Momentum investing: a systematic literature review and bibliometric analysis

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Abstract

This comprehensive research study aims to highlight the evolution of momentum investing research and identify the mature and emerging themes in momentum investing. This study reviews 532 research studies published between 1993 and 2019. The study uses a combination of various bibliometric and network analysis tools to identify the most influential research studies, key journals and leading authors. Bibliometric and network analysis also help in the broader classification of research studies into four major categories. Further, a rigorous investigation of these research studies identifies various loopholes and propose actionable themes for next-generation research.

1 Introduction

Earlier in 1970, financial researchers believed that stock prices follow random walk (Kassouf 1968; Fama 1970; Leuthold 1972; Solnik 1973). They believed that any apparent pattern in the stock prices is the result of data snooping and past information cannot be used to predict future stock prices. These kinds of views reflect the idea of the efficient market hypothesis proposed by Fama (1970). Nevertheless, in the last 25 years, this hypothesis has faced a lot of criticism in the form of various market anomalies (Basu 1983; Jegadeesh and Titman 1993; Sloan 1996; Heston et al. 1999; Chan and Lakonishok 2004). Out of these anomalies, momentum has

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gained maximum attention both from financial researchers and industry practitioners (Blitz et al. 2020). The popularity of the momentum can be judged from the fact that Eugene Fama termed it as "premier anomaly". In simple words, momentum means the continuation of the trend (Zaremba and "Koby" 2018). Initially, Levy (1967) introduces the term "relative strength" as an earlier form of momentum. However, the momentum got attention after the influential work of Jegadeesh and Titman (1993) titled "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency". Jegadeesh and Titman (1993) notice that stocks with higher past returns continue to have the superior future return over the next 3–12 months and stocks with lower past returns continue to exhibit lower future returns over the next few months. They suggest that by buying past winners and selling past losers, investors can earn significant profits.

Academic studies have proved the efficacy of momentum strategies across different geographical markets and asset classes (Rouwenhorst 1998; Griffin et al. 2003; Chui et al. 2010; Menkhoff et al. 2012; Asness et al. 2013; Bianchi et al. 2015). Research studies also explore various explanations and sources of momentum effect (Daniel et al. 1998; Conrad and Kaul 1998; Hong and Stein 1999; Lee and Swaminathan 2000; Cooper et al. 2004; Grinblatt and Han 2005). Traditional momentum strategies have faced much criticism after the subprime crisis, as these conventional investment strategies performed miserably during that period (Daniel and Moskowitz 2016; Fan et al. 2018; Demirer and Zhang 2019). Therefore, after the subprime crisis, researchers shifted their focus and tried to find out ways to enhance the performance of momentum investment strategies (Blitz et al. 2011; Moskowitz et al. 2012; Barroso and Santa-Clara 2015; Wang and Xu 2015).

Existing literature reviews concentrate on one or two aspects of momentum investing. For instance, some studies focus on explanations of momentum profits (Galariotis 2014; Subrahmanyam 2018) while other studies stress on reviewing research studies related to a particular country (Yang et al. 2019). The present study narrows this gap by conducting a more comprehensive review. The study has given special emphasis to research studies related to alternative momentum strategies. Alternative momentum has remained a core theme in momentum investing after the subprime crisis (Singh et al. 2020). This paper has considered 532 research papers for bibliometric analysis and 195 research papers for content analysis. In our knowledge, this is the first review study in the investment management literature that adopts a coalition of bibliometric and content analysis. By taking into consideration an extended period (1993–2019), the present study delivers a comprehensive review about the evolution of momentum investing. The current study will be a detailed roadmap for new researchers in momentum investing as it offers a unique set of future research directions.

The study begins by conducting an in-depth literature review. Further, authors have performed bibliometric and network analysis to identify various renowned and emerging themes of momentum investing. Lastly, the study has used content analysis to refine existing understanding about the established research themes and propose future research areas.

Our study contributes to the momentum investing literature in multiple ways. First, the present study is the first comprehensive literature review covering all the

significant aspects of this significant theme in investment management. Second, this is one of the earliest studies in finance literature that uses the trio of bibliometric, network and content analysis. It also contributes to the methodology of the systematic literature review method. Finally, our study provides an organised knowledge structure for momentum investing. Based on this structure, we have proposed potential ideas for further research.

Authors have arranged the remaining paper as follows. Section 2 outlines the structured methodology. In Sect. 3, the authors report the findings of bibliometric and network analysis. We conduct content analysis of eminent research studies in the next section. Section 5 examines the results of all the analysis, report significant insights and propose many areas for future research. The last section concludes the paper.

2 Research methodology

The present study employs the systematic methodological approach suggested by Tranfield et al. (2003) to ensure objective, reproducible and comprehensive coverage of literature. Structured reviews help in mapping the present state of the art and identification of potential research gaps in a particular field (Tranfield et al. 2003; Rousseau et al. 2008; Cai and Lo 2020). Authors discuss the complete methodological process in the following sub-sections.

2.1 Literature retrieval and selection

2.1.1 Search strategy

The research study uses electronic database searching along with backward and forward reference searching as this combined approach ensures the inclusion of all relevant studies (Eduardsen and Marinova 2020). The present study uses Scopus bibliometric database. Scopus covers a wide range of academic resources on finance, and it is popular among the researchers (Fahimnia et al. 2015; Martínez-López et al. 2018; Baas et al. 2020). To mitigate the probability of omission of relevant research studies, we have identified all the relevant keywords related to momentum investing and divide these keywords into the following two groups.

Group 1 includes keywords related to momentum investing such as "momentum effect", "cross-sectional momentum", "52-week high momentum", "time-series momentum", "risk-managed momentum", "industrial momentum", "idiosyncratic momentum", "dual momentum", "absolute momentum", "relative momentum", "residual momentum".

Group 2 includes keywords related to financial markets, financial assets and other miscellaneous keywords such as "equity markets", "emerging markets", "international markets", "bonds", "commodities", "currencies", "cryptocurrencies", "exchange-traded funds", "mutual funds", "real estate investment trusts", "explanations", "sources", "firm size", "capital investment", "credit ratings", "dividend", "idiosyncratic

volatility", "turnover", "market states", "liquidity", "investor sentiments", "macroeconomic variables".

The study uses various combinations of keywords from group 1 and group 2 to run the search queries. Apart from trying various combinations, the study also runs standalone search queries using the keywords in group 1. We retrieve 1823 research records in the initial search.

2.1.2 Selection of studies

To ensure the inclusion of relevant research studies, the study establishes the following inclusion criteria (IC): IC 1, the study will consider the peer-reviewed research studies (Ponomarev et al. 2014; Bailey et al. 2017; Fisch and Block 2018); IC 2, research papers in the finance domain will be acknowledged; and IC 3, the present study will incorporate the research papers written in English. After applying the above mentioned ICs, authors receive 864 results. Further, the present study applies a two-step procedure to identify relevant studies. The first step includes preliminary screening where the reviewer 1 reviews the titles, keywords, and abstracts of the documents, to decide upon its candidature for the present study. In the second step, the documents that pass the initial screening go through the deep screening (reading full-text) to decide upon its inclusion in the final dataset. Out of the 864 records examined, 502 studies passed the initial qualitative inspection, and 418 studies passed the full-text check; hence included in the final corpus of studies. In order to ensure the incorporation of all significant articles, we also apply forward and backward referencing approach and identify 114 additional research studies. Finally, we have 532 research studies published between 1993 and 2019 for bibliometric analysis.

2.2 Data analysis

The study employs bibliometric analysis on these selected papers. The bibliometric analysis consists of various evaluative and relational techniques to identify influential authors, journals and research studies on a particular field and highlight the intellectual and social structure of that field (Dzikowski 2018; Bhatt et al. 2020). Various open-source software tools are available for bibliometric analysis such as Bibexcel, Bibliometrix, CiteSpace, Histcite, Sitkis and ScientoPy. The present study uses Bibliometrix R package (3.0.1) for preliminary bibliometric analysis. The present study also utilises BibExcel (1.0) to prepare the required input data for network analysis. Several open-source tools such as Gephi, Pajek, SciMat and VOSviewer are available for network analysis. We have chosen Gephi (0.9.2) over other network analysis tools due to its advanced filtering capabilities and specialised clustering capabilities.
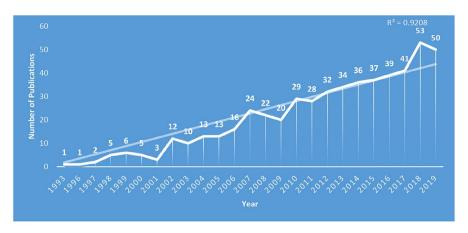
Fig. 1 Publishing trend in the area of momentum investing

3 Bibliometric and network analysis

3.1 Chronological publication trend

Figure 1 depicts the annual publication trend of the research studies on momentum investing. First relevant study on momentum investing appears in 1993. It is evident from the figure that the publication trend has been relatively stagnant in the initial years (1993–2001). However, from the year 2002, there has been a significant increase in the number of publications. Especially in the last 10 years, momentum investing has witnessed exponential growth, as approximately 70% of the total papers published in these 10 years. This rapid growth indicates the rising popularity of momentum investing among financial academicians. Further, the study also fit a linear trend line which indicates a significant relationship between the annual number of publications and the publication years.

3.2 Journal quality analysis

Initial results reveal that 113 journals contribute 532 research papers in the momentum investing literature. The contribution of the top 10 journals in total momentum literature is 34%. Table 1 represents the top 10 journals contributing to momentum investing literature along with their key characteristics. One can easily observe from the table that Journal of Banking and Finance (JBF) leads in terms of the number of publications. However, Journal of Finance (JF) is the most influential journal as the journal has the highest number of total citations, and this journal has contributed first publication on momentum investing. Journal is still contributing to momentum investing literature. Journal of Financial Economics (JFE) and Review of Financial Studies are among the other influential journals.

Table 1 Top 10 journals contributing to momentum investing

Journal (label)	Total articles	H index	TC	TC/A	Time span
Journal of Banking and Finance (JBF)	33	14	764	23.15	2002–2019
Journal of Finance (JF)	27	25	21134	782.70	1993–2019
Journal of Financial Economics (JFE)	21	17	4589	218.50	1998–2019
Pacific Basin Finance Journal (PBFJ)	20	11	476	23.80	2002–2019
Journal of Empirical Finance (JEF)	16	10	403	25.20	2003–2019
Journal of Financial and Quantitative Analysis (JFQA)	14	11	818	58.50	2000–2018
Review of Financial Studies (RFS)	14	13	1710	122.10	1998–2018
Applied Financial Economics (AFE)	14	6	86	6.15	2005–2014
Accounting and Finance (AF)	12	5	79	6.58	2007–2019
Journal of Asset Management (JAM)	12	5	54	4.50	2008–2019

Fig. 2 Geographical locations of all contributing organizations

3.3 Leading countries, regions and organisations driving research on momentum investing

To determine the leading countries driving research on momentum investing, the present study extract affiliations of authors from the comma separated value (CSV) file in Google sheets. After this, authors derive the GPS coordinates of these affiliations with the help of the Geocode tool in Google Sheets. Finally, the study plots these coordinates through Google Maps. Figure 2 discloses that North America and Europe are two continents which contribute the highest number of research studies

Table 2 Contribution of organizations based on their geographical regions

Geographical region	No. of organizations	Contribution in percentage (%)
Europe		
Northern Europe	24	2.33
Eastern Europe	17	1.65
Western Europe	203	19.71
Southern Europe	33	3.20
America		
Northern America	358	34.76
South America	4	0.39
Africa		
Northern Africa	2	0.19
Southern Africa	9	0.87
North Western Africa	5	0.48
Asia		
Eastern Asia	184	17.86
South-Eastern Asia	32	3.11
Western Asia	14	1.36
Southern Asia	34	3.30
Oceania		
Australia And New Zealand	111	10.78
Total	1030	100.00

in momentum investing literature. In contrast, the contribution of South American and African countries is minimal.

Additionally, in Table 2, the study subdivides the four major geographical areas into regions and report the contribution of each region. North America, Western Europe, along with Eastern Asia, are the major regions contributing to momentum investing literature. African regions, along with South America and Western Asia, are the least contributing regions. Further, Table 3 reports the leading organisations working in the field of momentum investing. Monash University, University of Delhi, California State University and Emory University are among the top-performing institutions.

3.4 Author influence

Table 4 represents the dominant authors working in the area of momentum investing. It is apparent from the table that Ko and Zaremba lead in terms of the total number of publications. Nevertheless, Jegadeesh and Titman are the most prominent authors, as both authors receive the highest number of citations. Jegadeesh and Titman also dominate with regard to h and g indexes. This dominance is primarily due to the fact that Jegadeesh and Titman are the earliest contributors to momentum investing.

Table 3 Top 10 contributing organizations

Organization	Location	Total articles
Monash University	Australia	9
University of Delhi	India	9
California State University	United States of America	8
Emory University	United States of America	8
National Chi Nan University	Taiwan	8
National University Of Singapore	Singapore	7
University of New South Wales	United Kingdom	7
Deakin University	Australia	6
East China University of Science and Technology	China	6
Erasmus University Rotterdam	Netherlands	6

Table 4 Top 10 contributing authors

Authors	Total publications	Total citations	H Index	G Index
Ko, K. C.	8	32	4	5
Zaremba, A	8	66	5	8
Jegadeesh, N	7	5507	7	7
Muga, L	7	60	5	7
Nartea, G. V.	7	60	5	7
Titman, S	6	5201	6	6
Miffre, J	6	320	5	6
Du, D	6	76	4	6
Cheema, M. A.	6	41	4	6
Grobys, K	6	36	3	6

3.5 Citation analysis

Citation analysis is a widely used method to measure the impact of a publication (Xu et al. 2018). There are two methods to conduct citation analysis (a) global citation analysis and (b) local citation analysis. Global citation analysis focuses on overall citations of a research publication. Local citation analysis stresses on citations of a research publication within a particular set of research publications like in our paper, we find local citations of a research article by counting the number of times that research article is cited by other research publications within 532-node network (532 research papers used for final analysis). Citation analysis discloses that 484 research studies have global citations, and 303 have local citations. Table 5 shows the ten most influential research studies based on local citations.

Table 5 Top 10 papers by local citations

Author (year)	Local citations	Total citations	Average citations
Jegadeesh and Titman (1993)	457	3652	130.43
Jegadeesh and Titman (2001)	277	931	46.55
Rouwenhorst (1998)	272	732	31.83
Barberis et al. (1998)	244	1690	73.48
Hong and Stein (1999)	237	1367	62.13
Moskowitz and Grinblatt (1999)	190	574	26.09
Griffin et al. (2003)	172	376	20.89
Hong et al. (2000)	168	924	44
Daniel et al. (1998)	164	1966	85.48
Chan et al. (1996)	155	734	29.36

3.6 PageRank analysis

Citation analysis considers only one aspect for determining the impact of the research paper that is popularity (Ma et al. 2008; Xu et al. 2018). It completely ignores the other important aspect that is prestige. To overcome this problem, PageRank analysis can be used to determine the impact of a research paper. Page and Brin developed this technique in 1998 to rank websites. Today it is also famous among academicians to assess the impact of a research study. We have used the following formula suggested by Xu et al. (2018) to calculate the PageRank of a research paper.

$$\text{PR(X)} = \frac{(1-d)}{N} + d\left(\frac{\text{PR}(T_1)}{C(T_1)} + \cdots + \frac{\text{PR}(T_n)}{C(T_n)}\right)$$

where PR(X) is page rank of paper X, d is damping factor ranges from 0 to 1, T_1, …, T_n is a set of research papers that have cited paper X, $C(T_1)$, …, $C(T_n)$ represents citations of papers T_1, …, T_n.

Table 6 shows the top 10 research papers based on PageRank measure. One can draw a meaningful conclusion from this table that the popularity of a research paper does not ensure its prestige. For instance, Moskowitz and Grinblatt (1999) and Griffin et al. (2003) both are highly cited research papers. However, these studies are not among the top 10 influential research papers based on PageRank measure.

3.7 Co-citation analysis

Although there are many techniques in bibliometrics for data-clustering analysis; co-citation analysis suggested by Small (1973) is most popular among the academicians (Fahimnia et al. 2015; Xu et al. 2018). We have done initial co-citation mapping with the help of Gephi and find that 297 research papers out of total 532 research papers have been co-cited by other research publications within our total

Table 6 Top 10 papers by PageRank

Author (year)	PageRank	Local citation	Global citation
Jegadeesh and Titman (1993)	0.012030	457	3652
Jegadeesh and Titman (2001)	0.008621	277	931
Rouwenhorst (1998)	0.007428	272	732
Barberis et al. (1998)	0.007153	244	1690
Hong and Stein (1999)	0.005967	237	1367
Carhart (1997)	0.005941	132	5181
Hong et al. (2000)	0.005870	168	924
Daniel et al. (1998)	0.005728	164	1966
Chan et al. (1996)	0.005069	155	734
Asness et al. (2013)	0.004957	132	583

sample. Further, we will use these research publications for data clustering (modularity) analysis.

3.7.1 Modularity analysis

Data clustering has remained a popular literature classification tool among the academicians (Radicchi et al. 2004; Xu et al. 2018). Data clustering helps in identifying research themes, establishing links between various research studies and grouping them. Gephi uses Louvain algorithm for data clustering. Based on iterative optimisation, Louvain algorithm maximises the modularity index by finding the optimum number of clusters and exercising Louvain algorithm to our 297 node co-citation network resulted in the formulation of four clusters. Each of these four clusters represents a unique set of research studies, and the number of research studies in each cluster differs (90 in the first cluster, 48, 97 and 62 in cluster second, third and fourth respectively). For content analysis, we have selected high-quality research papers (research papers published in ABDC's A* and A grade journals). As shown in Table 7, we have selected 172 research papers out of 297 research papers for content analysis. Out of these 172 research papers, 46 have been selected from cluster 1, 38 from cluster 2, 60 from cluster 3 and 28 from the last cluster.

To ascertain the research theme of each cluster, we identify the top 10 research papers (leading papers based on PageRank score) from each cluster. This is the popular strategy among academicians to investigate the direction of research (Fahimnia et al. 2015; Xu et al. 2018). Top research papers present a broad depiction of every cluster.

3.7.2 Analysis of the research clusters

After identifying the top 10 research papers from each cluster (shown in Table 8), we analyse the content of these research papers to determine the research theme of every cluster. The first cluster concentrates on testing the profitability of momentum investment strategies. This cluster also stresses on

Table 7 Classification of literature

Cluster	No. of papers	No. of selected papers	Area of research focus
1	90	46	Testing the profitability of momentum investment strategies and explanations of the momentum effect
2	48	38	Sources of momentum profits in international financial markets
3	97	60	Improvement over traditional momentum strategies or alternative momentum strategies
4	62	28	Momentum effect in Asia-Pacific financial markets
Total	297	172	

Table 8 Top 10 leading papers in each cluster

Cluster 1	Cluster 2
Jegadeesh and Titman (1993)	Cooper et al. (2004)
Jegadeesh and Titman (2001)	Chordia and Shivakumar (2002)
Daniel et al. (1998)	Lee and Swaminathan (2000)
Hong and Stein (1999)	Sagi and Seasholes (2007)
Barberis et al. (1998)	Liu and Zhang (2008)
Rouwenhorst (1998)	Chordia and Shivakumar (2006)
Moskowitz and Grinblatt (1999)	Sadka (2006)
Griffin et al. (2003)	Avramov et al. (2007)
Hong et al. (2000)	Arena et al. (2008)
Chan et al. (1996)	Bandarchuk and Hilscher (2013)
Cluster 3	**Cluster 4**
Asness et al. (2013)	Rouwenhorst (1999)
George and Hwang (2004)	Hameed and Kusnadi (2002)
Moskowitz et al. (2012)	Fama and French (2012)
Novy-Marx (2012)	Chui et al. (2010)
Barroso and Santa-Clara (2015)	Demir et al. (2004)
Blitz et al. (2011)	Hurn and Pavlov (2003)
Daniel and Moskowitz (2016)	Chan and Lakonishok (2004)
Liu et al. (2011)	Cakici et al. (2013)
Wang and Xu (2015)	Gaunt and Gray (2003)
He and Li (2015)	Durand et al. (2006)

various behavioural and risk-based explanations of momentum investing. Second cluster focuses on finding the relevant sources of momentum profits. Third cluster is about alternative momentum strategies. This cluster emphasises on testing of alternative momentum strategies. Fourth cluster mainly focuses on testing the profitability momentum strategies in Asia-Pacific financial markets.

4 Content analysis

We conduct content analysis to recognise sub-themes within each cluster. Co-citation analysis does not include some notable research papers because of fewer citations. Therefore, we also consider recently published papers (2017, 2018 and 2019) and identify another 23 research papers that fit into existing clustering structure. Finally, we have reviewed 195 research papers (all research papers published in A* and A rating journals).

4.1 Cluster 1: Testing the profitability of momentum strategies and explanations of the momentum effect

Cluster 1 focuses on testing the profitability of momentum strategies and explanations of the momentum effect. This cluster begins with the classical work of Jegadeesh and Titman (1993). They find that stocks with superior returns in the past also generate superior returns in the near future (3–12 months holding period) and similarly stocks with poor returns in the past generate poor returns in the near future. They report significant momentum effect in the US equity market. Academicians also confirm the significant momentum effect in other financial markets (Chan et al. 1996; Rouwenhorst 1998; Schiereck et al. 1999; Jegadeesh and Titman 2001; Griffin et al. 2003; Hon and Tonks 2003; Balvers and Wu 2006; Muga and Santamaría 2007). By testing various combinations of formation and holding periods, financial researchers agree that 6/6 momentum investment strategy (6 months' formation and 6 months holding) is the best strategy. Academicians do not limit themselves to only one asset class. They report significant momentum effect across various traditional and alternative asset classes such as mutual funds, corporate bonds, currencies, commodities, exchange-traded funds and real estate investment trusts (Grinblatt et al. 1995; Chui et al. 2003; Okunev and White 2003; Sapp and Tiwari 2004; Miffre and Rallis 2007; Derwall et al. 2009; Beracha and Skiba 2011; Menkhoff et al. 2012; Jostova et al. 2013; Fuertes et al. 2015; Narayan et al. 2015). Therefore, the momentum effect is pervasive.

Although there is consensus among the researchers about the existence of momentum effect, there are differences among academic researchers regarding the explanations of momentum investing. Broadly, explanations of momentum investing can be categorised into two major groups. The first group belongs to rational thinkers who believe that momentum premium is the compensation for the high risk taken by momentum traders. Academic studies suggest plausible risk-based momentum models (Conrad and Kaul 1998; Berk et al. 1999; Moskowitz and Grinblatt 1999; Johnson 2002; Bansal et al. 2005; Li 2017; Ruenzi and Weigert 2018). Berk et al. (1999) propose a theoretical model based on the notion that transitory persistence in structure and systematic risk of a firm's assets results in return continuation (momentum effect). Johnson (2002) presents a rational model that provides a theoretical link between expected growth rates and return-continuation patterns. Johnson (2002) observes that past winners (losers) experience positive (negative) shocks to their expected growth rate, which results in an immediate increase (decrease) in their stock prices. Bansal et al. (2005) examine the role of consumption risk in capturing momentum payoffs and document that consumption risk incorporated in cash flows can capture momentum profits. More recently, Li (2017) suggests a rational explanation based on a firm's investment and documents that short-term productivity associated with winner stocks (companies) cause price continuation effect. Griffin et al. (2003) challenge these rational explanations by giving contradictory evidence. Proponents of behavioural finance believe that the explanatory power of the rational models is the result of data mining and over-fitting bias. They believe that behavioural biases can solve the momentum puzzle. These explanations are known as behavioural explanations. There are three subthemes prevalent in behavioural

explanations. These are initial underreaction, overreaction and disposition effect. Underreaction theories are based on the notion that investors initial underreaction deviate the stock prices from their fundamental value resulting in higher subsequent returns (Barberis et al. 1998; Hong and Stein 1999; Hong et al. 2000; Vayanos and Woolley 2013; Da et al. 2014; Chen and Lu 2017). Barberis et al. (1998) report that investors' conservatism[1] cause underreaction to new information. Due to this underreaction stocks trade below their intrinsic value which results in higher subsequent returns (momentum effect). Hong and Stein (1999) propose a theoretical model based on two groups of investors. These two groups are 'news-watchers' and 'momentum traders'. Hong and Stein (1999) find that 'gradual diffusion of information' among the news watchers cause underreaction. Later on, Hong et al. (2000), Doukas and McKnight (2005), Da et al. (2014) and Chen and Lu (2017) augment the findings of Hong and Stein (1999). Vayanos and Woolley (2013) suggest an institutional momentum theory based on the outflow of investment funds. They reveal that gradual outflow of funds (underreaction) in response to a market shock cause momentum. Recently, Docherty and Hurst (2018) prove that investors' myopia[2] cause gradual diffusion of fundamental news which further result in price continuation effect.

Contrary to underreaction theories, overreaction models insist that investors overreaction drives stock prices far away from their intrinsic values that cause short term momentum (Daniel et al. 1998; Hillert et al. 2014; Adebambo and Yan 2016). Daniel et al. (1998) find that investors' overconfidence and self-attribution[3] cause market overreaction. Adebambo and Yan (2016) confirm the findings of Daniel et al. (1998) by examining the trading patterns of mutual fund managers in the United States of America. More recent and intriguing behavioural models focus on the role of disposition effect in explaining the momentum effect (Grinblatt and Han 2005; Hur et al. 2010; Hur and Singh 2019). Grinblatt and Han (2005) present a behavioural model based on two types of investors, i.e. disposition and rational investors. Irrational behaviour of disposition investors creates a spread between the intrinsic value and current market price of a stock. Based on the direction of this spread (either positive or negative), rational investors will either take a long or short position which will further result in upward or downward momentum. Extending the work of Grinblatt and Han (2005), Hur and Singh (2019) observe that anchoring bias, along with disposition effect plays a substantial role in solving the momentum puzzle.

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[1] Conservatism refers to the tendency of investors to stick with their original beliefs (past information) which results in a slow reaction to new information.

[2] Investors' myopia signifies investors' propensity to overweight the temporary price changes than long-run intrinsic value (Docherty and Hurst 2018).

[3] Daniel et al. (1998) find that overconfident traders pay more attention to own private information than public information. Self-attribution cause continuing overreaction if public information validates the private information.

[4] Disposition effect refers to the investors' tendency to hold losing stocks longer than winning stocks (Shefrin and Statman 1985).

4.2 Cluster 2: Sources of momentum profits

Cluster 2 focuses on finding the relevant sources of momentum profits. Cluster 1 serves as a foundation for this cluster. Rational and behavioural models discussed in cluster 1 provide the rationale behind the link between momentum and various sources. This cluster extends cluster 1 by providing a list of the various firm and market-specific characters that can be used as filters to enhance the performance of momentum strategies given by Jegadeesh and Titman (1993). This cluster begins in 2000 when Lee and Swaminathan (2000) establish a link between trading volume and momentum payoffs. Lee and Swaminathan (2000) report that stocks with higher (lower) past trading volume tend to generate lower (higher) future returns. They also find that high volume winners and low volume losers exhibit faster reversals. These findings attempt to harmonise the short-horizon "underreaction" and continuing "overreaction" models. After that, Chordia and Shivakumar (2002) propose a macroeconomic model to capture momentum payoffs. They find that momentum strategies generate positive payoffs only during expansionary time-periods, whereas during the economic downturn, momentum payoffs are negative. The findings of this study support risk-based momentum explanations. Later on, many other academic studies also explore various sources. Firm or stock-specific characteristics and market-specific characteristics are two major categories of these sources.

Research studies report significant relationship among specific firm-specific characteristics such as dividend, credit ratings, turnover, firm expansion, firm size, idiosyncratic volatility, capital investment and momentum payoffs (Lee and Swaminathan 2000; Avramov et al. 2007; Sagi and Seasholes 2007; Arena et al. 2008; Asem 2009; Jiang et al. 2012; Nyberg and Pöyry 2014; Booth et al. 2016). Avramov et al. (2007) support rational explanations by establishing a link between credit risk and momentum profits. They find significant momentum profits only among non-investment grade firms. Arena et al. (2008) reveal that stocks with greater idiosyncratic volatility[4] tend to generate higher momentum payoffs, and these stocks experience quicker reversals. These results are in accordance with the view that initial underreaction to firm-specific news is the main driver behind the momentum profits. Asem (2009) provides another evidence in support of underreaction theories by suggesting that investors can enhance their momentum payoffs by taking a long position in stocks that have increased dividend and short position in stocks that have decreased dividends. Jiang et al. (2012) establish a link between capital investments and momentum profits. They document that stocks with substantial capital investments generate enormous momentum profits. Corroborating the rational explanations, Booth et al. (2016) demonstrate that firm size (a proxy for risk) captures the momentum effect. They find significant price continuation effect only in the case of small-cap equities. Bandarchuk and Hilscher (2013) conduct a comprehensive study

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[4] Total volatility of a stock's return can be divided into two portions (a) explainable portion (b) residual portion. The residual portion (the portion of total volatility of a stock's return that cannot be captured by market model) is called idiosyncratic volatility.

on firm-specific characteristics and momentum profits. They report that these characteristics only work for stocks with more extreme returns.

Academic studies also find strong relationship among certain market-specific factors such as market states, market-wide liquidity, market dynamics, market sentiments, macroeconomic variables, political risk and momentum profits (Chordia and Shivakumar 2002; Cooper et al. 2004; Sadka 2006; Liu and Zhang 2008; Asem and Tian 2010; Stambaugh et al. 2012; Antoniou et al. 2013; Garcia-Feijoo et al. 2018; Filippou et al. 2018). Following the overreaction model (Daniel et al. 1998), Cooper et al. (2004) report that profitability of momentum strategies is dependent upon market states and these strategies generate positive returns only in UP market states.[5] Sadka (2006) provides direct evidence in favour of rational explanations by establishing a link between market-wide liquidity and momentum payoffs. Liu and Zhang (2008) provide another evidence in support of risk-based explanations. They examine the role of the growth rate of industrial production (a standard macroeconomic factor) in capturing momentum profits. Asem and Tian (2010) reveal that momentum investment strategies generate superior returns when markets remain in the same state than when markets transit to other state. They find that during the times of market continuation investor's confidence is higher that results in superior momentum payoffs. Antoniou et al. (2013) find that significant momentum payoffs arise only when investor sentiments are positive, i.e. when investors feel optimistic. Han and Li (2017) corroborate the findings of Antoniou et al. (2013). Recently, Filippou et al. (2018) provide evidence in support of rational explanations by linking the performance of momentum portfolios with political risk.

4.3 Cluster 3: Improvement over traditional momentum strategies or alternative momentum strategies

Although the first research paper in this cluster published in 2004; after the subprime crisis, this cluster has witnessed rapid growth. During the subprime crisis and recovery period, traditional momentum strategies performed worst (Moreira and Muir 2017; Dobrynskaya 2019). At that time, financial researchers shifted their focus to develop alternative versions of momentum that perform better than traditional momentum strategies, especially during nasty times. Firstly, George and Hwang (2004) suggest 52-week high momentum. By selecting stocks "based on the ratio of their current prices to past 52-week high prices", many academic studies confirm the superiority of 52-week high momentum strategies over traditional momentum strategies (George and Hwang 2004; Marshall and Cahan 2005; Du 2008; Liu et al. 2011). Academic studies also find that both traditional momentum and 52-week high momentum strategies perform miserably during high volatile periods (Wang and Xu 2015; Min and Kim 2016; Daniel and Moskowitz 2016). To resolve this issue, Blitz et al. (2011) recommend residual momentum. They report

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[5] Cooper et al. (2004) define up and down market states with the help of lagged 36 months' market return. For a particular month, if lagged 36 months' market return is positive, then the market is said to be in UP market state; otherwise, the market is said to be in downstate.

that residual momentum performs better than traditional momentum during the crisis period. The fundamental difference between traditional momentum and residual momentum lies in the stock selection process for portfolio formation. In residual momentum, stocks are selected on the basis of their residual return (stock return after adjusting Fama–French factors) rather than on the basis of their total return. Several studies report the superiority of residual momentum strategies over the traditional momentum (Chang et al. 2018; Lin 2019). In recent years, time-series momentum has gained much attention among financial researchers. Moskowitz et al. (2012) introduce time-series momentum. Time-series momentum also called absolute momentum, is based on selecting financial assets on the basis of their own past performance, neglecting the performance of other financial assets. After the work of Moskowitz et al. (2012) numerous research studies have explored the profitability of time-series momentum strategies (He and Li 2015; Bird et al. 2017; Shi and Zhou 2017; Goyal and Jegadeesh 2018; Lim et al. 2018; He et al. 2018). Some research studies suggest volatility scaling approaches to avoid huge losses resulting from traditional momentum strategies during bad times (Wang and Xu 2015; Barroso and Santa-Clara 2015; Kim et al. 2016; Daniel and Moskowitz 2016). Barroso and Santa-Clara (2015) propose risk-managed momentum strategies based on constant volatility scaling whereas Daniel and Moskowitz (2016) suggest alternative momentum framework based on dynamic volatility scaling approach. Fan et al. (2018) compare these two volatility scaling approaches and find that alternative momentum strategy based on dynamic volatility scaling generates superior returns. Several studies develop combined investment strategies such as combining value and momentum, cross-sectional and time-series momentum and these combined strategies perform better than standalone momentum strategies (Serban 2010; Asness et al. 2013; Lim et al. 2018).

4.4 Cluster 4: Momentum effect in Asia-Pacific financial markets

Cluster 4 focuses on testing the momentum effect in Asia-Pacific financial markets. In the last 10–15 years, asset managers have shifted their focus from mature European and North American financial markets to Asia-Pacific financial markets because these offer more growth opportunities than mature European and North American markets. In the recent past, numerous researchers have studied the performance of different investment strategies in Asia-Pacific financial markets. Evidence of the momentum effect in Asian markets is mixed. Rouwenhorst (1999) initially test the performance of momentum strategies across 20 emerging markets (including 9 Asian markets) and find that these strategies generate significant profits only in 3 Asian markets. Hameed and Kusnadi (2002) examine the momentum effect in six Asian stock markets. They do not exhibit any return continuation pattern in these markets. Griffin et al. (2003) also report weak momentum effect in Asia. After that, many studies test the momentum effect in different Asian regions. Research studies report no or minor momentum effect in Japan and Taiwan (Chui et al. 2000; Fama and French 2012; Asness et al. 2013). Evidence of momentum effect in the Chinese stock market is more confusing. Some studies disclose significant momentum effect

in Chinese stock market (Kang et al. 2002; Naughton et al. 2008; Cheema and Nartea 2014) while other studies do not exhibit any momentum effect in Chinese stock market (Zhou et al. 2010; Pan et al. 2013). Researchers find significant momentum effect in the Indian stock market (Gupta et al. 2010; Sehgal and Jain 2011; Maheshwari and Dhankar 2017). Although there are mixed results regarding the existence of momentum effect in Asia region, research studies exhibit strong momentum effect in Pacific region stock markets (Hurn and Pavlov 2003; Gaunt and Gray 2003; Demir et al. 2004; Vanstone and Hahn 2017).

5 Discussion

The first cluster began in 1993, the second cluster firstly appeared in 2000, and the fourth cluster emerged in 1999. All these three clusters have witnessed a downfall in research publications after the subprime crisis. Cluster 3 has witnessed a significant boost in research publications after the subprime crisis. We notice that momentum investing research has constantly evolved into two mainstreams. First, second and fourth clusters combined represents one stream. These three clusters mainly concentrate on testing profitability of traditional momentum strategies (momentum strategies suggested by Jegadeesh and Titman) across different financial markets, explanations and sources of these strategies. Cluster 3 represents another stream. This stream focuses on suggesting better alternatives of traditional momentum strategies that not only generate a better return than traditional momentum strategies but also minimise the risk, especially downside risk during the extreme times. This cluster also includes the research studies that compare whether combined momentum strategies (combining one version of momentum with other) perform better than standalone momentum strategies. After analysing the findings of various studies, we have drawn the following interesting facts.

1. Although academic research on momentum investing begins with the classical work of Jegadeesh and Titman in 1993, it has witnessed rapid growth after 2001.
2. 8 major journals contribute almost 80% of 195 research papers selected for content analysis. Among these 8 major journals, Journal of Finance and Journal of Banking and finance published most research studies on momentum investing.
3. Research on momentum investing can be categorised into two major streams consisting of four clusters. The second stream can be seen as an extension of the first stream. Cluster 3 presents the nascent research area in the field of momentum investing.

After undertaking content analysis, we find certain research themes in the field of momentum investing on which future researchers can focus. Firstly, most existing academic studies on momentum investing has focused on one or two versions of momentum. In the first and second cluster, most studies have used cross-sectional momentum suggested by Jegadeesh and Titman. In the third cluster, most studies consider their own versions of momentum. Although there are

academic studies which compare two or three versions of momentum (Gupta et al. 2010; Lim et al. 2018); there is not a single study that compares all the versions of momentum (cross-sectional momentum, industrial momentum, 52-week high momentum, residual momentum, time-series momentum). Therefore, in the future, researchers can focus on comparing all the versions of momentum and suggest which version of momentum performs best.

Secondly, most research studies in cluster 3 are about testing the profitability of alternative versions of momentum and comparing the performance of these alternative versions with the performance of traditional momentum. There are very few studies regarding the potential explanations and sources of profitability of these strategies (Kim et al. 2016; Andrei and Cujean 2017; Chang et al. 2018). Future researchers can target the relevant sources of profitability of different alternative momentum strategies. Apart from this, most research studies on alternative momentum strategies test the profitability of these strategies in developed stock markets. Nevertheless, in recent years, global fund managers have shifted their focus on emerging stock markets. Testing the profitability of these alternative momentum strategies in the emerging markets may become a potential area for future research.

Most academic studies on momentum have reported raw or risk-adjusted momentum profits. These studies skip one of the critical factor, which is the transaction cost. Very few academic studies have tested the profitability of momentum strategies after adjusting the transaction costs (Korajczyk and Sadka 2004; Siganos 2010). The role of transaction cost increases in emerging markets because brokerage commissions are comparatively high in emerging markets. Apart from transaction cost, academic studies do not take into consideration the short sales constraints. In many stock markets, short selling is not allowed. Therefore, testing the profitability of different momentum strategies after adjusting the transaction costs and after considering the short sale constraints can become a fertile area for future research.

Academic studies on the explanations of momentum have focused either on the rational aspect or the behavioural aspect. Both camps claim that their explanations are better than the other one. However, in the recent past, the concept of progressive rationality has gained a lot of attention. This concept tries to reconcile the behavioural and rational thoughts. Zoghlami (2013) explains the momentum payoffs with the help of progressive rationality, but it is limited to only the Tunisian stock market. More work in future is needed in this area.

Combining several momentum investment strategies represent a significant area where future researchers can focus. Asness et al. (2013) combine momentum strategies with value investment strategies and report that the combined strategy performs better than standalone strategies. In future, momentum strategies can be combined with other investment strategies like momentum effect with low-price effect, momentum effect with moving averages etc. Researchers can also test whether these combined momentum strategies can beat standalone momentum strategies. Apart from combining momentum strategies with other investment strategies, future researchers can test the applicability of momentum strategies on cryptocurrencies. Based on blockchain technology, these virtual currencies are emerging as new financial instruments. Grobys and Sapkota (2019) explore the momentum effect in the

Table 9 Identifying future research themes for momentum investing

Category	Issue	Future research theme
Comparison of different versions of momentum	Existing studies compare two or three versions of momentum.	Studies that compare all the versions of momentum
Sources of alternative versions of momentum	Lack of studies focusing on sources of the different alternative versions of momentum	Studying potential sources of alternative versions of momentum
Testing the alternative momentum strategies	Few research studies focus on testing the alternative momentum strategies in emerging markets	Testing alternative momentum strategies in emerging markets
Transaction cost	Most Academic studies report momentum payoffs without considering transaction cost	Testing the profitability of momentum strategies after considering transaction cost
Short sales constraints	Few studies focus on short sale constraints	Applicability of momentum strategies in financial markets where short sale is restricted
Reconciling rational and behavioural thoughts	Existing studies either focus on rational explanations or on behavioural explanations	Research studies focusing on reconciling the rational and behavioural explanations
Virtual Currencies	Lack of research studies testing the momentum effect in virtual currencies	Testing the momentum effect in virtual currencies

crypto market. Nevertheless, more research is needed in this field. In short future researchers can focus on research subthemes mentioned in Table 9.

6 Conclusion

Momentum investing has taken an inevitable place in the investment strategies literature. Apart from its wider acceptability in academic research, investment practitioners use these strategies to generate significant alphas in the financial markets. Although the literature on momentum anomaly comprises of a few review studies focusing on specific themes, a through structured review combined with bibliometric and network analysis covering all the major aspects of momentum investing has not been done. In this initial effort, we outline the evolution of momentum investing field, identify influential research studies and broader classification of literature. Besides classification, we also conduct content analysis of high ranked academic papers to gain valuable insights. We draw the broader conclusion that testing the performance of momentum investment strategies and finding their potential explanations and sources has remained major themes among the researchers. Recent academic studies are focusing on developing alternative momentum strategies to improve the performance of traditional strategies.

Our study will help the researchers working on momentum investing in multiple ways. First, our study outlines the knowledge framework of momentum investing. This knowledge framework will help the researchers in understanding how momentum investing evolved. Second, it may help them in identifying mature and emerging themes on momentum investing. Researchers can avoid these established themes and can focus on emerging themes. Third, our study represents a new methodology for systematic reviews by combining various bibliometric tools and content analysis.

The study is not free from limitations. First, the present research relies only on the Scopus database for literature search. Future studies can broaden the search scope by using multiple bibliometric databases. Second, we exclude research studies related to the applications of Robotics, Artificial Intelligence and Supported Technologies (RAIST) in momentum investing. As an emerging theme, these studies may enlighten this structured review. Third, the present review emphasises only on journal articles and thus discards other forms of literature such as books and "gray literature", i.e. conference papers, working papers, government reports, research reports. These other forms of literature might contain intriguing findings that may offer additional insights.

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