Evaluating Practitioner-Based Value Investing Strategies

A Comparative Analysis Using the Fama-French Five-Factor Model

Jacob Germundsson (42510)

Carl Richardson (42501)

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Abstract:
This thesis evaluates the performance of four practitioner-based value investing strategies based on Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield, and EV/EBITDA through the lens of contemporary asset pricing. Using monthly U.S. equity data from 1994 to 2024, we test whether these strategies generate abnormal returns unexplained by the Fama-French five-factor model. Three of the four strategies, Free Cash Flow Yield, EV/EBITDA and Greenblatt's Magic Formula, produce statistically significant alpha over the full sample period. However, only Free Cash Flow Yield remains significant post-2007, suggesting resilience to structural shifts in market efficiency. Shareholder Yield fails to generate alpha in any period, implying that its performance is largely driven by systematic risk exposures. Factor loadings reveal consistent exposure to market and size effects, while the traditional value factor (HML) is weak or negative across all strategies. These findings highlight the declining relevance of book-to-market-based definitions of value and support the growing emphasis on cash flow generation and capital discipline in practitioner models. By bridging academic theory and real-world investment practice, this study contributes to the ongoing discussion on the limits of linear factor models. The results suggest that more flexible frameworks may be needed to fully capture the performance of modern value investing strategies.

Key words:
Value investing, Asset pricing, Abnormal returns, Fama-French five-factor model

Authors:
Jacob Germundsson (42510)
Carl Richardson (42501)

Tutor:
Henrik Andersson, Affiliated Researcher, Department of Accounting

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Stockholm School of Economics

1. Introduction

Value investing, the practice of purchasing securities that trade below their perceived intrinsic value, has long served as a foundational approach in both professional asset management and academic literature. Originally formalized by Benjamin Graham and David Dodd in *Security Analysis* (1934), the strategy has evolved considerably, from traditional stock picking based on simple metrics, such as the book-to-market ratio, to more refined approaches that emphasize firm characteristics such as operational efficiency and capital allocation.

Despite its enduring appeal, value investing has come under increasing scrutiny in recent decades. Advances in asset pricing theory, particularly the development of multi-factor models such as the Fama-French three-factor (1993) and five-factor (2015) models, have raised questions about whether value strategies offer genuine outperformance or simply compensate for exposure to systematic risk. At the same time, practitioners have moved away from book-to-market-based definitions of value toward metrics that more directly reflect a firm's ability to generate cash and allocate capital effectively, such as free cash flow yield, enterprise value multiples and shareholder return measures.

This thesis investigates whether selected practitioner-based value investing strategies deliver excess returns (alpha) that are not fully explained by the Fama-French five-factor model. Specifically, we evaluate four practitioner oriented strategies that are based on Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield, and EV/EBITDA. While these approaches are commonly used in practice, they have received limited attention in the academic literature, particularly in terms of systematic testing against contemporary factor models. By selecting strategies that reflect a broad spectrum of practical value definitions, this study aims to fill a gap between practitioner intuition and academic theory, enabling a robust empirical comparison across frameworks and time periods.

The core research question asks whether these strategies generate statistically significant alpha after controlling for exposure to five systematic factors: market (MKT), size (SMB), value (HML), profitability (RMW) and investment (CMA). If statistically significant intercepts (α) are found in time-series regressions using the Fama-French five-factor model, it may indicate mispricing, behavioral biases or structural frictions in capital markets, ultimately challenging the assumptions of the Efficient Market Hypothesis (Fama, 1970, 1991). Furthermore, such findings may suggest the presence of omitted variable bias, implying that contemporary asset pricing models are insufficient to fully explain return variation.

The empirical analysis covers the U.S. equity market from 1994 to 2024, using monthly excess return data. Portfolios are constructed based on publicly available financial metrics, rebalanced annually and equal-weighted. For each strategy, we estimate full-sample regressions as well as subperiod regressions (pre- and post-2007) to capture the potential impact of the global financial crisis on return dynamics. Structural break tests are employed to assess changes in factor exposures over time. A range of diagnostic and robustness tests, including checks for heteroskedasticity, autocorrelation, multicollinearity and endogeneity, ensure that statistical inferences remain valid.

The results show that three of the four strategies, namely the Free Cash Flow Yield, Greenblatt's Magic Formula and EV/EBITDA strategies, generate statistically and economically significant alpha over the full sample period, even after accounting for standard risk factors. However, alpha appears to have weakened in the post-2007 period, particularly for the EV/EBITDA and Greenblatt's Magic Formula strategy. The Shareholder Yield strategy does not deliver significant abnormal returns, nor does it exhibit strong or consistent exposure to systematic risk factors. This suggests that its return variation is not well captured by the Fama-French five-factor model. Across all strategies, loadings on the traditional value factor (HML) are weak or insignificant, raising questions about its continued relevance in contemporary asset pricing models.

The findings are relevant for both academics and investment practitioners. For academics, the results provide updated empirical evidence on the explanatory power of contemporary factor models in capturing the performance of the examined value strategies. For practitioners, the analysis offers insight into which value signals remain effective in generating abnormal returns, particularly in a post-crisis market environment.

In summary, by empirically testing real-world value investing strategies through the lens of contemporary asset pricing, this thesis bridges the gap between practitioner intuition and academic theory. We evaluate four practitioner-based approaches based on Free Cash Flow Yield, EV/EBITDA, Shareholder Yield and Greenblatt's Magic Formula against the Fama-French five-factor model using monthly return data from 1994 to 2024. The findings contribute to the ongoing debate on the limits of factor models and the persistence of alpha in increasingly efficient markets. In doing so, the study highlights the evolving nature of *value* and suggests that investors and academics may need to rethink its traditional definition in favor of frameworks that better capture cash flow generation, capital discipline and operational quality.

2. Literature review

This chapter reviews the academic foundations relevant to value investing and multifactor asset pricing models. We begin with the history of value investing and then move on to the historical significance of the HML factor and its declining explanatory power in recent decades. Next, we explore the growing literature on alternative value definitions and behavioral finance explanations for persistent market anomalies. Finally, we discuss how practitioner-based strategies relate to these academic developments, highlighting the gap this thesis seeks to address.

2.1 Background to Value Investing

Value investing traces its origins to Benjamin Graham and David Dodd's (1934) seminal work "*Security Analysis"*, which laid the foundation for a disciplined approach to identifying undervalued securities. Graham and Dodd's approach was built on the principle that markets often misprice stocks in the short term, creating opportunities for investors who focus on a company's fundamental value rather than market sentiment. The authors emphasized quantitative screening, favoring stocks that traded at deep discounts relative to their book or liquidation value.

One of the core principles introduced by Graham and Dodd (1934) was margin of safety, which suggested that investors should only buy stocks when they trade well below their intrinsic value in order to minimize downside risk (Graham and Dodd, 1934). This framework led to net-net investing, where stocks were selected based on whether their market value was lower than their net current asset value, calculated as current assets minus total liabilities. The authors demonstrated that such stocks often produced superior long-term returns, as their market prices eventually converged with intrinsic value. Today, as financial markets are more developed, such stocks tend to be more difficult to identify.

Graham and Dodd's philosophy was further refined by Graham's most famous student, Warren Buffett, who transitioned from a purely quantitative deep-value approach to a more qualitative focus on firm characteristics. Inspired by Charlie Munger, Buffett moved away from investing in merely cheap stocks and instead prioritized companies with strong competitive advantages, high profitability and predictable earnings growth. This shift expanded value investing beyond static balance-sheet measures to include a more comprehensive set of firm characteristics.

Thus, the traditional emphasis on book value as a measure of intrinsic worth has been challenged and shifted the focus toward a more comprehensive set of firm characteristics. Additionally, the rise of passive investing and systematic factor strategies has prompted academic research to examine the persistence and drivers of the value premium. While some studies suggest that value investing captures a fundamental risk premium, others argue that its historical success is rooted in market inefficiencies that may no longer exist. These debates have fueled extensive research into the mechanics of value investing, leading to the development of asset pricing models that attempt to explain the sources of value-driven excess returns.

2.2 The development of Market Equilibrium Models

In the 1960s, the first formal asset pricing theory was introduced. Contrary to the views of Graham and Dodd, who focused on estimating a stock's intrinsic worth through financial analysis, the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964) and Lintner (1965) proposed that stock returns are determined by market risk. Specifically, CAPM implies that an asset's expected return is the risk-free rate plus a premium proportional to its exposure to market risk. Today, CAPM remains a cornerstone for practitioners, particularly in estimating the cost of equity in valuation exercises.

Fama (1970) advanced the field further by formulating the Efficient Market Hypothesis (EMH), which suggests that asset prices fully reflect all available information. He distinguished between three forms of market efficiency: the weak form, where past trading information is incorporated into prices; the semi-strong form, where all publicly available information is rapidly absorbed; and the strong form, where even insider information is presumed reflected in prices. Fama (1970) concluded that although occasional mispricings occur, markets are generally efficient enough to prevent consistent excess risk-adjusted returns, laying a theoretical foundation that would become subject for academic debate for decades.

However, empirical studies in the 1970s and 1980s challenged the universality of EMH. More specifically, Basu (1977) found that stocks with high earnings yields, defined as earnings divided by market capitalization, consistently outperformed those with low earnings yields, even after controlling for market beta, contradicting both CAPM and EMH. Similar anomalies were documented by Rosenberg, Reid and Lanstein (1985) regarding book-to-market ratios, Banz (1981) regarding firm size and Bhandari (1988) concerning leverage. Collectively, these findings suggested that variables beyond market risk played a critical role in explaining asset returns.

Building upon these anomalies, Fama and French (1992) demonstrated that earnings-to-price, book-to-market, size and leverage individually predicted average returns. Yet, they emphasized that many of these metrics are correlated due to their scaling by market prices. Through multivariate testing, they concluded that size and book-to-market were the dominant factors, effectively absorbing the explanatory power of the other variables. This work laid the empirical groundwork for an expanded asset pricing framework.

To formalize these insights, Fama and French (1993) extended the Capital Asset Pricing Model (CAPM) by introducing two additional factors, size (SMB) and value (HML), alongside the existing market risk (MKT) factor. The MKT factor captures the excess return of the market over the risk-free rate, while the SMB factor reflects the tendency for small-cap stocks to outperform large-cap stocks, based on observed size-related return differentials. The HML factor captures the systematic tendency for value stocks, i.e., those with high book-to-market ratios (value stocks), to outperform their counterparts (growth stocks), proposing that this premium reflects compensation for bearing additional risk. However, the validity and persistence of the size and value premium have been much debated in subsequent literature (Petkova, 2006; van Dijk, 2011; Aharoni, Grundy and Zeng, 2013; Asness and Frazzini, 2013; Fama and French, 2015; Blitz and Hanauer, 2021). By broadening CAPM's single-factor view, the three-factor model marked a pivotal shift in asset pricing theory and established a framework for understanding cross-sectional differences in returns.

2.3 The Diminishing Role of the HML Factor

Although the Fama-French three-factor model (1993) represented a major advancement in asset pricing theory, subsequent research has increasingly questioned the persistence and economic interpretation of its value component, the HML factor. Growing empirical evidence suggests that this interpretation may no longer hold in modern financial markets.

Several studies have challenged the robustness and relevance of the HML factor. For example, Petkova (2006) highlights the cyclical nature of HML's performance, showing that its returns are highly sensitive to macroeconomic conditions. Specifically, she finds that HML tends to outperform during periods of heightened risk aversion, such as economic downturns and underperform in expansions. This cyclical behavior undermines the notion of HML capturing a stable, systematic risk premium and instead points to conditional performance shaped by macroeconomic dynamics.

Blitz and Hanauer (2021) extended this critique by arguing that structural shifts in the economy, particularly the rise of intangible assets and changes in accounting practices, have eroded the effectiveness of book-to-market ratios as proxies for firm value. In a landscape where intellectual property, brand equity and software account for a large share of firm value, the authors argue that traditional balance sheet metrics may no longer capture intrinsic worth, thereby weakening HML's explanatory power.

From a firm-level perspective, Novy-Marx (2013) finds that profitability, measured as gross profit relative to assets, is at least as powerful a predictor of future stock returns as the book-to-market ratio. He documents that highly profitable firms often trade at low book-to-market ratios, and that the HML factor negatively correlates with gross profitability. This suggests that traditional value strategies may overweight low-quality firms while underrepresenting more fundamentally sound businesses. Such findings challenge the idea that value investing rewards investors for bearing risk, and instead raise the possibility that HML has historically captured mispricing or omitted quality characteristics. Supporting this view, Aharoni, Grundy and Zeng (2013) show that once variables like expected profitability and investment intensity are accounted for, the explanatory power of HML declines significantly. This implies that HML's historical success may have been driven more by valuation distortions than by systematic risk exposure.

Further doubts about HML's robustness are raised by Asness and Frazzini (2013), who show that small methodological changes in how HML is constructed, such as differences in portfolio sorting or weighting, can lead to materially different return patterns. This fragility suggests that HML may have inadvertently captured temporary effects such as momentum or misvaluation, rather than a fundamental economic premium. The authors also note that as arbitrage mechanisms have become more efficient and hedge fund activity has grown, the inefficiencies that HML once exploited have likely diminished.

As a response to this body of evidence, Fama and French (2015) expanded their model to five factors, incorporating profitability (RMW) and investment (CMA) alongside the original market, size and value factor. The RMW factor captures the return premium associated with firms exhibiting high operating profitability relative to weakly profitable firms, while the CMA factor accounts for differences in corporate investment behavior. Their findings indicated that, after controlling for these new dimensions, HML added little incremental explanatory power. This suggests that the traditional value premium could be more accurately attributed to variations in profitability and investment efficiency rather than purely to differences in book-to-market ratios. In fact, their results show that when RMW and CMA are included, the loading on HML often becomes statistically insignificant, implying that profitability serves as a more fundamental driver of cross-sectional returns than previously recognized. This revision has significant implications for both asset pricing theory and applied investment strategies, as it shifts the understanding of value from a static balance sheet measure toward more dynamic indicators of firm quality and growth potential (Fama and French, 2015).

Taken together, these findings call into question the continued relevance of the HML factor in modern asset pricing. They suggest that more sophisticated measures of firm quality and forward-looking valuation, such as profitability and investment efficiency, may now provide a superior framework for understanding equity returns.

2.4 The Development of Market Efficiency

While classical asset pricing theories such as the Efficient Market Hypothesis (EMH) and factor models typically assume stable market structures, there is growing empirical evidence that the efficiency of financial markets has evolved over time. In particular, the period following the 2008 global financial crisis appears to mark a structural shift toward greater informativeness and pricing efficiency in equity markets (Bai, Philippon and Savov, 2016). Understanding these developments is essential for contextualizing the declining effectiveness of traditional value investing strategies, which have historically relied on delayed price adjustment and persistent mispricings.

One key driver of this evolution has been the rapid advancement of trading technology and the increase of algorithmic strategies. Chordia, Roll and Subrahmanyam (2011) document that the rise of algorithmic and high-frequency trading during the early 2010s was associated with tighter bid-ask spreads, greater liquidity and more efficient price discovery. These technological innovations have allowed market participants to react to new information more quickly and with greater precision, contributing directly to improved pricing efficiency.

In parallel, the broader digital transformation of financial markets has played a central role in improving price efficiency. Bai, Philippon and Savov (2016) provide empirical evidence that U.S. equity markets have become significantly more informative over time, particularly in the years following the 2008 financial crisis. By examining the ability of stock prices to forecast future firm-level earnings and investments, the authors show that markets have become more effective at reflecting fundamental information. They attribute this development to improved information dissemination, enhanced analytical tools available to investors and increased competition among institutional market participants. These structural improvements have lowered the cost of processing information and made it easier for sophisticated investors to identify and act on pricing inefficiencies, thereby accelerating information incorporation and reducing the persistence of mispricings.

However, as Fama (1991) pointed out, empirical tests of market efficiency always involve a joint hypothesis: they assess both the efficiency of markets and the validity of the asset pricing model used to define expected returns. This presents an inherent limitation in interpreting anomalies or excess returns, as such outcomes may reflect either genuine inefficiencies or simply shortcomings in the model itself. As markets have evolved and models become more complex, this joint hypothesis problem remains a central challenge in the empirical evaluation of efficiency.

2.5 Behavioral Finance and Value Investing

Asset pricing models, such as the Fama-French three- and five-factor models (Fama and French, 1993; 2015), assume that stock returns are driven by risk-based factors. However, behavioral finance offers an alternative explanation for the persistence of value investing returns, arguing that systematic mispricing, investor biases and limits to arbitrage prevent markets from fully correcting valuation inefficiencies. This perspective suggests that value stocks may outperform not because they are riskier but due to cognitive and structural market inefficiencies that lead to their undervaluation.

De Bondt and Thaler (1985) argue that investors tend to overreact to recent performance, becoming overly optimistic about past winners and excessively pessimistic about past losers. This overreaction can drive prices away from fundamentals, creating opportunities for reversal as expectations eventually adjust, benefitting past losers that were unjustifiably punished. In contrast, Barberis, Shleifer and Vishny (1998) proposed a model where investors exhibit underreaction to new information, especially when in conflict with existing beliefs. This inertia in belief updating can cause the market to respond too slowly to improving fundamentals, leading to some stocks remaining undervalued for extended periods. Despite differing mechanisms, both perspectives suggest that persistent mispricing, driven by investor psychology, can explain why value stocks deliver superior long-term returns.

Investor sentiment further contributes to these mispricings, particularly during speculative market phases. Baker and Wurgler (2006) demonstrate that during periods of high investor optimism, growth stocks become overvalued while value stocks remain neglected. As sentiment shifts and the mispricing corrects, value stocks generate excess returns. This sentiment-driven mispricing is reinforced by psychological biases such as representativeness bias, where investors assume that companies with recent poor performance will continue to underperform, despite financial evidence to the contrary. Prospect theory, developed by Kahneman and Tversky (1979), suggests that investors disproportionately fear losses. This may help explain why value stocks, often perceived as distressed investments, are avoided, allowing mispricings to persist.

Although market efficiency theories assume that arbitrage should correct these mispricings, several constraints prevent this from occurring. Shleifer and Vishny (1997) highlight limits to arbitrage, which restrict rational investors from eliminating mispricing due to short-selling constraints, high transaction costs and the risk of further divergence before eventual correction. Institutional factors also play a role. Lakonishok, Shleifer and Vishny (1994) argue that professional fund managers, concerned with short-term performance relative to benchmarks, often avoid value stocks in favor of more popular, high-growth stocks that appear safer in the short run. This herding behavior exacerbates the underpricing of value stocks and allows for the value premium to persist.

Taken together, these findings suggest that the success of value investing strategies may not be fully captured by risk-based models but instead reflect persistent behavioral mispricings.

2.6 Practitioner-Based Value Investing Strategies

Value investing, as practiced today, extends beyond traditional book-to-market-based strategies and has evolved into a variety of practitioner-oriented methods used by fund managers and investors alike. While academic research has largely focused on explaining the value premium through factors like the HML, real-world investment strategies often prioritize practical application and portfolio construction methods aimed at generating consistent returns.

This study focuses on four distinct value investing strategies that are applied in the investment industry. These four strategies are based on Greenblatt's Magic Formula, Shareholder Yield, Free Cash Flow Yield and the Enterprise Value-to-EBITDA multiple (EV/EBITDA). Altogether, the selected strategies offer a diverse yet complementary perspective on practitioner-based value investing. While each approach is rooted in the fundamental principles of identifying undervalued securities, they employ distinct methodologies - ranging from profitability-focused rankings, capital return efficiency, free cash flow prioritization and enterprise valuation methods. This diversity allows the study to examine whether different forms of value investing are still adequately captured by contemporary asset pricing models, or if modern value strategies have evolved beyond the explanatory power of factor-based models. By incorporating four distinct value investing strategies, this study provides a well-rounded analysis of how real-world value investing strategies interact with established financial theories. The remainder of this section outlines the rationale and theoretical foundations of each strategy individually. However, the exact portfolio construction process will be described in section 3.3.

2.6.1 Free Cash Flow Yield Strategy

As a complement to individual stock selection strategies, several exchange-traded funds (ETFs) have been developed to capture value-based opportunities in the market. Exchange-Traded Funds (ETFs) are investment funds that trade on stock exchanges, similar to individual stocks. Many ETFs are designed to track stock market indices, but others follow factor-based or actively managed strategies. These funds use systematic stock selection methods, such as book-to-market sorting, dividend yield or profitability measures, to construct portfolios that align with specific investment philosophies. One such fund is the Pacer U.S. Cash Cows 100 ETF which follows a value-oriented investment strategy by selecting the 100 companies with the highest free cash flow yields. This approach prioritizes firms that generate substantial cash flow relative to their market valuation, ensuring that investments are directed toward fundamentally strong, yet undervalued, businesses.

The emphasis on free cash flow yield as an investment criterion aligns with value investing principles, as it provides a more direct measure of financial health and sustainability compared to earnings-based metrics. This is supported by Richardson, Sloan, Soliman and Tuna (2005), whose study shows that free cash flows are generally more informative than accrual-based earnings when it comes to evaluating firm performance, largely because they are less prone to manipulation. As a result, the authors highlight the value of free cash flow metrics for investors seeking to make more accurate valuation and investment decisions. By including this strategy in the study, a recognized investment approach that emphasizes cash flow efficiency as a key driver of stock performance is incorporated.

2.6.2 EV/EBITDA Strategy

Secondly, an EV/EBITDA strategy is introduced. The EV/EBITDA multiple is a widely used approach by investors seeking undervalued companies based on their operating performance. The multiple is favored by practitioners because it accounts for both debt and equity in the valuation process, making it a more comprehensive measure of firm value than the P/E or book-to-market ratio alone. Research supports the idea that EV/EBITDA provides strong explanatory power for future stock returns, particularly in identifying stocks that are undervalued relative to their earnings before interest, taxes, depreciation and amortization (Loughran and Wellman, 2011). This measure is frequently employed in private equity and corporate valuation contexts, making it a highly practical and real-world investment metric. By including the EV/EBITDA strategy, this study broadens the scope of value investing beyond traditional price-based multiples and incorporates one of the most widely used valuation metrics in the investment industry.

2.6.3 Shareholder Yield Strategy

Another value-oriented ETF is the Cambria Shareholder Yield ETF, which focuses on companies that actively return capital to shareholders through cash dividends, share repurchases and debt repayment. The ETF’s selection process involves identifying stocks with high shareholder yield, i.e. the sum of the three above-mentioned components, and subsequently filtering for valuation multiples to exclude overvalued firms. This approach implicitly tilts toward firms with strong cash flows and low relative valuations, characteristics traditionally associated with value stocks.

The rationale for including this strategy in the study is that it represents a fundamental, practitioner-driven approach to value investing that extends beyond simple book-to-market measures, instead incorporating broader capital allocation efficiency. This approach is supported by research from Boudoukh, Michaely, Richardson and Roberts (2007), who argued that payout yield (dividend yield and share repurchases), especially when adjusted for share issuances (net payout yield), offers stronger predictive power for stock returns than dividend yield alone. Building on this, Wesley and Vogel (2014) further refined the metric by including net-debt paydown, creating a more comprehensive shareholder yield measure. Their findings indicate that firms ranking high on this expanded metric generated significantly higher returns, results that remained robust across different market conditions, and that this excess performance was not fully explained by traditional Fama-French three-factor exposures. These results suggest that shareholder yield captures dimensions of value not reflected in conventional models, particularly those related to financial discipline and efficient capital allocation.

2.6.4 Greenblatt's Magic Formula

Finally, one of the most well-known practitioner-based approaches to value investing is Greenblatt's Magic Formula, which ranks stocks based on a combination of earnings yield (EBIT/EV) and return on capital (ROC) (Greenblatt, 2006). Unlike traditional book-to-market sorting, Greenblatt's model selects companies that have both relatively low valuation and exhibit relatively high operational efficiency. This dual emphasis on valuation and profitability aligns with modern value investing principles, which argue that profitability is a key determinant of future returns (Novy-Marx, 2013; Fama and French, 2015). Greenblatt's Magic Formula has gained widespread attention among practitioners due to its simple yet effective ranking system, and its historical ability to generate attractive long-term returns. However, studies that examine its performance against contemporary asset pricing models remain limited. Therefore, this study seeks to address this gap by empirically evaluating the strategy in the context of the Fama-French five-factor model, providing insight into whether its excess returns can be attributed to established risk factors.

2.7 Summary and Contributions

The literature reviewed in this chapter highlights a growing skepticism toward the continued relevance of the book-to-market ratio, traditionally used to define value stocks through the HML factor. Empirical evidence increasingly suggests that HML's explanatory power has diminished, as it fails to capture important firm characteristics such as profitability, cash flow efficiency and capital allocation practices. The expansion of the Fama-French model to five factors, as well as critiques from behavioral and structural perspectives, support the notion that value investing is no longer adequately represented by static accounting measures alone.

This thesis builds on these insights by empirically examining four practitioner-based value investing strategies - Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield, and an EV/EBITDA strategy. By regressing the returns of these strategies against the Fama-French factor models, the study assesses the extent to which established asset pricing frameworks can explain the performance of modern value investing approaches.

In doing so, this research contributes to three central debates in financial economics. First, it evaluates the practical relevance of academic factor models in capturing real-world investment performance. Second, it investigates whether the excess returns associated with these strategies represent compensation for systematic risk or arise from market inefficiencies and behavioral biases. Third, by conducting subperiod analysis, the thesis assesses whether the relationship between value strategies and factor loadings has evolved following the 2007–2008 financial crisis.

Taken together, this study provides both theoretical and practical contributions. It offers a more nuanced understanding of how contemporary value investing strategies behave in relation to factor models, and highlights the need for asset pricing frameworks to reflect the changing informational and structural dynamics of modern financial markets.

3. Method & Data

This study applies a quantitative research design to evaluate the performance of four practitioner-based value investing strategies relative to established asset pricing models. Specifically, we use time-series regression analysis based on the Fama-French three- and five-factor models to assess whether the returns of these strategies can be explained by exposure to systematic risk factors or whether abnormal returns (alpha) remain.

The analysis covers the period from July 1994 to June 2024, using monthly excess return data. This frequency allows for greater statistical power and the identification of time-varying relationships. The four strategies examined, Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield and EV/EBITDA, are constructed using screening rules designed to mirror real-world, practitioner-oriented investment approaches.

By comparing the factor loadings and intercepts across models and time periods, we aim to identify whether these strategies align with traditional risk-based explanations or whether they reflect persistent mispricing not captured by existing frameworks.

3.1 Research Question and Hypotheses

This study investigates whether practitioner-based value investing strategies generate abnormal returns that are not captured by contemporary asset pricing models. While previous research has largely focused on value definitions derived from academic constructs such as the book-to-market ratio, this study tests the explanatory power of factor models in relation to strategies based on real-world heuristics and valuation screens. Specifically, the research seeks to determine whether strategies such as Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield and EV/EBITDA produce significant excess returns once controlled for exposures to known risk factors.

Therefore, the central research question this study seeks to answer is:

> *"Do practitioner-based value investing strategies generate abnormal returns that cannot be explained by the Fama-French five-factor model?"*

To address this, the following hypotheses are formulated for each of the four strategies:

Hypotheses (per strategy):

- **H_0:** The value investing strategy does not generate statistically significant alpha under the Fama-French five-factor model.

- **H_1:** The value investing strategy generates statistically significant alpha, suggesting that its returns are not explained by the Fama-French five-factor model.

In addition to evaluating static factor exposures, the study also explores whether the effectiveness of asset pricing models has changed over time. The global financial crisis of 2007–2008 serves as a natural breakpoint for this analysis, given its implications for investor behavior, regulation and informational efficiency in financial markets.

To test for structural change, the sample is divided into two subperiods: July 1994–June 2007 (pre-crisis) and July 2007–June 2024 (post-crisis). For each strategy, the five-factor model is re-estimated in both subperiods. A Chow test is conducted to statistically assess whether a structural break exists in the relationship between strategy returns and factor exposures.

Together, these analyses provide a comprehensive assessment of whether practitioner-based value strategies still offer abnormal returns, and whether the underlying drivers of those returns have shifted in a post-crisis financial environment.

3.2 Data Collection and Sample Selection

This study utilizes a comprehensive dataset covering the period from 1994 to 2024, incorporating historical stock market and financial data to construct and evaluate practitioner-based value investing strategies. Stock price and financial statement data are sourced from S&P Capital IQ, while factor data is retrieved from Kenneth R. French's Data Library.

This research follows the methodology of Fama and French (1992, 2015) by considering the U.S. stock market, including all companies listed on major U.S. exchanges (NYSE, NASDAQ and AMEX). This broader sample provides a more representative assessment of value investing strategies across different market capitalizations.

To ensure data integrity and comparability, specific inclusion criteria are applied:

- Sector exclusions: Firms in the financial and utilities sectors, as well as Real Estate Investment Trusts (REITs), are excluded due to their unique regulatory environments and accounting treatments, which could distort valuation metrics.
- Liquidity and financial history requirements: Only firms with a sufficient trading history and financial data availability are included. Companies must have at least two consecutive years of financial data at the time of selection to be eligible for portfolio construction.
- Mitigating survivorship bias: To ensure that portfolio performance reflects real-world investment conditions, delisted firms are included in the dataset. This prevents a dataset skewed toward companies that survived the entire sample period, which could otherwise overstate the effectiveness of value investing strategies.

These selection criteria ensure that the study's results are robust, generalizable and reflective of real-world portfolio performance, aligning with the methodological rigor required to evaluate the explanatory power of asset pricing models.

While portfolios are rebalanced annually, return calculations are conducted using monthly excess returns, consistent with the Fama-French factor data frequency. This allows for a higher-resolution time-series regression analysis, improving statistical power and enabling a more nuanced assessment of factor exposure stability over time compared to annual excess return data.

3.3 Portfolio Construction

To systematically evaluate the performance of practitioner-based value investing strategies, we construct four distinct portfolios for each year between 1994–2023, each following a specific method. Portfolio selection is based on predefined quantitative screening criteria, with stocks ranked according to each strategy's key metric(s). Rebalancing occurs annually to maintain consistency in stock selection and ensure that performance reflects the latest available financial data.

To increase comparability, the rebalancing process follows Fama and French's (1992, 2015) method for portfolio construction. Each year, at the end of June, the portfolios are formed using financial statement data from the prior calendar year. For example, at the end of June

1994 portfolios were constructed based on income and cash flow statements for 1993 and balance sheets as of 31 December 1993. Stocks are ranked based on each strategy's selection criteria, and the top 30 stocks meeting the criteria are selected. The choice of selecting the top 30 stocks for each strategy reflects a balance between real-world implementability and statistical robustness. This level of concentration is consistent with several practical approaches, and allows for meaningful signal strength without introducing excessive idiosyncratic noise. Each portfolio is then equal-weighted at the time of formation, meaning each stock receives an identical allocation. Stocks are held for one year, after which the selection process is repeated. Monthly excess returns are then calculated for each portfolio by subtracting the one-month U.S. Treasury bill rate from monthly total returns. These excess returns serve as the dependent variable in the subsequent time-series regression framework.

3.3.1 Free Cash Flow Yield Portfolio

This strategy selects stocks based on their ability to generate Free Cash Flow relative to their market capitalization defined as:

1. $Free\ Cash\ Flow\ Yield\ =\ \frac{Free\ Cash\ Flow}{Market\ Capitalization}$

Selection Process:

- Firms are ranked in descending order based on their Free Cash Flow Yield.
- The top 30 stocks with the highest Free Cash Flow Yield are included in the portfolio and held for one year before rebalancing.

This strategy prioritizes firms that generate strong cash flows relative to their valuation, aiming to capture companies with high cash-generating efficiency and strong reinvestment potential.

3.3.2 EV/EBITDA Portfolio

This strategy focuses on stocks with low Enterprise Value to EBITDA multiples, a widely used valuation metric in corporate transactions and fundamental investing.

1. $Enterprise\ Value\ =\ Market\ Capitalization\ +\ Debt\ -\ Cash$
2. $EBITDA\ =\ Earnings\ Before\ Interest,\ Tax,\ Depreciation\ and\ Amortization$

Selection Process:

- Stocks with negative EBITDA are removed.
- Stocks are ranked in ascending order, favoring those with the lowest EV/EBITDA multiples.
- The top 30 stocks with the lowest multiples are selected and held for one year before rebalancing.

This strategy targets companies with strong operating profitability relative to enterprise value, enabling comparisons across firms regardless of capital structure. It is widely used in corporate transactions and by value investors seeking operational improvements or potential multiple re-rating.

3.3.3 Shareholder Yield Portfolio

This strategy selects stocks based on their Shareholder Yield defined as, and calculated by summing the following yields:

1. $Dividend\ Yield\ = \frac{Dividends\ Paid}{Market\ Capitalization}$
2. $Net\ Buyback\ Yield\ = \frac{Share\ Buybacks - Shares\ Issued}{Market\ Capitalization}$
3. $Debt\ Paydown\ Yield\ = \frac{Net\ Debt\ Reduction}{Market\ Capitalization}$

Selection Process:

- The three yield components are summed to create a Shareholder Yield metric.
- Stocks are ranked in descending order based on Shareholder Yield.
- The top 30 stocks are selected and held for one year before rebalancing.

This approach targets companies that actively redistribute cash through dividends, share buybacks and debt reduction. Although debt reduction is not a direct return to shareholders, it is included in this version of Shareholder Yield to reflect broader capital allocation behavior, consistent with the Cambria Shareholder Yield ETF methodology.

3.3.4 Greenblatt’s Magic Formula Portfolio

The final strategy is constructed following Joel Greenblatt’s Magic Formula, which ranks stocks based on two key financial metrics:

1. $Earnings\ Yield\ = \frac{Earnings\ Before\ Interest\ and\ Tax}{Enterprise\ Value}$
2. $Return\ on\ Capital\ = \frac{Earnings\ before\ interest\ and\ Tax}{Net\ Working\ Capital + Net\ fixed\ Assets}$

Selection Process:

- Each stock in the sample is ranked separately on both metrics.
- The two rankings are averaged, and stocks with the highest combined ranking are selected.
- The top 30 stocks are chosen and held for one year before rebalancing.

This strategy targets firms that are both attractively valued and operationally efficient. By combining earnings yield and return on capital, the Magic Formula aims to capture high-quality companies trading at low valuations.

3.4 Regression Analysis and Factor Testing

To assess whether the excess returns from the created portfolios can be explained by the Fama-French five-factor model, the study computes the excess return for each portfolio as the difference between the portfolio's return and the risk-free rate. The risk-free rate is proxied by the one-month U.S. Treasury bill yield in accordance with the Fama-French five-factor model methodology. The study then applies time-series regression analysis using the Fama-French five-factor model, which regresses the excess returns of each portfolio on market risk (MKT), size (SMB), value (HML), profitability (RMW) and investment (CMA) factors:

$$r_{p,t} - r_{f,t} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \epsilon\tau \quad (1)$$

Where

$r_{p,t}$: *Portfolio return at time t*

$r_{f,t}$: *Risk-free rate at time t*

α: Alpha (excess return not explained by the factors)

β_1, β_2, β_3, β_4, β_5 *: Factor loadings (sensitivities)*

MKT_t: *Market Excess Return (market risk factor)*

SMB_t: *Small Minus Big (size factor)*

HML_t: *High Minus Low (value factor)*

RMW_t: *Robust Minus Weak (profitability factor)*

CMA_t: *Conservative Minus Aggressive (investment factor)*

ϵt: Error term

To complement the full-sample baseline regressions and strengthen the robustness of our findings, a series of supplementary tests are conducted. These aim to evaluate the stability and reliability of the observed relationships between practitioner-based value strategies and systematic risk factors. Specifically, the analysis addresses both structural and econometric concerns, including time-variation in factor exposures, potential violations of key OLS assumptions and the presence of structural breaks.

3.4.1 Time-Variation and Structural Stability

To ensure that our regression models yield statistically reliable and interpretable results, we conduct a series of diagnostic tests addressing potential violations of core Ordinary Least Squares (OLS) assumptions. These include tests for multicollinearity, heteroskedasticity, endogeneity and autocorrelation. While these diagnostics are essential for empirical validity, the absence of major issues is largely expected, given that the Fama-French factor data is well-established and constructed to minimize such statistical irregularities. Nonetheless, we report all relevant results to confirm the robustness of our empirical framework and to prevent misleading inferences about factor significance or strategy performance.

Multicollinearity, which arises when two or more independent variables are highly correlated, can inflate standard errors, weaken statistical power and cause unstable coefficient estimates. In the context of the Fama-French model, factors like HML and CMA may capture overlapping firm characteristics. To test for this, we compute the Variance Inflation Factor (VIF) for each independent variable. A VIF value exceeding 10 is commonly viewed as problematic.

To test for heteroskedasticity, i.e., violations of the assumption that the variance of the error term is constant, we use the Breusch-Pagan test. If this test indicates the presence of heteroskedasticity, we adjust our inference using heteroskedasticity-robust standard errors. This correction ensures that our statistical significance estimates remain valid, even when residual variance varies across observations.

Endogeneity, another potential concern, arises when an explanatory variable is correlated with the regression error term. This can lead to biased and inconsistent estimates. In asset pricing, endogeneity may emerge if a factor in the Fama-French five-factor model is influenced by omitted risk characteristics or investor sentiment. To evaluate this, we implement a Two-Stage Least Squares (2SLS) approach using lagged factor values as instruments, under the assumption that they are correlated with current factor but uncorrelated with the error term. A Hausman test is then used to compare OLS and IV estimators to determine whether endogeneity is present or not.

Autocorrelation, or serial correlation of the residuals, is another issue often encountered in time-series data such as monthly returns. When present, autocorrelation can lead to underestimated standard errors and overstated t-statistics. We test for this using the Durbin-Watson statistic and, if necessary, correct for it by employing Newey-West standard errors, which are robust to both autocorrelation and heteroskedasticity. These adjustments ensure that our inference remains reliable across all regression specifications.

3.4.2 Subperiod and Structural Break Analysis

To assess whether the relationship between practitioner-based value investing strategies and systematic risk factors has changed over time, the sample is divided into two distinct subperiods: July 1994 – June 2007 and July 2007 – June 2024. This division is based on the 2007–2008 global financial crisis, a period associated with notable shifts in market dynamics, investor behavior and the broader adoption of factor-based and passive investment strategies.

Separate Fama-French five-factor regressions are estimated for each subperiod. This enables an evaluation of whether factor exposures and alpha estimates remain stable across different market regimes, or whether systematic changes have occurred in the risk-return profiles of the strategies. The subperiod analysis is particularly useful in identifying whether the explanatory power of asset pricing models has weakened in the post-crisis era.

In addition to the subperiod regressions, a Chow test is employed to statistically test for structural breaks in the regression relationships around the crisis threshold. The test evaluates whether the coefficients of the independent variables differ significantly between the two subperiods, thereby identifying potential shifts in the underlying return-generating processes.

This dual approach provides a robust framework for analyzing the temporal stability of factor exposures and contributes to understanding how practitioner-based value strategies perform across structurally different market environments.

3.5 Limitations and Assumptions

While this study applies a rigorous and academically grounded methodology, several limitations and assumptions should be acknowledged to contextualize the findings.

First, although survivorship bias is mitigated by including delisted firms in the dataset, residual effects may remain if certain firms were removed from databases before our observation period. Similarly, we control for look-ahead bias by constructing portfolios based solely on financial data from the preceding calendar year. Nonetheless, minor timing inconsistencies could occur in isolated cases due to reporting delays or fiscal year misalignments.

Second, the analysis is limited to U.S. equities listed on NYSE, NASDAQ and AMEX. While this focus aligns with the construction of the Fama-French factor models and ensures data quality, it restricts the generalizability of our results to other geographic markets with differing accounting regimes, investor behavior and structural dynamics.

Third, we assume that the Fama-French five-factor model sufficiently captures the major dimensions of systematic risk. If alternative or omitted risk factors, such as investor sentiment, liquidity constraints or macroeconomic variables, are relevant, our alpha estimates may partly reflect these unaccounted influences.

Finally, while we conduct extensive diagnostic testing and subperiod regressions to validate our findings, all results are contingent on the linearity and stability of factor exposures as modeled through static regressions. More advanced time-varying or nonlinear approaches may capture dimensions of strategy performance that our current framework does not.

Despite these limitations, the study offers robust insights into the evolving performance of practitioner-based value strategies and their interaction with academic asset pricing models. The combination of monthly return data, subperiod analysis and diagnostic robustness testing provides a solid foundation for interpreting the results within the chosen empirical framework.

4. Results

This chapter presents the empirical findings from our analysis of four practitioner-based value investing strategies. We begin by summarizing portfolio performance and risk characteristics, followed by regression results based on the Fama-French five-factor model. Subperiod analysis is then used to explore time variation in factor exposures and strategy performance, supported by structural break tests and diagnostic evaluations. All detailed regression tables, subperiod outputs and robustness diagnostics are provided in Appendix A for transparency and reproducibility.

4.1 Descriptive Statistics

To contextualize the regression findings, descriptive statistics are presented for the four practitioner-based value investing strategies over the full sample period (July 1994 to June 2024) using monthly excess returns. This includes each strategy's return profile and risk characteristics, providing a foundation for evaluating whether these strategies generate alpha or are fully explained by systematic risk factors.

4.1.1 Portfolio Performance and Risk Characteristics

Full sample period	Average annual return	Average annual excess return	Sharpe ratio	FF3FM	FF5FM
Free Cash Flow Yield	29.8%	26.7%	0.88	1.480%***	1.500%***
EV/EBITDA	24.1%	21.4%	0.84	1.167%***	1.262%***
Shareholder Yield	9.0%	6.6%	0.38	0.293%	0.351%
Greenblatt's Magic Formula	17.3%	14.6%	0.66	0.571%**	0.548%**

Table 1: Descriptive Statistics for the full sample period.

Table 1 reports the average annual return, annual excess return (relative to the one-month U.S. Treasury bill rate), annual Sharpe ratio (defined as average annual excess return divided by the annualized standard deviation) and monthly alpha estimates from the Fama-French three-factor model (FF3FM) and the Fama-French five-factor model (FF5FM) for each value investing strategy.

The Free Cash Flow Yield strategy delivers the highest annual excess return (26.7%), which can be compared to the US market's (AMEX, NYSE and NASDAQ) annualized excess return of 8.3%. Moreover, the Free Cash Flow Yield strategy exhibits a Sharpe ratio of 0.88. The EV/EBITDA strategy yielded a 21.4% excess return and a Sharpe ratio of 0.84.

Greenblatt's Magic Formula also demonstrates robust performance, yielding 14.6% excess return and a Sharpe ratio of 0.66. The Shareholder Yield strategy, by contrast, generates a more modest 6.6% excess return with a Sharpe ratio of 0.38, indicating a less favorable risk-return profile.

Multi-factor regressions confirm these findings, with statistically significant alpha estimates at the 1% level for Free Cash Flow Yield and EV/EBITDA across both models. Greenblatt's strategy also shows consistent significance at the 5% level, while Shareholder Yield fails to produce statistically meaningful alpha under any specification. These results suggest that valuation metrics focused on cash generation, enterprise value and profitability offer performance advantages that are not fully captured by conventional factor models.

4.2 Baseline Regressions and Factor Exposures

To evaluate whether the returns of practitioner-based value investing strategies are driven by systematic risk factors or if they generate unexplained alpha, we estimate time-series regressions using the Fama-French five-factor model with monthly excess returns. Each regression is performed over the full sample period, and where necessary, Newey-West robust standard errors are applied to correct for autocorrelation and heteroskedasticity. Statistical significance is evaluated at the 5% level unless otherwise noted.

As the central focus is on the intercept (α), which reflects abnormal returns not explained by factor exposures, hypothesis tests are conducted for each strategy to determine whether α differs significantly from zero. These tests are summarized briefly following the presentation of regression results for each strategy.

4.2.1 Free Cash Flow Yield Strategy

FCF Yield	Coefficient	Standard error	T-value	P-value
MKT	1.078	0.093	11.59	0.000
SMB	0.811	0.137	5.93	0.000
HML	-0.008	0.156	-0.05	0.961
RMW	-0.345	0.174	-1.98	0.048
CMA	0.621	0.229	2.71	0.007
Intercept (α)	0.015	0.004	3.86	0.000

R-squared	0.451
F-statistic	58.08
Prob > F	0.000

Table 2: Free Cash Flow Yield Full-sample regression

The Free Cash Flow Yield strategy demonstrates strong sensitivity to the market factor, with a beta coefficient of approximately 1.08 ($\beta_1 \approx 1.08$, $p < 0.01$), indicating substantial exposure to systematic market risk. The SMB factor is also positive and significant ($\beta_2 \approx 0.81$, $p < 0.01$), suggesting a pronounced tilt toward smaller firms. Furthermore, the value factor (HML) is statistically insignificant, indicating that the Free Cash Flow Yield strategy does not exhibit a reliable relationship with the traditional book-to-market based definition of value over the sample period. The coefficient for profitability (RMW) is negative and statistically significant at the 5% level ($\beta_4 \approx -0.35$, $p = 0.048$), implying a mild inverse relationship with the profitability factor. The investment factor (CMA) is positive and statistically significant ($\beta_5 \approx 0.62$, $p = 0.007$), suggesting that the strategy favors firms with more conservative investment behavior. The R-squared indicates that approximately 45.1% of the variation in the Free Cash Flow Yield strategy's returns is explained by the model, and the F-statistic of 58.08 with a p-value of 0.000 confirms that the regression is highly statistically significant overall.

The intercept (α) is statistically significant at the 1% level ($\alpha \approx 1.49\%$ per month, $p < 0.01$), indicating that the Free Cash Flow Yield strategy generates abnormal returns that cannot be explained by the five-factor model. This result provides evidence in support of the notion that strategies focusing on free cash flow can identify undervalued firms that deliver excess returns. The robustness of these findings is supported by diagnostic tests. No major concerns of heteroskedasticity or autocorrelation are present, and robust standard errors confirm the significance of the alpha term. VIF scores reveal no multicollinearity, and the Hausman test provides no evidence of endogeneity. This indicates that the Free Cash Flow Yield strategy delivers positive abnormal returns unexplained by standard risk factors, warranting a rejection of the null hypothesis of zero alpha.

4.2.2 EV/EBITDA Strategy

EV/EBITDA	Coefficient	Standard error	T-value	P-value
MKT	0.933	0.076	12.24	0.00
SMB	0.787	0.112	7.04	0.00
HML	0.013	0.128	0.11	0.92
RMW	-0.263	0.143	-1.84	0.07
CMA	0.138	0.188	0.73	0.46
Intercept (α)	0.013	0.003	3.96	0.00

R-squared	0.499
F-statistic	70.63
Prob > F	0.00

Table 3: EV/EBITDA Full-sample regression

The EV/EBITDA strategy exhibits strong and statistically significant exposure to the market factor, with a beta coefficient of approximately 0.93 ($\beta_1 \approx 0.93$, $p < 0.01$), indicating that the strategy closely tracks broad market movements. The size factor (SMB) also shows a significant and positive loading ($\beta_2 \approx 0.79$, $p < 0.01$), suggesting a pronounced tilt toward small-cap stocks. The HML, RMW and CMA factors loadings are not statistically significant, implying no reliable exposure to these factors under the five-factor model. Moreover, the model is statistically significant overall ($F = 70.63$, $p < 0.001$), confirming that the five factors jointly explain a substantial portion, about 49.9%, of the variation in EV/EBITDA strategy returns, though a considerable share remains unexplained.

Furthermore, the regression intercept is positive and statistically significant at the 1% level ($\alpha \approx 1.26\%$ per month, $p < 0.01$), indicating that the EV/EBITDA strategy delivers abnormal returns beyond those explained by its factor exposures. This suggests that investors may be rewarded for identifying firms with low Enterprise Value relative to EBITDA. Diagnostic tests confirm the robustness of the findings. The Breusch-Pagan test does not reveal the presence of heteroskedasticity, and the Durbin-Watson test suggests no serious autocorrelation. Multicollinearity is not a concern, with VIF values well below conventional thresholds, and the Hausman test does not indicate endogeneity. This result provides strong evidence that the EV/EBITDA strategy generates abnormal returns that are not captured by its exposure to the five factors, thereby supporting the rejection of the null hypothesis that alpha equals zero.

4.2.3 Shareholder Yield Strategy

SH Yield	Coefficient	Standard error	T-value	P-value
MKT	0.201	0.121	1.66	0.098
SMB	0.016	0.124	0.13	0.900
HML	0.088	0.230	0.38	0.703
RMW	-0.150	0.151	-0.99	0.322
CMA	0.064	0.276	0.23	0.816
Intercept (α)	0.004	0.004	0.90	0.369

R-squared	0.0364
F-statistic	2.37
Prob > F	0.0388

Table 4: Shareholder Yield Full-sample regression

The Shareholder Yield strategy does not exhibit any statistically significant loadings on the five Fama-French factors. Market exposure is weak and statistically inconclusive, and the strategy shows no reliable relationship with the size, value, profitability or investment factors. This suggests that its return pattern cannot be systematically explained by standard risk factors. Although the model is statistically significant at the 5% level ($F = 2.37$, $p = 0.0388$), the very low R-squared of 3.6% indicates that the Fama-French five-factor model explains only a small fraction of the variation in the Shareholder Yield strategy's returns.

The intercept ($\alpha \approx 0.35\%$ per month) is statistically insignificant ($p = 0.369$), indicating that the Shareholder Yield strategy does not deliver abnormal returns beyond what is explained by standard risk factors. This suggests that shareholder-oriented capital allocation through dividends, buybacks and debt reduction does not systematically translate into excess performance over the sample period. Regression diagnostics confirm the robustness of these findings, with no issues related to heteroskedasticity, autocorrelation, multicollinearity or endogeneity. Accordingly, there is insufficient evidence to reject the null hypothesis that alpha equals zero.

4.2.4 Greenblatt's Magic Formula Strategy

Greenblatt	Coefficient	Standard error	T-value	P-value
MKT	1.02	0.078	13.12	0.000
SMB	0.749	0.109	6.84	0.000
HML	0.084	0.118	0.71	0.480
RMW	-0.081	0.184	-0.44	0.661
CMA	0.260	0.200	1.30	0.195
Intercept (α)	0.005	0.003	1.98	0.048

R-squared	0.582
F-statistic	66.87
Prob > F	0.000

Table 5: Greenblatt's Magic Formula Full-sample regression

Greenblatt's Magic Formula displays a strong and statistically significant loading on the market factor, with a beta coefficient of approximately 1.02 ($\beta_1 \approx 1.02$, $p < 0.01$), indicating exposure to market movements. The SMB factor is also highly significant, with a coefficient of approximately 0.75 ($\beta_2 \approx 0.75$, $p < 0.01$), suggesting a consistent and pronounced tilt toward smaller firms. The HML, RMW and CMA factors loadings are not statistically significant, implying no reliable exposure to these factors under the five-factor model. Furthermore, with an R-squared of 58.2% and a highly significant F-statistic (66.87, $p < 0.001$), the model explains a substantial portion of the strategy's return variation, confirming strong overall explanatory power.

The intercept ($\alpha \approx 0.55\%$ per month, $p = 0.048$) is statistically significant at the 5% level, providing strong evidence that Greenblatt's Magic Formula delivers positive alpha not accounted for by the Fama-French five-factor model. This result reinforces the notion that the strategy may be capturing mispricing or behavioral inefficiencies in the market. Regression diagnostics including multicollinearity, endogeneity, autocorrelation, and heteroskedasticity were assessed, and robust standard errors were applied due to evidence of heteroskedasticity. The findings remain robust, confirming the reliability of the statistical inference. This supports the rejection of the null hypothesis of zero alpha, indicating that Greenblatt's Magic Formula generates positive abnormal returns not explained by exposure to the Fama-French five-factor model.

4.2.5 Summary of Hypothesis Testing

Hypthesis testing	Monthly Alpha	Significance	Null Hypothesis rejected
Free Cash Flow Yield	1.50%***	Yes	Yes
EV/EBITDA	1.26%***	Yes	Yes
Shareholder Yield	0.35%	No	No
Greenblatt's Magic Formula	0.50%**	Yes	Yes

P < 0.05 = **
P < 0.01 = ***

Table 6: Summary of Hypothesis Testing

The results of the hypothesis testing reveal that three of the four practitioner-based value strategies (Free Cash Flow Yield, EV/EBITDA and Greenblatt's Magic Formula) generate statistically significant alpha under the Fama-French five-factor model for the full sample period, leading us to reject the null hypothesis for these strategies. This suggests that their excess returns cannot be fully explained by the risk factors in the Fama-French five-factor model and may reflect pricing inefficiencies, behavioral effects or omitted variables. In contrast, the Shareholder Yield strategy does not exhibit statistically significant alpha. However, the Fama-French five-factor model also shows limited explanatory power in this case, as indicated by low R-squared values and generally insignificant factor loadings. Thus, while the null hypothesis is not rejected, the results do not strongly support the conclusion that the strategy's returns are explained by systematic risk factors either.

4.3 Subperiod Descriptive Statistics

While the baseline regressions provide valuable insights into the average relationships between strategy returns and risk factors over the full sample period, they assume static exposures across time. To test the robustness of these relationships and assess potential structural changes, subperiod regressions are conducted by splitting the sample into pre- and post-2007 periods. This test offers a more dynamic view of how practitioner-based value strategies interact with systematic risk factors across different market regimes.

4.3.1 Subperiod Portfolio Performance and Risk Characteristics

Pre 2007	Average annual return	Average annual excess return	Sharpe ratio	FF3FM	FF5FM
Free Cash Flow Yield	39.4%	35.1%	1.68	2.216%***	2.237%***
EV/EBITDA	38.5%	34.0%	1.69	2.221%***	2.419%***
Shareholder Yield	13.0%	9.4%	0.88	0.476%	0.442%
Greenblatt's Magic Formula	26.0%	22.1%	1.21	1.117%***	0.908%**

Table 7: Descriptive statistics Pre-2007

Table 7 presents the performance of the value investing strategies in the first of the two distinct subperiods (pre-2007). During the pre-2007 period, the Free Cash Flow Yield and EV/EBITDA strategies achieved strong returns, with annual excess returns of 35.1% and 34.0%. This can be compared to the US market's (AMEX, NYSE and NASDAQ) annualized excess return of 7.5% during the period. The Sharpe ratios for the two strategies are 1.68 and 1.69 respectively. Both strategies generated highly significant alpha estimates across Fama-French specifications, suggesting that their outperformance was not explained by conventional risk factors. Furthermore, Greenblatt's Magic Formula delivered robust performance, with an average annual excess return of 22.1%, a Sharpe ratio of 1.21, and statistically significant alpha across both models. This confirms the strategy's effectiveness in identifying undervalued, high-quality stocks in the earlier market environment. The Shareholder Yield strategy also performed strongly in this period, with a 9.4% excess return and a Sharpe ratio of 0.88. However, the strategy did not generate a significant alpha under the Fama-French specifications.

Post 2007	Average annual return	Average annual excess return	Sharpe ratio	FF3FM	FF5FM
Free Cash Flow Yield	20.8%	19.1%	0.56	0.90%	1.157%**
EV/EBITDA	10.9%	9.5%	0.40	0.026%	0.044%
Shareholder Yield	6.6%	5.5%	0.27	0.026%	0.117%
Greenblatt's Magic Formula	8.8%	7.3%	0.36	0.055%	0.292%

Table 8: Descriptive Statistics Post-2007

Post-2007, all strategies experienced a marked decline in performance. The Free Cash Flow Yield strategy remained the top performer with a 19.1% excess return, which can be compared to the US market's (AMEX, NYSE and NASDAQ) annualized excess return of 8.8%, and a Sharpe ratio of 0.56, still delivering statistically significant alpha under the Fama-French five-factor model. In contrast, EV/EBITDA, Greenblatt's Magic Formula and

Shareholder Yield strategies saw a substantial deterioration, with the Greenblatt and EV/EBITDA strategies' alpha losing significance in the Fama-French models and Shareholder Yield remaining statistically insignificant.

These results indicate that while the Free Cash Flow Yield strategy maintained its edge after the financial crisis, the broader landscape of value investing became more competitive or efficient, reducing abnormal returns in several previously effective strategies.

Chow tests confirm structural breaks across all four strategies, validating the decision to divide the sample into pre- and post-2007 subperiods. These results suggest that the return-generating processes underlying practitioner-based value strategies are not temporally stable, with shifts in factor exposures and alpha significance emerging after the financial crisis.

4.4 Subperiod Regressions and Factor Exposures

To complement the descriptive statistics presented above, this section examines how each value investing strategy's factor exposures and alpha estimates evolve across the pre- and post-2007 subperiods. Using time-series regressions based on the Fama-French five-factor model, we evaluate whether these strategies generate abnormal returns not accounted for by systematic risk factors in each period. Results are presented separately for each strategy, highlighting differences in systematic risk exposures, significance of alpha, and the stability of return drivers before and after the financial crisis.

4.4.1 Free Cash Flow Yield Strategy

FCF Yield	Coefficient	Standard error	T-value	P-value
MKT	0.938	0.121	7.77	0.000
SMB	0.514	0.126	4.07	0.000
HML	0.244	0.209	1.17	0.245
RMW	-0.376	0.185	-2.03	0.044
CMA	0.514	0.238	2.16	0.032
Intercept (α)	0.022	0.004	5.35	0.000

R-squared	0.517
F-statistic	30.79
Prob > F	0.000

Table 9: Free Cash Flow Yield Pre-2007

During the pre-2007 period, the Free Cash Flow Yield strategy exhibits statistically significant positive loadings on the market and size factors, suggesting broad market exposure and a strong tilt toward small-cap stocks. Additionally, the strategy loads negatively on the profitability factor (RMW) and positively on the investment factor (CMA), both statistically significant at the 5% level, indicating a tendency to favor less profitable but more conservatively investing firms. The HML factor is not statistically significant in this period. The intercept is positive and highly significant ($\alpha \approx 2.24\%$, $p < 0.01$), supporting the presence of abnormal returns not captured by the five-factor model. Diagnostic tests validate the robustness of these results with no evidence of multicollinearity, endogeneity, heteroskedasticity or autocorrelation.

FCF Yield	Coefficient	Standard error	T-value	P-value
MKT	1.135	0.129	8.81	0.000
SMB	1.284	0.245	5.24	0.000
HML	-0.515	0.224	-2.30	0.022
RMW	-0.971	0.306	-3.17	0.002
CMA	0.839	0.358	2.35	0.020
Intercept (α)	0.012	0.006	2.04	0.043

R-squared	0.488
F-statistic	38.86
Prob > F	0.000

Table 10: Free Cash Flow Yield Post-2007

During the post-2007 period, the Free Cash Flow Yield strategy continues to exhibit statistically significant exposure to the market and size factors, indicating that its returns remain influenced by broad market trends and a pronounced small-cap tilt. Additionally, the value factor (HML) becomes significantly negative, suggesting an inverse relationship with traditional book-to-market-defined value stocks. The strategy also loads negatively on profitability (RMW) and positively on investment (CMA), both statistically significant, indicating that it favors less profitable firms with more conservative investment profiles. The intercept remains positive and statistically significant ($\alpha \approx 1.16\%$, $p = 0.043$), providing continued evidence of abnormal returns not fully explained by the five-factor model. Diagnostic checks confirm the reliability of these estimates with no violations of core regression assumptions.

4.4.2 EV/EBITDA Strategy

EV/EBITDA	Coefficient	Standard error	T-value	P-value
MKT	0.941	0.106	8.90	0.000
SMB	0.748	0.111	6.77	0.000
HML	0.509	0.183	2.78	0.006
RMW	-0.309	0.162	-1.91	0.058
CMA	-0.273	0.208	-1.31	0.193
Intercept (α)	0.024	0.004	6.60	0.000

R-squared	0.639
F-statistic	50.95
Prob > F	0.000

Table 11: EV/EBITDA Pre-2007

During the pre-2007 period, the EV/EBITDA strategy shows statistically significant exposure to the market, size and value factors, indicating alignment with these dimensions of systematic risk. Loadings on the profitability (RMW) and investment (CMA) factors are statistically insignificant, suggesting limited relevance of these dimensions during this period. The strategy's intercept remains highly significant ($\alpha \approx 2.42\%$, $p < 0.01$), providing evidence of abnormal returns not fully captured by the five-factor model. Diagnostic tests confirm the robustness of these findings, with no indication of heteroskedasticity, autocorrelation, multicollinearity or endogeneity.

EV/EBITDA	Coefficient	Standard error	T-value	P-value
MKT	0.962	0.104	9.21	0.000
SMB	0.975	0.199	4.91	0.000
HML	-0.414	0.182	-2.28	0.024
RMW	-0.645	0.248	-2.64	0.009
CMA	0.498	0.290	1.72	0.087
Intercept (α)	0.004	0.005	0.96	0.339

R-squared	0.488
F-statistic	38.86
Prob > F	0.000

Table 12: EV/EBITDA Post-2007

During the post-2007 period, the EV/EBITDA strategy continues to exhibit statistically significant exposure to the market and size factors, indicating persistent alignment with broad market movements and a strong tilt toward small-cap stocks. Notably, the strategy also shows a statistically significant negative loading on the HML factor, suggesting a tilt away from traditional book-to-market-defined value stocks. In addition, the RMW factor becomes significantly negative, indicating a tilt away from highly profitable firms. The CMA factor remains insignificant, and the intercept is no longer statistically significant, implying that the strategy's returns are now largely explained by its factor exposures. Diagnostic tests confirm the validity of the results, with no major violations of OLS assumptions detected.

4.4.3 Shareholder Yield Strategy

SH Yield	Coefficient	Standard error	T-value	P-value
MKT	0.496	0.086	5.76	0.000
SMB	0.207	0.092	2.25	0.026
HML	0.263	0.150	1.75	0.082
RMW	0.087	0.135	0.65	0.520
CMA	-0.033	0.172	-0.19	0.846
Intercept (α)	0.004	0.003	1.51	0.134

R-squared	0.210
F-statistic	9.57
Prob > F	0.000

Table 13: Shareholder Yield Pre-2007

During the pre-2007 period, the Shareholder Yield strategy exhibits statistically significant exposure to the market and size factors, indicating sensitivity to general market trends and a mild tilt toward smaller firms. Factor exposures to HML, RMW and CMA are statistically insignificant. The intercept is positive but not statistically significant, suggesting that the strategy does not deliver abnormal returns beyond those explained by systematic risk factors in this period. Diagnostic tests confirm the robustness of these results, with no indication of heteroskedasticity, multicollinearity, endogeneity or autocorrelation.

SH Yield	Coefficient	Standard error	T-value	P-value
MKT	0.115	0.116	0.99	0.326
SMB	-0.049	0.221	-0.22	0.824
HML	0.005	0.201	0.02	0.982
RMW	-0.329	0.274	-1.2	0.231
CMA	0.232	0.323	0.72	0.473
Intercept (α)	0.001	0.005	0.23	0.822

R-squared	0.018
F-statistic	0.68
Prob > F	0.637

Table 14: Shareholder Yield Post-2007

In the post-2007 period, none of the five Fama-French factors show significant explanatory power, and the intercept remains statistically insignificant. This suggests that the Shareholder Yield strategy does not deliver alpha in the later period either, and that its performance is not reliably captured by risk factor exposures across regimes.

4.4.4 Greenblatt's Magic Formula Strategy

Greenblatt	Coefficient	Standard error	T-value	P-value
MKT	1.18	0.109	10.82	0.000
SMB	0.723	0.114	6.36	0.000
HML	0.099	0.189	0.53	0.599
RMW	0.245	0.167	1.47	0.144
CMA	0.416	0.215	1.94	0.055
Intercept (α)	0.009	0.004	2.40	0.017

R-squared	0.577
F-statistic	31.18
Prob > F	0.000

Table 15: Greenblatt's Magic Formula Pre-2007

During the pre-2007 period, Greenblatt's Magic Formula exhibits statistically significant positive loadings on the market and size factors, suggesting exposure to general market movements and a pronounced tilt toward smaller firms. The strategy's coefficients on the value (HML), profitability (RMW) and investment (CMA) factors are statistically insignificant, indicating limited alignment with these dimensions of risk. The intercept is positive and statistically significant at the 5% level ($\alpha \approx 0.91\%$, $p < 0.05$), supporting the presence of abnormal returns not fully explained by the five-factor model. Diagnostic tests confirm the robustness of these findings, with no evidence of heteroskedasticity, autocorrelation, multicollinearity or endogeneity.

Greenblatt	Coefficient	Standard error	T-value	P-value
MKT	1.005	0.080	12.55	0.000
SMB	0.938	0.152	6.15	0.000
HML	-0.193	0.139	-1.39	0.167
RMW	-0.716	0.190	-3.76	0.000
CMA	0.323	0.223	1.45	0.148
Intercept (α)	0.003	0.004	0.83	0.409

R-squared	0.642
F-statistic	73.13
Prob > F	0.000

Table 16: Greenblatt's Magic Formula Post-2007

During the post-2007 period, Greenblatt's Magic Formula maintains statistically significant positive exposure to the market and size factors, indicating continued sensitivity to broad market movements and small-cap stocks. The profitability factor (RMW) loads negatively and is statistically significant at the 1% level, suggesting a tilt away from highly profitable firms in the latter period. The HML and CMA factors remain statistically insignificant. The intercept is positive but statistically insignificant ($\alpha \approx 0.30\%$, $p = 0.409$), indicating that the strategy does not deliver abnormal returns beyond those explained by standard risk exposures in this subperiod. Diagnostic tests confirm the reliability of these results, with no indication of heteroskedasticity, multicollinearity, endogeneity or autocorrelation.

4.4.5 Summary of Subperiod Analysis

In summary, the subperiod regressions reveal a notable shift in both factor exposures and alpha significance following the 2007–2008 financial crisis. While the Free Cash Flow Yield strategy continues to deliver significant abnormal returns post-crisis, the EV/EBITDA and Greenblatt's Magic Formula strategies show diminished alpha in the later period. Across all strategies, the Chow test confirms structural breaks in return-generating processes, supporting the view that market dynamics and investor behavior changed meaningfully after 2007. These findings suggest that the explanatory power of factor models is not stable across regimes, highlighting the importance of accounting for temporal variation when evaluating strategy performance.

4.5 Diagnostic Evaluation of Model Validity

To ensure the reliability of our regression estimates, we conducted a series of diagnostic tests for multicollinearity, heteroskedasticity, autocorrelation and endogeneity across all four strategies. Variance Inflation Factors (VIFs) ranged between 2.0 and 2.5, indicating no severe multicollinearity. The Breusch-Pagan test revealed heteroskedasticity only for Greenblatt's Magic Formula strategy for the full sample period, and hence robust standard errors were applied to ensure valid inference. The Durbin-Watson statistic indicated no evidence of autocorrelation in any of the four strategies.

Furthermore, potential endogeneity was tested using Hausman tests with lagged instruments in a two-stage least squares (2SLS) framework. The tests failed to reject the null hypothesis of exogeneity across all factors and strategies ($p > 0.10$), supporting the validity of the OLS estimates. These diagnostics confirm the empirical robustness of the findings and help mitigate the risk of biased inference due to econometric violations.

4.6 Summary of Empirical Findings

Overall, the empirical findings indicate that three of the four practitioner-based value strategies, Free Cash Flow Yield, EV/EBITDA and Greenblatt's Magic Formula, deliver statistically and economically significant alpha over the full sample period. This suggests the presence of abnormal returns is not fully captured by the Fama-french five-factor model. However, the strength and persistence of alpha vary over time. In the post-2007 period, both Greenblatt's Magic Formula and the EV/EBITDA strategy lose their statistical significance, while Free Cash Flow Yield remains robust. The Shareholder Yield strategy fails to generate significant alpha in any period. Across all strategies, factor exposures are dominated by persistent loadings on the market and size factors, whereas HML exposures are weak or negative. These patterns challenge the continued relevance of traditional value definitions and underscore the need to account for time-varying dynamics in factor model evaluations. Furthermore, it is important to note that the results reflect portfolios constructed from the top 30 ranked stocks per strategy, which may amplify exposure to idiosyncratic risk and increase alpha variance, particularly in strategies with lower diversification across sectors or market capitalizations.

5. Discussion

This section bridges the empirical findings with the theoretical insights outlined in the literature review. We focus on how the performance and explanatory patterns of practitioner-based value investing strategies relate to evolving market dynamics, shifts in asset pricing frameworks, and the limitations of contemporary factor models.

5.1 The Declining Explanatory Power of HML

Our results show that the HML factor, which captures traditional value based on book-to-market ratios, is statistically insignificant across nearly all strategies and periods. In some post-2007 regressions, the HML loading is even negative. This supports prior research (Blitz and Hanauer, 2021; Novy-Marx, 2013; Fama and French, 2015) that questions the modern relevance of HML due to its failure to capture intangible asset value and dynamic firm characteristics. Our findings reinforce the notion that traditional definitions of value have lost predictive power, suggesting that modern asset pricing models may require additional factors to more effectively explain the return dynamics of practitioner-based strategies.

Moreover, the HML factor's declining performance may reflect structural changes in the global economy. The growing dominance of firms with high intangible assets, such as technology companies, challenges the relevance of book-based valuation metrics. These companies typically show low book-to-market ratios despite strong earnings and profitability. Consequently, value investing strategies rooted in book value may overlook such firms, leading to diminished HML factor performance.

5.2 Persistent Alpha in the Free Cash Flow Yield Strategy

The Free Cash Flow Yield strategy generates statistically significant alpha across all models and subperiods. This aligns with studies highlighting the strength of cash-based metrics in identifying undervalued yet financially sound firms (Wesley and Vogel, 2014; Novy-Marx, 2013). Notably, as the negative RMW coefficient indicates, the strategy avoids highly profitable firms, yet still produces abnormal returns. This suggests that Free Cash Flow Yield captures aspects of firm value and investor behavior not explained by standard risk factors. One possible explanation is that, unlike accrual-based earnings, free cash flow is less prone to accounting manipulation and more reflective of a firm's underlying financial health, an insight supported by Richardson et al. (2005), who demonstrate that free cash flows provide a more reliable proxy for firm performance.

Additionally, the consistent outperformance of the Free Cash Flow Yield strategy during both market regimes suggests that this approach may be robust to macroeconomic and structural changes. Its focus on internally generated cash flows offers a resilient screening metric that may be less sensitive to accounting adjustments or investor sentiment. This finding invites future exploration into how free cash flow metrics may serve as a cornerstone for next-generation factor models.

5.3 The Size Effect and Persistent SMB Loadings

A consistent empirical pattern across all four strategies is the presence of statistically significant positive loadings on the SMB factor, indicating a strong and persistent tilt toward small-cap stocks. This result holds both in full-sample and subperiod regressions, suggesting that size exposure is a core characteristic of practitioner-based value strategies. This outcome is not unexpected, as a majority of firms in the Fama-French universe (and our sample) are classified as small, and our portfolios are equally weighted, giving proportionally greater influence to smaller firms compared to value-weighted indices.

While the existence of a size premium has been debated in recent literature (e.g., van Dijk, 2011; Fama and French, 2015), our findings lend support to the notion that smaller firms continue to offer excess return potential, particularly when selected through cash-flow-based or enterprise-value-focused screens. The persistence of small-cap exposure may reflect both market structure and behavioral dynamics. From a structural perspective, small firms are less covered by analysts and more prone to mispricing due to lower liquidity and limited institutional ownership. Behaviorally, investors may exhibit aversion to perceived risk with smaller firms, leading to systematic underpricing.

These factors are consistent with the idea that size-related return premia, while less pronounced than in earlier decades, may still be relevant within carefully constructed value strategies. Overall, the prominence of SMB across all four strategies suggests that size exposure remains an important driver of practitioner-based value performance. This has implications for both portfolio construction and factor model development, reinforcing the need to consider the nuanced interaction between size, valuation approach and informational frictions in asset pricing frameworks.

5.4 Structural Breaks and Market Efficiency

A key insight from our subperiod analysis is the sharp decline in excess returns for all the strategies and the alpha post-2007 for two out of four strategies. Chow tests confirm structural breaks in return-generating processes, consistent with the notion that the 2007–2008 financial crisis marked a regime shift. Literature by Bai et al. (2016) and Chordia et al. (2011) supports this view, documenting increased market efficiency due to technological innovation, algorithmic trading and improved information dissemination. These developments have likely compressed mispricing opportunities, making it harder for traditional value strategies to outperform.

This shift may also reflect the increased popularity and institutionalization of factor investing itself. As value strategies become more widely adopted and systematized via ETFs and quant funds, the alpha they generate may be arbitraged away. This reinforces the importance of monitoring how investor behavior and market structure influence the lifecycle of factor premiums.

As Fama (1991) highlights, tests of market efficiency are joint tests of both efficiency and the validity of the asset pricing model used. Therefore, when significant alpha is observed, as in the Free Cash Flow Yield, EV/EBITDA and Greenblatt's Magic Formula strategies, it remains unclear whether this reflects genuine mispricing or model misspecification. This limitation underscores the need for caution when interpreting alpha as definitive evidence of inefficiency.

5.5 Model Fit and Statistical Significance in Context

Across the regressions, we observe varying degrees of model fit, as captured by R-squared values, and differing levels of overall model significance as measured by the F-statistic and its corresponding p-value (Prob > F). These diagnostics help us understand how well the Fama-French five-factor model explains each strategy's return profile. The Free Cash Flow Yield, EV/EBITDA and Greenblatt's Magic Formula strategies exhibit relatively high R-squared values (above 0.45) and large F-statistics with highly significant p-values ($p < 0.001$), confirming that the model captures a substantial portion of systematic return variation. This aligns with Fama and French’s (1993, 2015) view that multifactor models can explain broad patterns in asset pricing.

By contrast, the Shareholder Yield strategy shows a notably low R-squared (around 0.04) and a much smaller F-statistic, indicating a weaker model fit and more limited explanatory power. Although the Prob > F is marginally significant, this likely reflects statistical sensitivity rather than economic robustness. In practical terms, this indicates that the model may pass a formal significance test without meaningfully explaining the variation in returns, thereby limiting the economic relevance of its factor loadings.

These findings resonate with Boudoukh et al. (2007) and Wesley and Vogel (2014), who emphasize that implementation details, such as how repurchases and debt reduction are measured, strongly influence the predictive strength of payout-based strategies. In our case, the muted explanatory power suggests either omitted variable bias or that the Fama-French factors are insufficient to explain the strategy’s return-generating process.

Furthermore, the divergence in R-squared values across strategies may reflect the evolving nature of market efficiency. As highlighted by Bai et al. (2016), modern equity markets increasingly incorporate firm-level fundamentals more effectively, possibly limiting the explanatory potential of factor exposures in strategies that rely on capital return metrics or qualitative screens. Thus, while high R-squared values in some regressions underscore the model’s relevance, the inconsistency across strategies highlights the limitations of applying a single framework to diverse practitioner-driven approaches.

5.6 Greenblatt’s Magic Formula: A Case of Factor Crowding?

Greenblatt’s strategy shows a strong pre-2007 alpha that fades post-2007. While earlier literature (Greenblatt, 2006; Novy-Marx, 2013) documents its effectiveness, the decline in post-crisis alpha could be attributed to factor crowding, where popular strategies become less effective as more investors adopt them (Asness and Frazzini, 2013). This saturation of trades erodes arbitrage opportunities, consistent with the life cycle theory of factor premiums.

An alternative explanation is the increasing transparency and accessibility of Greenblatt’s approach, which may have allowed market participants to arbitrage away its edge. As backtests and rule-based replication tools become common, widely followed strategies become vulnerable to diminished excess returns due to anticipatory trading and overexposure.

5.7 Shareholder Yield's Inconclusive Performance

Despite prior evidence of its predictive power (Boudoukh et al., 2007; Wesley and Vogel, 2014), the Shareholder Yield strategy does not deliver statistically significant alpha over the full sample period or in any subperiod. This could reflect differences in implementation, such as the exclusion of net-debt paydown, or changing market expectations surrounding share repurchases. It may also indicate that shareholder payout activities are now more efficiently priced, reducing their potential to generate excess returns. This interpretation is further supported by the correlation matrix (Appendix 4), which shows that Shareholder Yield exhibits only weak correlation with the other strategies. This suggests that it captures a distinct return profile, reinforcing the idea that it behaves differently from more valuation- or profitability-driven approaches.

5.8 Behavioral Finance Implications

The presence of unexplained alpha, especially in the Free Cash Flow Yield and EV/EBITDA strategies, aligns with behavioral finance theories suggesting persistent mispricings due to investor overreaction, underreaction and sentiment-driven biases (De Bondt and Thaler, 1985; Barberis et al., 1998; Baker and Wurgler, 2006). These strategies may exploit inefficiencies that persist despite the rise in market efficiency, especially if limits to arbitrage (Shleifer and Vishny, 1997) and institutional constraints (Lakonishok et al., 1994) remain relevant.

Furthermore, the failure of standard factor models to explain alpha may reflect a lack of behavioral components in these frameworks. Investors may systematically underprice firms with strong cash flows or operational efficiency due to biases in evaluating intangible qualities, risk or past performance. Our findings point to a gap between rational risk-based explanations and real-world investor behavior, suggesting that hybrid models incorporating behavioral elements could enhance explanatory power. One such behavioral element could be the inclusion of a momentum factor, which captures the tendency of stocks that have performed well in the recent past to continue outperforming in the short term, and vice versa for underperformers.

5.9 Implications for Asset Pricing Models

Finally, our results highlight the limitations of the Fama-French five-factor model. While it captures a substantial portion of systematic variation, it fails to explain the alpha observed in several modern value strategies. This echoes Fama and French's (2015) own acknowledgment that additional dimensions may be needed to fully capture cross-sectional return variation. Our findings suggest that practitioner-based strategies built on relative profitability, enterprise value and free cash flow may reflect pricing dimensions overlooked by current academic models, underscoring the need for updated frameworks that better align with real-world investment practices.

Importantly, the divergence between statistically significant alpha and factor loadings challenges the completeness of linear factor-based frameworks. It may be necessary to explore nonlinear specifications, machine learning models or models with time-varying betas to more accurately capture return-generating processes. Future research might also examine whether hybrid models that blend behavioral, fundamental and macroeconomic factors can better reconcile empirical anomalies with theoretical expectations.

5.10 Summary

Taken together, our findings support the conclusion that while contemporary factor models offer valuable insights, they are increasingly insufficient in capturing the performance of contemporary value investing strategies. Strategies that emphasize modern valuation metrics and cash flow-based screening criteria appear to remain effective, even in a more developed market regime. These results underscore the continued evolution of both markets and asset pricing theories, and suggest a need for greater integration between academic models and practitioner insights.

6. Conclusion

This thesis helps bridge the gap between practitioner-based value investing and academic asset pricing by evaluating four real-world strategies, Greenblatt's Magic Formula, Free Cash Flow Yield, Shareholder Yield and EV/EBITDA, through the lens of the Fama-French five-factor model. By using monthly U.S. equity data from 1994 to 2024, we assess whether these strategies deliver abnormal returns (alpha) unexplained by standard risk factors.

Our results show that three out of four strategies, Greenblatt's Magic Formula, Free Cash Flow Yield and EV/EBITDA, generate statistically significant alpha over the full sample period, leading to a rejection of the null hypothesis of zero alpha for these strategies. Notably, Free Cash Flow Yield maintains significance even in the post-2007 subperiod, suggesting robustness to structural changes in market efficiency. These findings highlight persistent inefficiencies in capital markets and point to the limitations of linear factor models in capturing modern value signals.

Consistent and significant exposure to the SMB factor across all strategies confirms the enduring relevance of the size effect in practitioner-based portfolios. In contrast, HML loadings are weak or negative, particularly post-2007, underscoring the diminishing usefulness of book-to-market as a proxy for value. Together, these results align with growing academic skepticism toward traditional value definitions and reinforce the argument that incorporating metrics such as cash flow efficiency, operational quality, and capital discipline may provide a more robust foundation for value investing in contemporary markets.

While these results are robust and informative, several limitations must be acknowledged. First, the analysis is restricted to U.S. equities, limiting the external validity of our findings. Second, portfolios are constructed using the top 30 equal-weighted stocks per strategy, which increases exposure to idiosyncratic risk and may not fully reflect real-world constraints such as liquidity or transaction costs. Third, the empirical framework assumes linear and time-invariant relationships between factors and returns, which may overlook evolving market dynamics. Lastly, while behavioral explanations are proposed to interpret alpha, these mechanisms are not directly tested within the regression framework.

Future research could address these limitations by replicating this methodology in international markets, testing alternative portfolio designs (e.g., value weighting or dynamic rebalancing), and by incorporating behavioral proxies such as investor sentiment, media attention or retail flows. Furthermore, exploring nonlinear asset pricing models or machine learning approaches might improve explanatory power by capturing more complex patterns in return generation.

In summary, this thesis finds that modern value strategies rooted in practitioner heuristics exhibit consistent performance that is not fully captured by the Fama-French five-factor model. These results underscore the need for a more integrated approach between academic theory and investment practice, recognizing that as markets evolve, so too must the models used to explain them.

7. Reference list

7.1 Published articles

Aharoni, G., Grundy, B. D., & Zeng, Q. (2013). Stock returns and the Miller Modigliani valuation formula: Revisiting the Fama-French analysis. *Journal of Financial Economics*, 110(2), 347–357. https://doi.org/10.1016/j.jfineco.2013.08.003

Asness, C., & Frazzini, A. (2013). The devil in HML's details. *The Journal of Portfolio Management*, 39(4), 49–68. https://www.proquest.com/docview/1428164974

Bai, J., Philippon, T., & Savov, A. (2016). *Have financial markets become more informative?* Journal of Financial Economics, 122(3), 625–654. https://doi.org/10.1016/j.jfineco.2016.08.008

Baker, M., & Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *The Journal of Finance*, 61(4), 1645–1680. https://www.jstor.org/stable/3874723

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, 9(1), 3–18. https://doi.org/10.1016/0304-405X(81)90018-0

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. *Journal of Financial Economics*, 49(3), 307–343. https://doi.org/10.1016/S0304-405X(98)00027-0

Basu, S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis. *Journal of Finance*, 32(3), 663–682. https://doi.org/10.2307/2326304

Bhandari, L. C. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance*, 43(2), 507–528. https://doi.org/10.2307/2328473

Blitz, D. & Hanauer, M. X. (2021). Resurrecting the Value Premium. *The Journal of Portfolio Management*, 47(2), 63–81. https://doi.org/10.3905/jpm.2020.1.188

Boudoukh, J., Michaely, R., Richardson, M., & Roberts, M. R. (2007). On the importance of measuring payout yield: Implications for empirical asset pricing. *The Journal of Finance*, 62(2), 877–915. https://www.jstor.org/stable/4622289

Chordia, T., Roll, R., & Subrahmanyam, A. (2011). *Recent trends in trading activity and market quality.* Journal of Financial Economics, 101(2), 243–263. https://doi.org/10.1016/j.jfineco.2011.03.001

De Bondt, W. F. M., & Thaler, R. (1985). Does the stock market overreact? *Journal of Finance*, 40(3), 793–805. https://doi.org/10.2307/2327804

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25(2), 383–417. https://doi.org/10.2307/2325486

Fama, E. F. (1991). Efficient capital markets: II. *Journal of Finance, 46*(5), 1575–1617. https://doi.org/10.2307/2328565

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *Journal of Finance*, 47(2), 427–465. https://doi.org/10.2307/2329112

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116(1), 1–22. https://doi.org/10.1016/j.jfineco.2014.10.010

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–292. https://doi.org/10.2307/1914185

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *Journal of Finance*, 49(5), 1541–1578. https://doi.org/10.2307/2329262

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. Review of Economics and Statistics, 47(1), 13–37. https://doi.org/10.2307/1924119

Loughran, T., & Wellman, J. W. (2011). New evidence on the relation between the enterprise multiple and average stock returns. *Journal of Financial and Quantitative Analysis*, 46(6), 1629–1650. https://www.jstor.org/stable/41409663

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, 108(1), 1–28. https://doi.org/10.1016/j.jfineco.2013.01.003

Petkova, R. (2006). Do the Fama–French factors proxy for innovations in predictive variables? *Journal of Finance*, 61(2), 581–612. https://www.jstor.org/stable/3699352

Richardson, S. A., Sloan, R. G., Soliman, M. T., & Tuna, İ. (2005). Accrual reliability, earnings persistence, and stock prices. *Journal of Accounting and Economics*, 39(3), 437–485. https://doi.org/10.1016/j.jacceco.2005.04.005

Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive evidence of market inefficiency. *Journal of Portfolio Management*, 11(3), 9–16. https://doi.org/10.3905/jpm.1985.409007

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425–442. https://doi.org/10.2307/2977928

Shleifer, A., & Vishny, R. W. (1997). The limits of arbitrage. *Journal of Finance*, 52(1), 35–55. https://doi.org/10.2307/2329555

Van Dijk, M. A. (2011). Is size dead? A review of the size effect in equity returns. *Journal of Banking & Finance*, 35(12), 3263–3274. https://doi.org/10.1016/j.jbankfin.2011.05.009

Wesley, D., & Vogel, W. (2014). Enhancing the Investment Performance of Yield-Based Strategies. *Journal of Investing*, 23(2), 44–50. https://doi.org/10.3905/joi.2014.23.2.044

7.2 Books

Graham, B., & Dodd, D. L. (1934). *Security Analysis*. McGraw-Hill.

Greenblatt, J. (2006). *The Little Book That Beats the Market*. John Wiley & Sons.

7.3 Databases

French, K. R. (2025). Data library. Retrieved from https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

S&P Global. (2025). S&P Capital IQ database. Retrieved from https://www.capitaliq.com/CIQDotNet/Login-okta.aspx

8. Appendices

Appendix 1: Summary of Regression Output

FCF Yield	CAPM	P-Value	FF 3-Factor	P-Value	FF 5-Factor	P-Value
MKT	1.187	0.000	1.042	0.000	1.078	0.000
SMB	N/A	N/A	0.957	0.000	0.811	0.000
HML	N/A	N/A	0.151	0.175	-0.008	0.961
RMW	N/A	N/A	N/A	N/A	-0.345	0.0048
CMA	N/A	N/A	N/A	N/A	0.621	0.007
Intercept (α)	0.015	0.000	0.015	0.000	0.015	0.000

	CAPM	FF 3-Factor	FF 5-Factor
R-squared	0.330	0.432	0.451
F-statistic	176.44	90.10	58.08
Prob > F	0.000	0.000	0.000

Table A1: Free Cash Flow Yield Regression Summary. Monthly excess returns regressed against the CAPM, Fama-French 3-Factor, and 5-Factor models for the full sample period (1994–2024).

EV/EBITDA	CAPM	P-Value	FF 3-Factor	P-Value	FF 5-Factor	P-Value
MKT	1.095	0.000	0.951	0.000	0.934	0.000
SMB	N/A	N/A	0.889	0.000	0.787	0.000
HML	N/A	N/A	-0.04	0.961	0.013	0.916
RMW	N/A	N/A	N/A	N/A	-0.264	0.066
CMA	N/A	N/A	N/A	N/A	0.138	0.464
Intercept (α)	0.011	0.001	0.112	0.000	0.126	0.000

	CAPM	FF 3-Factor	FF 5-Factor
R-squared	0.380	0.494	0.499
F-statistic	219.40	115.63	70.64
Prob > F	0.000	0.000	0.000

Table A2: EV/EBITDA Regression Summary. Monthly excess returns regressed against the CAPM, Fama-French 3-Factor, and 5-Factor models for the full sample period (1994–2024).

SH Yield	CAPM	P-Value	FF 3-Factor	P-Value	FF 5-Factor	P-Value
MKT	0.220	0.001	0.213	0.002	0.201	0.009
SMB	N/A	N/A	0.073	0.463	0.016	0.890
HML	N/A	N/A	0.072	0.425	0.088	0.493
RMW	N/A	N/A	N/A	N/A	-0.150	0.294
CMA	N/A	N/A	N/A	N/A	0.064	0.733
Intercept (α)	0.003	0.326	0.003	0.338	0.004	0.270

	CAPM	FF 3-Factor	FF 5-Factor
R-squared	0.030	0.033	0.036
F-statistic	10.92	4.04	2.68
Prob > F	0.001	0.001	0.022

Table A3: Shareholder Yield Regression Summary. Monthly excess returns regressed against the CAPM, Fama-French 3-Factor, and 5-Factor models for the full sample period (1994–2024).

Greenblatt	CAPM	P-Value	FF 3-Factor	P-Value	FF 5-Factor	P-Value
MKT	1.118	0.000	1.001	0.000	1.025	0.000
SMB	N/A	N/A	0.786	0.000	0.749	0.000
HML	N/A	N/A	0.168	0.028	0.084	0.439
RMW	N/A	N/A	N/A	N/A	-0.081	0.504
CMA	N/A	N/A	N/A	N/A	0.260	0.102
Intercept (α)	0.006	0.056	0.006	0.028	0.005	0.042

	CAPM	FF 3-Factor	FF 5-Factor
R-squared	0.466	0.578	0.582
F-statistic	311.73	162.21	98.36
Prob > F	0.000	0.000	0.000

Table A4: Greenblatt's Magic Formula Regression Summary. Monthly excess returns regressed against the CAPM, Fama-French 3-Factor, and 5-Factor models for the full sample period (1994–2024).

Appendix 2: Summary Pre- and Post-2007 Regression Output

5-factor	FCF Yield	EV/EBITDA	Shareholder Yield	Greenblatt
MKT	0.938***	0.941***	0.496***	1.177***
SMB	0.514***	0.748***	0.207**	0.723***
HML	0.244	0.509***	0.263*	0.099
RMW	-0.376**	-0.310*	0.087	0.245
CMA	0.514**	-0.273	-0.033	0.416*
Intercept (α)	0.022***	0.024***	0.004	0.009**
R-squared	0.512	0.639	0.235	0.577
F-statistic	30.79	50.95	9.57	39.24
Prob > F	0.000	0.000	0.000	0.000

*Table A5: Pre-2007 Regression Results against the Fama-French 5-Factor Model. Coefficients reflect monthly excess return regressions from July 1993 to June 2007. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.*

5-factor	FCF Yield	EV/EBITDA	Shareholder Yield	Greenblatt
MKT	1.135***	0.962***	0.114	1.005***
SMB	1.284***	0.975***	-0.049	0.938***
HML	-0.515**	-0.414**	0.005	-0.193
RMW	-0.971***	-0.654***	-0.329	-0.716***
CMA	0.839**	0.498*	0.232	0.323
Intercept (α)	0.012**	0.044	0.001	0.003
R-squared	0.493	0.0488	0.018	0.642
F-statistic	39.74	38.86	0.68	73.13
Prob > F	0.000	0.000	0.637	0.000

Table A6: Post-2007 Regression Results against the Fama-French 5-Factor Model.
Coefficients reflect monthly excess return regressions from July 2007 to June 2023.
*Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.*

Appendix 3: Diagnostic Tests Summary

Strategy	Multicollinearity	Endogeneity	Heteroskedasticity	Autocorrelation
FCF Yield	No evidence (VIF <5)	No	No	No
EV/EBITDA	No evidence (VIF <5)	No	No	No
SH Yield	No evidence (VIF <5)	No	No	No
Greenblatt	No evidence (VIF <5)	No	Yes*	No

Table A7: Diagnostic tests summary for all four value strategies, covering multicollinearity, endogeneity, heteroskedasticity and autocorrelation.
**Robust standard errors are applied for Greenblatt Magic Formula due to detected heteroskedasticity.*

Appendix 4: Strategy Correlation Matrix

Correlation Matrix	FCF Yield	EV/EBITDA	Shareholder Yield	Greenblatt
FCF Yield	1.000	0.601***	0.131**	0.550***
EV EBITDA	0.601***	1.000	0.157***	0.801***
Shareholder Yield	0.131**	0.157***	1.000	0.137***
Greenblatt	0.550***	0.801***	0.137***	1.000
R-squared	0.493	0.0488	0.018	0.642
F-statistic	39.74	38.86	0.68	73.13
Prob > F	0.000	0.000	0.637	0.000

Table A8: Pairwise Pearson correlations for the four practitioner-based value strategies. The matrix reveals strong correlations between Greenblatt Magic Formula, EV/EBITDA, and Free Cash Flow Yield, while Shareholder Yield shows relatively weak alignment with the others.
*Asterisks denote statistical significance (***$p < 0.01$, **$p < 0.05$).*

Appendix 5: Usage of AI in Thesis Writing

During the development of this thesis, we used ChatGPT-4o (OpenAI) as a language-based support tool to enhance clarity and efficiency in the writing process. The tool was not used for any form of data analysis, coding or statistical output. All econometric estimations and interpretations were conducted independently using Stata, and all theoretical frameworks were based on peer-reviewed sources.

AI assistance was limited to refining sections of the Literature Review and Discussion by suggesting alternative phrasings, improving structural flow and clarifying technical terms. These suggestions were always reviewed critically and edited to ensure academic precision, neutrality and adherence to the Stockholm School of Economics' standards. At no point did AI output replace the authors' analytical reasoning or conclusions.

We are aware of the risks associated with generative AI, including potential factual inaccuracies or verbosity. To mitigate these, we used AI in a cautious and supplementary role, comparable to a digital writing assistant or style guide. No content from the tool was included without proper verification.

In summary, ChatGPT was employed strictly for improving readability and structure. All academic contributions, argumentation and results are our own, and we have complied fully with institutional guidelines for ethical AI use.