episodes highlight an important tension: while ETFs are perceived as vehicles that enhance liquidity and price transparency, their arbitrage processes can fail precisely when price anchoring is most needed. In such contexts, the ETF price may no longer reflect either

fundamentals or net asset values. This introduces additional pricing noise, undermining the reliability of ETFs as valuation proxies, contrary to what some might have claimed.

Contagion effects

Passive investing, particularly through ETFs, has introduced new channels through which shocks can propagate across assets and sectors. A defining feature of ETFs is that they bundle together diverse securities, incorporating different industries and geographies into a single tradable instrument. While this design facilitates diversification, it also creates mechanical linkages among otherwise unrelated assets.

When investors sell shares of an ETF they previously owned, the fund must liquidate a proportional share of all its underlying holdings to facilitate this. Crucially, this liquidation process occurs indiscriminately: firms experiencing no deterioration in fundamentals may still be sold off simply because they share a portfolio with more volatile or distressed peers. Bhattacharya and O'Hara (2018) referred to this phenomenon as a flow-based channel of contagion.

Such transmission effects are particularly important during market downturns, when ETF selloffs accelerate and ETF sponsors engage in large-scale sales. The result is a blurring of economic boundaries: idiosyncratic resilience provides limited protection in a framework where price pressures are determined by portfolio mechanics rather than fundamentals.

From a systemic perspective, this undermines one of the core functions of capital markets: the ability to discriminate between risks. Instead, contagion caused by ETFs generates synchronized volatility. This increases the likelihood of a sharp downturn in the stock market.

Governance dilution

One of the less visible but structurally significant consequences of passive investing is its impact on corporate governance. Unlike active investors, who can divest from underperforming firms and for other reasons previously mentioned, passive funds must include all the stocks in the index or select as many stocks as necessary to replicate it, regardless of the financial and extra-financial performance and strategy of the underlying assets.

This structural immobility restricts passive investors' ability to serve as effective monitors. Appel, Gormley and Keim (2016) documented that increased passive ownership is associated with a significant decline in shareholder activism, including a lower rate of proposal submissions and proxy contests.

Bebchuk and Hirst (2019) further argued that although large passive managers professed a commitment to long-term engagement, their incentives are misaligned. With thousands of portfolio companies and limited resources, effectively engaging in the governance of each company is complicated. The result is often a lack of management support, even in controversial decisions regarding executive compensation, capital allocation, or ESG commitments.

The increase in passive ownership undermines the mechanisms that promote accountability among managers. Over time, this can result in shifts from original strategies to choices that do not align with shareholder interests, alongside a diminished responsiveness from shareholders. Consequently, this decline contributes to poorer company performance, adverse market conditions, and a loss of responsiveness on the part of shareholders. This ultimately leads to a decline in company performance, unfavorable market conditions and the erosion of confidence among the few remaining investors.

Common ownership

As passive funds have expanded, they have emerged as significant shareholders in numerous publicly traded companies, including direct competitors within the same industry. This situation, referred to as common ownership, arises when identical institutional investors possess substantial stakes in rival firms. While it was once viewed as harmless portfolio diversification, recent empirical research has raised concerns about its impact on competitive neutrality.

Azar, Schmalz, and Tecu (2018) provided evidence that common ownership reduces competitive behavior, particularly in concentrated industries. Studying the US airline sector, they found that when leading index funds simultaneously own stakes in all major carriers, ticket prices rise and output falls. Their interpretation is that when investors benefit from the profits of all competitors, they have little incentive to push for aggressive competition or market disruption.

The issue is not one of precise coordination but rather of weakened incentives. Passive asset managers, bound by fiduciary duty to all companies in their portfolios, may unintentionally prioritize industry-wide stability over the performance of individual firms. As Schmalz argued, this transforms corporate governance from a mechanism of discipline into one of conflicted neutrality.

From a systemic perspective, common ownership undermines market competition, a foundational principle of capitalist economies. It creates subtle yet pervasive distortions in

managerial incentives and diminishes the pressure to innovate or operate efficiently. If left unchecked, it may entrench oligopolistic market structures, benefiting shareholders in the short term while undermining long-term consumer welfare and economic dynamism.

Procyclicality of passive flows

A primary argument supporting passive investing is its focus on long-term growth and its stabilizing influence on financial markets. However, increasing empirical evidence indicates that passive strategies might actually exhibit procyclical behavior by exacerbating price trends instead of mitigating them. Procyclicality refers to the tendency of investment flows to reinforce existing market movements. In the context of passive investing, this effect arises from the mechanical nature of index tracking. When a stock or sector rises in value, its weight within a market-capitalization-weighted index increases, causing passive funds to allocate even more capital to it. Conversely, declining assets see their weight decrease, triggering outflows. This creates feedback loops that can intensify market booms or stresses. Bai, Bond, and Hatch (2012) provided empirical evidence on the procyclical effects of leveraged ETFs. These passive funds, which seek to deliver several times the daily index returns, must mechanically rebalance their holdings at the end of each trading day. They conducted an analysis of the Real Estate sector and demonstrated that this rebalancing induces significant late-day price momentum, with notable performance between 3 and 4pm. They also emphasize that these price changes often reverse the following morning, suggesting a mechanical overshooting effect. This phenomenon is especially important for smaller and less liquid stocks, where these ETFs exert a notable influence. Moreover, Wurgler (2011) emphasized that passive flow is demand inelastic: it responds to index rules rather than valuation signals. As more capital is directed into passive solutions, this mechanical flow structure gains macro significance. Its impact on the stock market becomes increasingly important as passive ownership rises, regardless of the size of the underlying companies. Over time, this procyclical behavior challenges the notion that passive capital is neutral for financial markets. While passive investors do not actively forecast, their aggregate behavior, when scaled, introduces momentum that alters market dynamics in ways that few foresaw when indexing was a marginal practice.

Rebalancing shocks

A key characteristic of passive investing is its reliance on established, rules-based allocation mechanisms and systems. These rules specify not only the assets that the investment

vehicle must include but also outline when and how it should adjust its holdings in the underlying assets. Such adjustments, typically referred to as rebalancing, occur in response to index changes, calendar-driven mandates, or fund inflows that necessitate reallocating investments. Although essential for maintaining index accuracy, this rebalancing process can have distinct impacts on asset prices and volumes, particularly when executed on a large scale.

At their core, rebalancing shocks are predictable trading events that arise from the need to realign a portfolio with its benchmark. For instance, when the S&P 500 adds a new company or removes another, all index-tracking funds must buy or sell the securities affected by this change. This often happens simultaneously for every ETF, and in significant quantities, as the number of passive funds and their size has grown increasingly important. This creates artificial demand or supply pressure, leading to temporary price distortion. Harris and Gurel (1986) and more recently, Chang, Hong, and Liskovich (2015) showed that such events induce statistically significant short-term unwanted price effects, even in highly liquid markets. Estimates suggest that the month following inclusion (or exclusion) in an index results in a 5% excess return due to rebalancing flows for ETFs.

The risks arise not from the intent of rebalancing but from their scale and simultaneous nature. As passive assets under management continue to grow and gain importance over active ownership, the flows associated with index adjustments become larger and have a greater impact on financial markets. Furthermore, the timing of these changes is well known, as explained. They mainly occur near month-end or quarter-end, making them attractive targets for front-running by active traders.

From a systemic perspective, rebalancing shocks reduce the informational content of short-term price changes, increase execution costs, and may cause crowding effects that amplify volatility. In extreme cases, these flows may temporarily overwhelm market depth, turning a benign structural adjustment into a source of stress for the underlying assets.

Strategic front-running

The transparency and rule-based nature of passive investing, while contributing to its popularity, have introduced vulnerabilities to a specific type of opportunistic trading: strategic front-running. This phenomenon was mentioned in the previous section, but we need to further develop this concept since it can significantly impact the financial market. Front-running is defined by the Nasdaq, the second largest US stock exchange, as “Entering into an equity trade, options or futures contracts with advance knowledge of a block transaction that will influence

the price of the underlying security to capitalize on the trade." Although front-running is prohibited, many specialists exploit ETF rebalancing, as they do not rely on private information. Because index-trading strategies must adjust their portfolios in response to known benchmarks and rebalancing schedules, the identities of the stocks added or removed are usually disclosed several days in advance. This advance notice creates an opportunity for arbitrageurs to buy the inclusion stocks before passive funds do, driving up the price, and then sell into the forced buying pressure from index funds, securing a riskless gain at the expense of slower-moving passive capital.

Evidence of this mechanism is well documented. Wang, Yao, and Yelekenova (2015) demonstrated that hedge funds actively anticipate ETF rebalancing trades. Their study shows that these funds gradually build positions in target stocks before rebalancing events, capturing statistically significant abnormal returns. Indeed, they estimated that hedge funds achieved a 0.6% monthly alpha with these strategies.

While such strategies do not violate legal statutes, as previously explained, their systemic ramifications are significant: (i) they impose higher transaction costs on passive investors, who ultimately acquire assets at inflated valuations. (ii) they worsen short-term price inefficiencies, where valuation changes reflect positioning rather than substantial information. (iii) they lead to a misallocation of resources by prioritizing expediency and opportunism over long-term investment.

As the size of passive assets under management grows, so too does the economic value of exploiting their predictability through front-running. In this context, passive ownership, while constructed and presented as efficient vehicles, can become a source of value transfer and vulnerability within the global financial markets.

Decline in informational efficiency.

As explained in previous sections, the core function of financial markets is to process information into prices, enabling capital to be allocated toward the most promising firms. Passive investing, however, weakens this feedback loop by allocating capital according to index rules rather than fundamentals. As a result, firm-specific news, such as earnings announcements, guidance, or strategy changes has less impact on stock prices.

Israeli, Lee, and Sridharan (2017) show that increased ETF ownership is associated with lower earnings response coefficients, meaning stock prices react less to new information. This implies that passive flows dilute the role of informed trading in reflecting corporate fundamentals.

Marco Sammon (2024) further explores this subject in his paper "Passive Ownership and Price Informativeness" by demonstrating that a 15% increase in ownership from passive vehicles leads to a reduction of one-fourth of the information communicated before earnings are integrated into the stock price.

Moreover, the displacement of active managers decreases incentives for analysts to cover stocks held passively. Boone and White (2015) documented that research coverage declines in firms with high passive ownership, further diminishing the availability of information.

These dynamics undermine the market's role as an information aggregator. In a system where prices are driven more by flows than by insights, mispricing can last longer, and capital is no longer directed toward the companies that need it.

Concentration risk in the asset management industry

The widespread adoption of passive investing has democratized access to financial markets. However, beneath this apparent decentralization lies a significant structural shift: the increasing concentration of financial power in the hands of a small number of asset managers offering passive solutions. Currently, the three firm we mentioned earlier: BlackRock, Vanguard, and State Street, manage over 80% of the global index funds and ETF markets. This dominance has raised significant concern among scholars, regulators, and policymakers.

Bebchuk and Hirst (2019) described this phenomenon as a form of hidden decentralization. They explained that the governance of thousands of public companies listed on stock exchanges is effectively shaped by a few institutions with minimal public accountability. These firms are among the largest shareholders in most of the companies that are part of the S&P 500 index. They wield significant power and influence over these companies, but it is often entrusted to under-resourced stewardship teams, which operate with limited transparency in their decision-making processes.

From a systemic standpoint, the risks are multifaceted. Coates (2018) warned that the "problem of twelve," where a dozen institutions control most of the economy's equity, may lead to a governance model detached from shareholder diversity, democratic control, or competitive discipline. Moreover, operational or reputational failures at any of these dominant firms could have cascading effects across global equity markets. Despite their systemic footprint, these institutions are not regulated like banks, raising concerns about the adequacy of current macroprudential frameworks.

The Financial Stability Board (2020) highlighted, in its post-COVID review, the systemic vulnerabilities associated with concentrated index ownership, particularly during stress episodes when similar strategies can lead to correlated responses. In this context, market-wide herding is more likely, amplifying volatility and diminishing the resilience of price signals.

Ultimately, these companies are playing a greater role in shaping the indices, influencing ESG standards, and participating in policy debates, often aligning these efforts with their own risk and business priorities. Although passive investing adheres to a rules-based framework, the authority over these rules is decidedly non-neutral.

In conclusion, the growth of passive investing has led to an unprecedented imbalance between the decentralization of capital and the centralization of control.

Hypothesis Development

Initially, we might have thought that literature, with its diverse opinions, addressed all the liquidity risks posed by ETFs.

Indeed, Hamm (2010) explained that he found a correlation between ETF ownership and illiquidity. However, Boehmer & Boehmer (2003) showed that the liquidity of shares for 30 ETFs improved after their listing on the New York Stock Exchange. They estimate that liquidity increased by nearly 10% after ETFs began trading on the NYSE. Saglam and Tuzun (2025) recently published a more moderate study on this debate. They suggest that liquidity is primarily enhanced by arbitrageurs seeking to capitalize on price discrepancies. Moreover, they point out that liquidity improves only under very specific conditions, particularly in 'plain-vanilla equity ETFs'. "Plain vanilla" refers to the most basic version of a financial instrument. They clarify that the results for other types of ETFs discussed above (leveraged ETFs, inverse ETFs, corporate bond ETFs, etc.) do not allow us to draw any clear conclusions about whether liquidity improves for ETF underlying assets.

However, none of the research we have found so far has focused on episodes of crisis and their manifestations, particularly in terms of liquidity. We believe that addressing this issue is crucial because the scale of a crisis is primarily defined by its liquidity before, during, and after it reaches its lowest point. Our empirical analysis focuses on the U.S. equity market beginning January 1, 2000. To maintain a broad and consistent perspective over time and to prevent distortions related to index rebalancing or changes in index composition, we create a fixed sample of 500 firms that were included in the S&P 500 at a specific reference date. This approach allows us to examine several episodes of market turbulence or crisis within a unified framework. To ensure our results aren't influenced by variations in firms' market capitalization growth over time, we rely, whenever possible, on relative metrics expressed in percentage terms rather than absolute values. Building on the literature discussed in the previous section, we believe that one dimension has not received enough attention: trading volume. While it is a key indicator of market dynamics, this aspect remains underexplored in the context of passive investing. In this study, we propose testing two hypotheses focused on trading activity and liquidity conditions.

H1: An increase in passive holdings has no impact on post-crash volumes.

The initial hypothesis is predicated on the observation that ETF volumes frequently remain sustained or may even experience an increase during episodes of crisis. This resilience has been construed by some as indicative of the notion that ETFs provide a buffer against market stress, consequently enabling investors to reallocate risk without directly impacting the underlying assets. Nonetheless, such an interpretation may be hasty. While trading volume remains stable in aggregate, it may, in fact, become more concentrated, especially around market close auctions, during which numerous passive funds undertake their rebalancing activities. The resultant compression of liquidity into specific time intervals may obscure a loss of market depth throughout the remainder of the trading day. From a theoretical perspective, if passive investors exhibit mechanical behavior and refrain from selling during declining markets, one could anticipate diminished reactions concerning post-crash trading volumes. Conversely, should index-linked flows be sufficiently substantial and synchronized, they may precipitate procyclical trading dynamics, even without active decision-making. In practical terms, elucidating this ambiguity is imperative: a determination of no correlation would lend credence to the notion that ETFs offer a stabilizing mechanism; conversely, a significant correlation could uncover underlying amplification mechanisms that are at work.

H2: Passive management reduces market liquidity.

The second hypothesis addresses a more structural concern: the erosion of market liquidity following the rise of passive ownership, particularly during periods of market stress. Unlike active managers, passive vehicles do not contribute to price discovery; their trades are mainly determined by benchmark composition rather than by valuation signals. As passive funds increase their market share, this shift in the profile of marginal traders may diminish the market's responsiveness to new information and affect its ability to adjust efficiently.

Empirical evidence suggests that stocks heavily held by ETFs often exhibit higher return co-movement and lower sensitivity to firm-specific news or microeconomic events. Furthermore, the increasing concentration of trading at the end of the day—driven by the operational constraints of index tracking—raises concerns about the actual depth of intraday liquidity. While these developments may not pose immediate risks under normal conditions, they could become destabilizing during periods of heightened volatility or when arbitrage breaks down, as seen in past instances of market stress.

More generally, the growth of passive strategies may contribute to what some have described as a "liquidity illusion": ETF shares seem highly liquid, but the underlying portfolios may contain illiquid assets, especially in credit or emerging markets. In such situations, the disconnect between share liquidity and asset liquidity could amplify price dislocations, as authorized participants may become reluctant to intervene during turbulent periods.

These hypotheses together aim to illuminate the dual characteristics of passive investing: effective during calm periods but potentially vulnerable in times of stress. By conducting empirical tests, this study contributes to the ongoing discussion about whether the structural changes in financial markets, driven by the growth of index-based strategies, have inadvertently created new instability factors.

Data and Methodology

All data used in this study was extracted from FactSet, one of the world's leading providers of financial information. As previously mentioned, our dataset is based on a fixed sample of 500 firms that were constituents of the S&P 500 index on a specific reference date (the sample will be named S500 hereafter; see Appendix 1 for the full list). This choice was driven by both practical and conceptual considerations. From a technical standpoint, using a dynamic or extended panel would have significantly increased the complexity of data handling without necessarily enhancing the reliability of our model. Conceptually, passive investment strategies are primarily concentrated in large-cap U.S. equities, which are well represented in our selected sample. As such, the systemic risks potentially amplified by passive investing are most likely to stem from this segment of the global market. Moreover, focusing on this fixed sample helps us avoid issues related to low liquidity or delayed inclusion of smaller stocks in passive portfolios.

The time and frequency of data vary depending on the hypothesis being tested.

In the context of our study, we have developed or utilized several indicators. A detailed explanation of their uses will be provided subsequently.

Volumes intraday (VI)

VI corresponds to the number of shares exchanges daily. We can express it in % with the following formula:

$$VI = \frac{Numberofsharestraded}{Numberofsharesoutstanding}$$

VI_45dAVG_before

Is the average intraday day volumes 45 days before a specific date.

$$VI_{\_45dAVG\_before} = \frac{\sum VI45daysbeforeanspecificdate}{45}$$

VI_45dAVG_after

Is the average intraday day volumes 45 days before a specific date.

$$VI_{\_45dAVG\_after} = \frac{\sum VI45daysafteranspecificdate}{45}$$

Post market volume (PMV)

The PMV was constructed utilizing a Factset formula to ascertain the number of shares traded post-market. The data has been accessible since 30 December 2011. Furthermore, the sole timeframe available for analysis was daily. Consequently, we selected this starting point and timeframe. Additionally, we extracted the daily performance and total share count of each S500 company within this timeframe.

Post market volume share (PMVS)

$$PMVS = \frac{PMV}{(PMV + VI)}$$

PMVS indicates the percentage of the total volume that originates from post-market exchanges.

Market Capitalisation (MC)

MC is the price of a share multiplied by the number of outstanding shares for a company.

Passive ownership (%PO)

$$\%PO = \frac{MCheldbypassiveinvestor}{MC}$$

Concerning the first hypothesis, we retrieved daily data concerning the percentage of ownership (%PO) for each stock as referenced in S500, spanning from December 31, 1999, to April 30, 2025. This extensive timeframe facilitates reliable monitoring of the progression of %PO over time while concurrently capturing various episodes of market stress or crises. Additionally, we have identified critical periods of financial turmoil and selected the troughs associated with each crisis episode. Furthermore, we established a temporal framework surrounding the low points to analyze trading volumes and compare trends across different crises. To mitigate the influence of outliers related to American holidays, such as Thanksgiving and Christmas, we employed the winsorization process at 1%. This approach enhanced comparability across crises we will focus on and which are the following one :

- **September 2002 :** one of the first major downturns since the late 1990s was the bursting of the Internet bubble, also known as the tech bubble. While the correction began in

March 2000, it was in September 2002 that the S&P 500 reached its lowest point of the entire period. At the time, markets had been driven by euphoria around new technologies, particularly the Internet, with valuations skyrocketing for companies that often had no solid revenues or viable business models. The reversal was sharp when the first bankruptcies were recorded and promised results failed to materialize. From its peak on March 24, 2000, when the S&P 500 closed at around 1,527 points, the index continuously declined for over two years. It bottomed out on October 9, 2002, at 776.76 points, representing a drop of 49.1%. More specifically, during the month of September 2002, the S&P 500 fell by approximately 11.0%, dropping from 916.07 points at the close on September 3 to 815.28 points on September 30. The decline accelerated in the second half of the month, particularly between September 17 and September 24, when the index lost 5.8% over just five trading sessions. At that time, ETFs already existed but were still used by a limited audience. The SPDR S&P 500 ETF (SPY), launched in 1993, was not yet widely adopted by retail investors or institutions. As a result, ETFs had only a marginal impact on market liquidity. However, this period marked a turning point: the prolonged volatility, valuation issues in the tech sector, and the growing need for diversification began to draw attention to ETFs as simpler and more transparent investment tools. In the short term, however, liquidity in tech stocks had significantly deteriorated, bid-ask spreads widened, and some securities were nearly impossible to sell, which contributed to amplifying stress in the U.S. equity market.

- **February 2007** is often seen as one of the first warning signs before the big financial crisis that started in 2008. On February 27, 2007, global stock markets fell sharply because of several reasons (i) In China, the government said the day before that it might make its money policies stricter, which caused a big drop in the Shanghai stock market. (ii) at the same time, in the United States, some economic and financial signs worried investors, especially the growing number of people failing to pay back risky home loans. On that day, the main US stock index dropped by 3.47 %, going from 1,406.82 points on February 26 to 1,359.95 points on February 27. This was the largest one-day drop for the index since 2003. Even though the market recovered some of the losses in the following days, this event changed how investors saw the risks linked to the US housing market and complex loan products. When it comes to liquidity, markets still worked overall, but the sharp fall showed how quickly investors can become more cautious after

sudden shocks. Investment funds that track entire markets also did well with high trading volumes and stayed active during the day. This showed that these funds were becoming more important for managing investments, especially as a way to protect against losses or leave the market fast when things get risky. At that time, these funds were not seen as causing problems but were clearly becoming more popular.

- **February 2009 :** The next big drop we focused on happened in February 2009 and it was a crucial moment in the global financial crisis. Markets were getting close to their lowest point after more than a year and a half of problems caused by the bursting of the credit bubble. By then, several major banks had already failed or been saved by the government. For example, Lehman Brothers collapsed in September 2008 and Citigroup was partly taken over by the government at the end of the year. People had very little confidence in the banking system and economic signs were worrying with rising unemployment, shrinking GDP and falling house prices. The main US stock index had already dropped a lot since late 2007 and it fell another 11 % in February 2009 going from 825.88 points at the close on February 2 to 735.09 points on February 27. The drop sped up in the last days of the month when the index lost 9.5 % between February 17 and February 27th showing how negative investors were feeling. This time was also marked by very serious liquidity problems especially in credit markets and financial stocks. Even so investment funds that track the stock market kept working well with very high trading volumes. For many investors these funds became important tools to quickly buy or sell shares when trading individual stocks was very difficult. Although the difference between buying and selling prices on some of these funds got wider for a while their ability to keep trading during the crisis made them trusted tools even in very tough times.

- **January 2016** marked by a sharp return of risk aversion across global markets. Investors were worried about a slowdown in China’s economy the ongoing collapse in oil prices and growing doubts about how effective the U.S. Federal Reserve’s policies would be after its first interest rate hike in December 2015. During the first week of the year equity markets fell quickly as the S&P 500 lost 5.96 % between January 4 with 2,012.66 points and January 8 with 1,899.68 points. The decline continued until January 20 when the index hit a low of 1,859.33 points down 7.6 % since the start of the month.

Volatility increased sharply and many investors rushed to reduce their exposure to equities. In that environment index ETFs became a key tool with trading volumes jumping as these products allowed quick adjustments without having to buy or sell dozens of individual stocks. But this sudden demand sometimes caused their market prices to deviate from the actual value of the assets they track especially during market openings where discounts of one to two percent were observed. This raised fresh concerns about how stable ETFs really are during market stress. Still they mostly held up well and acted as a source of liquidity at a time when many energy and industrial stocks were very hard to sell without causing further price drops.

- **December 2018:** At the end of 2018, stock markets experienced a very tense period due to growing concerns about global economic growth and ongoing trade tensions. Investors became increasingly cautious about risks related to tariffs and a possible slowdown in corporate earnings. The main US stock index fell sharply in December, going from 2,743.15 points on December 3 to 2,346.58 points on December 24, which is a drop of about 14.5 % in less than a month. Volatility increased and many investors looked to reduce their exposure to stocks. This environment of high uncertainty made trading more difficult for many stocks, especially in the technology and consumer sectors, which suffered significant declines. This period clearly showed how quickly markets can tighten in response to negative economic and political factors.

- **March 2020** : financial markets were shaken by the COVID-19 pandemic, causing the main US stock index to fall sharply from 2954.22 points on February 19 to 2,237.40 points on March 23, a decline of about 24 % in just over a month. This period was marked by extreme volatility, large price swings, and reduced liquidity in some sectors. In this highly uncertain context, ETFs played a crucial role by offering investors a fast and efficient way to manage their market exposure. Despite the turbulence, these products remained very liquid, allowing smooth trading even as underlying markets faced significant stress. The crisis also accelerated the recognition of ETFs as a central element of the financial landscape. Their popularity reached record growth in 2020, with net global inflows of 762.87 billion dollars, according to the annual report by ETFGI. This surge in interest reflects a widespread awareness of ETFs' advantages, including their flexibility, transparency, and lower costs compared to traditional funds.

- **October 2022:** Market tensions intensified in October 2022, driven by persistently high inflation, rising interest rates set by central banks, and growing doubts about global economic growth. These factors caused significant volatility, with daily fluctuations sometimes exceeding 2 %, leading to a notable increase in buying and selling volumes. Faced with an uncertain environment, investors frequently adjusted their portfolios, generating substantial capital flows. Some chose to reduce their exposure through quick sales, while others seized the opportunities created by market pullbacks. This period revealed a complex interaction between heightened volatility and continued liquidity, demonstrating that despite the tensions, markets remained very active.

- **March 2025:** Recently, financial markets experienced a period of turbulence marked by a significant decline in the main US stock index, which fell by 5.63 % over the month. This correction was driven by persistent concerns about inflation, rising interest rates, and geopolitical tensions, creating a highly uncertain environment. In this context, buying and selling volumes increased significantly. Investors reacted to the volatility by quickly adjusting their portfolios, leading to substantial capital flows, notably towards ETFs. ETFs continued to play a central role, offering investors increased flexibility and liquidity to navigate this period of volatility. According to data from ETFGI, ETFs recorded net inflows of 158.81 billion dollars in March 2025, bringing the cumulative net flows since the beginning of the year to 304.70 billion dollars, a record level. Equity ETFs attracted 86.29 billion dollars, bond ETFs 15.70 billion dollars, and commodity ETFs 9.44 billion dollars. Actively managed ETFs also saw strong demand, with net inflows of 41.52 billion dollars in March, bringing their cumulative net flows to 145.26 billion dollars since the start of the year. Among the most popular ETFs, the iShares Core S&P 500 ETF recorded the largest individual net inflow with 23.63 billion dollars in March.

The inclusion of the most recent episode of market stress enhances the comprehensiveness of our crisis sample and is made possible by the extended temporal coverage of our volume dataset. Specifically, to test our first hypothesis—whether post-crisis intraday trading volumes are influenced by increasing passive ownership—we focus on the average VI during the 30 trading days following each market trough. Since the latest trough occurred

in March 2025, our dataset extends through April 2025, allowing for the full inclusion of this episode. We computed the difference between VI_45dAVG_before and VI_45dAVG_after and obtained a market average for each crisis we studied. For the second hypothesis, we aim to examine both intraday and post-market volumes (VI and PMV) to draw a general conclusion on the effect of passive management on liquidity.

Our priority was to study the impact of being added to or removed from the S&P 500 on VI over a timeframe of 45 days to understand the short-term effects on liquidity caused by inclusion in the S&P 500. We did not use a longer timeframe because we believe changes in liquidity could result from other factors.

The most common and intuitive reason for a company to be included or excluded from an index is changes in its market capitalization (MC). When a company grows substantially and reaches a certain size, it may meet the requirements to be added to the index. Conversely, when a company contracts or no longer effectively represents the broader U.S. market, it can be removed.

However, size isn't the only factor at play. A company can also exit the index if it's been acquired. In other situations, mergers and spinoffs can also lead to index changes. Some companies are removed due to bankruptcy, like Lehman Brothers in 2008, or for technical reasons such as insufficient liquidity or a public float that's too limited.

There's also a less obvious case: when an American company is absorbed by a foreign group, it can lose its eligibility for the S&P 500, which includes only companies domiciled in the U.S.

To keep our analysis focused and clear, we chose to study only index changes linked to shifts in market capitalization within the S&P 500. Cases involving mergers or cross-border acquisitions are more complex to track, especially because it's difficult to gather consistent data on volatility and liquidity in those scenarios.

For this second hypothesis, we will also study the influence of %PO on PMVS. We will further analyze the dynamics between VI and PMVS over time to see whether there is a migration of volume to the aftermarket.

Results

Before delving into the results specific to the hypotheses we'll be looking at, we felt it essential, both from a methodological point of view and to validate our sources, to retrace the evolution of %PO over time. Using the aforementioned definition of %PO and our S500 panel, it appears that after a relative stability of around 15-28% between 2000 and 2008, %PO grew by over 1,200 basis points. During this period, MC total posted compound annualized growth of 8.8%. This compare with 12.6% CAGR for MC held by passive management.

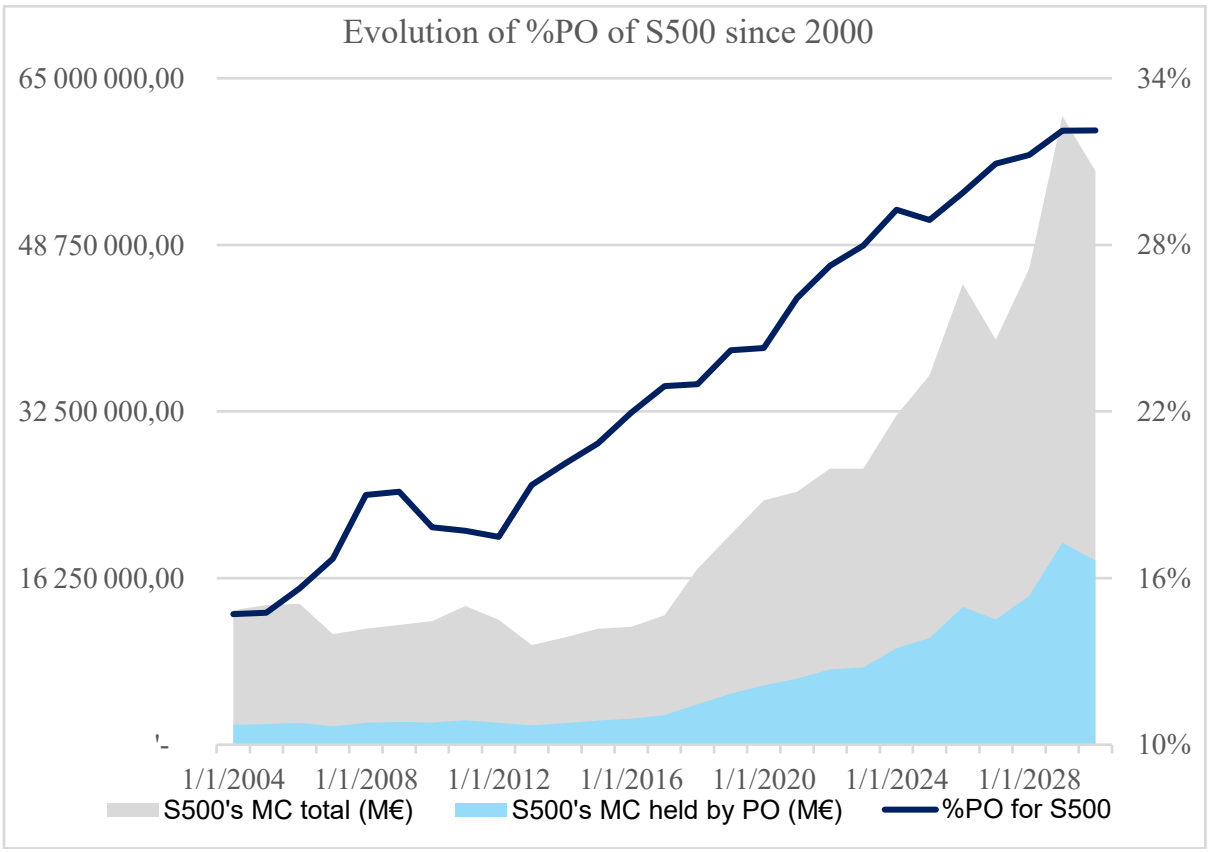

Figure 1Team research, data extracted from FactSet,

For hypothesis 1 :

General results

In 2002, volumes picked up sharply after the crisis, rising by almost 3%. In 2007, volumes also increased by around 11%. In 2009, volumes continued to rise, similar to the magnitude seen in 2007, at +8.5%. By 2016, volumes averaged 9.6% lower than before the crisis, following a low point. In 2018, volumes dropped by more than 3% after the low point on 12/24. During the

COVID-19 pandemic in 2020, volumes were 30% higher than before the low point. For the crises of 2022 and 2025, post-low point volumes were lower than previous levels, decreasing by 9.2% in 2022 and 7.2% in 2025. When comparing the %PO for the period, excluding 2020—which we will note is a unique crisis episode—we observe a significant decorrelation between %PO growth and the decline in volumes following the low point of a stock market crisis: the correlation coefficient between the difference before and after the crisis and %PO is -0.85, and the coefficient of determination is 0.73.

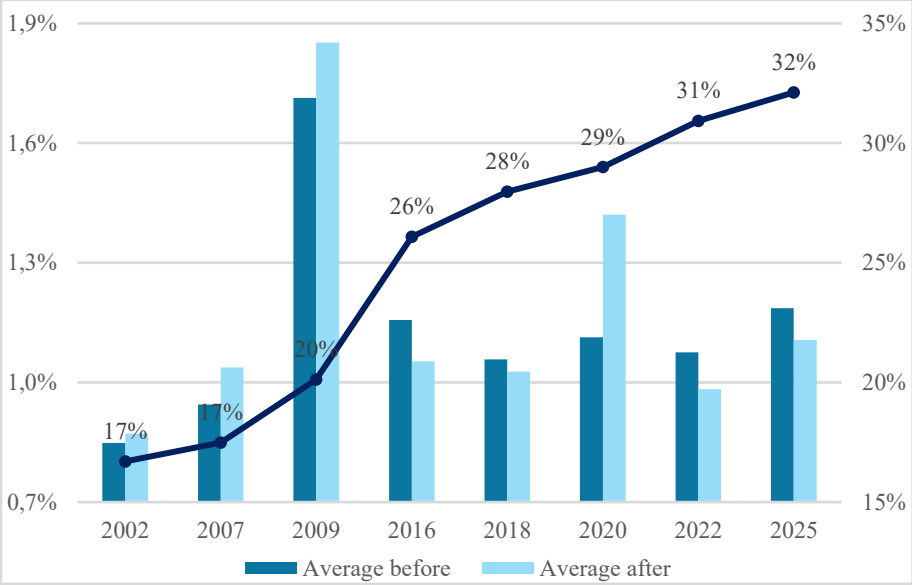

Figure 2Team research, data extracted from FactSet,

Crisis	Average before	Average after	Var.	%PO
2002	0,8%	0,8%	3,0%	17%
2007	0,9%	1,0%	10,7%	17%
2009	1,7%	1,9%	8,5%	20%
2016	1,1%	1,0%	-9,6%	26%
2018	1,0%	1,0%	-3,1%	28%
2020	1,1%	1,4%	29,6%	29%
2022	1,0%	0,9%	-9,2%	31%
2025	1,2%	1,1%	-7,2%	32%

Figure 3Summary of variation and %PO/ year of crisis. Team research, data extracted from FactSet

By year of crisis

For each dot chart, the x-axis represents the variation, while the y-axis indicates the average of %PO.

In 2002, MEGA CAPs and BIG CAPs observed a significant rise in volumes, increasing by 11.1% and 9.1%, respectively, from their crisis lows. During that year, these two categories constituted 30% of the companies for which we possessed reliable data. The MID CAPs, which represented 50% of the variation in 2002 while utilizing unweighted averages, experienced a volume increase of 4% following the low point. The timeframe for this period was delineated as 145 sessions prior to the low point and 145 sessions subsequent to it (hereafter referred to as +/- days around the low point).

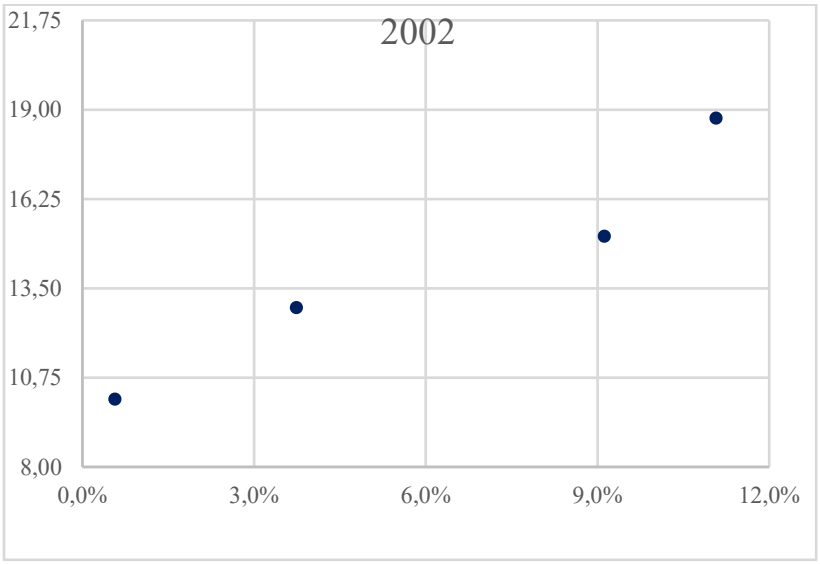

Figure 4Team research, data extracted from FactSet,

In 2007, MEGA CAP, BIG CAP, and MID CAP all experienced similar volume increases after the low on 02/27/2007, recording rises of 11.7%, 13.2%, and 9.7%, respectively. These categories together represented 98% of our panel in that year. The duration for this analysis included 81 sessions prior to the low point and 145 sessions following it.

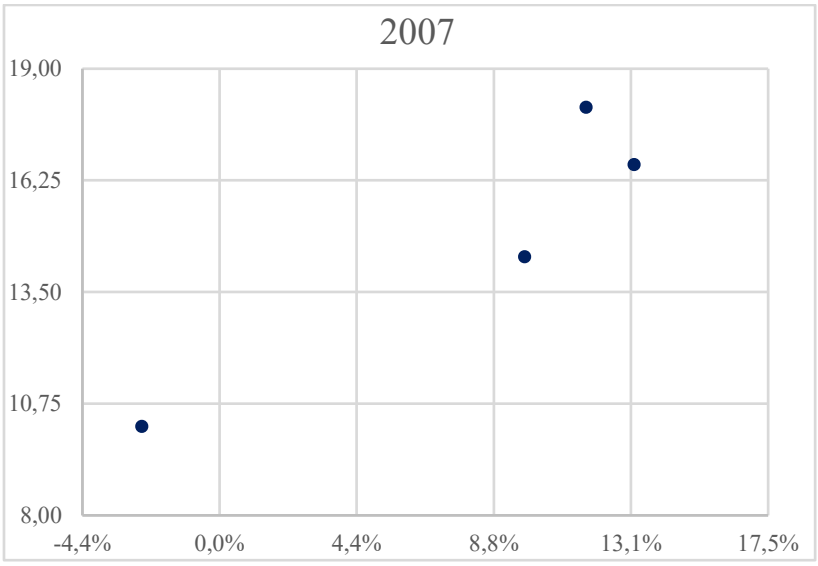

Figure 5Team research, data extracted from FactSet,

In 2009, MEGA CAPs, making up 2% of our panel at that time, experienced a volume decline of nearly 1%. BIG CAPs, which constituted about 28% of the panel, saw an increase of slightly over 2%. Mid caps, representing 50% of our panel during this period, reported a volume increase of more than 11%. SMALL CAPs, accounting for 18% of the panel, also showed growth, rising by almost 9%. The volume growth in 2009 was primarily driven by smaller companies, with the timeframe for this analysis set at +/-107 sessions from the low point.

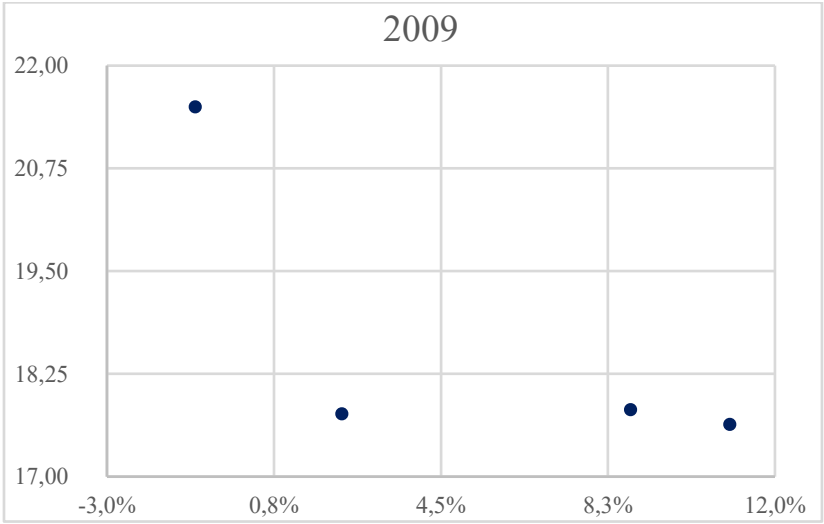

Figure 6Team research, data extracted from FactSet,

In 2016, all larger companies, except for SMALL CAPs (5% of the panel), experienced a decline in average volumes after the crisis's low point. MEGA CAPs faced the largest decrease at -17.7%, followed by BIG CAPs at -14.8%, and MID CAPs at -8.4%. This decline correlates

with MC's growth during the crisis. Overall, in 2016, post-crisis volumes for the panel were -9.6% lower than those before the crisis's low point, which was measured over a period of +/- 124 sessions around that low point.

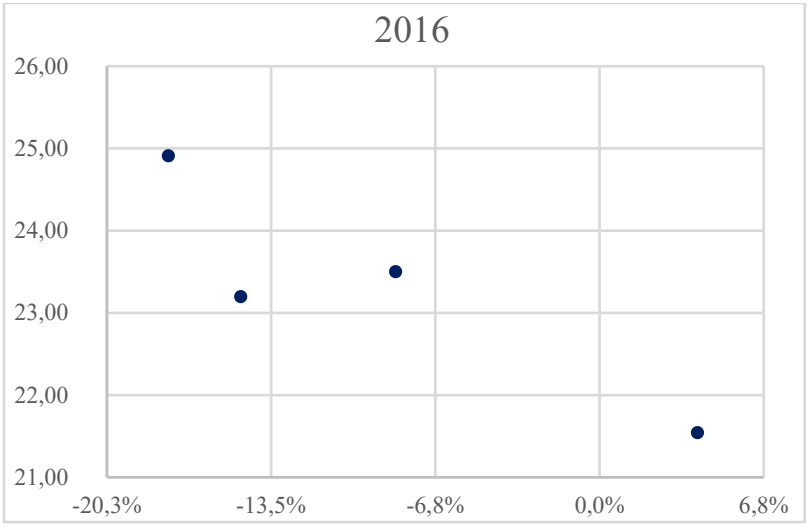

Figure 7Team research, data extracted from FactSet

In 2018, all companies, from SMALL CAP to MEGA CAP, experienced average post-crisis volumes that were lower than pre-crisis levels, showing a decline of about -3.1%. BIG CAPs, making up 63% of the panel, saw the most significant drop, with average volumes reduced by -4.6%. MEGA CAPs, which represent 10% of the panel, experienced a decrease of -3.8%. SMALL CAPs followed with a decline of -1.4%, while MID CAPs, comprising 21.6% of the panel, faced a slight drop of about -0.5%. This analysis covers a timeframe of +/- 105 sessions around the lowest point.

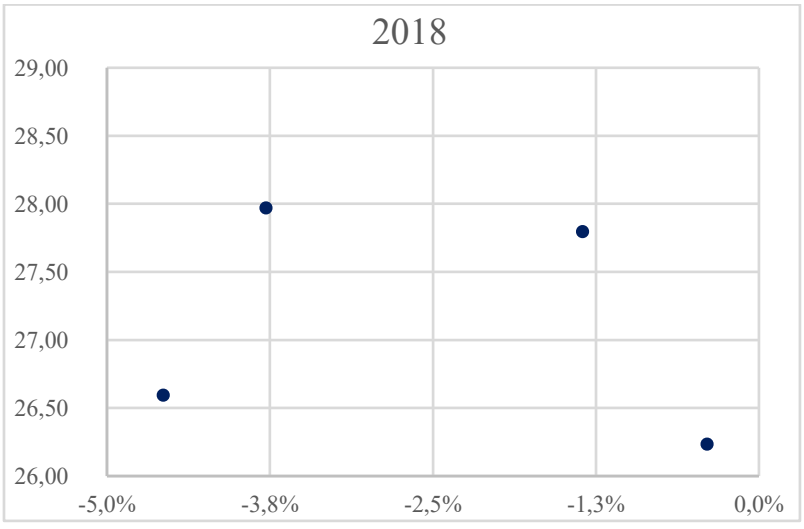

Figure 8Team research, data extracted from FactSet

For 2020, all companies, from SMALL CAP to MEGA CAP, have, on average, seen their post-crisis volumes exceed pre-crisis levels (around +30%). The timeframe for this period is set at +/- 124 sessions around the low point.

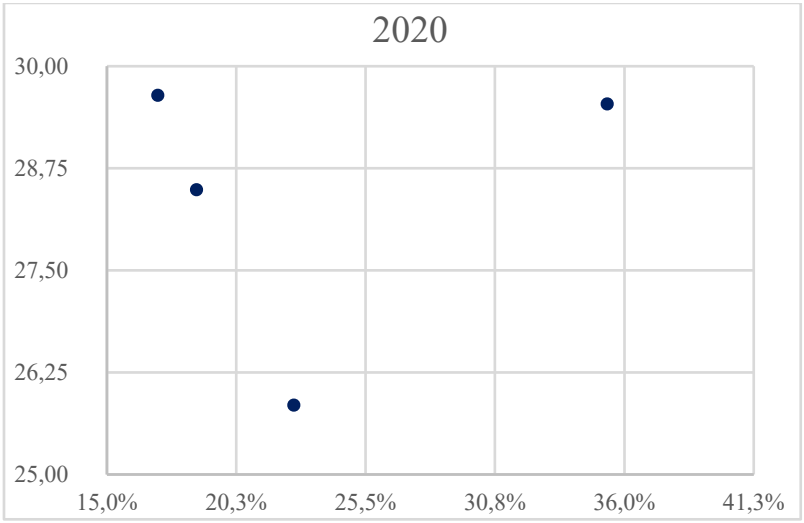

Figure 9Team research, data extracted from FactSet

For the year 2022, except for SMALL CAPs (2.4% of the panel), which demonstrate post-crisis volumes up by over 9%, all other MC sizes (95% of the panel) exhibit volumes down by between -5.4% and -8.1%.

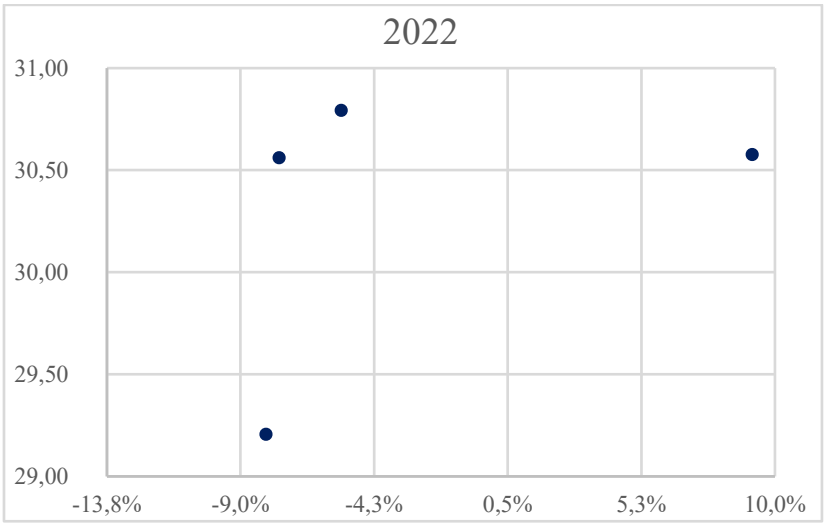

Figure 10Team research, data extracted from FactSet

Regarding the crisis we encountered in 2025, the BIG and MID CAP categories, comprising 74% of the panel, reported volumes that were, on average, 3% lower than those recorded prior to the crisis, following the low point on April 4th. Conversely, the MEGA CAP category, which

constitutes 19.5% of the panel, exhibited volumes that were 5% higher than those before April 4th. In aggregate, the volumes across the panel were 7.2% below the pre-crisis levels.

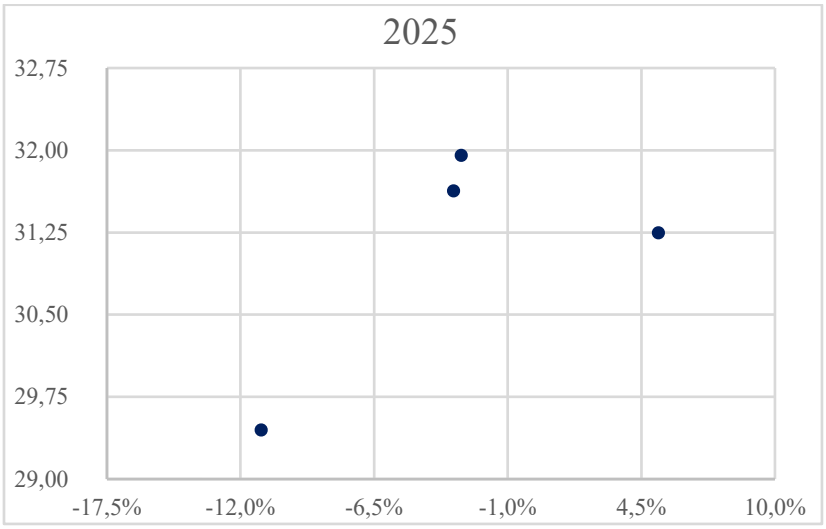

Figure 11Team research, data extracted from FactSet

Results by MC

MEGA CAP : In the crisis years of 2002 and 2007, mega cap volumes were +10% higher after the low point; in 2009, volumes fell only slightly (-1%). 2016, 2018 and 2022 each saw big cap volumes fall by -17.7, -3.8 and -7.6% respectively. If we compare the pre-2015 and post-2015 crises (excluding 2020, which is a rather singular crisis, as we have explained), we can clearly see that MEGA CAP volumes after the low point are well below their pre-crisis averages.

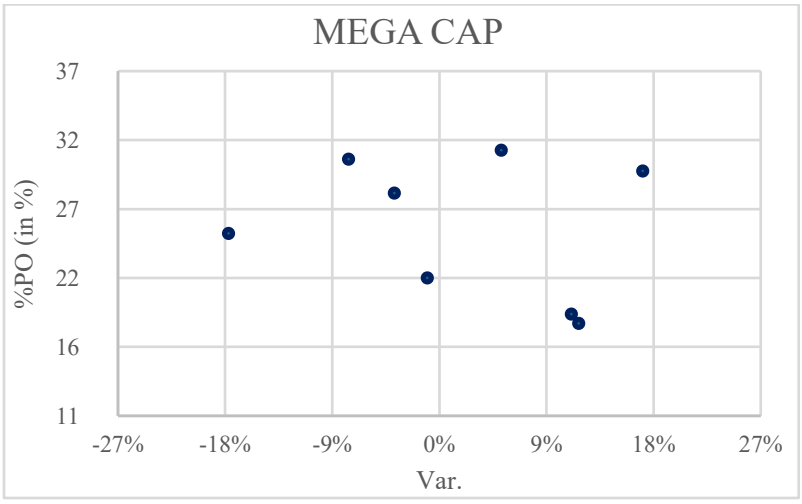

Figure 12Team research, data extracted from FactSet

BIG CAP : Companies categorized as BIG CAP demonstrate results similar to those of MEGA CAP. In both 2002 and 2007, these big caps experienced nearly a +10% increase in post-crisis volumes. A more modest growth of 2.3% was noted in 2009. However, following crises after

2015, except for 2020, big caps showed a decline in volumes: 2016 recorded -17,7%, 2018 -3.8%, 2022 -7.6%, and 2025 -2.9%.

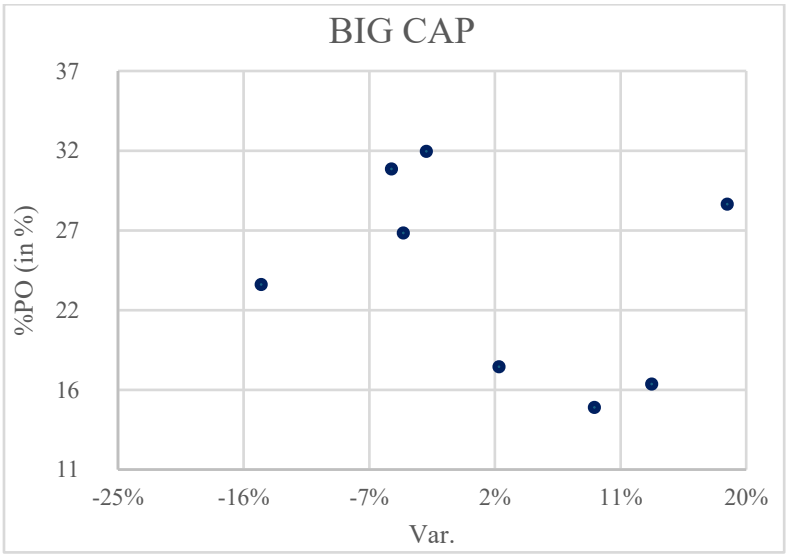

Figure 13Team research, data extracted from FactSet

MID CAP : For the MID CAP segment, results are in line with those of the larger capitalizations, albeit by orders of magnitude. In 2007 and 2009, volume levels rose by +10% from their lows. In 2002, they were also up by a slightly smaller amount: +3.7%. In 2016, the decline was once again the greatest: -10%. In 2018, the decline was around -0.5%. In 2022, it was -8%. In 2025, MID CAPs saw their volumes fall by an average of -3%.

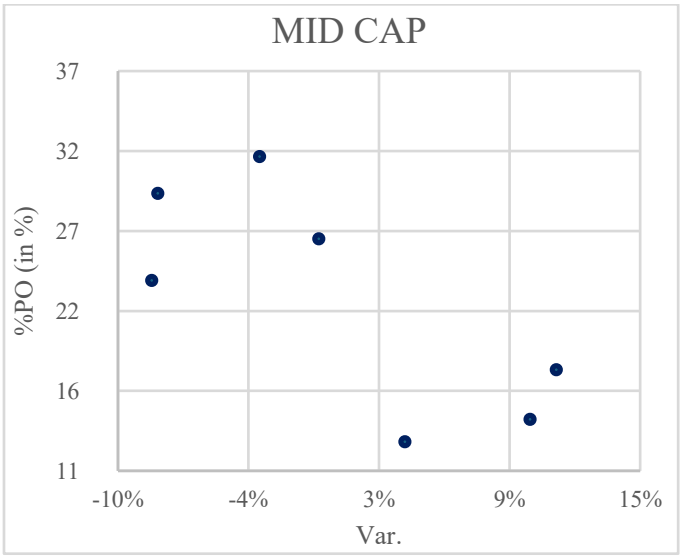

Figure 14Team research, data extracted from FactSet

SMALL CAP : In the SMALL CAP segment, the trend differs from that of larger companies. In the absence of a clear trend, we provide the variations in volumes: 2002 : +0.6 %, 2007 : -2,5%, 2009 : +8.8 %, 2016 : +4.0 %, 2018 :-1,4%, 2020 : +22.6 %, 2022 : +9.2 %, 2025 : -11,2%.

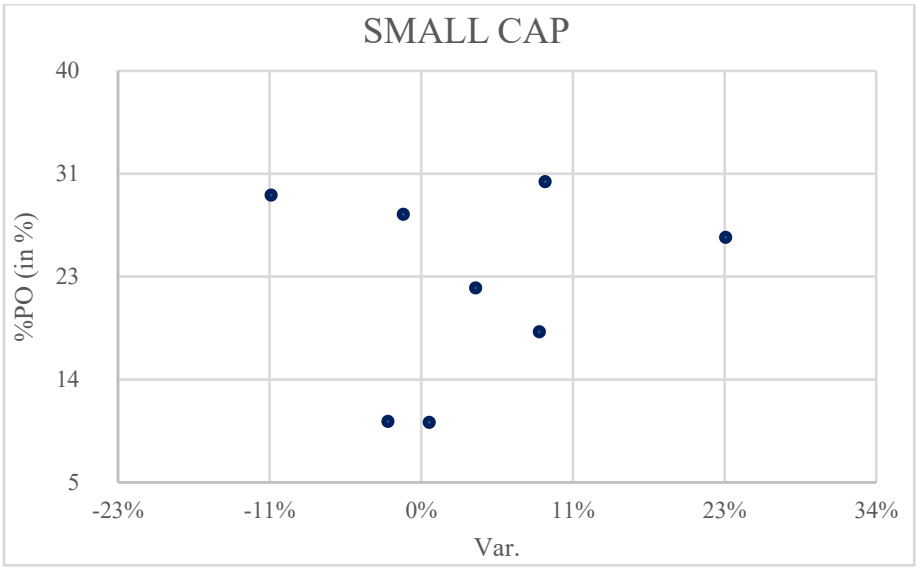

Figure 15Team research, data extracted from FactSet

For hypothesis 2 :

The PMVS averaged 1.51% in 2012. By 2025, it increased to around 6.2%, according to the latest data we analyzed. This growth signifies an annualized growth rate of over 11% (CAGR), indicating an overall increase of 311%. During the same period, %PO rose from 23 to 32%. The correlation coefficient between PMVS and %PO is 0.88, while the coefficient of determination is 0.78, indicating a strong correlation. We can assume that a +1 basis point increase in %PO led to a +0.5 basis point increase in PMVS.

Over this period, VI has been decreasing. On average, VI was 1% in 2012. For the entire year of 2024, VI decreased by an average of 0.73%, which represents a drop of more than 22 basis points over 12 years, equating to a 27% decrease.

PMVs are rising sharply, even as intraday liquidity tends to contract. If we consider the entire period and not just selected years, as found in other studies, the correlation coefficient between VI and PMVS is -0.4 and the coefficient of determination is 0.15. If we examine only 2013, 2015, 2019, 2021, and 2024 (the adjusted period), similar to a few other studies, the correlation coefficient is approximately -0.83.

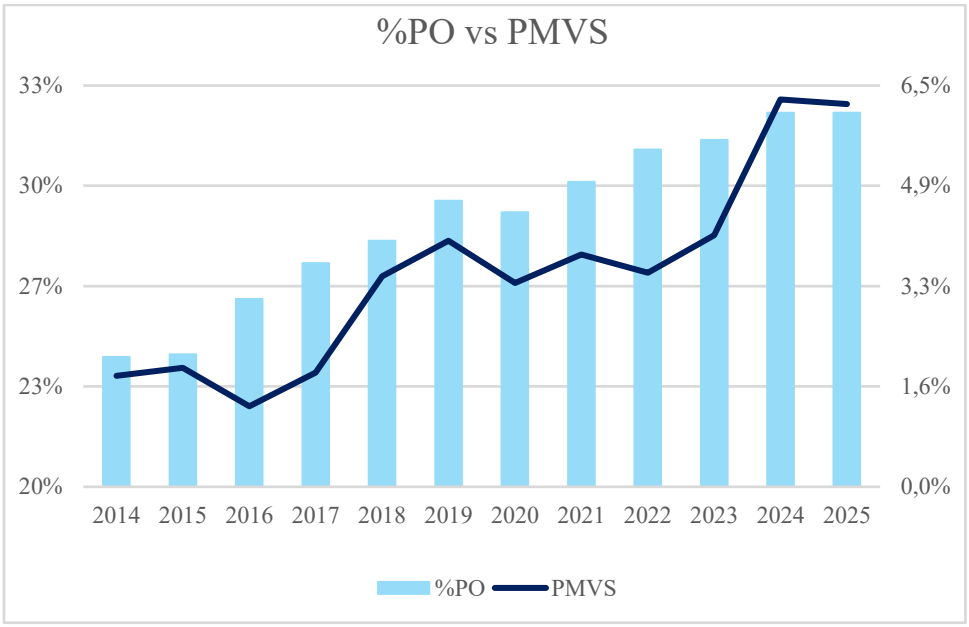

Figure 16Team research, data extracted from FactSet

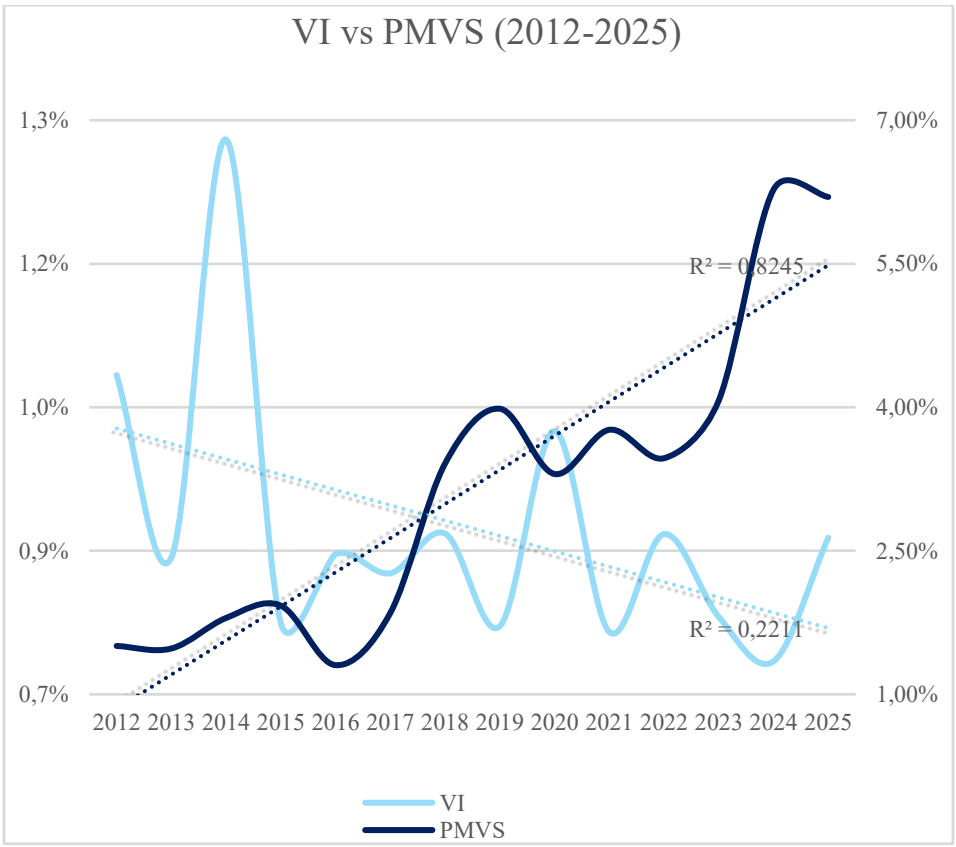

Figure 17Team research, data extracted from FactSet

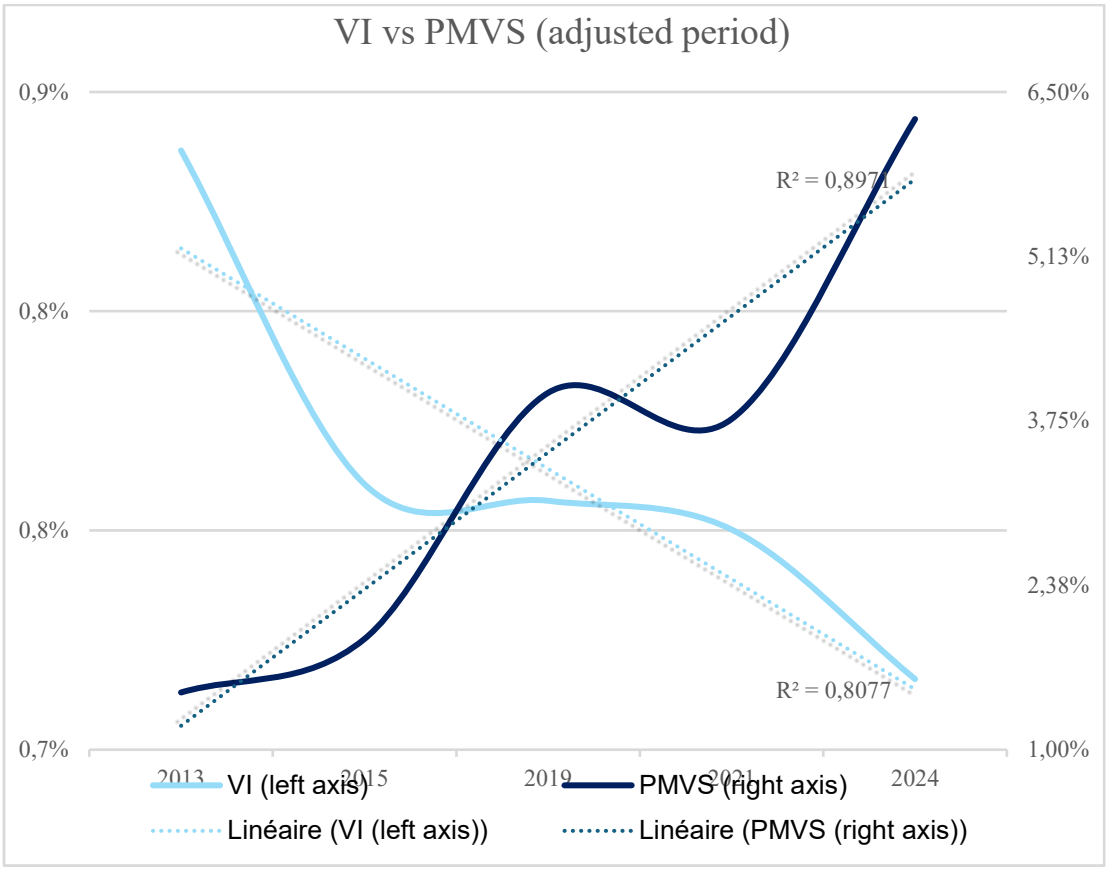

Figure 18Team research, data extracted from FactSet

We are now interested in the volumes of different companies before and after their inclusion. Our panel for this hypothesis was composed, as explained in the previous section, of companies that had either been included in or removed from the S&P 500 due to their market capitalization (MC). For companies removed from the S&P 500, we studied 115 firms that were eliminated from this major US index since December 8, 1999, due to changes in their MC. For stocks added to the S&P 500, our panel consisted of 107 companies that were newly included in the index.

Stocks added

For the +/-45 days surrounding the date of inclusion in the S&P 500, we observe that 59 companies experienced a decline in their VI following inclusion; the decline averages -48 basis points for these stocks, with a median of -28 basis points. Conversely, 48 stocks experienced an increase in their VI, averaging +67pb, with a median of +32 basis points. For the entire panel

of stocks added, we observe a 2,9 basis point increase in volume post-inclusion, with a standard deviation of 97 basis points.

If we consider that our panel X follows a normal distribution N(0,03%;0,97%), the probability that the variation is between -1,6% and +1,8% is equal to 90%.

We have P(-1.6% < X < 1.8%) = 0.9.

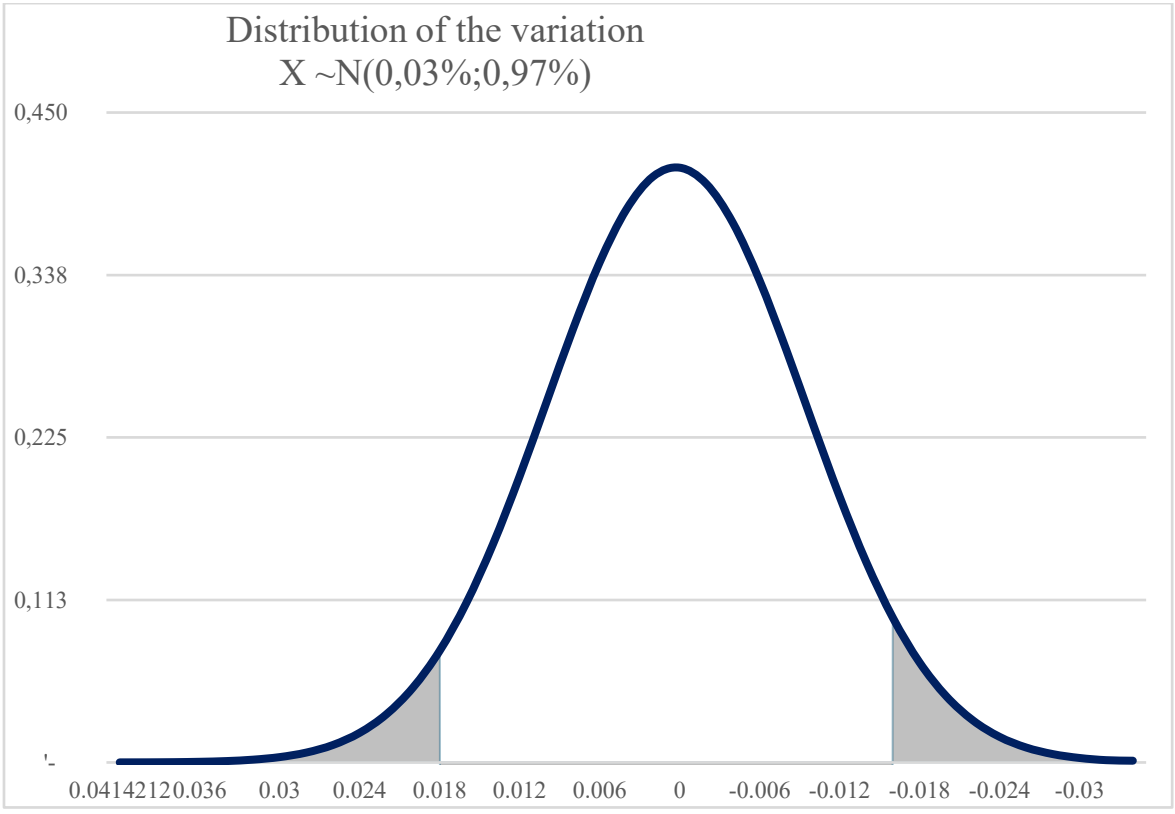

Figure 19Team research, data extracted from FactSet

Probabilistically, we can also reason with a t-test on the absolute variation to determine whether the removal from the index influences volumes either upwards or downwards.

If we consider the following hypothesis :

H0 = the absolute variation after inclusion =< à 0,75%

H1 : the absolute variation after inclusion > 0,75%

α = 5%

We have the following results:

	After inclusion
Mean	0,005633196
Variance	6,18095E-05
Observations	107
Hypothesized Mean Difference	0,0075
df	106
t Stat	-2,456
P(T<=t) one-tail	0,0078
t Critical one-tail	1,659
P(T<=t) two-tail	0,0156
t Critical two-tail	1,982

As the p-value, 0,0078 is < 1,65, the t critical one-tail, we accept H0. We observed that the variation of VI after the inclusion in the S&P 500 is not significant. It is even more insignificant as increased are almost equal to decrease.

Stocks removed

For the +/- 45 days surrounding the date of removal from the S&P 500, we observe that 62 companies experienced a decline in their VI after being removed; the average decline for these stocks is -71 basis points, with a median of -45 basis points. 53 stocks experienced an increase in their VI on average at +73bp, with a median of +44 basis points. For the entire panel of stocks removed, we notice a -5 basis point increase in volume after inclusion, with a standard deviation of 1,11%.

If we consider that our panel X follows a normal distribution N(0,05%;1,11%), the probability that the variation is between -1,6% and +1,6% is equal to 90%. I.e, we have the following probability P(-1.6% < X < 1.8%) = 0.9.

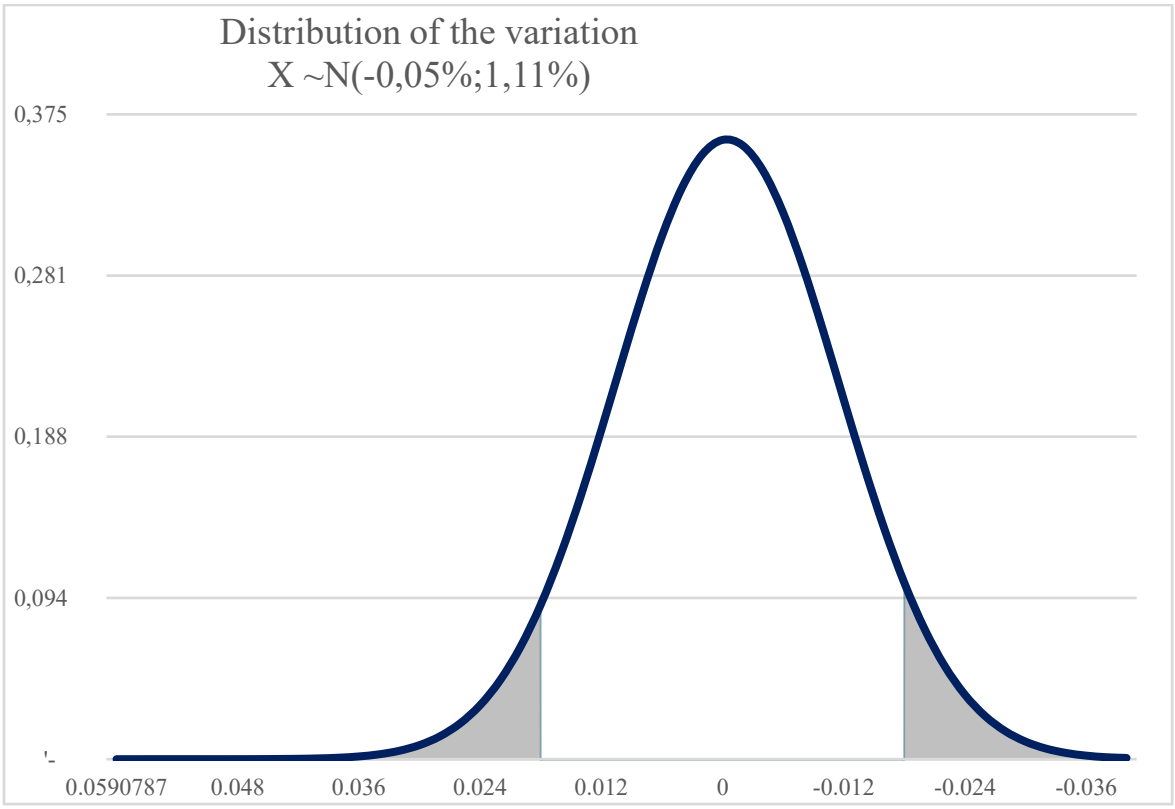

Figure 20Team research, data extracted from FactSet

Probabilistically, we can also reason with a t-test on the absolute variation to determine whether the removal from the index influences volumes either upwards or downwards.

If we consider the following hypothesis :

H0 = the absolute variation after removal < to 0,8%

H1 : the absolute variation after removal > 0,8%

α = 5%

We have the following results:

	After removal
Mean	0,007209679
Variance	7,02706E-05
Observations	115
Hypothesized Mean Difference	0,008
df	114
t Stat	-1,0110
P(T<=t) one-tail	0,157
t Critical one-tail	1,6583
P(T<=t) two-tail	0,3141
t Critical two-tail	1,980

As the p-value, 0,15 is < 1,66, the t critical one-tail, we accept H0. We observed that the variation of VI after the removal in the S&P 500 is not significant. It is even more insignificant as increases are almost equal to decreases.

Discussion & Practical implications

Our research has culminated in a conclusion that necessitates caution regarding the extensive proliferation of passive management. According to our definition of passive management, it currently constitutes approximately 35% of the US markets, as indicated by our panel, S500. Furthermore, other studies have reached a similarly comparable level, despite the ongoing debate surrounding the definition of passive ownership.

From our perspective, the emphasis on liquidity represents a crucial element that has received insufficient attention. Liquidity facilitates the assessment of a fair price for a share. A decline in liquidity may negatively affect the stability of financial markets due to factors such as mispricing, among others.

By focusing on the evolution of volumes following entry into the S&P 500, we were able to make a significant addition to the work of Harris and Guerel (1986). Their study demonstrated that immediately after a company entered the S&P 500, its share price rose by 3%. However, according to their findings, this rise was eroded within two weeks. Although the study centred on the impact on liquidity, it did not draw any overarching conclusions. In fact, by concluding that 'on the first trading day following the announcement of an addition to the list, a sharp increase in volume is observed, suggesting a shift in demand', we feel it is vital to provide figures for recent crises, considering the evolution of the financial markets between 1986 and the crises we studied. Indeed, through analysing the market as a whole, we have been able to build upon the work of Saglam and Tuzun (updated in March 2025), who concentrated on the equities held by certain ETFs. They also examined the 2007-2009 crisis, which we have divided into two separate crises. According to their findings, during this crisis, a decline in ETF ownership did not adversely affect liquidity. In our view, and as evidenced by the results mentioned in the previous section, these crises (2007 and 2009) represent a departure from recent crises post-2015 in terms of growth in VI after market lows. It is worth considering whether Saglam and Tuzun's conclusions would also hold true for recent crisis episodes, should they be applicable to the crises examined in this thesis. Focusing on the U.S. Debt Ceiling crisis of 2011, they analyzed the correlation between companies with high ETF ownership and trading costs. Trading costs are 'Costs of buying and selling marketable securities and borrowing'. This includes commissions, slippage, and the bid/ask spread. A higher bid/ask spread can indicate reduced liquidity in a stock. This may lead to price discrepancies and increased risk. They were able to show that sell orders are negatively impacted, whereas buy orders are positively affected. Overall, they concluded that ETFs enhance the liquidity of the stocks they hold. However, they

examined crises prior to 2015. Once again, with our contributions, we assert that it is essential to extend the temporality covered by Saglam and Tuzun. In fact, this extension of temporality would provide critical insights. This suggestion can also be applied to the work of Israeli et al. (2017). Indeed, in their report they concluded that, in the period from 2000 to 2014, ETF ownership was positively related to higher trading costs, lower benefits from information acquisition, a reduced response coefficient in future earnings and a decline in the number of analysts covering the firm. The question of price efficiency is significant, and the impact of ETFs is a highly debated topic. Glosten et al. (2015), for example, reported in their study that an increase in ETF ownership leads to enhanced information efficiency. However, the distinguishing factor lies in the fact that Israeli et al. (2017) focused on the future impact of ETF ownership on the underlying security, whereas Glosten et al. (2015) studied the contemporary effects of a shift in ETF ownership.

Furthermore, as explained above, rebalancing shocks are sources of inefficiencies in markets. Chang, Hong, and Liskovich have shown that these events create price inefficiencies even in liquid markets. Given that liquidity tends to decrease over time, it is important to consider to what extent their results would be affected by the illiquidity induced by an increasing %PO.

Regarding the issue of illiquidity resulting from an escalating percentage of ETF ownership, our research enhances that conducted by Israeli et al. (2017). Their study illustrated that as ETF ownership rises, the associated securities exhibit an increased quantity of shares held by authorized participants (APs). Consequently, while these securities may be traded collectively through ETFs, they become inaccessible for individual trading, which results in diminished liquidity at the share level.

Regarding the impact of Exchange-Traded Fund (ETF) growth on price efficiency, our initial hypothesis suggests that during the crises preceding 2015, passive management had a minimal effect on trading volumes and, consequently, on market efficiency. However, since 2015, the growth of ETFs has resulted in trading volumes failing to recover from post-crisis lows, which remain considerably below pre-crisis averages. Therefore, it can be asserted that market efficiency is significantly influenced by the expansion of passive management during times of crisis. Nevertheless, we do not observe any correlation; crises are unique events, and investors' responses tend to be less discernible during such periods. Additionally, we express concern over the unusually rapid recovery from the low point of 2025. Indeed, for us, and with a %PO this high, crises will become increasingly volatile, with deeper effects on the stock market. Current market conditions and the views of certain investors, to which we will return later, indicate a

lack of knowledge. In fact, since the 2008 crisis, markets have become accustomed to short falls and increasingly violent rebounds. The latest was in April 2025. As a result, few imagine a real bear market any longer. The reflex can be summed up in an acronym that has become famous even among the least informed: 'BTFD', for 'Buy the fucking deep'. This idea has been democratised almost as quickly as ETFs. In our view, and without wishing to be overly alarmist, it is worth questioning the euphoria that seizes investors at the slightest downturn.

Need for active share legislation

We consider that it is becoming more necessary than ever to introduce strict exposure rules for active managers. Active share should be regulated. Active share quantifies the extent of divergence between the holdings of a portfolio and those of a benchmark portfolio. Today, the active share is far too small for most active managers, to the point where their management is near to passive management. As a result, on the one hand, the %PO could be underestimated, and on the other, these managers contribute to market destabilisation, even though stability is beneficial to them. As a general rule, a fund with an active share of over 0.7 is considered to be actively managed. In fact, many funds still label themselves "active" when their active share is well below 0.7. Some frequently "rebenchmark" to limit risk, rather than engage in conviction-based stock-picking during crises. Simplicity is often the first choice for managers, who frequently prefer not to outperform. This can be explained by the criticism they have faced for several years. This may have led them to act this way in order, at worst, to achieve a gross performance equal to that of their index. One way to encourage managers to adopt a more active approach would be to base management fees on the average active share of their funds. Today, performance fees depend on alpha, the performance in excess of the benchmark index. Management fees are generally a percentage of the amount invested in the fund. These percentages have been considerably reduced over the years. A thesis by K.J. Martijn Cremers estimates that average fees paid by investors have fallen from 1.06% in 2000 to 0.78% in 2017. As a result, fund managers' remuneration has been severely impacted, leading them to deliberately set a benchmark that is sometimes far removed from their own management style, in order to maximise the likelihood of outperforming it and thus apply very high outperformance fees. Basing management and outperformance fees on active share could therefore prompt managers to rethink their management style. This conclusion is also echoed by Martijn Cremers (Active Share and the Three Pillars of Active Management: Skill, Conviction and Opportunity). This could encourage investors to base their fund and investment

selection on active share. This would not penalise their outperformance, as Cremers' study shows that there is no link between high active share and underperformance. This suggests that truly active management can outperform. As mentioned earlier, underperformance is often driven by net performance, after management fees.

Conviction-based management, as we advocate it, entails investing for extended periods. Typically, the investment duration recommended by managers for their clients ranges from 5 to 7 years. We contend that the holding period should likewise be sufficiently long to realise the benefits of our convictions. However, passive management, and consequently, managers who adhere to this approach in either an assertive or roundabout manner, do not consider this concept. This short holding period is detrimental from a performance perspective, given that in nearly 50 years (1974 - 2023), the S&P 500 has concluded the year down only 13 times. This emphasises the significance of temporality in reducing the likelihood of negative performance. The matter of holding time is crucial, as are the risks induced by the extensive expansion of passive management, which must be addressed promptly. In fact, during the 1950s, the average holding period for a stock on the New York Stock Exchange was 8 years. Today, it is 8 months. For ETFs, the average holding period in the portfolios of SPY investors (S&P 500 ETF) in 2023 was 17 days. It was precisely for this reason that John Bogle declared what we have taken up to open this thesis. Simplified access to ETFs has significantly contributed to this “fast trading” phenomenon.

The digitisation of the financial world and its accessibility to the largest number of people must be controlled. Of course, democratizing investment for as many individuals as possible will benefit the economy and firms seeking to attract capital. However, access to the investment world needs to be more informed to avoid impacting market efficiency. The growth of ETFs in retail portfolios is intensifying, and the average age of investors is decreasing. According to an AMF report published in November 2024, in 2020, the average age of French individuals investing in ETFs was 52.9 years, compared to 41.3 years in Q2 24. For equities, the average age fell only slightly during this period, from 52.9 to 52.3. As an indicator of the tendency of younger investors to engage with ETFs, 45% of French active investors aged between 25 and 35 bought or sold ETFs in the first six months of 2024, compared to 11.7% in 2019. Thus, they appear to align more closely with the behaviour of other European investors, who were already active in ETFs by 2019. The proportion of other European investors dealing with ETFs, across all age groups, was 34.6% in 2019 and reached 45.8% in the first half of 2024. With this rapid trading, ETFs are compelled to allocate the capital they receive to selling equities to cover

redemptions. This directly increases the PMVS. This democratization of ETFs has also been propelled by self-proclaimed investment advisors on social networks. The latter promote their services on platforms like X, linked to them by affiliate links. Consequently, every account opened on the platform by someone using the link shared by the influencer contributes to the latter's remuneration. It is therefore in their interest to encourage their audience, often young and uninformed, to invest through ETFs.

Some even go so far as to recommend portfolio allocations, despite lacking the legal authority to do so. However, there seems to be minimal oversight of this type of post. The AMF in France and the ESMA (European Securities and Markets Authority) may need to regulate them.

Nonetheless, the situation is not entirely bleak. We can assume that by investing more, individuals will recognise on their own initiative the need to educate themselves about the stock market and even seek advice. This is what an Opinionway study has shown, estimating that the proportion of savers managing their assets independently has dropped sharply, by 8 points compared to the previous year, in favour of advised management and discretionary management, both of which have increased by 4 points each. Younger people, in particular, are seeking advice: 60% of 18-34 year-olds would utilise an independent adviser for their investments, compared with just 33% of those over 55. We believe that the use of an adviser is of vital importance. Advisers themselves draw upon various specialists, such as equity research specialists. It has been demonstrated that equity research contributes directly to market stability by providing objective analyses of listed companies, thereby enhancing market understanding and, by definition, market efficiency. Equity research also promotes market efficiency by fostering transparency among issuers. Thus, the growing financial literacy of individual investors is a crucial factor in maintaining market stability.

Discussion on PMVS

Our work on the PMVS complements Bogousslavsky's, who focused on the closing auction period. The closing auction, also known as "fixing," is the brief span after the market closes, during which shares are sold at auction. This period, similar to the after-market period that we examined, is becoming a significant consideration. Historically, limited stock market activity occurred during these few seconds. However, with the rise of passive management, many voices are beginning to raise concerns about the potential risks associated with trading volume shifting towards the end of the trading day. Bogousslavsky illustrates that, on the whole, volumes tend to increase toward the end of the trading day to the detriment of the rest of the

day. However, he leaves open the question of how much of this trend is due to the growth of passive management. In any case, taking his results into account, we can consider the PMVS we have obtained to be conservative. By including closing auction volumes, the decline in intraday liquidity, excluding closing auctions, would be further reduced. Although Bogousslavsky found little difference between the auction price and the closing quote midpoint, it is worth asking whether measures to maintain liquidity during the day are becoming more than necessary. In our view, one way of addressing this problem is through continuous quotation. Continuous listing would enable financial assets to be traded 24 hours a day, 7 days a week. Therefore, by definition, there would be no post-market. From a market efficiency perspective, this would improve liquidity or at least mitigate the illiquidity risks posed by PMVS and closing auction volume. Several quantitative analyses concur with our proposal, as seen in Blonien and Ober (2025). They have shown that major markets would benefit in terms of liquidity by extending their trading hours to nearly 24/7.

However, we understand that this necessitates technological capabilities for both marketplaces and asset managers. Indeed, the latter may not be able to access information published outside their office hours, which would be immediately integrated by players equipped to do so. Furthermore, continuous quotation would result in significant changes in the world of finance, as closing prices are used as a reference in the settlement of numerous derivative contracts.

During this thesis, another point was of particular interest to us, also concerning liquidity, a concept on which we have particularly concentrated, as you will have understood. However, it deals with another aspect of liquidity, not risk, as has often been the case up to now, but rather the liquidity premium, or rather the illiquidity premium.

One of the foundations of financial theory rests on the postulate that a rational investor demands compensation in line with the risk taken and the length of time his capital is tied up. This notion, rooted in the work of Markowitz (1952) on modern portfolio theory and later formalised by Sharpe (1964) through the Capital Asset Pricing Model (CAPM), establishes that the expected return on an asset correlates with its level of systematic risk. In other words, any investor, whether institutional or individual, will agree to deploy his capital provided he expects a return that is proportional to both the volatility of the underlying asset and the liquidity constraint to which he is subject. This principle can also be observed in yield curves, where long maturities generally offer duration premiums, illustrating the fact that capital locked in over time should be fairly rewarded. Thus, in an efficient market, no investor should accept an unfavourable

risk/return ratio compared with a more liquid or less risky asset unless there is a sufficient financial or extra-financial incentive.

As part of this approach to rewarding risk and liquidity, we have concentrated on the distinction between small caps and large caps. Historically, small caps have outperformed in relative terms, often interpreted as the quid pro quo for higher risk, less liquidity and greater sensitivity to economic cycles. This risk premium, documented in particular by Fama and French (1992) in their three-factor model, has long justified a bias in favour of small caps in certain strategic allocations.

However, this dynamic appears to have reversed over the last decade. The relative performance of small caps, particularly in Europe, has been significantly less favourable, calling into question the ongoing existence of a size premium. Several possible explanations exist: a persistently low interest rate environment has diminished risk appetite, flows are increasingly concentrated in large, liquid stocks, and heightened regulatory pressure is prompting institutional investors to favour assets regarded as safer or easier to value. This raises the question of the structural evolution of this risk premium and its potential disappearance in a market where liquidity is becoming a central selection criterion.

This paradigm shift is also evident in the exponential growth of passive management, particularly in ETFS, which has profoundly altered market behaviour. These instruments, often indexed to benchmarks weighted by market capitalisation, automatically favour large caps to the detriment of smaller ones. This mechanism contributes to a concentration of flows towards a limited number of securities, further reinforcing the size effect in asset valuation.

Against this backdrop, the market appears to be shifting towards a ‘winner takes all’ approach, with large caps that already benefit from high visibility and liquidity drawing the majority of capital. This polarisation of investments highlights valuation differences between capitalisation segments and undermines the historical drivers of outperformance for small caps. Consequently, the role of ETFs in the structural reallocation of financial flows may partly explain the erosion of the size premium, in favour of a new form of efficiency dictated by volumes, liquidity, and market recognition.

There are numerous other subjects that could have been explored in this dissertation, or at the very least, touched upon. Decisions also had to be made. For instance, we concentrated on the liquidity associated with passive management. However, there are many other aspects that could have been examined.

Among them, the question of the shareholder's active role as a counter-power within corporate governance could have been explored in greater depth. In an active management model, investors have the ability to directly influence corporate strategy; they can express their dissent by selling their shares or by exercising their voting rights at general meetings. This power of arbitration or sanction serves as a lever for market discipline, reinforcing managers' accountability to their shareholders.

The rise of passive management, particularly through ETFs, is tending to dilute this role. End investors are becoming passive, delegating their voting rights and decision-making power to asset management companies, which mechanically replicate the weightings of an index without making any value judgements about the individual strategies of the companies that constitute the index. This development raises questions about the capacity of markets to maintain disciplined governance when economic power is concentrated in the hands of a select few large passive managers whose primary objective is faithful replication of an index rather than strategic influence. Even so, this point was difficult to verify and, above all, to measure. Furthermore, it was not necessarily part of our choice in terms of liquidity.

Limits and avenues for further research

We have laid the foundations for an in-depth study of the impact of the growth of passive management on financial market liquidity. However, the various elements we have studied could be explored further or expanded upon.

In fact, for reasons already mentioned, we have based our research on a defined panel of companies that constituted the S&P 500 index at a specific point in time. Extending the research to account for changes in the composition of the S&P 500 over time could further enhance the validity of our results.

The choice of index studied could also be extended. Our reasoned and justified choice of the

The world's flagship index has allowed us to draw some initial conclusions that may raise cause for concern, or at least necessitate action. Further studies could enhance our findings by expanding the panel to include other geographical areas and company sizes, which could introduce additional granularity.

Regarding the timeframe studied in our tests of PVMS, we had to use the beginning of 2012 as the starting date. Extending this period to include earlier times could introduce new elements, which we believe warrant analysis.

One aspect that warrants analysis is the correlation between stock market performance and the volumes generated by passive management. Limitations in data have prevented us from conducting a study on this matter.

Following this reflection, we also considered exploring the potential differences between ETF replication methods, namely physical replication (the purchase of the securities comprising the index) and synthetic replication (using swaps). The aim was to determine whether the choice of replication method could influence the liquidity of ETFs and, by extension, that of the underlying assets.

However, it proved difficulty to identify in-depth studies on this subject, and the available data did not permit us to clearly establish a significant link between the replication method and the level of liquidity. The sometimes opaque nature of the derivatives used in synthetic ETFs, along with the structural differences between products, complicates comparative analysis. Furthermore, the perceived liquidity of an ETF is often more closely associated with the liquidity of the security itself in the secondary market than with the liquidity of its underlying assets or its replication mechanism. Thus, although this avenue has generated particular interest, it could not be rigorously explored within the context of this dissertation. Nevertheless, we

believe that as more advanced tools become available, it would be very interesting to extend the comparison according to the type of ETF (synthetic or physical).

Due to the lack of available data, we have focused on physical ETFs, which account for over 90% of the ETF market and, in our view, are more susceptible to liquidity issues.

A precise focus on this subject would be a definite source of improvement for our work.

Finally, we would like to acknowledge our inherent biases that have undoubtedly influenced this work. The majority of the team operates in the asset management sector and will naturally tend to favour active management. While we view passive management as a means of easy access to capital markets, the naive enthusiasm surrounding it on social networks or among beginners has prompted us to further explore this market segment, which is reshuffling the dynamics of traditional finance, both positively and negatively.

Conclusion

John C. Bogle is probably correct. His various positions warning about the negative consequences that the growth of passive management will have on the markets, some of which date back almost 15 years, are now supported by a large body of data.

Firstly, there are numerous academic studies that have examined the impact of passive management on various aspects of growth. The initial focus is often on the direct effects on market functioning. These can result in price distortions, increased comovement between index shares, or rebalancing shocks that undermine market efficiency. However, there are also indirect effects. A decline in shareholder commitment has been observed in companies that have a relatively large proportion of their capital held by funds employing a passive management strategy or by ETFs directly. Furthermore, common ownership is a topic that may raise concerns, considering the limited number of large groups specialising in ETFs that control a significant percentage of the capital of many companies, some of which are direct competitors.

Without revisiting the entire literature review, there exists a significant amount of academic data that, when juxtaposed, can raise entirely justified concerns. Having engaged with this enriching literature, we believe that the issue of liquidity has received insufficient attention. In the few instances where it has been discussed, we have observed that the conclusions tend to be hasty or methodologically questionable. Furthermore, these studies merit regular scrutiny by new research as passive management becomes increasingly prevalent. As the significance of passive management grows, we must acknowledge this paradigm shift, which is altering and will continue to alter the rules of engagement on the stock markets, especially regarding liquidity.

By testing various aspects of liquidity over different timeframes, each extended appropriately and without reprocessing to manipulate the results, it appears to us that (i) during the crises occurring after 2015, the liquidity of companies decreases following the low point, while in the crises prior to 2015, liquidity not only recovered but even exceeded previous levels. However, (iii) inclusion in or exclusion from the S&P 500 has no significant impact on liquidity in the short term after the date of inclusion or withdrawal.

Another striking conclusion from this work is superficial liquidity. In other words, while ETFs create the illusion of abundant liquidity due to high trading volumes on the product itself, this liquidity often conceals a scarcity of activity and an increase in spreads on the underlying

securities. Thus, what investors perceive as easier access and greater fluidity is, in reality, a mirage that can lead to hidden costs and heightened market vulnerability during times of stress.

In light of this thesis and other academic writings, it seems essential for the main regulators and market makers to make decisions to regulate passive management. We advocate for active share remuneration for active managers, as this would encourage them to adopt genuine conviction-based management. Given that many portfolio managers are content to replicate their benchmark index, this approach would address both the underperformance of actively managed funds and the rise of passive management. While actively managed, they would still require information from equity research, which plays a direct role in stock market efficiency. By educating investment neophytes, they could become aware of the necessity for advice and information, thus also engaging Equity Research. We also believe that the evolution of listing times should be reviewed to ensure it does not lead to a total cessation of listings. These measures would help maintain Balance, as defined above, which is essential for efficient markets.

This thesis raises a broader question about the efficiency of markets in an environment dominated by passive management. If the majority of flows are content to follow indices mechanically, without any fundamental consideration, what sense does the continuous listing of securities retain? The traditional role of the stock market—to ensure efficient price discovery by aggregating the information and expectations of economic agents—could be called into question. If economic events, financial results, or sectoral changes are no longer rapidly reflected in share prices due to passive inertia, then the very principle of dynamic and meritocratic company valuations will be eroded. This question paves the way for new research into the link between the increasing passivity of flows and the loss of informational responsiveness of financial markets.

Appendix

1. S500 (our panel) composition

Ticker	Name
MMM	3M Co.
ACE	ACE Limited
ABT	Laboratories
ANF	Fitch Company A
ACN	Accenture
ADBE	Inc
AMD	Devices
AES	AES Corp
AET	Aetna Inc
AFL	AFLAC Inc
A	Technologies Inc
GAS	Inc.
APD	Chemicals Inc
ARG	Airgas Inc
AKAM	Technologies Inc
AA	Alcoa Inc
ALXN	Pharmaceuticals
ATI	Technologies Inc
AGN	Allergan Inc
ALL	Allstate Corp
ANR	Resources
ALTR	Altera Corp
MO	Altria Group Inc
AMZN	Amazon.com Inc
AEE	Ameren Corp
AEP	Electric Power
AXP	Express Co
AIG	Group Inc
AMT	Corp A
AMP	Financial
ABC	en Corp
AMGN	Amgen Inc
APH	A
APC	Petroleum Corp
ADI	Inc
AON	Aon plc
APA	Corporation
AIV	Investment &
APOL	Apollo Group Inc
AAPL	Apple Inc.
AMAT	Inc
ADM	Midland Co
AIZ	Assurant Inc
T	AT&T Inc
ADSK	Autodesk Inc
ADP	Processing
AN	AutoNation Inc
AZO	AutoZone Inc
AVB	Communities,

Ticker	Name
AVY	Corp
AVP	Avon Products
BHI	Inc
BLL	Ball Corp
BAC	Corp
BK	York Mellon
BCR	Bard (C.R.) Inc.
BAX	International Inc.
BBT	Corporation
BEAM	Beam Inc.
BDX	Dickinson
BBBY	Beyond
BMS	Bemis Company
BRK.B	Hathaway
BBY	Inc.
BIG	Big Lots Inc.
BIIB	Inc.
BLK	BlackRock
HRB	Block H&R
BMC	BMC Software
BA	Boeing Company
BWA	BorgWarner
BXP	Properties
BSX	Boston Scientific
BMY	Squibb
BRCM	Corporation
BF.B	Corporation
CHRW	Worldwide
CA	CA, Inc.
CVC	Systems Corp.
COG	Cabot Oil & Gas
CAM	International
CPB	Campbell Soup
COF	Financial
CAH	Inc.
CFN	Carefusion
KMX	Carmax Inc
CCL	Carnival Corp.
CAT	Caterpillar Inc.
CBG	CBRE Group
CBS	CBS Corp.
CELG	Celgene Corp.
CNP	Energy
CTL	CenturyLink Inc
CERN	Cerner
CF	Holdings Inc
SCHW	Charles Schwab
CHK	Energy
CVX	Chevron Corp.

Ticker	Name
CMG	Grill
CB	Chubb Corp.
CI	CIGNA Corp.
CINF	Financial
CTAS	Corporation
CSCO	Cisco Systems
C	Citigroup Inc.
CTXS	Citrix Systems
CLF	Resources
CLX	Clorox Co.
CME	CME Group Inc.
CMS	CMS Energy
COH	Coach Inc.
KO	Coca Cola Co.
CCE	Enterprises
CTSH	Technology
CL	Palmolive
CMCSA	Comcast Corp.
CMA	Comerica Inc.
CSC	Sciences Corp.
CAG	Inc.
COP	ConocoPhillips
CNX	Inc.
ED	Edison
STZ	Brands
CBE	Cooper Industries
GLW	Corning Inc.
COST	Costco Co.
CVH	Care Inc.
COV	Covidien plc
CCI	International
CSX	CSX Corp.
CMI	Cummins Inc.
CVS	Corp.
DHI	D. R. Horton
DHR	Danaher Corp.
DRI	Restaurants
DVA	DaVita Inc.
DF	Dean Foods
DE	Deere & Co.
DELL	Dell Inc.
DNR	Resources Inc.
XRAY	International
DVN	Corp.
DV	DeVry, Inc.
DO	Offshore Drilling
DTV	DirecTV
DFS	Financial
DISCA	Communications

Ticker	Name	Ticker	Name	Ticker	Name
DLTR	Dollar Tree	FRX	Laboratories	ISRG	Inc.
D	Resources	FOSL	Fossil, Inc.	IVZ	Invesco Ltd.
RRD	& Sons	BEN	Resources	IRM	Incorporated
DOV	Dover Corp.	FCX	McMoran Cp &	JBL	Jabil Circuit
DOW	Dow Chemical	FTR	Communications	JEC	Engineering
DPS	Snapple Group	GME	GameStop Corp.	JDSU	Corp.
DTE	DTE Energy Co.	GCI	Gannett Co.	JNJ	Johnson
DD	Du Pont (E.I.)	GPS	Gap (The)	JCI	Johnson Controls
DUK	Duke Energy	GD	Dynamics	JOY	Joy Global Inc.
DNB	Dun & Bradstreet	GE	General Electric	JPM	& Co.
ETFC	E-Trade	GIS	General Mills	JNPR	Juniper Networks
EMN	Chemical	GPC	Genuine Parts	K	Kellogg Co.
ETN	Eaton Corp.	GNW	Financial Inc.	KEY	KeyCorp
EBAY	eBay Inc.	GILD	Gilead Sciences	KMB	Kimberly-Clark
ECL	Ecolab Inc.	GS	Group	KIM	Kimco Realty
EIX	Edison Int'l	GT	Rubber	KMI	Kinder Morgan
EW	Lifesciences	GOOG	Google Inc.	KLAC	Corp.
EA	Electronic Arts	GWW	Inc.	KSS	Kohl's Corp.
EMC	EMC Corp.	HAL	Halliburton Co.	KFT	Kraft Foods Inc-A
EMR	Emerson Electric	HOG	Harley-Davidson	KR	Kroger Co.
ESV	Ensco plc	HAR	Industries	LLL	Communications
ETR	Entergy Corp.	HRS	Corporation	LH	of America
EOG	EOG Resources	HIG	Svc.Gp.	LRCX	Lam Research
EQT	EQT Corporation	HAS	Hasbro Inc.	LM	Legg Mason
EFX	Equifax Inc.	HCP	HCP Inc.	LEG	Leggett & Platt
EQR	Residential	HCN	Health Care REIT	LEN	Lennar Corp.
EL	Cos.	HNZ	Heinz (H.J.)	LUK	National Corp.
EXC	Exelon Corp.	HP	Payne	LXK	Lexmark Int'l Inc
EXPE	Expedia Inc.	HES	Hess Corporation	LIFE	Life Technologies
EXPD	Expeditors Int'l	HPQ	Hewlett-Packard	LLY	Lilly (Eli) & Co.
ESRX	Express Scripts	HD	Home Depot	LTD	Inc.
XOM	Corp.	HON	Inc.	LNC	Lincoln National
FFIV	F5 Networks	HRL	Corp.	LLTC	Technology Corp.
FDO	Stores	HSP	Hospira Inc.	LMT	Corp.
FAST	Fastenal Co	HST	Resorts	L	Loews Corp.
FII	Investors Inc.	HCBK	Bancorp	LO	Lorillard Inc.
FDX	Corporation	HUM	Humana Inc.	LOW	Lowe's Cos.
FIS	Information	HBAN	Bancshares	LSI	LSI Corporation
FITB	Bancorp	ITW	Works	MTB	M&T Bank Corp.
FHN	National	IR	PLC	M	Macy's Inc.
FSLR	First Solar Inc	TEG	Group Inc.	MRO	Corp.
FE	FirstEnergy Corp	INTC	Intel Corp.	MPC	Petroleum
FISV	Fiserv Inc	ICE	xchange Inc.	MAR	Marriott Int'l.
FLIR	FLIR Systems	IBM	Machines	MMC	McLennan
FLS	Corporation	IFF	Flav/Frag	MAS	Masco Corp.
FLR	Fluor Corp.	IGT	Game	MA	Mastercard Inc.
FMC	FMC Corporation	IP	Paper	MAT	Mattel Inc.
FTI	Technologies Inc.	IPG	Interpublic Group	MKC	Co.
F	Ford Motor	INTU	Intuit Inc.	MCD	Corp.

Ticker	Name	Ticker	Name	Ticker	Name
MHP	McGraw-Hill	OI	Owens-Illinois Inc	ROP	Roper Industries
MCK	McKesson Corp.	PCAR	PACCAR Inc.	ROST	Ross Stores Inc.
MJN	Mead Johnson	PLL	Pall Corp.	RDC	Rowan Cos.
MWV	Corporation	PH	Parker-Hannifin	R	Ryder System
MDT	Medtronic Inc.	PDCO	Companies	SWY	Safeway Inc.
MRK	Merck & Co.	PAYX	Paychex Inc.	SAI	SAIC
MET	MetLife Inc.	BTU	Peabody Energy	CRM	Salesforce.com
PCS	Communications	JCP	Penney (J.C.)	SNDK	Corporation
MCHP	Technology	PBCT	Bank	SCG	SCANA Corp
MU	Technology	POM	Inc.	SLB	Ltd.
MSFT	Microsoft Corp.	PEP	PepsiCo Inc.	SNI	Networks
MOLX	Molex Inc.	PKI	PerkinElmer	STX	Technology
TAP	Brewing	PRGO	Perrigo	SEE	Corp.(New)
MON	Monsanto Co.	PFE	Pfizer Inc.	SHLD	Corporation
MNST	Beverage	PCG	PG&E Corp.	SRE	Sempra Energy
MCO	Moody's Corp	PM	International	SHW	Sherwin-Williams
MS	Morgan Stanley	PSX	Phillips 66	SIAL	Sigma-Aldrich
MOS	Company	PNW	Capital	SPG	Group Inc
MSI	Solutions Inc.	PXD	Resources	SLM	SLM Corporation
MUR	Murphy Oil	PBI	Pitney-Bowes	SJM	Smucker (J.M.)
MYL	Mylan Inc.	PCL	Timber Co.	SNA	Snap-On Inc.
NBR	Ltd.	PNC	Services	SO	Southern Co.
NDAQ	Group	RL	Lauren Corp.	LUV	Airlines
NOV	Varco Inc.	PPG	PPG Industries	SWN	Energy
NTAP	NetApp	PPL	PPL Corp.	SE	Corp.
NFLX	NetFlix Inc.	PX	Praxair Inc.	S	Corp.
NWL	Rubbermaid Co.	PCP	Castparts	STJ	St Jude Medical
NFX	Exploration Co	PCLN	Priceline.com Inc	SWK	Decker
NEM	Corp. (Hldg. Co.)	PFG	Financial Group	SPLS	Staples Inc.
NWSA	Corporation	PG	Gamble	SBUX	Starbucks Corp.
NEE	Resources	PGR	Corp.	HOT	& Resorts
NKE	NIKE Inc.	PLD	ProLogis	STT	Corp.
NI	NiSource Inc.	PRU	Financial	SRCL	Stericycle Inc
NE	Noble Corp	PEG	Enterprise Inc.	SYK	Stryker Corp.
NBL	Noble Energy Inc	PSA	Public Storage	SUN	Sunoco Inc.
JWN	Nordstrom	PHM	Pulte Homes Inc.	STI	SunTrust Banks
NSC	Corp.	QEP	QEP Resources	SYMC	Symantec Corp.
NTRS	Corp.	PWR	Inc.	SYY	Sysco Corp.
NOC	Grumman Corp.	QCOM	QUALCOMM Inc.	TROW	Group
NU	Utilities	DGX	Diagnostics	TGT	Target Corp.
NRG	NRG Energy	RRC	Resources Corp.	TEL	Ltd.
NUE	Nucor Corp.	RTN	Raytheon Co.	TE	TECO Energy
NVDA	Corporation	RHT	Red Hat Inc.	THC	Corp.
NYX	NYSE Euronext	RF	Financial Corp.	TDC	Teradata Corp.
ORLY	Automotive	RSG	Services Inc	TER	Teradyne Inc.
OXY	Petroleum	RAI	American Inc.	TSO	Petroleum Co.
OMC	Omnicom Group	RHI	International	TXN	Instruments
OKE	ONEOK	ROK	Automation Inc.	TXT	Textron Inc.
ORCL	Oracle Corp.	COL	Rockwell Collins	HSY	Company

Ticker	Name
TRV	Companies Inc.
TMO	Scientific
TIF	Tiffany & Co.
TWX	Time Warner Inc.
TWC	Cable Inc.
TIE	Corp
TJX	Inc.
TMK	Torchmark Corp.
TSS	Services
TRIP	TripAdvisor
TSN	Tyson Foods
TYC	International
USB	U.S. Bancorp
UNP	Union Pacific
UNH	Group Inc.
UPS	Service
X	Steel Corp.
UTX	Technologies
UNM	Unum Group
URBN	Urban Outfitters
VFC	V.F. Corp.
VLO	Valero Energy
VAR	Systems
VTR	Ventas Inc
VRSN	Verisign Inc.
VZ	Communications
VIAB	Viacom Inc.
V	Visa Inc.
VNO	Trust
VMC	Vulcan Materials
WMT	Wal-Mart Stores
WAG	Walgreen Co.
DIS	Walt Disney Co.
WPO	Co B
WM	Management Inc.
WAT	Corporation
WPI	Pharmaceuticals
WLP	WellPoint Inc.
WFC	Wells Fargo
WDC	Western Digital
WU	Co
WY	Corp.
WHR	Whirlpool Corp.
WFM	Market
WMB	Williams Cos.
WIN	Corporation
WEC	Energy
WPX	WPX Energy, Inc.
WYN	Worldwide
WYNN	Ltd
XEL	Xcel Energy Inc
XRX	Xerox Corp.
XLNX	Xilinx Inc
XL	XL Capital
XYL	Xylem Inc.
YHOO	Yahoo Inc.
YUM	Yum! Brands Inc
ZMH	Zimmer Holdings
ZION	Zions Bancorp

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Declaration of Academic Integrity and Resources Used

We, Alexandre XERRI, Tanguy RAVIART and Rayan SENOUSSAOUI, declare that this document, titled INCREASE IN PASSIVE OWNERSHIP AND MARKET INEFFICIENCY: FOCUS ON LIQUIDITY AND CRISIS, is the result of our original research and scholarly work conducted during my enrollment at Grenoble Ecole de Management. We affirm that we have adhered to the principles of academic integrity and honesty, ensuring the appropriate use of external resources and the acknowledgment of contributions made by others.

1. Originality of Work:
a. The content presented in this document is the product of our independent thinking, insights, and critical analysis.
b. We have not plagiarized or misrepresented the work of others, and we have provided proper citations and references for all sources consulted.

2. Use of External Resources:
a. We have utilized a wide range of scholarly resources, including books, research articles, conference papers, and online publications, to inform and support the research conducted in this thesis.
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b. We have exercised critical judgment in selecting and presenting the outputs of the generative AI tools, ensuring their relevance, validity, and coherence with the broader research objectives.
c. We have adhered to ethical guidelines and legal considerations related to the use of generative AI tools, respecting intellectual property rights, and ensuring compliance with applicable laws, regulations, and licensing agreements.

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a. We have adhered to ethical guidelines and legal obligations throughout this research, ensuring the privacy and confidentiality of participants (if applicable) and conforming to relevant legal and ethical standards.
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Date : 06/13/2025

Alexandre XERRI and Tanguy RAVIART