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What is New in Value Investing? A Systematic Literature Review

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Abstract

This study provides an overview of the academic research in the field of Value Investing (VI), identifying the knowledge structure, influential authors, connections between relevant papers, and salient trends. Following a defined protocol, the Google Scholar database is examined to extract, rank, and connect influential books and academic articles in VI. Through a systematic literature review methodology, this study retrieves a database of 400 academic works published between 1965 and 2020. Using rigorous bibliometric and visualization tools, it identifies four major research clusters: (1) competing explanations of the value premium, (2) anomalies research, (3) momentum and fundamentals, and (4) wrong beliefs on investing. Contributions of this work include a catalog of existing approaches that may help researchers and practitioners navigate the VI literature, a map of the connections between influential publications, a suggestion of a list of "must-read" publications in VI, a content analysis of clusters of most relevant papers, the identification of leading authors, and the detection of areas for future research.

Keywords

Value Investing, Systematic Literature Review, value premium, bibliometric analysis, citation net-work analysis, alpha, fundamental analysis, momentum trading.

JEL Code

G12, G40

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I. Introduction

An increasing number of investors base their decisions on academic research. The popularity of Warren Buffett as the most successful investor in the world has certainly brought attention to the field. Knowledge production has been growing rapidly in the last few years, serving both academics and practitioners.

The strong debate on the Efficient Market Hypothesis (Fama, 1970) has been displaced by other discussions in the Value Investing (VI) literature. The existence of a pervasive value-premium in global markets is now widely accepted, whereas the controversy on the value-premium explanations remains open. Since the influential book of Graham & Dodd (1934), evidence that value strategies outperform the market has been accumulating, and today there is some agreement on the fact that they produce consistent abnormal returns. A wide variety of value strategies producing superior returns have been documented. To name a few, there is evidence of a value premium for the case of stocks with low Price-to-Book and low Price-to-Earnings (Chan, Hamao, & Lakonishok, 1991; Fama & French, 1992); for the case of firms with high gross profit-to-assets (Novy-Marx, 2013); for companies with low leverage (Penman, Richardson, & Tu, 2007); and in general, there is evidence that VI improves with information from financial statements (Abarbanell & Bushee, 1997, 1998; Piotroski, 2000).

Recognition of the existence of a value premium can be found today in academic papers on both sides of the EMH debate, not only on the side of its detractors but also on the side of its proponents. The explanations of the value premium remain, in turn, as a matter of academic research. For example, in a global study across 24 countries, Asness, Frazzini, & Pedersen (2019) document consistent abnormal returns through a quality-minus-junk factor that goes long on high-

quality stocks and shorts low-quality stocks. The study recognizes the findings to be consistent with quality stocks being underpriced and junk stocks overpriced or, alternatively, with quality stocks being riskier than junk stocks (two of the most prominent but radically different explanations).

At least two lines of research aim to explain the value premium evidence. From the mainstream finance point of view, an influential paper by Fama & French (1992) asserts that value stocks are fundamentally riskier, and thus the higher average returns are simply compensation for the additional risk. Behavioral explanations, on the other hand, include a variety of heuristics and cognitive biases. Hou, Xue & Zhang (2020) compile a data library of 447 anomalies, of which 36% are significant. Behavioral explanations are in direct opposition to the risk-factor argument.

While there is an emerging research base in the field of VI, it remains difficult for practitioners to identify key approaches in current research, as well as classic approaches in which current research is rooted. VI's body of knowledge is still fragmented and contradictory, with radically different lines of research, and themes that have permeated from other disciplines, such as behavioral explanations. To be able to establish the relevance of each group of papers, avoiding a purely subjective evaluation, a research method is necessary. Scientific principles should be applied not only in the generation of new VI knowledge but also in the analysis of how newly generated evidence accords with previous knowledge in the field.

To the best of our knowledge, only one article with some sort of bibliometric analysis on VI has been published in academic journals thus far: this focused on a specific goal related to qualitative information. Battisti, Miglietta, Salvi & Creta (2019) cover 45 papers from the period 2007-2017, of which 24 papers specifically analyze VI. While this is an essential first step in the direction of mapping the field of VI, the article only focuses on the objective of determining

whether contributions employ a qualitative analysis of a company. Therefore, a broader view of the field is needed, as well as a more comprehensive selection of literature. The 24 papers include just a small fraction of the several VI debates, and the 2007-2017 period excludes most of the VI classics, such as the works of Fama & French (1998); Lakonishok, Shleifer, & Vishny (1994); Piotroski (2000); and includes none of the influential books in the field, such as the ones published by Greenwald, Kahn, Sonkin, & van Biema (2020); or Andrei Shleifer (2000). To the best of our understanding, there are no other works performing a systematic literature review in the field of VI, with the inclusion of both academic papers and books.

Consequently, there is an urgent need to critically examine the VI literature in a comprehensive, transparent, and methodological way; to serve as a guide for both researchers and practitioners.

This study, through a methodological analysis of secondary data from other academic publications and the identification of the knowledge structure of the field, contributes to the current state of the science by providing a meeting point between channels of knowledge.

II. Research Methodology

Systematic Literature Reviews (SLRs) are methods to map out areas of uncertainty, identifying where little or no relevant research has been done (Tranfield, Denyer, & Smart, 2003; Petticrew & Roberts, 2005; Rousseau, Manning, & Denyer, 2008; Cai & Lo, 2020). They are scientific instruments for identifying research domains and knowledge structure (Fan, Lo, Ching, & Kan, 2014; Cai & Lo, 2020). They aim to provide collective insights through theoretical synthesis into fields and subfields (Tranfield et al., 2003). Unlike traditional reviews, in which the identification of the research domain and the knowledge structure are commonly determined based on the

researcher's judgment and can thus be considered subjective, SLRs follow a research protocol. To avoid the lack of rigor and relevance present in many traditional literature reviews, SLRs proceed with pre-defined steps. In SLRs, the criteria for including studies in the review must be made explicit, identifying as high a proportion as possible of the works meeting the criteria.

Traditional (or "narrative") literature reviews frequently summarize samples of studies in an unsystematic and biased fashion (Petticrew & Roberts, 2005). They often lack thoroughness, and, in many cases, they are not undertaken as genuine pieces of investigatory science (Tranfield et al., 2003). Unlike traditional reviews, SLRs adopt a replicable and transparent process. They leave an audit trail of the reviewers' decisions, as well as their procedures and inferences.

As in other disciplines, VI studies often appear to have contradictory findings. Different studies addressing the same question do not always lead to the same conclusion. A systematic review can be used to methodically examine the reason why this happens (Petticrew & Roberts, 2005).

Although a systematic review is not the only alternative to critically examine the VI literature, it offers protection against investigators' biases, through the design and documentation of an appropriate research protocol, and the intention of passing through this filter the widest possible body of evidence. Then, after taking measures to control biases in the process of reviewing previous academic works, the use of appropriate statistical methods to summarize the results can help identify successful VI strategies, separating them from the ones that are not supported by empirical evidence.

II.1.Literature retrieval and selection of studies

A major concern for scientific analysis is the scope and sample selection of the research works to be analyzed. Unlike traditional reviews, this study employs a methodology designed to ensure a transparent, reproducible, and comprehensive coverage of the body of knowledge in the field of VI, as described in the previous section.

To ensure the incorporation of all significant studies in the sample, the Google Scholar (GS) database is examined for data collection and screening of VI publications. GS covers a wide range of research outputs, including not only academic articles but also books, book chapters, and conference papers. The major bibliographic databases, Web of Science and Scopus, have the disadvantage of limited coverage in social sciences and humanities (Mingers & Meyer, 2017). Moreover, the use of GS has advantages over the Web of Science in fields that produce more diverse types of outputs than just research articles (Prins, Costas, & van Lee, 2016). The main problem with the use of GS is the identification and elimination of duplicates (Bornmann, Thor, Marx, & Schier, 2016).

To make the process more efficient, this study employs the Publish or Perish software (Harzing, 2020) to search for publications on the GS database. A total of 6 keywords, identified by a brainstorming process, drive the initial search (value investing, value investor, value investors, value growth, Graham, Buffett). To mitigate the probability of omission of relevant research, a forward and backward referencing approach is applied (as in Singh & Walia, 2020) tracking the references of the top 10 results and, thus, identifying additional VI studies that do not necessarily include any of the keywords. The search is carried out without any date restriction, so that old records can appear, as long as they are relevant. After eliminating duplicates, a database of 2160 records is retrieved.

The following exclusion criteria are established: (1) works not written in English, (2) works outside the domain of VI, (3) books or academic articles with less than 20 citations. After filtering the initial sample according to the exclusion criteria, a database of 400 studies, published between 1965 and 2020, is obtained.

II.2.Bibliometric and content analysis

The intensity of "forward" citations (the number of citations received from subsequent papers) is employed to measure the significance of an academic article (as in the works of Lanjouw & Schankerman, 2004; and Blazsek & Escribano, 2010, for the case of patents). Similarly, "backward" citations (citations made to previous academic articles) are analyzed in this study to identify classic papers.

Two main citation metrics are used in this research: (1) the number of citations per publication, and (2) total publications of the sample each year. To assess the relevance of the citations received by each academic work, avoiding the inevitable truncation of the data, each paper's forward citations are scaled by the total citation count since the publication year (as suggested for patent citations in the works of Hall, Jaffe, & Trajtenber, 2001). The ratio of the number of citations of each publication, divided by the total number of citations of all works in the sample since the publication year, is employed to rank the sample.

With the Publish or Perish software, forward citations are obtained for each study in the sample, as of January 18, 2021. Once the sample of academic works has been extracted, a bibliometric analysis based on citations and content is also employed. Bibliometric analysis is a quantitative approach for the description and evaluation of published research. In turn, co-citation can be used to establish clusters of academic research, as suggested in the works of Small (1973).

Bibliometric analysis is a firmly established method within scientific and applied fields (Ellegaard & Wallin, 2015). It is a methodology that has benefited greatly from the emergence of specialized computer software in recent years, stimulating its use in different types of investigations. In the natural sciences, bibliometrics has established itself as a standard procedure for quantitative research evaluation (Bornmann et al., 2016). In finance and investing, there are recent works adopting this methodology as well (see Singh & Walia, 2020; Battisti et al., 2019; Delle Foglie & Panetta, 2020; Daugaard, 2020; Bhowmik & Wang, 2020).

In a comprehensive work on bibliometrics, De Bellis (2009) recalls the origins of the term "citation". The word has an etymological root in the Latin citäre, an iterative form of ciëre, which means to move, to set in motion, to stir, and also to call, to invite, to invoke (a person, a text, a divinity). For De Bellis (2009, p. p. xvii):

> "Transversal to each dimension is the omnipresent, multipurpose, and somewhat equivocal concept of influence: the influence of people on other people's lives through transactions firmly embedded in the social network of power relations (an echo of the primeval rootedness of the concept in the astrological theory of the influence exercised by the heavens on the course of human actions); and the influence of texts on other texts through the uninterrupted chains of endorsements and rebuttals linking past ideas with new ideas."

For each of the top 40 papers resulting from the citation rank, the "references" section is extracted, and compiled in a single file. Then, the dataset containing the references of the top 40 papers is analyzed with the network software Gephi (Gephi Consortium, 2008), in order to identify clusters and connections between works. A cluster is a subset of nodes within a graph, such that

connections between the nodes are denser than connections with the rest of the network (Radicchi, Castellano, Cecconi, Loreto, & Parisi, 2004). Gephi employs the Louvain algorithm for data clustering (Blondel, Guillaume, Lambiotte & Lefebvre, 2008).

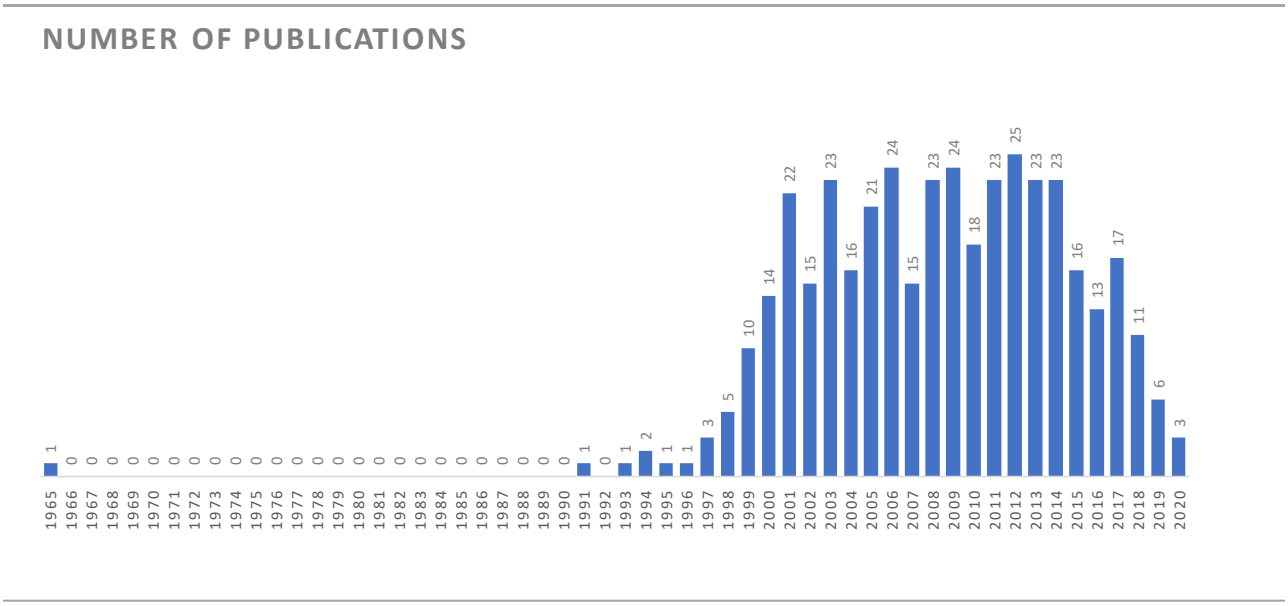
Finally, content analysis is performed. Content analysis is a qualitative method for extracting the insights in a study and its objectives. The content of the four clusters is evaluated to identify the research themes, and the dataset is also exposed to the text analyzer software Voyant (Sinclair & Rockwell, 2021), refining the understanding of the VI knowledge, and detecting influential authors and salient trends.

III. Bibliometric Evaluation

III.1. Forward citations

The chronological distribution of VI research in terms of the number of publications (limited to the English language, with more than 20 citations, as established in the inclusion criteria), shows that the explosion of VI research occurred in the last two decades (see Figure 1).

Figure 1



The figure presents the 400 academic works of the sample, distributed according to the publication year.

The top ranking of academic works in VI, in terms of the highest number of adjusted citations (corrected by trunk bias as described in the methodology section), is presented in Appendix A – Table 1. The sample has an average citation rate of 21 forward citations per year. However, the top 40 publications in the citation ranking account for more than 50% of the total citations. The sub-sample of the top 40 publications includes 36 academic articles, 2 books, and 2 book chapters. Three authors, Eugene F. Fama, Kewei Hou, and Clifford S. Asness have more than one paper in the top 15.

III.2. Backward citations

Academic studies within the top-40 also cite others within the same group. Appendix B - Table 2 - Backward citations within the top-40 papers

comprises the most cited VI works by other relevant papers in the sample, according to the ranking presented in the previous section.

III.3. Word cloud

The complete text of the top 40 publications, including books and academic articles, is compiled into a single file and subjected to the text-analyzer software Voyant (Sinclair & Rockwell, 2021). Excluding general words such as "journal", "finance" or “market”, it is interesting that the text-analyzer tool highlights “returns”, “momentum”, “earnings” and “accounting” as the words that appear the most. The word-cloud chart is presented in Figure 2.

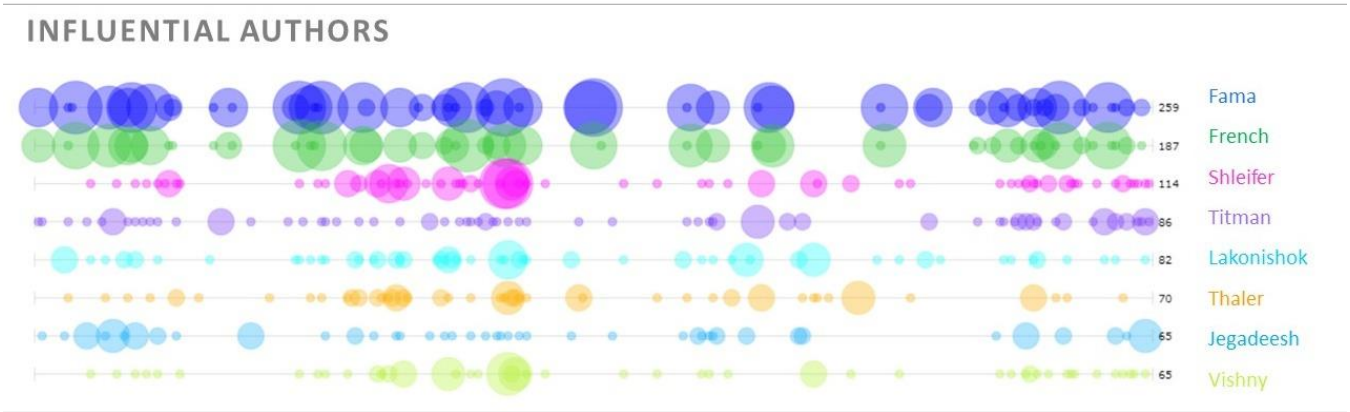
Figure 2

The figure shows the words with the most appearances in the compiled text of the top 40 VI publications.

The Voyant software is also run on the "references" section of the top 40 publications. The authors which appear most often are Eugene F. Fama, Kenneth R. French, Andrei Shleifer, Sheridan Titman, Josef Lakonishok, Richard Thaler, Narasimhan Jegadeesh, and Robert W. Vishny. The "bubble-line" chart for this data is presented in Figure 3.

References to Fama and French occur in unison. Titman's appearances are smoothed out, suggesting that he is an author who intervenes in a wide variety of papers, and the paths of Thaler and Vishny are similar.

Figure 3



The chart represents the number of times the name of an author is mentioned in the "references" section of the top-40 VI publications. Lines represent the place in the text where each name is located.

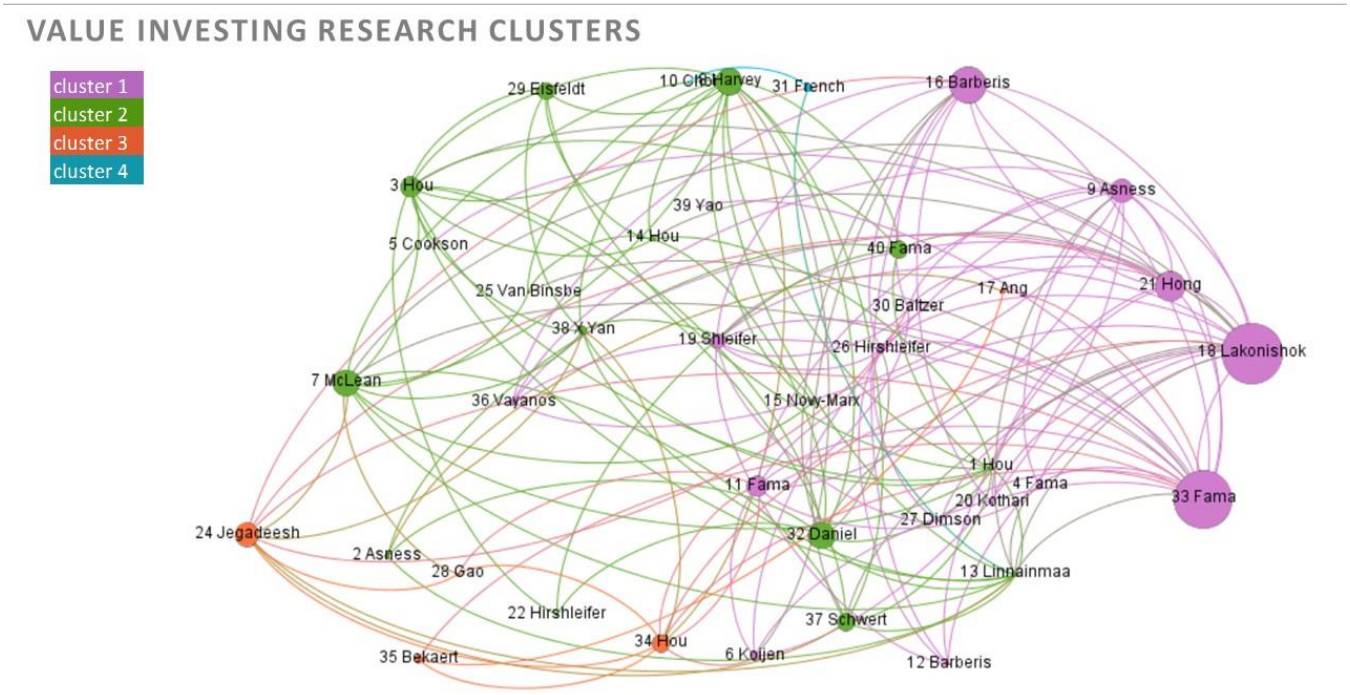
The test is repeated for the complete text of all top 40 publications, including not only references but also the content of each book and article, and results are similar. The most mentioned authors are Eugene F. Fama (with 1254 appearances), Kennet R. French (941), William F. Sharpe (359) Sheridan Titman (265), Josef Lakonishok (236), Narasimhan Jegadeesh (230), Andrei Shleifer (226), Richard Thaler (218), and Robert W. Vishny (140).

III.4. Data clustering

The Louvain algorithm (Blondel et al., 2008), run through the software Gephi (Gephi Consortium, 2008), performs a modularity analysis on the data, establishing connections between the different academic works, and grouping them into clusters.

The network analysis of the top VI scientific collaborations leads to impressive results. Specific research areas emerge, and the debate over themes where there is greater controversy is easily seen in the network map. Connections between papers are detected through the network analysis software Gephi, and four algorithmically identified clusters appear. The citations network and the corresponding clusters are presented in Figure 4, and the components of each cluster are listed in Appendix C – Table 3. Clusters are identified by colors, and the node size increases with the number of citations received from other papers in the top 40. It is interesting to note that the most relevant papers in the network are not necessarily the ones with the highest number of total citations (in other words, they are not necessarily the first results in Google Scholar).

Figure 4

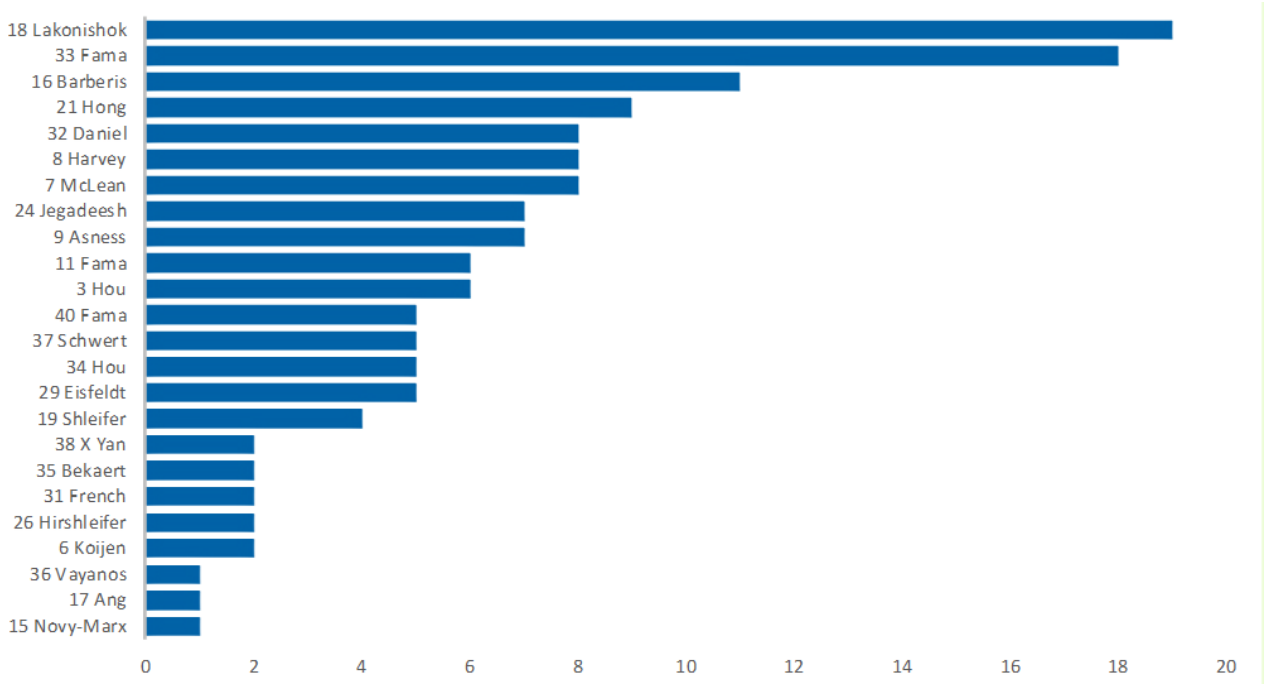


The figure shows the citations network of the top 40 academic studies in VI. The node size increases with the number of citations received from other publications in the top 40. Codes for each paper are included in Appendix A – Table 1.

Three articles stand out as concentrating the highest numbers of citations from the other studies in the top 40: "Contrarian Investment, Extrapolation, and Risk" (Lakonishok et al., 1994), "Value versus Growth: The International Evidence" (Fama & French, 1998), and "A Model of Investor Sentiment" (Barberis, Shleifer & Vishny, 1998). All three belong to the same cluster. The largest nodes in the network pass two tests simultaneously: (1) they are top-ranked in terms of adjusted citations, and (2) they receive qualified citations, from other top researchers. These investigations are considered valuable by other relevant articles; either to confirm their results or

to call them into question. They may be thought of as classic papers that maintain their relevance (see Figure 5).

Figure 5



The figure shows the most relevant academic works in terms of citations received from other works in the top 40. Codes for each paper are included in Appendix A – Table 1Appendices

III.5. Appendix A - Table 1 - Top 40 VI publications

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The selection of papers in Figure 5 can be considered, certainly, a "must-read" for practitioners. These are filtered and important works that maintain their relevance; a powerful tool to discover what the empirical evidence has to say on the chosen value strategies, and how far the science has gone in knowing them.

IV. Content Analysis

For nearly 50 years, the Efficient Market Hypothesis (EMH, Fama, 1970) has been at the core of mainstream finance. In one way or another, it is part of most debates. It has been widely studied and tested, and it is impressive to see how it has permeated academic works for several years.

In the first two decades after its publication, the EMH established itself as the dominant paradigm. The accepted view in most academic journals was that news is quickly incorporated into security prices and that markets are extremely efficient. Consequently, neither technical analysis (the study of past stock prices) nor fundamental analysis (the study of financial statements and other public information), was thought to produce superior returns.

Criticism of the EMH came mainly from the area of Behavioral Finance, sparking the well-known heated debate. VI, in turn, can be located as a third position, closer to the latter, especially in terms of the rationality assumption. VI has been outside the EMH since the beginning. For value investors, the market is considered a volatile and unpredictable mechanism in the short term (a "schizophrenic" individual), but then, after some time, sanity is usually recovered, and the price eventually takes into account the fundamentals. In the words of Benjamin Graham (1965), the market is a "voting mechanism" in the short term, while it is a "weighting mechanism" in the long term. This definition of the father of VI has a profound implication regarding the belief in the possibility to beat the market.

In this context, the content of the top 40 papers is analyzed below. The academic publications included in this study are rooted in the EMH discussion and, thus, market inefficiencies are labeled “anomalies”. Some concessions from the mainstream, however, such as the recognition of

a pervasive value premium in global markets, opened up different branches of discussion. Certain publications referred to in this article as "classic" papers reflect the efficiency debate. Others, in turn, shift to the discussion on value-premium explanations.

The content analysis of the clusters identified with Gephi (Gephi Consortium, 2008) yields four different themes: (1) competing explanations of the value premium, (2) anomalies research, (3) momentum and fundamentals, and (4) wrong beliefs on investing.

IV.1. Cluster 1: Competing explanations for the value premium

There is extensive research in return-predictability, in particular, cross-sectional asset pricing anomalies (alphas). It has been documented that value stocks (equities with low price related to a fundamental such as earnings, book value, or cash flow) have higher average returns than growth stocks (equities with a high price related to fundamentals); as shown for U.S. returns (DeBondt & Thaler, 1985; Fama & French, 1992; Lakonishok et al., 1994), and international returns (Chan, Hamao & Lakonishok, 1991; Fama & French, 1998; Rouwenhorst, 1998; Griffin, Ji & Martin, 2003; Chui, Titman & Wei, 2010; Asness et al., 2013).

The debate between two competing explanations of the value premium (higher average returns of value stocks relative to growth stocks) feeds most interactions within the first cluster. The first hypothesis, led by the main article in the cluster, Lakonishok et al. (1994), asserts that the value premium in average returns arises because the market undervalues distressed stocks and overvalues growth stocks. When the mispricing is corrected, value stocks produce high returns, and growth stocks generate low returns. In this view, the typical investor's irrational behavior induces mispricing, causing the value effect. In turn, in a later article, Shleifer & Vishny (1997)

document that limits to arbitrage enable mispricing to persist. Briefly put, investor irrationality combined with limits to arbitrage induce asset prices to deviate from fundamentals.

The second hypothesis, in turn, refers to unmodeled risk. Primarily associated with Fama & French (1993; 1995; 1996), it sustains that cross-sectional return anomalies occur because value stocks are fundamentally riskier. The value effect is a compensation for risk not captured by the Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965).

Both Lakonishok et al. (1994) and Fama & French (1996), the biggest nodes in the cluster, agree on the notion that the value premium is associated with relative distress. However, the first hypothesis relates the value effect to irrational behavior, and the second, to additional risk.

In this debate, it is important to note that, for value investors, the term "risk" has a different meaning than the one employed in mainstream finance. From the VI point of view, risk does not equal volatility of historical returns. On the contrary, associating risk with volatility is considered a gross distortion. Risk is the loss of capital or miscalculation of intrinsic value (Buffett, 2013; Hagstrom, 2001).

Not only has the value-premium effect of differences between price and fundamentalsbeen recognized in mainstream finance, but the “momentum” effect (stocks that have done well over the past year, tend to continue to do well) is also accepted. The connection between value and momentum is also part of cluster 1. Another important node refers to the negative correlation between value and momentum. Asness et al. (2013) find consistent value and momentum return premia across eight markets and asset classes, but value and momentum are negatively correlated with each other (both within and across asset classes). While both rational and behavioral theories for value and momentum focus predominantly on equities, Asness et al. document the existence of

correlated value and momentum effects in other asset classes. The study suggests the presence of common global risk factors for which value and momentum premia provide compensation.

Asness et al. emphasize the controversy with the behavioral explanations, which are represented by another important node in the cluster. In this line, Barberis et al. (1998) explain two return anomalies (underreaction and overreaction) in terms of how investors form beliefs. The overreaction evidence shows that over horizons of 3-5 years, security prices overreact to consistent patterns of news pointing in the same direction. As with other anomalies, from the behavioral point of view, it means that sophisticated investors can earn superior returns without bearing extra risk. In addition, Hong & Stein (1999) provide a model for a unified account of under- and overreactions. The study predicts that, if traders can only implement simple strategies, their attempts at arbitrage will inevitably lead to overreaction at long horizons. Both Barberis et al. and Hong & Stein are representative of behavioral explanations. In contrast, the works of Asness et al. (2013) and Fama & French (1996) attempt to explain the evidence from the angle of the EMH.

IV.2. Cluster 2: Anomalies research

Whereas articles in cluster 1 reflect a debate that started in the ‘90s (Lakonishok et al., 1994; Fama & French, 1998; Barberis et al., 1998; Hong & Stein, 1999), papers in cluster 2 were published between 2003 and 2020. Most papers in cluster 2 are focused on the study of anomalies. A few years after the influential Fama & French (1993) 3-factor model, diverse articles started to appear, studying asset pricing anomalies that it fails to account for (see, for example, Chan, Jegadeesh & Lakonishok, 1996; Ang, Hodrick, Xing & Zhang, 2006). These articles may be considered the predecessors of many of the works in cluster 2.

Hou, Xue & Zhang (2015) construct an empirical model capturing many of the anomalies that are challenging for the 3-factor model. The study analyzes nearly 80 anomalies and concludes that many claims in the anomalies' literature seem exaggerated (about one-half of the anomalies earn insignificant average returns for the high-minus-low deciles formed with NYSE breakpoints and value-weighted returns). The empirical q-factor model introduced by Hou et al. consists of the market factor, a size factor, an investment factor, and a profitability factor.

In a later article, also part of cluster 2, the same authors (Hou, Xue & Zhang, 2020), compile a large data library with 447 anomalies. The list includes variables from the momentum, value-versus-growth investment, profitability, intangibles, and trading frictions categories. The study concludes that 286 (64%) of the anomalies are insignificant at the 5% level. In particular, 95 out of the 102 liquidity variables (93%) are insignificant. Employing the cutoff t-value of 3 proposed by Harvey et al. (2016), which is presented in another article of cluster 2, the number of insignificant anomalies ríses to 380 (85%).

Widely cited variables that Hou et al. mark as insignificant include: the Jegadeesh (1990) short-term reversal; the Lakonishok et al. (1994) five-year sales growth; Ang, Hodrick, Xing & Zhang (2006) idiosyncratic volatility, total volatility, and systematic volatility; Francis, LaFond, Olsson & Schipper (2004) earnings attributes; and the Fama & French (2015) operating profits-to-book equity. However, certain anomalies are indeed confirmed by this work (some of them, of lower magnitude than originally reported): Jegadeesh & Titman (1993) price-momentum; Lakonishok et al. (1994) cash flow-to-price; Sloan (1996) operating accruals; Chan et al. (1996) earnings momentum formed on standardized unexpected earnings, abnormal returns around earnings announcements, and revisions in analysts' earnings forecasts; and Cooper, Gulen & Schill

(2008) asset growth. As a general conclusion, capital markets are considered more efficient than previously recognized.

In another study of anomalies, also within cluster 2, McLean & Pontiff (2016) program 97 anomaly variables. Comparing returns pre- and post-academic publications, the study estimates a 32% lower return from publication-informed trading. Findings suggest that investors learn about mispricing from academic publications. As an example, Jegadeesh & Titman (2001), recognize that the relative returns to high momentum stocks changed after the publication of their 1993 paper.

With the proliferation of studies on anomalies, an interest in data mining has emerged. In cluster 2, this is reflected by the works of Harvey et al. (2016), considered a pioneering meta-study in finance, adding to the literature on biases and inefficiencies in cross-sectional regression studies. The article introduces a multiple testing framework and provides historical cutoffs for tests of the cross-section of expected returns. It suggests a hurdle that increases over time as more anomalies are data-mined (a t-statistic greater than 3 for current research).

Finally, in a comprehensive work on anomalies, also within cluster 2, Linnainmaa & Roberts (2018), present a list of documented anomalies as of 2018, grouping them into eight categories: profitability (e.g., gross profitability, Novy-Marx, 2013; operating profitability, Fama & French, 2015), earnings quality (e.g., Net Operating Assets, Hirshleifer, Hou, Hong & Zhang, 2004), valuation (e.g., book-to-market, Fama & French, 1992; cash flow-to-price, Lakonishok et al., 1994), investment and growth (e.g., asset growth, Cooper et al., 2008; growth in inventory, Thomas & Zhang, 2002; abnormal capital investment, Titman, Wei & Xie, 2004; investment-to-assets, Lyandres, Sun & Zhang, 2008), financing (e.g., debt issuance, Spiess & Affleck-Graves, 1999; one-year share issuance, Pontiff & Woodgate, 2008; five-year share issuance, Daniel & Titman, 2006), distress (e.g., O-score, Dichev, 1998; Z-score Dichev, 1998; distress risk, Campbell, Hilscher &

Szilagyi, 2008), other (e.g., industry concentration, Hou & Robinson, 2006), and composite anomalies (e.g., F-score, Piotroski, 2000; market-to-book and accruals, Bartov & Kim, 2004; quality-minus-junk, Asness et al., 2019). Additionally, "price-based" anomalies include short-term reversals and medium-term momentum.

IV.3. Cluster 3: Momentum and fundamentals

According to the citation analysis, the Jegadeesh & Titman (2001) work on the momentum effect seems to be the origin of the debate in cluster 3. The paper is the oldest in the group, the largest node in the chart, and a hub that has connections with another two clusters. A previous article written by the same authors, Jegadeesh & Titman (1993) was the first to document the momentum effect. As stated above, this is a line of research that was later backed up in the works of Hou et al. (2020), as one of the significant anomalies. The article evaluates various explanations for the profitability of momentum strategies documented in Jegadeesh & Titman (1993) and provides support for the behavioral models of overreactions (they tentatively conclude that momentum may be related to investor's behavioral biases).

In addition to momentum, cluster 3 includes the study of fundamentals. In a recent paper within cluster 3, Asness et al. (2019) present a dynamic valuation model, defining "quality" stocks as securities with characteristics that should command a higher (scaled) price. The study documents that a quality-minus-junk factor that goes long on high-quality stocks and shorts low-quality stocks earns significant risk-adjusted returns not only in the U.S. but also globally across 24 countries. The quality-minus-junk measure is a combination of various fundamentals: gross profitability, return on equity, return on assets, cash flow to assets, gross margin, and accruals.

In another study relating price and fundamentals, also within cluster 3, Hou, Karolyi & Kho (2011) examine a large number of firm indicators and their connection to global stock returns, comprising 27,000 individual stocks from 49 countries over three decades (1981 to 2003). The investigation evaluates dividends, size, earnings yields, cash flow-to-price, book-to-market equity, momentum, and leverage.

IV.4. Cluster 4: Wrong beliefs

The last cluster comprises only three articles, published between 2008 and 2020. It has a lower degree of importance in comparison with the other three clusters, both in terms of the number of connections as well as the citation ranking position. However, as these are papers included in the top 40, they may indicate a trend or a disruptive point of view, which is worth following in future investigations.

In a U.S. investigation for the 1980-2006 period, the work of Kenneth French (2008) aims to determine how much investors spend in trying to beat the market. The study includes four components: the fees investors pay for mutual funds, the investment management costs of institutional investors, the fees investors pay for hedge funds, and the costs all investors pay to trade. These costs are compared to the costs of holding a passive market portfolio, considering the difference as the cost of active investing. The study concludes that, under reasonable assumptions, the typical investor would increase his average annual return by 67 basis points if he switched to a passive market portfolio.

From an efficient-market point of view, French's article discusses the negative-sum nature of active trading and leaves the question of why active investors continue to play a negative-sum game. A proposed tentative answer, according to French, is that "Perhaps the dominant reason is a

general misperception about investment opportunities. Many are unaware that the average active investor would increase his return if he switched to a passive strategy" (French, 2008, p. 1562).

Taking up the gauntlet, this time from the behavioral point of view, Choi & Robertson (2020) employ a survey to investigate the popularity of active investing, given that in aggregate passive funds outperform active funds (e.g., Gruber, 1996; French, 2008; Fama & French, 2010). In a survey of a nationally representative sample of 1,013 U.S. individuals in the RAND American Life, Choi & Robertson investigate how well leading academic theories describe their financial beliefs and decisions. The study finds that the most important factors behind active fund purchase are a belief that active funds would supply higher returns on average, and also the recommendation of a financial adviser. The study concludes that individuals tend to believe that past mutual fund performance is a good signal of stock-picking skill; actively managed funds do not suffer from diseconomies of scale; value stocks are safer and do not have higher expected returns and high-momentum stocks are riskier and do have higher expected returns.

V. Conclusions

The knowledge structure of the VI literature, based on citation analysis and the Louvain algorithm, may be divided into four clusters: (1) competing explanations of the value premium, (2) anomalies research, (3) momentum and fundamentals, and (4) wrong beliefs on investing.

The first cluster comprises the debate on the possible explanations for the abnormal returns of value stocks, mainly represented in the works of Lakonishok et al. (1994) with the irrational behavior hypothesis; and Fama & French (1996) with the unmodeled risk hypothesis. The second cluster is focused on the study and refinement of asset pricing anomalies, such as the cash flow-to-price (Lakonishok et al., 1994), asset growth (Cooper et al., 2008), and price momentum

(Jegadeesh & Titman, 1993). The third cluster orbits around Jegadeesh & Titman's (1993, 2001) investigations on the momentum effect. Finally, the fourth quarter debates investors' wrong beliefs on active and passive investment (French, 2008; Choi & Robertson, 2020).

Text and citation tests point to Eugene F. Fama, Kenneth R. French, Sheridan Titman, Josef Lakonishok, Richard Thaler, Narasimhan Jegadeesh, Nicholas Barberis, Clifford S. Asness, and Harrison Hong as the most influential authors in the field.

VI. Appendices

VI.1. Appendix A - Table 1 - Top 40 VI publications

#	Publication	Code	#	Publication	Code
1	(Hou et al., 2020)	1 Ho	21	(Hong & Stein, 1999)	21 H
2	(Asness et al., 2019)	2 As	22	(Hirshleifer et al., 2018)	22 H
3	(Hou et al., 2015)	3 Ho	23	(Lee et al., 2019)	23 L
4	(Fama & French, 2017)	4 Fa	24	(Jegadeesh & Titman, 2001)	24 J
5	(Cookson & Niessner, 2020)	5 Co	25	(van Binsbergen & Opp, 2019)	25 V
6	(Koijen et al., 2018)	6 Ko	26	(Hirshleifer, 2001)	26 H
7	(McLean & Pontiff, 2016)	7 Mc	27	(Dimson et al., 2009)	27 D
8	(Harvey et al., 2016)	8 Ha	28	(Gao et al., 2018)	28 G
9	(Asness et al., 2013)	9 As	29	(Eisfeldt & Papanikolau, 2013)	29 E
10	(Choi & Robertson, 2020)	10 C	30	(Baltzer et al., 2019)	30 B
11	(Fama & French, 2012)	11 F	31	(French, 2008)	31 F
12	(Barberis & Thaler, 2003)	12 B	32	(Daniel & Titman, 2006)	32 D
13	(Linnainmaa & Roberts, 2018)	13 L	33	(Fama & French, 1998)	33 F
14	(Hou et al., 2017)	14 H	34	(Hou et al., 2011)	34 H
15	(Novy-Marx & Velikov, 2016)	15 N	35	(Bekaert et al., 2009)	35 B
16	(Barberis et al., 1998)	16 B	36	(Vayanos & Woolley, 2013)	36 V
17	(Ang et al., 2009)	17 A	37	(Schwert, 2003)	37 S
18	(Lakonishok et al., 1994)	18 L	38	(Yan & Zheng, 2017)	38 X
19	(Shleifer, 2000)	19 S	39	(Yao et al., 2014)	39 Y
20	(Kothari, 2001)	20 K	40	(Fama & French, 2006)	40 F

The table presents the top-40 publications according to the citation ranking, corrected for trunk bias.

VI.2. Appendix B - Table 2 - Backward citations within the top-40 papers

	7 Mc	8 Ha	9 As	16 B	18 L	21 H	24 J	32 D	33 F
1									
Ho	1	1			1			1	
2									
As								1	
3									
Ho	1	1			1			1	
4									
Fa			1		1				1
5									
Co						1			
6									
Ko			1						1
7									
Mc		1	1				1		1
8									
Ha	1							1	
9									
As				1	1	1			1
10									
C									
11									
F			1		1				1
12									
B				1	1	1			
13									
L	1	1	1		1		1	1	1
14									
H		1			1			1	

	7 Mc	8 Ha	9 As	16 B	18 L	21 H	24 J	32 D	33 F
21									
H				1	1				1
22									
H								1	
23									
L									
24									
J				1		1			1
25									
V	1	1							1
26									
H				1	1	1		1	1
27									
D					1				1
28									
G	1						1		
29									
E									
30									
B			1	1		1	1		
31									
F									
32									
D				1	1				
33									
F					1				
34									
H					1		1		1

15									**35**											
N	1	1							**B**											1
16									**36**											
B					1			1	**V**				1	1		1				1
17									**37**											
A								1	**S**					1	1		1			
18									**38**											
L									**X**	1	1						1			
19									**39**											
S				1	1	1		1	**Y**											1
20									**40**											
K				1	1	1			**F**						1					
									To-											
	(cont.)								**tal**	**8**	**8**	**7**	**11**	**19**	**9**	**7**	**8**	**18**		

The table shows main backward citations taken from the “references” section of each paper in the top-40. Codes for each paper are included in Appendices

Appendix A - Table 1 - Top 40 VI publications

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VI.3. Appendix C - Table 3 - Contents of each cluster

CR	Authors (year)	Title	Cluster
1	Hou, K., Xue, C., & Zhang, L. (2020)	Replicating Anomalies	2
5	Cookson, J. A., & Niessner, M. (2020)	Why Don't We Agree? Evidence from a Social Network of Investors	1
10	Choi, J. J., & Robertson, A. Z. (2020)	What Matters to Individual Investors? Evidence from the Horse's Mouth	4
2	Asness, C. S., Frazzini, A., & Pedersen, L. H. (2019)	Quality minus junk	2
23	Lee, T. K., Cho, J. H., Kwon, D. S., & Sohn, S. Y. (2019)	Global stock market investment strategies based on financial network indicators using machine learning techniques	4
25	van Binsbergen, J. H., & Opp, C. C. (2019)	Real anomalies	2
30	Baltzer, M., Jank, S., & Smajlbegovic, E. (2019)	Who trades on momentum?	1
6	Koijen, R. S. J., Moskowitz, T. J., Pedersen, L. H., & Vrugt, E. B. (2018)	Carry	1
13	Linnainmaa, J. T., & Roberts, M. R. (2018)	The history of the cross-section of stock returns	2
22	Hirshleifer, D., Hsu, P.-H., & Li, D. (2018)	Innovative originality, profitability, and stock returns	2
28	Gao, P., Parsons, C. A., & Shen, J. (2018)	Global relation between financial distress and equity returns	3
4	Fama, E. F., & French, K. R. (2017)	International tests of a five-factor asset pricing model	1
14	Hou, K., Xue, C., & Zhang, L. (2017)	A comparison of new factor models	2
38	Yan, X. (Sterling), & Zheng, L. (2017)	Fundamental analysis and the cross-section of stock returns: A data-mining approach	2
7	McLean, R. D., & Pontiff, J. (2016)	Does academic research destroy stock return predictability?	2
8	Harvey, C. R., Liu, Y., & Zhu, H. (2016)	… and the cross-section of expected returns	2
15	Novy-Marx, R., & Velikov, M. (2016)	A taxonomy of anomalies and their trading costs	2
3	Hou, K., Xue, C., & Zhang, L. (2015)	Digesting anomalies: An investment approach	2
39	Yao, J., Ma, C., & He, W. P. (2014)	Investor herding behaviour of Chinese stock market	1
9	Asness, C. S., Moskowitz, T. J., & Pedersen, L. H. (2013)	Value and momentum everywhere	1
29	Eisfeldt, A. L., & Papanikolau, D. (2013)	Organization capital and the cross-section of expected returns	2
36	Vayanos, D., & Woolley, P. (2013).	An institutional theory of momentum and reversal	1
11	Fama, E. F., & French, K. R. (2012)	Size, value, and momentum in international stock returns	1

(cont)

CR	Authors (year)	Title	Cluster
34	Hou, K., Karolyi, G. A., & Kho, B.-C. (2011)	What factors drive global stock returns?	3
17	Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009)	High idiosyncratic volatility and low returns: International and further US evidence	3
27	Dimson, E., Marsh, P., & Staunton, M. (2009)	Triumph of the optimists: 101 years of global investment returns	1
35	Bekaert, G., Hodrick, R. J., & Zhang, X. (2009)	International stock return comovements	3
31	French, K. R. (2008)	Presidential address: The cost of active investing	4
32	Daniel, K., & Titman, S. (2006)	Market reactions to tangible and intangible information	2
40	Fama, E. F., & French, K. R. (2006)	Profitability, investment and average returns	2
12	Barberis, N., & Thaler, R. (2003)	A survey of behavioral finance	1
37	Schwert, G. W. (2003)	Anomalies and market efficiency	2
20	Kothari, S. P. (2001)	Capital markets research in accounting	1
24	Jegadeesh, N., & Titman, S. (2001)	Profitability of momentum strategies: An evaluation of alternative explanations	3
26	Hirshleifer, D. (2001)	Investor psychology and asset pricing	1
19	Shleifer, A. (2000)	Inefficient markets: An introduction to behavioural finance	1
21	Hong, H., & Stein, J. C. (1999)	A unified theory of underreaction, momentum trading, and over-reaction in asset markets	1
16	Barberis, N., Shleifer, A., & Vishny, R. (1998)	A model of investor sentiment	1
33	Fama, E. F., & French, K. R. (1998)	Value versus growth: The international evidence	1
18	Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994)	Contrarian investment, extrapolation, and risk	1

The table shows the list of top-40 publications according to the citation ranking (adjusted by trunk bias) and the cluster in which each publication is included.

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