



A bibliometric review of financial market integration literature

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ABSTRACT

We undertake a meta-literature review on the topic of financial market integration (FMI), covering 260 articles from 1981 to 2021. Our review consists of quantitative analysis of bibliometric citations concomitant with qualitative analysis of content, towards a goal of identifying primary research streams and proposing directions for future research. We identify five research groups: (1) portfolio diversification with financial market integration; (2) general equity market integration; (3) financial market linkage with respect to crises and events; (4) time-varying financial market integration; and (5) co-movements and spillovers between commodities and financial markets; as well as present a wide array of future research directions. We conduct an extensive review of FMI literature, answering several questions: (1) What is the domain of FMI research?; (2) What are the influential aspects of top journals and authors, and the characteristics of the most studied topics?; (3) What are the past and current key research streams in FMI literature?; and (4) What are the substantial future relevant research questions to explore regarding FMI? Given the ongoing attention on financial market integration by both academicians and policy makers, our results should be of great interest.

1. Introduction and motivation

The state where financial markets in different countries move together and show the same expected risk-adjusted returns is known as financial market integration (FMI) (Patel, 2019a, 2019b, 2019c). Financial market integration continues to be emphasized in academic finance, particularly because of its relevance to portfolio diversification. Weak or low market integration produces risk diversification benefits for investors (Bekaert, Hodrick, & Zhang, 2009; Ibrahim, 2005; Patel, 2019a, 2019b, 2019c). According to (Click & Plummer, 2005) with respect to markets not yet fully integrated, to get better risk-return trade-off, investors can allocate funds to the most productive market, or region, or diversify by allocating across diverse regions. However, as countries globalize, forming, for instance, regional and international trade associations, markets become more integrated (Chowdhury, 2005), with depreciation of diversification benefits. Certainly, nations that conduct more international trade exhibit higher market integration (Patel, 2017).

A focus on market integration by finance academics stems from the early 1970s, with researchers (e.g., Grubel, 1968; Kenen, 1976; Subrahmanyam, 1975) identifying the existence of financial market integration and concomitant mitigation of investor diversification benefits. Along with these investigations, another research tract emerged examining changes in financial market integration. For instance, Vos (1988) evidences increases in financial market integration. Other studies identify time-varying integration among markets (e.g., Bekaert & Harvey, 1995). Related to these investigations of time variation, researchers (Bekaert et al., 2009; Huyghebaert & Wang, 2010; Yu, Fung, & Tam, 2010) focus on examining changes in market integration with respect to financial crises and other ‘triggers.’

While in the last several decades, there have been several significant FMI studies, focusing on various domains, few studies comprehensively assess FMI research (Adekoya, Oliyide, Asl, & Jalalifar, 2021; Cagliesi & Guidi, 2021a, 2021b; Krarup, 2021; Patel, 2019a, 2019b, 2019c; Patel, 2021a). In contrast, the present study focuses on bibliometric analysis. Consequently, in line with the models of Alon, Anderson, Munim, and

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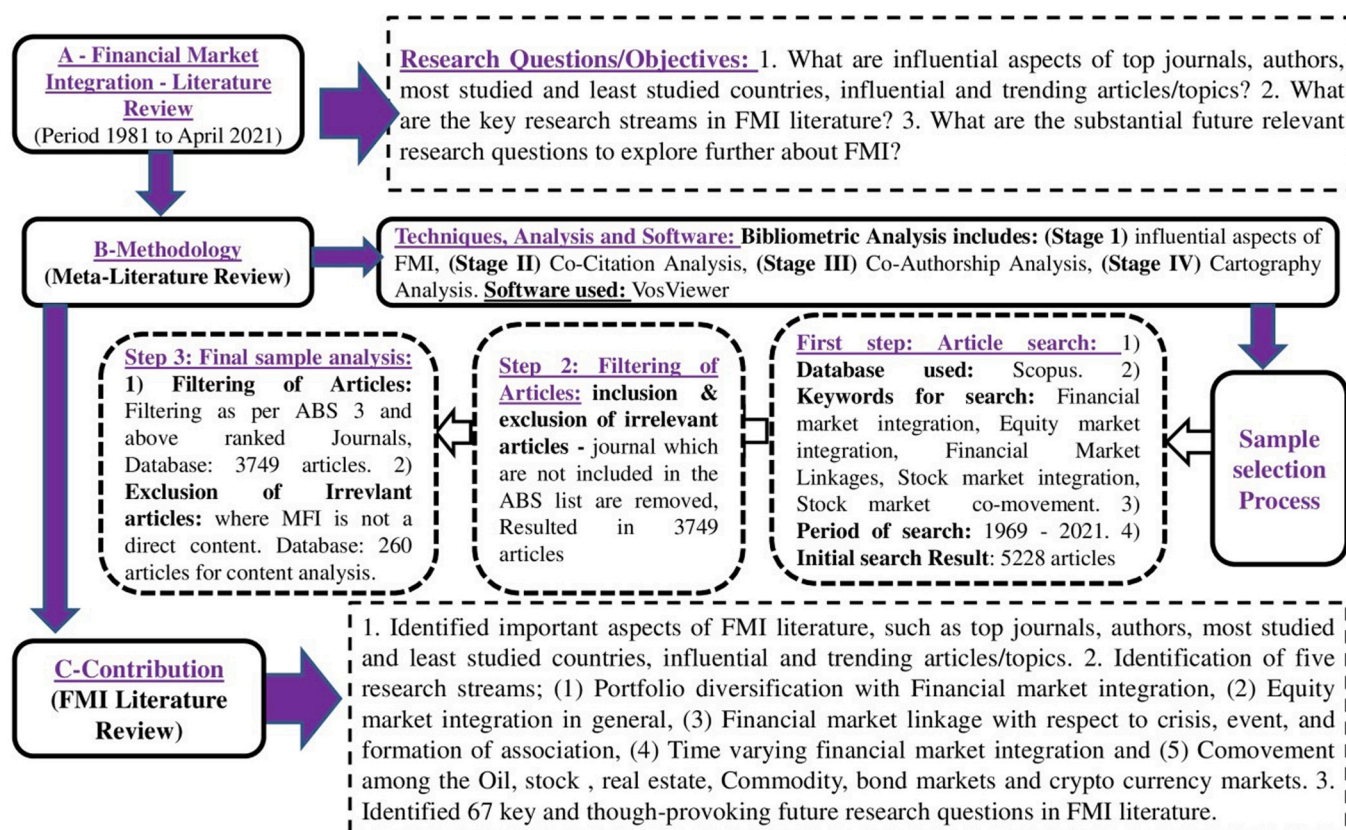


Fig. 1. Outline of methodology.

Ho (2018), Øyna and Alon (2018), and Zott, Amit, and Massa (2011), we contribute by conducting a more extensive review of FMI literature, with a goal of answering several questions: (1) What is the domain of FMI research?; (2) What are the influential aspects of top journals and authors, and the characteristics of the most studied topics?; (3) What are the past and current key research streams in FMI literature?; and (4) What are the substantial future relevant research questions to explore regarding FMI?

We conduct a meta-literature review of FMI literature published between January 1981 and April 2021, applying a methodology that combines bibliometric citation and content analyses (Alon et al., 2018). Across the social sciences, bibliometric citation analysis is a burgeoning review technique. For instance, Helbing, (2019) explores the literature on IPOs by applying bibliometric citation techniques to identify the relationship among citations, authors, countries, and themes, while Paltrinieri, Hassan, Bahoo, and Khan (2019) conduct a meta-literature review to assess literature on sukuk.

We apply a meta-literature review to 260 FMI articles in top journals, outlining the influential aspects of top journals, authors, as well as identifying influential and trending topics, and key research streams. We investigate several questions: (1) What is the domain of FMI research?; (2) What are the influential aspects of top journals and authors, and the characteristics of the most studied topics?; (3) What are the past and current key research streams in FMI literature?; and (4) What are the substantial future relevant research questions to explore regarding FMI?

We also identify five research groups: (1) portfolio diversification with financial market integration; (2) general equity market integration; (3) financial market linkage with respect to crises and events; (4) time-varying financial market integration; and (5) co-movements and spillovers between commodities and financial markets; as well as present a wide array of future research directions. Given the ongoing attention on financial market integration by both academicians and policy makers, our results should be of great interest.

2. Methodology

To extract knowledge from multi-faceted research studies, a meta-analysis of a vast body of literature should be conducted (Glass, 1976). Glass (1976) defines meta-analysis as “the analysis of analysis.” The present study is undertaken by conducting a meta-literature review, wherein we use both quantitative and qualitative techniques, including bibliometric citation and content analysis (Fetscherin, Voss, & Gugler, 2010). These methods are now used over a widespread range of approaches to performing meta-analysis in the fields of management, business, and finance research (Zamore, Ohene Djan, Alon, & Hobdari, 2018).

Bibliometric analysis, first introduced by Bradford (1934), has considerably evolved. Price (1965) presents bibliometric methods to evaluate and map scholarly articles based on numbers of citations (Kim & McMillan, 2008), using articles as a basic unit of analysis (Alon et al., 2018). According to Potter and Levine-Donnerstein (1999), content analysis is a social science methodology to systematically review and confirm the validity of knowledge in a specific field of research. An outline of the methodology used in this paper is presented in Fig. 1.

2.1. Sample selection process

As shown in Fig. 1, the sample selection process consists of three steps. The first step regards the selection of databases and the extraction of papers from these databases. In this study, we identify papers based on searches of the Scopus database. Scopus is widely used in bibliometric studies due to it having, compared with Web of Science, more extensive coverage over peer-reviewed articles from 1970 (Ball & Tunger, 2006; Fahimnia, Sarkis, & Davarzani, 2015; Feng, Zhu, & Lai, 2017; Mishra, Gunasekaran, Papadopoulos, & Childe, 2018). As noted by Vieira and Gomes (2009), Scopus is particularly comprehensive as it covers many publications houses and the fields of study.

Table 1
Sample selection process and identification of keywords through cartographic analysis.

Search Word	Period	Search Technique	Initial Search Results # Articles	Final Sample (After Exclusion)	Analyses	Identification of Research Streams (Co-Citation analysis)	Keywords in Each Stream (Cartographic analysis)
“Financial market integration” OR	1969–2021	Scopus	2010	151	Meta-Literature Review (i. Bibliometric citation analysis, ii. Content analysis)	1. Portfolio diversification with financial market integration	Financial market integration; Portfolio diversification; European stock markets
“Equity market integration” OR	1976–2021	Scopus	566	12		2. Equity market integration in general	Stock market co-movement; Equity market integration
“Financial market linkages” OR	1979–2021	Scopus	944	22		3. Financial market linkage with respect to crises, events, and formations of association	Market integration; crises; Asia; Latin America
“Stock market integration” OR	1982–2021	Scopus	1257	64		4. Time varying financial market integration	International financial integration; time; contagion
“Stock market co-movement”	1981–2021	Scopus	451	11		5. Co-movement among oil, stock, real estate, commodity, bond and cryptocurrency markets	Stock markets; regional market integration; oil
Total number of articles			5228	260			

Note: The table presents the sample selection process, final sample size, and keywords identified through cartographic analysis. The table also lists the keywords for each research stream identified through the cartographic analysis.

We identify papers based on the keywords, ‘financial market integration,’ ‘equity market integration,’ ‘financial market linkages,’ ‘stock market integration,’ and ‘stock market co-movement,’ appearing in article titles, abstracts, and keywords. Search results for these five keywords leads to an initial sample of 5228 articles. As the selection of the keywords is very important, to ensure that we cover the entire body of literature on FMI, we conduct cartographic analysis through the *VOSviewer* software program to confirm that our keywords include the entire spectrum of the literature. *VOSviewer* receives bibliometric data as input and outputs the most repeated keywords in each research stream (see Fig. 4). It is found that among all five streams. ‘Financial integration’ is the most representative and repeated keyword. The sample selection process, the search technique, and the identification of the keywords through the cartographic analysis are outlined in Table 1.

The second step relates to identifying irrelevant articles to exclude from the initial sample. To do this, we filter based on journals listed on the 2018 *Academic Journal Guide* of the Chartered Association of Business Schools (ABS) ranking. Journals not included in the ABS list are removed. After this filtering, the number of articles in our sample is reduced to 3749. To get better quality papers, articles are further filtered to the restriction of the respective journal having an ABS 3 or above rating. This filtering process reduces the number of articles to 820. We further filter by applying the Zott et al. (2011) criteria that any article we engage with, discuss, examine, or analyze has FMI as its direct content. This process is conducted by two independent authors. Our final selection, after these filtering, consists of 260 articles.

2.2. Meta-literature review

Our meta-literature analysis consists of quantitative analysis of bibliometric citations and qualitative content analyses. For bibliometric citation analysis, we follow Liu, Bollen, Nelson, and Sompel (2005), Apriliyanti and Alon (2017), Fetscherin and Heinrich (2015), Zamore et al. (2018) and Paltrinieri et al. (2019) by conducting the following analyses: (1) co-citation analysis, (2) co-authorships and (3) cartographic analyses. We use the *VOSviewer* software. *VOSviewer* takes article details as an input and provides output. *VOSviewer* utilizes distance-based mapping techniques to visualize items. As compared to *Cite Space* and *Sci2*, *VOSviewer* is considered a more powerful tool (Van Eck & Waltman, 2014). *VOSviewer* identifies networks and clusters in

Table 2
Most and least studied countries.

Most-studied countries		Least-studied countries	
Country	Times studied	Country	Times studied
USA	176	Angola	1
UK	134	Azerbaijan	1
Germany	114	Brunei	1
Japan	103	Burundi	1
France	99	Cambodia	1
Italy	76	Cameroon	1
Hong Kong	66	El Salvador	1
Netherlands	65	Fiji	1
South Korea	62	Gabon	1
Spain	60	Guatemala	1
Canada	59	Guinea	1
Belgium	58	Haiti	1
China	57	Honduras	1
Thailand	57	Iran	1
Malaysia	56	Laos	1
Australia	54	Myanmar	1
Switzerland	54	Nepal	1
Mexico	52	Papua New Guinea	1
Singapore	52	Swaziland	1

Source: Author’s calculation from the content analysis.

different forms and colors based on citation data. These clusters are based on assessing of links, including the strength of links among the sample articles (Van Eck & Waltman, 2014).The following subsections elaborate on our analysis procedures.

2.2.1. Stage 1: Identification of the influential aspects of FMI literature

The most studied countries (Table 2) are found from content analysis, whereas we apply *VOSviewer* to identifying the most influential journals (Table 3), authors (Table 4), and articles and topics (Tables 5 and 6). Initial analysis shows that 260 papers were published in 44 journals, authored by 508 scholars. These 260 papers have a total of 13,465 citations and investigate 150 world stock markets along with various other indices, sectors, and commodities. (See Table 7.)

2.2.2. Stage 2: Co-citation analysis

The commonalities and research streams in the literature are identified through bibliometric co-citation analysis. Co-citation means that

Table 3
Top influential journals.

Panel A: # papers		
Rank	Journal	#papers
1	<i>International Review of Financial Analysis</i>	33
2	<i>Journal of Banking and Finance</i>	30
3	<i>Journal of International Money and Finance</i>	30
4	<i>Journal of International Financial Markets, Institutions and Money</i>	28
5	<i>Journal of Empirical Finance</i>	16
6	<i>Energy Economics</i>	15
7	<i>International Journal of Finance and Economics</i>	11
8	<i>Economics Letters</i>	9
9	<i>European Journal of Finance</i>	8
10	<i>Journal of Business, Finance and Accounting</i>	6
Panel B: # citations		
Rank	Journal	# citations
1	<i>Journal of Banking and Finance</i>	2080
2	<i>Journal of International Money and Finance</i>	1387
3	<i>Journal of International Economics</i>	1130
4	<i>International Review of Financial Analysis</i>	965
5	<i>Journal of International Financial Markets, Institutions and Money</i>	781
6	<i>Journal of Empirical Finance</i>	780
7	<i>Journal of Financial Economics</i>	695
8	<i>Journal of Finance</i>	593
9	<i>Energy Economics</i>	510
10	<i>Economics Letters</i>	393
Panel C: Cites per document		
Rank	Journal	Cites per document
1	<i>Journal of Banking and Finance</i>	69.33
2	<i>Journal of Empirical Finance</i>	48.75
3	<i>Journal of International Money and Finance</i>	46.23
4	<i>Journal of Business, Finance and accounting</i>	43.67
5	<i>Economics Letters</i>	43.67
6	<i>Energy Economics</i>	34.00
7	<i>International Journal of Finance and Economics</i>	31.91
8	<i>International Review of Financial Analysis</i>	29.24
9	<i>Journal of International Financial Markets, Institutions and Money</i>	27.89
10	<i>European Journal of Finance</i>	14.38

articles cite each other, typically because they belong to the same concept or topic (Kim & McMillan, 2008). Co-citation analysis is performed using VOSviewer. VOSviewer receives bibliometric data as input and provides the output in different colors. Results of co-citation analysis are presented in Fig. 2.

2.2.3. Stage 3: Co-authorship analysis

Using VOSviewer, we also conduct co-authorship analysis on the authors who are working on FMI (Liu et al., 2005; Piette & Ross, 1992). VOSviewer accepts bibliometric data as an input and provides co-citations, co-authorships, and cartographic analysis, leading to a picture of the social network of researchers in FMI. Results of this co-authorship analysis are illustrated in Fig. 3.

2.2.4. Stage 4: Cartographic analysis

Keywords corresponding to streams of research are discovered by conducting cartographic analysis with VOSviewer (Van Eck & Waltman, 2010; Zamore et al., 2018). As keywords represent content areas, articles with the same keywords are clustered together in a cartographic analysis (Ding, Chowdhury, & Foo, 2001). Results of cartography analysis are reported in Fig. 4. Keywords are selected based on a minimum occurrence of three times

As a matter of course

Cartographic analysis will also confirm the initial selection of keywords used to identify our selection of articles

With 'financial market integration,' 'equity market integration,' 'financial market linkages,' and 'stock market co-movement' being the

most commonly occurring keywords in our sample. However

This analysis extends past this to identify keywords under each research stream. We use a minimum scale of co-occurrence of three for respective keywords

2.2.5. Stage 5: Content analysis

According to Potter and Levine-Donnerstein (1999), the purpose of content analysis is to explore, verify, and organize the research streams identified through bibliometric co-citation analysis. By applying content analysis on our sample of 260 articles, we explore the origins, concepts, classifications, and current streams of FMI literature.

3. Influential aspects of the financial market integration literature

3.1. Most and least studied countries (markets)

The most- and least-studied countries are identified based on content analysis. It is important to identify the most- and least-studied markets, as the most-studied markets will have greater influence on research conclusions, whereas the least-studied markets can be a focus of future studies. Consequently, to explore the linkage among the markets and portfolio diversification opportunities, it is important to study the most- and least-studied countries. The list of the 20 most- and least-studied countries is presented in Table 2. As can be seen in Table 2, the 260 sample papers examine 150 countries. Initially, studies focused mainly on developed markets but more recent studies focus shift on emerging

Table 4
Top influential authors.

Panel A: # documents			
Rank	Author	University/institution	# documents
1	Geert Bekaert	Columbia Business School, United States	6
2	Eliza Wu	The University of Sydney, Australia	5
3	Brian M. Lucey	Trinity College Dublin, Ireland	4
4	Hossein Asgharian	Knut Wicksell Centre for Financial Studies, Sweden	3
5	Lieven Baele	Tilburg University, Netherlands	3
6	Michel Beine	University of Luxembourg, Luxembourg	3
7	Patricia Chelley-Steeley	Birmingham Business School, United Kingdom	3
8	Khaled Guesmi	PSB Paris School of Business, France	3
9	Campbell R. Harvey	Fuqua School of Business, United States	3
10	Suk-Joong Kim	The University of Sydney, Australia	3
11	Gulser Meric	Rowan University, United States	3
12	Ilhan Meric	Rider University, United States	3
13	Jian Yang	University of Colorado Denver, United States	3

Panel B: # citations			
Rank	Author	University/institution	# citations
1	Philip R. Lane	European Central Bank, Germany	1045
2	Gian Maria Milesi-Ferretti	International Monetary Fund, United States	1045
3	Geert Bekaert	Columbia Business School, United States	872
4	Campbell R. Harvey	Fuqua School of Business, United States	438
5	Eliza Wu	The University of Sydney, Australia	398
6	Bala Arshanapalli	Indiana University Northwest, United States	329
7	John Doukas	Old Dominion University, United States	329
8	Fariborz Moshirian	UNSW Sydney, Sydney, Australia	284
9	Robin L. Lumsdaine	National Bureau of Economic Research, United States	279
10	Casper G. De Vries	Erasmus Universiteit Rotterdam, Netherlands	257
11	Philipp Hartmann	European Central Bank, Germany	257
12	Stefan T.M. Straetmans	Maastricht University, Netherlands	257

Panel C: Citations per paper			
Rank	Author	Institution	Citations per paper
1	Campbell Harvey	Fuqua School of Business, United States	146
2	Geert Bekaert	Columbia Business School, United States	145.33
3	Fariborz Moshirian	UNSW Sydney, Australia	142
4	Nikolaos Antonakakis	Portsmouth Business School, United Kingdom	122
5	George Fil	Bournemouth University, United Kingdom	122
6	Elie Bouri	Holy Spirit University of Kaslik USEK, Lebanon	106
7	John L. Glascock	University of Connecticut, United States	104.5
8	Kate Phylaktis	CityUniversity of London, United Kingdom	103.5
9	Marcel Fratzscher	Centre for Economic Policy Research, United Kingdom	93.5
10	Svitlana Voronkova	Zentrum für Europäische Wirtschaftsforschung GmbH, Germany	86.5
11	Eliza Wu	The University of Sydney, Australia	79.6

Table 5
Top cited articles.

Rank	Article	Journal	Citations
1	Lane and Milesi-Ferretti (2007)	<i>Journal of International Economics</i>	1045
2	Arshanapalli and Doukas (1993)	<i>Journal of Banking and Finance</i>	329
3	Bekaert et al. (2002)	<i>Journal of Financial Economics</i>	279
4	Hartmann, Straetmans, and Vries (2004)	<i>Review of Economics and Statistics</i>	257
5	Bekaert (1995)	<i>World Bank Economic Review</i>	254
6	Jorion and Schwartz (1986)	<i>Journal of Finance</i>	234
7	Chen et al. (2002)	<i>Journal of Banking and Finance</i>	214
8	Baxter and Jermann (1997)	<i>American Economic Review</i>	213
9	Norden and Weber (2009)	<i>European Financial Management</i>	210
10	Carriero et al. (2007)	<i>Journal of Financial and Quantitative Analysis</i>	207
11	Antonakakis et al. (2013)	<i>Economics Letters</i>	205

markets. Frontier markets have been least considered.

In addition to financial markets, FMI papers also consider indices and commodities. Studies also examine various stock-market index

categories as US (MSCI-US), emerging (MSCI-EM), frontier (MSCI-FM), World (MSCI WORLD), and various regional focuses (Cagliesi & Guidi, 2021a, 2021b; Reboredo, 2018). Commodities examined include aluminum, beverages, cocoa, coffee, copper, corn, cotton, diamond, energy, feeder cattle, gasoil, gold, heating oil, live cattle, natural gas, nickel, oil, platinum, precious metals, silver, soybeans, tea, unleaded gasoline, wheat and zinc are also considered by the studies to examine the integration among financial markets and commodity markets.

3.2. Influential journals and authors

We identify influential journals and authors using VOSviewer. We identify 10 leading journals based on total papers, number of citations, and number of citations per year. Top journals are listed in Table 3. These journals are *International Review of Financial Analysis*, *Journal of Banking and Finance*, *Journal of International Money and Finance*, *Journal of International Financial Markets, Institutions and Money*, and *Journal of Empirical Finance*, *Energy Economics*, *International Journal of Finance and Economics*, *Economics Letters*, *European Journal of Finance*, and *Journal of Business Finance and Accounting*. These journals have published the most papers on financial market integration for 1981–2021.

We determine the most influential authors, based on numbers of

Table 6
Trending articles.

Rank	Article	Journal	Citations	Per year citation
1	Lane and Milesi-Ferretti (2007)	<i>Journal of International Economics</i>	1045	74.64
2	Ji et al. (2019)	<i>International Review of Financial Analysis</i>	87	43.50
3	Antonakakis et al. (2013)	<i>Economics Letters</i>	205	25.63
4	Maghyereh et al. (2016)	<i>Energy Economics</i>	125	25.00
5	Dimitriou et al. (2013)	<i>International Review of Financial Analysis</i>	167	20.88
6	Ghosh and Kanjilal (2016)	<i>Energy Economics</i>	90	18.00
7	Norden and Weber (2009)	<i>European Financial Management</i>	210	17.50
8	Hartmann et al. (2004)	<i>Review of Economics and Statistics</i>	257	15.12
9	Carrieri et al. (2007)	<i>Journal of Financial and Quantitative Analysis</i>	207	14.79
10	Bekaert et al. (2002)	<i>Journal of Financial Economics</i>	279	14.68
11	Reboredo (2018)	<i>Energy Economics</i>	40	13.33

papers, numbers of citations, and average citations per paper. Top authors are reported in Table 4. According to Van Eck and Waltman (2014), lists of top journals and top authors are helpful to the future researchers to collaborate and publish their work.

3.3. Influential and trending articles and topics

We identify influential and trending articles using VOSviewer. Influential and trending articles are identified based on two criteria: 1) total citations and 2) citations per year. Identifying influential and trending articles assists future authors considering differing directions for research (Bahoo, Alon, & Paltrinieri, 2020). We particularly identify 11 articles, as listed in Table 5.

4. Citation mapping and visualization of the FMI literature

4.1. Co-citation mapping and visualization

We conduct co-citation analysis using VOSviewer. VOSviewer receives bibliometric data as input and provides output denoted in differing colors. We choose to perform co-citation analysis considering a minimum of 20 citations. As shown in Fig. 2, the output is shown in five colors: red (portfolio diversification with financial market integration); blue (equity market integration in general); green (financial market linkage with respect to crisis, event, and formation of association); yellow (time varying financial market integration); and violet (co-movement among the oil, stock, real estate, as well as commodity, bond, and crypto currency markets). In this study, by ‘commodity,’ we mean all commodity markets other than oil, as we have chosen to consider the oil markets as particularly distinct from other commodities due to their wide-spread importance and geopolitical influence (Corbet, Goodell, & Günay, 2020). Hence, we consider five main research streams in the literature.

In the second step, we conduct a detailed content analysis of 48 identified articles that are highly linked with each other. We do this to identify, explain and confirm their interlinkages. This leads to identifying five major research streams in the literature. (1) portfolio diversification with financial market integration; (2) general equity market integration; (3) financial market linkage with respect to crises and events; (4) time-varying financial market integration; and (5) co-movements and spillovers between commodities and financial markets.

4.2. Co-authorship visualization

We also explore, again with the aid of VOSviewer, the co-authorship network among researchers working investigating financial market integration. Such co-authorship analysis is valuable as it identifies those researchers who are working on topics within financial market integration. This co-authorship visualization is illustrated in Fig. 3. The minimum scale for this analysis is three co-authored papers with 130 citations. Fig. 4 shows the cartography analysis generated by VOSviewer. Cartography analysis reveals keywords such as stock market, integration, linkage, market integration, comovement, international equity markets, evidence, crisis, financial integration, financial market, equity market integration etc. Researchers can use such keywords in search queries to efficiently locate published work on financial market integration. Fig. 5 shows the cartography analysis of the evolution of FMI through VOSviewer. Words such as market integration, financial integration, market, co-movement and integration were the initial keywords in the evolution of FMI literature.

5. Research streams in FMI literature

5.1. Equity market integration in general

This research stream examines market integration under general conditions, focusing on cross-listing based integration, lead markets, portfolio diversification opportunities, new approaches and methods to measure integration, and the factors that affect market integration. Factors impacting financial integration examined in the literature include credit quality, inflation and inflation variability, interest rates, exchange rate controls, the presence (or lack) of high-quality regulatory and accounting frameworks, and levels of stock-markets development (Bekaert, 1995; Bracker, Docking, & Koch, 1999; Johnson and Soenen, 2002).

Wu (2019) finds that the governments in East and Southeast Asia region have successfully facilitated financial market integration, as evidenced by ASEAN5 + 4 stock markets having high levels of financial market integration. In support of this, Qiao, Chiang, and Wong (2008) evidence that the relaxation of government restrictions with subsequent adoption of liberal economic policies increases market integration.

Studies investigating factors engender integration find that co-movement among markets normally occurs because of trade, along with correlations of economic cycles and other global factors (e.g., Wang and Guo, 2020; Wu, 2020). Devereux and Yu (2020) evidence that the opening of financial markets increases financial market integration. Studies examining market integration have considered various areas. Masih and Masih (2001) evidence a leading role of the US and UK markets to other Asian markets. Lane and Milesi-Ferretti (2007) find that industrialized countries are ahead of developing countries in terms of the scale of cross-border asset trade, with consequently greater integration.

Other important papers discuss the stochastic nature of changes to integration. According to Akbari, Ng, and Solnik (2021) integration is a gradual process not driven by cyclical or transitory processes. Patra and Panda (2021) find increasing integration of emerging markets with developed markets. Asgharian, Hess, and Liu (2013) find that geographically closed markets become more integrated with each other.

Other papers examine the impact of integration on investor propensity to rebalance portfolios. Kim and Lee (2020) find that investors in highly integrated markets manifest a greater propensity to rebalance portfolios. Others look at the impact of cross listings on integration, finding that equity cross-listings increases integration by motivating foreign direct investment and cross-border mergers (Howe & Madura, 1990; Hupperets & Menkveld, 2002; Lok & Kalev, 2006; Varela & Lee, 1993). However, Werner and Kleidon (1996) evidence that equity cross-listings do not always increase market integration.

Other papers find that equity-market integration conditions how

Table 7
Summary of key papers in each stream.

Authors (year)	Type of paper (empirical or qualitative)	Objective/research question	Methods (technique/sample of study/data sources)	Main findings
First stream: Portfolio diversification with financial market integration				
Brooks and Negro (2004)	Empirical	<ul style="list-style-type: none"> Evidences that increases in co-movements across stock markets are partially driven by market integration (along with industry bubbles) 	<ul style="list-style-type: none"> Regression 41 Developed and emerging markets 	<ul style="list-style-type: none"> Global integration driven by stock market bubbles. Diversifying across the countries is still an effective option to reduce the portfolio risk.
Berger et al. (2011)	Empirical	<ul style="list-style-type: none"> Are frontier markets integrated with the world market? Do frontier markets offer portfolio diversification benefits? 	<ul style="list-style-type: none"> Principal component analysis, Mean-variance frontier analysis 25 Developed and emerging markets 	<ul style="list-style-type: none"> Frontier markets remain integrated with the world market but not Frontier markets are not integrated with world markets
Gupta et al. (2012)	Empirical	<ul style="list-style-type: none"> How is the Indian market integrated with other Asian markets? 	<ul style="list-style-type: none"> Cointegration test, DCC-GARCH 5 developed and emerging markets 	<ul style="list-style-type: none"> Weak integration of India with other Asian markets Portfolio diversification opportunities for investors in the Indian Market
Lee (2017)	Empirical	<ul style="list-style-type: none"> Examines intra- and inter-regional portfolio diversification strategies under regional market integration 	<ul style="list-style-type: none"> Regression Based Model 64 developed and emerging markets 	<ul style="list-style-type: none"> Integration among the financial markets at regional level No diversification benefits for the investors of US or global investors.
Reboredo (2018)	Empirical	<ul style="list-style-type: none"> How do green-bond and financial markets move with each other? 	<ul style="list-style-type: none"> Copula models Bond and financial market indexes 	<ul style="list-style-type: none"> Weak integration of green bond market with stock and energy commodity markets Portfolio diversification benefits to investors in stock and energy markets Strong integration of green bond market with fixed-income markets No portfolio diversification benefits to corporate and treasury bond markets.
Boakoet al. (2020)	Empirical	<ul style="list-style-type: none"> Examines time-based connectedness among the equity and commodity markets 	<ul style="list-style-type: none"> Wavelet analysis 9 commodity markets and 11 equity markets 	<ul style="list-style-type: none"> Long-term integration among the stock markets returns and commodities returns Equity and commodity combinations-based portfolio improves the performance
Cagliesi and Guidi (2021)	Empirical	<ul style="list-style-type: none"> How the US market is integrated with emerging and frontier markets Do US investors gain from portfolio diversification in emerging and frontier markets? 	<ul style="list-style-type: none"> ARCH and SWARCH models 3 indices 	<ul style="list-style-type: none"> Weak integration of US market with emerging and frontier markets Better diversification benefits with emerging and frontier markets
Patel (2021b)	Empirical	<ul style="list-style-type: none"> Are markets integrated with respect to global financial crises? Do investors obtain portfolio diversification benefits? 	<ul style="list-style-type: none"> Cointegration tests and VAR analysis 10 developed and emerging markets 	<ul style="list-style-type: none"> The markets become more integrated after the global financial crisis. Investors can diversify their funds to other markets as the diversification can result in a better Sharpe ratio.
Second stream: Equity market integration in general				
Bekaert (1995)	Empirical	<ul style="list-style-type: none"> How are emerging markets integrated? Which factors are barriers for market integration? 	<ul style="list-style-type: none"> Correlation 23 developed and emerging markets 	<ul style="list-style-type: none"> Integration among emerging markets and US Factors, namely poor credit ratings, high and variable inflation, exchange rate controls, lack of high-quality regulatory and accounting framework, and limited size of stock markets are important barriers in market integration.
Masih and Masih (2001)	Empirical	<ul style="list-style-type: none"> Examines the dynamic causal linkages among major international stock markets 	<ul style="list-style-type: none"> VAR model and impulse response analysis 9 developed and emerging markets 	<ul style="list-style-type: none"> Strong integration among OECD and Asian markets Leading role of the US and UK markets to other Asian markets
Hartmann et al. (2004)	Empirical	<ul style="list-style-type: none"> Linkages among the bond and stock markets of G5 during crises 	<ul style="list-style-type: none"> Univariate analysis 23 developed markets 	<ul style="list-style-type: none"> Strong integration among the markets
Voronkova (2004)	Empirical	<ul style="list-style-type: none"> Equity market integration in central European emerging markets 	<ul style="list-style-type: none"> Cointegration tests, error correlation modeling 9 Developed and emerging markets 	<ul style="list-style-type: none"> Strong and significant integration among the markets Market integration becoming stronger at regional and global level
Berben and Jansen (2005)	Empirical	<ul style="list-style-type: none"> Has co-movement among Germany, Japan, the UK, and the US increased? 	<ul style="list-style-type: none"> Lagrange multiplier test, GARCH modeling 4 developed markets and 10 sectors 	<ul style="list-style-type: none"> Strong integration among the markets UK, US and Germany at Market level and Industry level Lack of integration of Japan market with other markets
Kim et al. (2005)	Empirical	<ul style="list-style-type: none"> Dynamic nature of regional and global stock market integration. 	<ul style="list-style-type: none"> Bivariate ARMA-EGARCH-t-test 17 developed and emerging markets 	<ul style="list-style-type: none"> Increase in integration with the introduction of EMU Decrease in the portfolio diversification opportunities
Lane and Milesi-Ferretti (2007)	Empirical	<ul style="list-style-type: none"> Shift in the structure of external portfolio for emerging market economies 	<ul style="list-style-type: none"> Correlation 50+ developed and emerging markets 	<ul style="list-style-type: none"> Industrialized countries are ahead of developing countries in terms of financial market integration with respect to scale of cross-border asset trade
Beineet al. (2010)	Empirical	<ul style="list-style-type: none"> Does globalization have a dark side for international investors with respect to portfolio diversification? 	<ul style="list-style-type: none"> Regression 17 developed and emerging markets 	<ul style="list-style-type: none"> Increase in co-movement due to global integration demonstrates a dark side of global integration.

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Table 7 (continued)

Authors (year)	Type of paper (empirical or qualitative)	Objective/research question	Methods (technique/sample of study/data sources)	Main findings
Alouiet al. (2015)	Empirical	<ul style="list-style-type: none"> How sharia-compliant stocks and sukuk in the GCC countries are co-move 	<ul style="list-style-type: none"> VAR analysis, wavelet squared coherency approach 6 developed and emerging markets 	<ul style="list-style-type: none"> Investors will have more difficulties in having a gain from asset diversification. Negative linkage between sharia assets Varying co-movement among sharia stocks and sukuk
Wu (2019)	Empirical	<ul style="list-style-type: none"> Do East and Southeast Asian markets hold any market integration? Do global factors play any role in this integration? 	<ul style="list-style-type: none"> Graph theory, VAR modeling 9 developed and emerging markets 	<ul style="list-style-type: none"> High level of financial market integration among the ASEAN5 + 4 stock markets The governments in East and Southeast Asia region promotes the financial market integration
Harkmann (2020)	Empirical	<ul style="list-style-type: none"> How are the Baltic markets and developed Western Europe markets integrated with each other? 	<ul style="list-style-type: none"> Johansen cointegration tests, Vector error correction modeling 4 Market indexes 	<ul style="list-style-type: none"> Long-term and short-term integration among the Baltic and Swedish markets Western European developed markets are not integrated with Baltic markets
Akbari et al. (2021)	Empirical	<ul style="list-style-type: none"> How are emerging markets integrated with developed markets in financial and economic terms? 	<ul style="list-style-type: none"> Correlation, regression 41 developed and emerging markets 	<ul style="list-style-type: none"> Factors which increase and decrease integration of emerging markets with developed markets Integration is a gradual process and is not driven by cyclical or transitory processes.
Jian and Li (2021)	Empirical	<ul style="list-style-type: none"> The level of systematic risk across global equity markets with respect to a skewness-based market integration approach 	<ul style="list-style-type: none"> OLS regression and GMM 38 developed and emerging markets 	<ul style="list-style-type: none"> The Skewness-based integration increased rapidly before the global financial crisis and the EU debt crisis
Patra and Panda (2021)	Empirical	<ul style="list-style-type: none"> How the BRICS markets are integrated with US markets and commodities (Gold and Oil) 	<ul style="list-style-type: none"> VAR modeling 6 developed and emerging markets 	<ul style="list-style-type: none"> Integration of BRICS with the US markets and commodities
Third stream: Financial market linkage with respect to crisis, event, and formations of associations				
Arshanapalli and Doukas (1993)	Empirical	<ul style="list-style-type: none"> How the US, UK, Germany, France and Japan are linked with each other with respect to pre- and post-October 1987 period 	<ul style="list-style-type: none"> Cointegration tests, Error correlation testing 5 developed markets 	<ul style="list-style-type: none"> Increase in the market integration after crisis Transmission of shocks from one to another markets
Caporale et al. (2005)	Empirical	<ul style="list-style-type: none"> How the East Asian markets are integrated with each other with respect to crisis 	<ul style="list-style-type: none"> Wald test, correlation 5 developed and emerging markets 	<ul style="list-style-type: none"> Markets become integrated post crises Portfolio diversification is ineffective during financial crises
Bartram et al. (2007)	Empirical	<ul style="list-style-type: none"> Did the introduction of Euro impact the dependence among 17 European stock markets? 	<ul style="list-style-type: none"> Time-varying copula dependence model 17 developed markets 	<ul style="list-style-type: none"> Increase in integration with Euro membership announcements
Chesney et al. (2011)	Empirical	<ul style="list-style-type: none"> Impact of terrorism on stock, bond, and commodity markets 	<ul style="list-style-type: none"> Event-study approach, GARCH-EVT approach Various bond and equity market indexes 	<ul style="list-style-type: none"> Non-parametric approach is most suitable methods to examine the impact of terrorism on financial markets Terrorist attacks have negative impact on the markets, sectors and industries Portfolio diversification opportunity exist with alternative investments
Bekaert et al. (2013)	Empirical	<ul style="list-style-type: none"> Do the European markets hold financial and economic integration with respect to the Euro? What effects does EU membership have on bilateral segmentation? 	<ul style="list-style-type: none"> Linear regression model 33 developed and emerging markets 	<ul style="list-style-type: none"> EU membership has increased the financial and economic integration among the European markets The integration remains same in the crisis period
Wang (2014)	Empirical	<ul style="list-style-type: none"> Market integration at the regional level with respect to 2008 global financial crisis 	<ul style="list-style-type: none"> VAR Analysis, Impulse response analysis 7 developed and emerging markets 	<ul style="list-style-type: none"> After the financial crisis the markets become more integrated with each other. The East Asian markets does not respond to the shock of US Markets after the global financial crisis.
Rughoo and You (2016)	Empirical	<ul style="list-style-type: none"> Are the Asian money and bond markets integrated with each other with respect to crisis? 	<ul style="list-style-type: none"> Phillips and Sul panel convergence tests, regression 9 developed and emerging markets 	<ul style="list-style-type: none"> Decrease in the money market integration after crisis Bond markets are integrated in both pre-& post-crisis period & become more integrated after the crisis.
Javed and Virk (2017)	Empirical	<ul style="list-style-type: none"> Integration of European leading markets: Short-term or long-term with respect to pre- and post-euro introduction? 	<ul style="list-style-type: none"> DCC-MIDAS GARCH Technique 7 developed markets 	<ul style="list-style-type: none"> Increase in market integration after the introduction of Euro
Narayan et al. (2018)	Empirical	<ul style="list-style-type: none"> How the terrorism activities and fear affect the market integration? 	<ul style="list-style-type: none"> The dynamic conditional correlations model 8 developed and emerging markets 	<ul style="list-style-type: none"> The portfolio decision is sensitive to the domestic terrorism risk The fear of terrorism is important factor for making international portfolio investment.
Dias et al. (2019)	Empirical	<ul style="list-style-type: none"> Do the Latin American markets shows significant levels of market integration during financial crises? 	<ul style="list-style-type: none"> Gregory-Hansen tests 7 emerging markets 	<ul style="list-style-type: none"> Partial integration among the markets during the crisis and non-crisis periods. The Latin American markets have a greater impact from the Global financial crisis as compare to dot-com crisis.
BenSaida and Litimi (2020)	Empirical	<ul style="list-style-type: none"> How the G10 markets were co-integrated during the global financial crisis and the European sovereign debt crisis 	<ul style="list-style-type: none"> Marginal GARCH Model, Vine copula specifications 	<ul style="list-style-type: none"> Strong integration during the Global financial crisis and European sovereign debt crisis

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Table 7 (continued)

Authors (year)	Type of paper (empirical or qualitative)	Objective/research question	Methods (technique/sample of study/data sources)	Main findings
Song, Huang, Paramati, and Zakari (2021)	Empirical	<ul style="list-style-type: none"> How the economic integration affects to the stock market co-movement of India with other major Asian markets? 	<ul style="list-style-type: none"> 10 developed markets Cointegration analysis, ARDL method 9 emerging markets 	<ul style="list-style-type: none"> The market integration is positively affected by economic integration Interdependence in Asia was positively affected by the global financial crisis
Fourth stream: Time varying financial market integration				
Jong and Roon (2005)	Empirical	<ul style="list-style-type: none"> Do the emerging markets hold time-varying integration? 	<ul style="list-style-type: none"> Regression 29 emerging markets 	<ul style="list-style-type: none"> Emerging markets in Europe, Mideast, and Africa are affected by within country segmentation. Asian markets do not hold time-varying integration.
Carrieri et al. (2007)	Empirical	<ul style="list-style-type: none"> How are emerging markets time-varyingly integrated? 	<ul style="list-style-type: none"> Correlation, Garch Model 8 emerging markets 	<ul style="list-style-type: none"> Markets hold time varying integration Financial market development and financial policies are important for financial market integration.
Cho et al. (2015)	Empirical	<ul style="list-style-type: none"> Extent that portfolios can be sorted based on firm features—showing time-varying integration and co-movement with global and regional factors 	<ul style="list-style-type: none"> RS GARCH model Indices from Latin America, Europe, North America and Asia Pacific 	<ul style="list-style-type: none"> Particular indices hold time-varying integration Contagion effects during the global financial crisis.
Lee and Kim (2020)	Empirical	<ul style="list-style-type: none"> Do the European countries hold time-varying integration with respect to introduction of Euro in 1999 and banking crisis of GIIPS in 2011? Are monetary drivers relevant to time-varying integration? 	<ul style="list-style-type: none"> Dynamic panel regressions 14 developed markets 	<ul style="list-style-type: none"> Increased integration among European stock markets after GIIPS crisis of 2010–2011 Increased integration of EU stock markets due to higher monetary similarities of EU countries Integration among the EU stock markets increased after the EMU launch
Nardo, Ossola, and Papanagiotou (2021)	Empirical	<ul style="list-style-type: none"> Do European markets holds time-varying integration? 	<ul style="list-style-type: none"> Time-invariant integration index 28 developed, emerging, and frontier markets 	<ul style="list-style-type: none"> Integration increases with crises Market size, technological development, and political uncertainty drive integration.
Fifth stream: Co-movement among the stock, real estate, commodity, bond, and cryptocurrency markets				
Glascok et al. (2000)	Empirical	<ul style="list-style-type: none"> How REIT, bond and stock returns are integrated 	<ul style="list-style-type: none"> Error correction models, VAR Model 3 indices 	<ul style="list-style-type: none"> Average integration among REITs and bond market Strong integration among stocks and REITs Decrease in portfolio diversification opportunities
Kim et al. (2006)	Empirical	<ul style="list-style-type: none"> How the EU bond markets are integrated 	<ul style="list-style-type: none"> Bivariate EGARCH model 10 developed and emerging markets 	<ul style="list-style-type: none"> Strong linkage of Euro zone bond markets with Germany. Weak integration of Euro zone bond markets with Czech Republic, Hungary, Poland, and the UK.
Delatte and Lopez (2013)	Empirical	<ul style="list-style-type: none"> How equity and commodity markets are linked 	<ul style="list-style-type: none"> Copula approach 4 developed markets and 21 commodities 	<ul style="list-style-type: none"> Integration between the commodity and equity markets Integration among equity markets and commodities increased after the 2008 global financial crisis
Kollias et al. (2013)	Empirical	<ul style="list-style-type: none"> Do wars and terrorist attacks affect the oil-stock returns relationship? 	<ul style="list-style-type: none"> Non-linear BEKK–GARCH type models 4 developed markets 	<ul style="list-style-type: none"> Impact of war on the oil price-stock market relationship Impact of terrorist attacks on the oil price-stock market relationship Terrorist attacks result in significant diversification benefits for investors
Fititiet al.(2015)	Empirical	<ul style="list-style-type: none"> Do oil markets and stock market in G7 countries hold a relationship? 	<ul style="list-style-type: none"> Wavelet analysis 7 developed markets 	<ul style="list-style-type: none"> Co-movement in short- medium term (stronger) and long-term (weaker) among the oil price growth and stock return Oil demand shocks influence G7 stock markets. These markets were also affected by global oil price shock of 2007–2008.
Ghosh and Kanjilal (2016)	Empirical	<ul style="list-style-type: none"> Integration of crude oil and the Indian stock markets 	<ul style="list-style-type: none"> Cointegration tests, granger non-causality tests 1 emerging market and oil indexes 	<ul style="list-style-type: none"> No integration of crude oil prices and the Indian stock market. The integration among the oil price and market increases after 2009
Antonakakis, Cunado, Filis, Gabauer, and De Gracia (2018)	Empirical	<ul style="list-style-type: none"> Volatility spillovers and co-movements among prices of major oil and gas corporations? 	<ul style="list-style-type: none"> Dynamic conditional correlation Model 10+ oil and gas corporations 	<ul style="list-style-type: none"> Increase in the integration between the volatilities of WTI and each oil and gas companies after global financial crisis WTI volatility is impacted by the firm level volatility.
Ji et al. (2019)	Empirical	<ul style="list-style-type: none"> Cryptocurrency integration 	<ul style="list-style-type: none"> Connectedness network analysis of six cryptocurrency markets 	<ul style="list-style-type: none"> Litecoin and Bitcoin driving the forces for other cryptocurrencies. Bitcoin and Litecoin manifest volatility spillovers and co-movements.

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Table 7 (continued)

Authors (year)	Type of paper (empirical or qualitative)	Objective/research question	Methods (technique/sample of study/data sources)	Main findings
Ma, Ji, Wu, and Pan (2021)	Empirical	<ul style="list-style-type: none"> Which factors contribute to return co-movement dynamics in international commodity markets? 	<ul style="list-style-type: none"> DCC-GARCH specification, 21 commodities 	<ul style="list-style-type: none"> Linkages between the energy commodities are stronger as compared to integration among the agricultural or metal commodities. Financial market information is important contributor to the commodity market movement during crisis period.

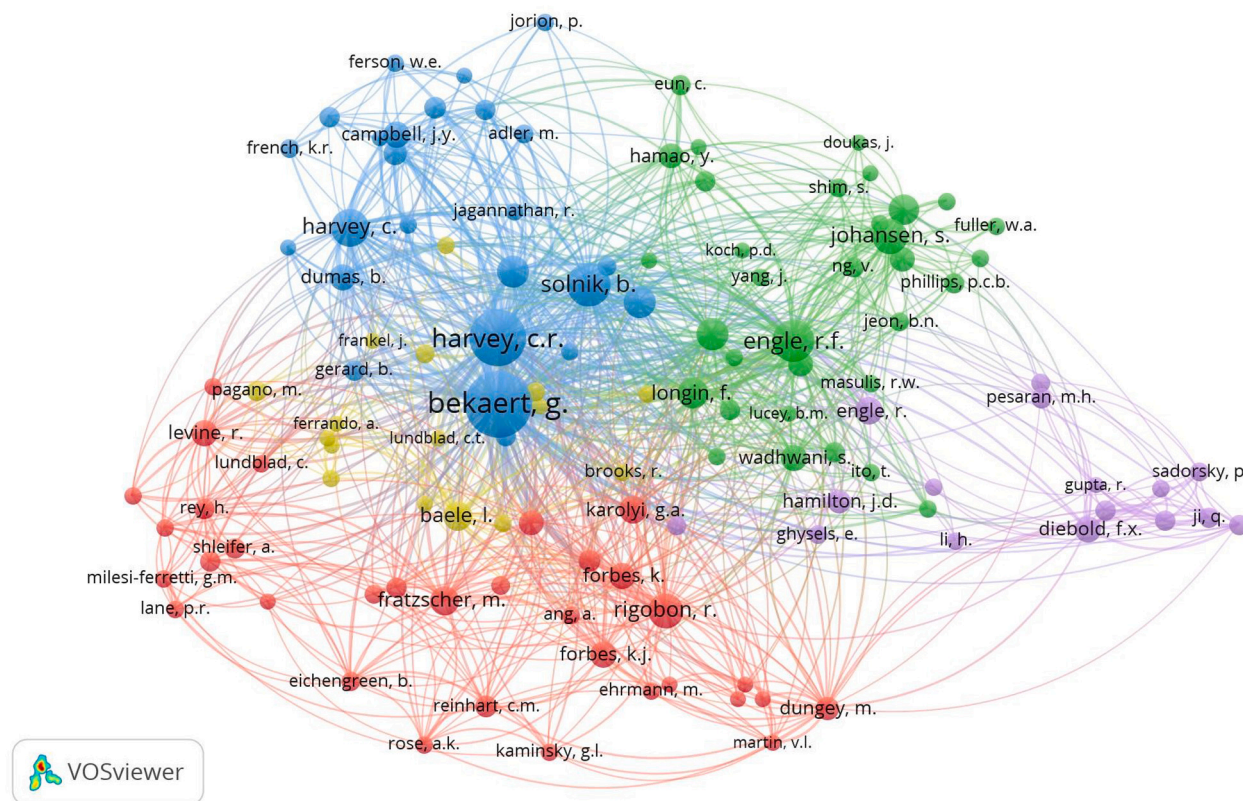


Fig. 2. Results of co-citation analysis.

shock spillovers are impacted by both bilateral economic factors and cultural factors (Balli, Balli, Louis, & Vo, 2015), applying methodologies such as correlation-based network, analysis of network structures, and VAR-BEKK frameworks to examines the integration and shift in market dependence (BenSaïda, Boubaker, & Nguyen, 2018; Chowdhury, Dungey, Kangogo, Sayeed, & Volkov, 2019; Patra & Panda, 2021; Tong, Chen, & Buckle, 2018). Kim, Moshirian, and Wu (2005) highlight decreased diversification opportunities with the increase in integration following the introduction of the EMU. Beine, Cosma, and Vermeulen (2010) evidence increased co-movement resulting from global integration. Other studies investigating the role of integration with portfolio diversification opportunities include Cheng, Jahan-Parvar, and Rothman (2010); Dicle and Levendis (2011); Harkmann (2020); and Patra and Panda (2021). Akdogan (1992) notes that market integration leads to higher levels of systematic risk. While the role of financial market integration on portfolio diversification has been broadly covered, the dynamics of how market integration stochastic changes impacts opportunities for diversification has further exploration possibilities.

5.2. Financial market linkage with respect to crises, events, and formations

The research stream investigating the effect of crises, extraordinary events, and formations of associations on financial market integration has received considerable attention. Studies find that integration among the equity market increases during and after financial crises (Meric, Leal, Ratner, & Meric, 2001; Aggarwal & Kyaw, 2005; Caporale, Cipollini, & Spagnolo, 2005; Dimitriou, Kenourgios, & Simos, 2013; Wang, 2014; Sewraj, Gebka, & Anderson, 2018; Patel, 2019a, 2019b, 2019c; BenSaïda & Litimi, 2020). Such studies include finding that equity market integration increases with Euro membership announcements (Bartram, Taylor, & Wang, 2007; Bekaert, Harvey, Lundblad, & Siegel, 2013; Fratzscher, 2002).

Further, because of integration, shocks are transmitted to other markets (Arshanapalli & Doukas, 1993). According to Rughoo and You (2016), integration between money and bond markets also increases post-financial crises. As compared to regional crises, global financial crises have greater impact on the financial market integration (Dias, da Silva, & Dionísio, 2019). This increasing integration, of course, leads to decreases in global portfolio diversification opportunities (Fratzcher, 2002; Sewraj et al., 2018).

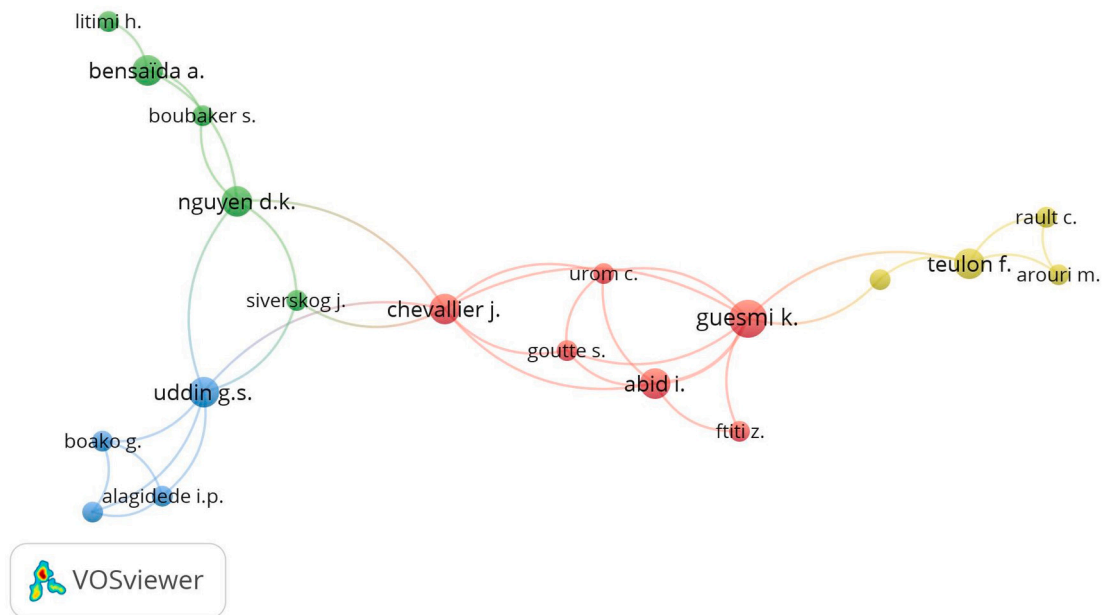


Fig. 3. Co-authorship analysis with VOSviewer. The minimum scale for this analysis is three co-authored papers with 130 citations (author calculations).

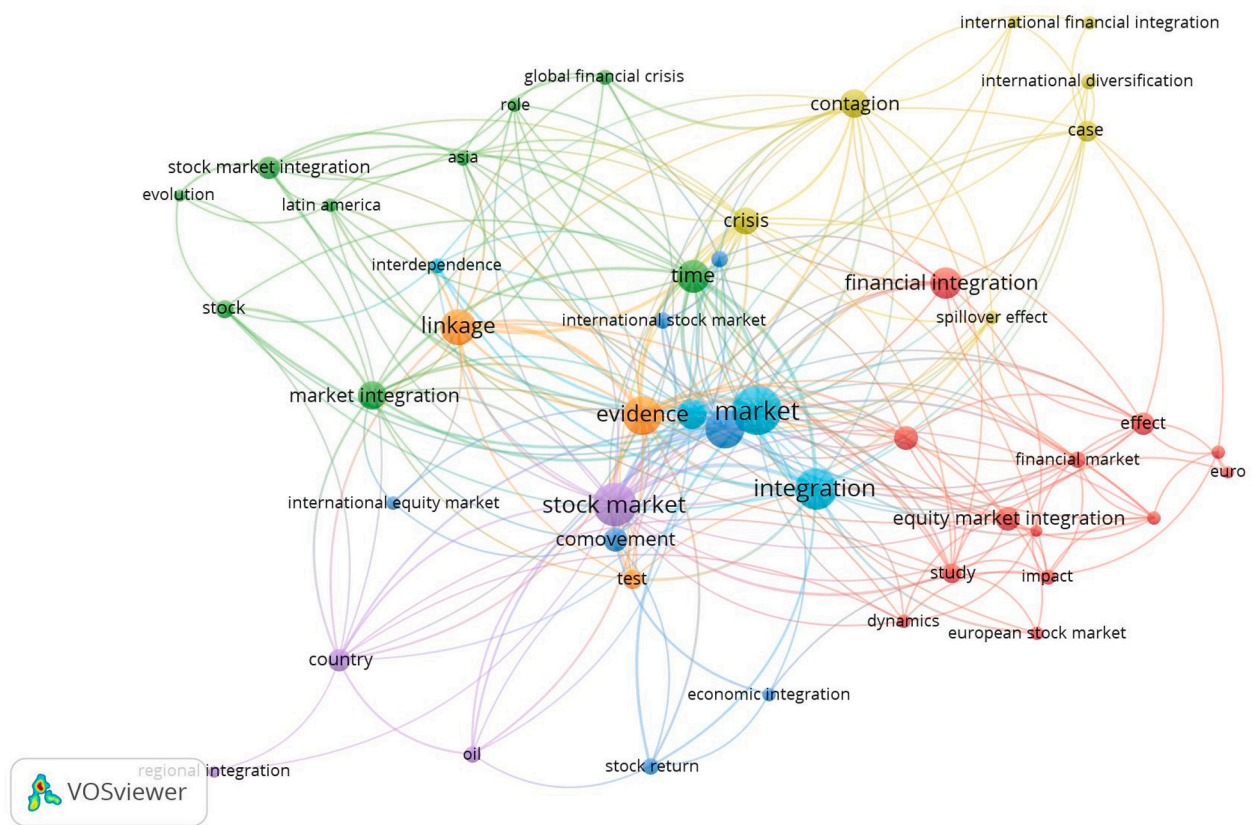


Fig. 4. Cartography analysis through VOSviewer.

Studies focus on markets integration with respect to events such as the introduction of the Euro, and responses to terrorist attacks and political crises. Javed and Virk and Javed (2017) evidence increases in equity market integration post introductions of the Euro. Chesney, Reshetar, and Karaman (2011) find that terrorist attacks negatively impact market integration, leading to a greater role for alternative investments to establish portfolio diversification.

Portfolio construction decisions are sensitive to domestic terrorism risk. Fear of terrorism is an important factor in making international portfolio decisions (Narayan, Le, & Srianthakumar, 2018). Financial liberalization positively impacts stock-market co-movement (Beine & Candelon, 2011; Huang, Goodell, & Goyal, 2021). Political crises negatively impact market integration (Frijns, Tourani-Rad, & Indriawan, 2012). Researchers examine financial market integration with

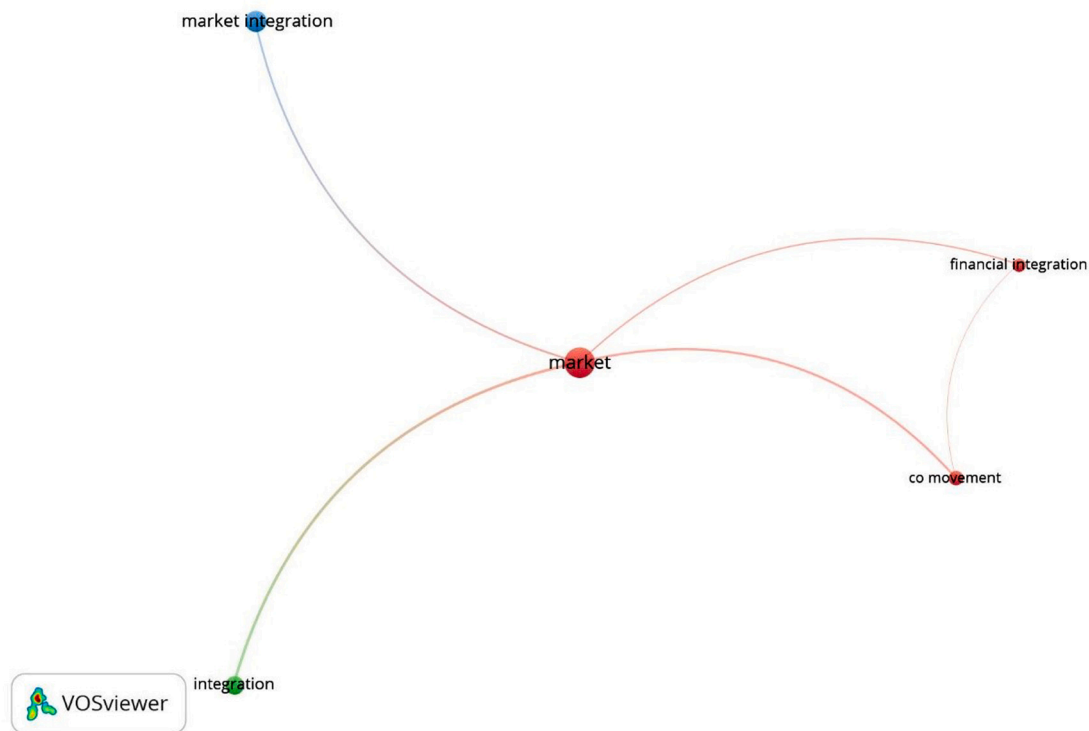


Fig. 5. Cartography analysis of the evolution of FMI through VOSviewer.

respect to crises, events, and formation of association by applying various techniques and models. However, further studies can be performed to explore the domain focusing on other events and crises. Studies have explored financial market integration in these respects, but extensions of portfolio diversification concerns remain to be explored.

5.3. Time varying financial market integration

Articles on time-varying financial market integration are a limited part of the literature. These articles focus on various sub-domains such as time-varying integration at regional and global level, integration with respect to crisis, EMU launch, Integration among oil and financial markets, portfolio diversification with integration etc.

Past studies find that the bond, oil and equity markets hold time-varying limited integration. Additionally, the markets of transition economies hold partial time-varying integration with each other (Rockinger & Urga, 2001). De Jong and De Roon (2005) assert that emerging markets in Europe, Mideast and Africa are affected by the segmentation of the respective country itself. The Asia and East region markets does not hold time-varying integration, reveals that the time-varying integration does not hold at regional levels for the Asia and east region markets (De Jong & De Roon, 2005).

Berger and Pozzi (2013) find that developed markets have time-varying integration with the World market, suggesting market integration has dynamic variability. Financial markets development and financial policies influences the financial market integration (Carrieri, Errunza, & Hogan, 2007). The stock market liberalization engenders time-varying integration in emerging markets, as well as interdependence among stock and bond market returns (Panchenko & Wu, 2009). Batten, Kinatader, Szilagyi, and Wagner (2019) find that the Asian Energy and Stock Markets holds both weak and strong Time-varying integration during first and second periods of the study.

Studies examining time-varying integration with respect to crises events find mix outcomes. Market indices manifest changing levels of integration as well as contagion effects during global financial crises. Markets evidence time-varying integration at cross-national and

subnational levels, with such integration impacted by the regional and global financial crises (Cho, Hyde, & Nguyen, 2015). Lee and Kim (2020) find that time-varying integration among EU markets increased as a result of monetary similarities. Further, the GIIPS (Greece, Ireland, Italy, Portugal and Spain) crisis of 2010–2011 and EMU launch also increased the integration. On the other hand, Baele and Inghelbrecht (2010) evidence that financial crises and terrorist attacks does not have much impact on the integration.

Studies also examine the diversification benefits of time-varying integration. With increased integration and globalization, the benefits of the geographic portfolio diversification have decreased. Nevertheless, geographical diversification still is identified as having larger risk reduction benefits than industry diversification (Baele & Inghelbrecht, 2009).

De Jong and De Roon (2005) find that the time-varying integration among markets results in lower expected returns, with lower costs of capital. They also highlight the impact of crises, terrorist attacks, as well as regional and economic association formations on the market integration, along with concomitant portfolio diversification opportunities.

5.4. Co-movement among the oil, stock, real estate, commodity, bond and cryptocurrency markets

The fourth identified research stream in the literature is Comovement among the Oil, stock, real estate, commodity, bond markets and crypto currency markets. This stream entails papers pertaining to the integration of stock markets with the Oil, real estate, commodity and bond markets. The real estate market holds integration with bond and stock markets (Glascock, Lu, & So, 2000; Hiang Liow, 2012). The Oil and stock returns holds relationship with each other (Ciner, 2013; Gil-Alana & Yaya, 2014). Ghosh and Kanjilal (2016) found that the oil and stock markets does not hold any relationship. However, after the global financial crisis, the oil and stock markets become integrated. In a study, (Ftiti, Guesmi, & Abid, 2016) found that the stock markets are also affected by global oil price shocks. According to Kim, Lucey, and Wu (2006), the bond markets can hold within strong and weak integration.

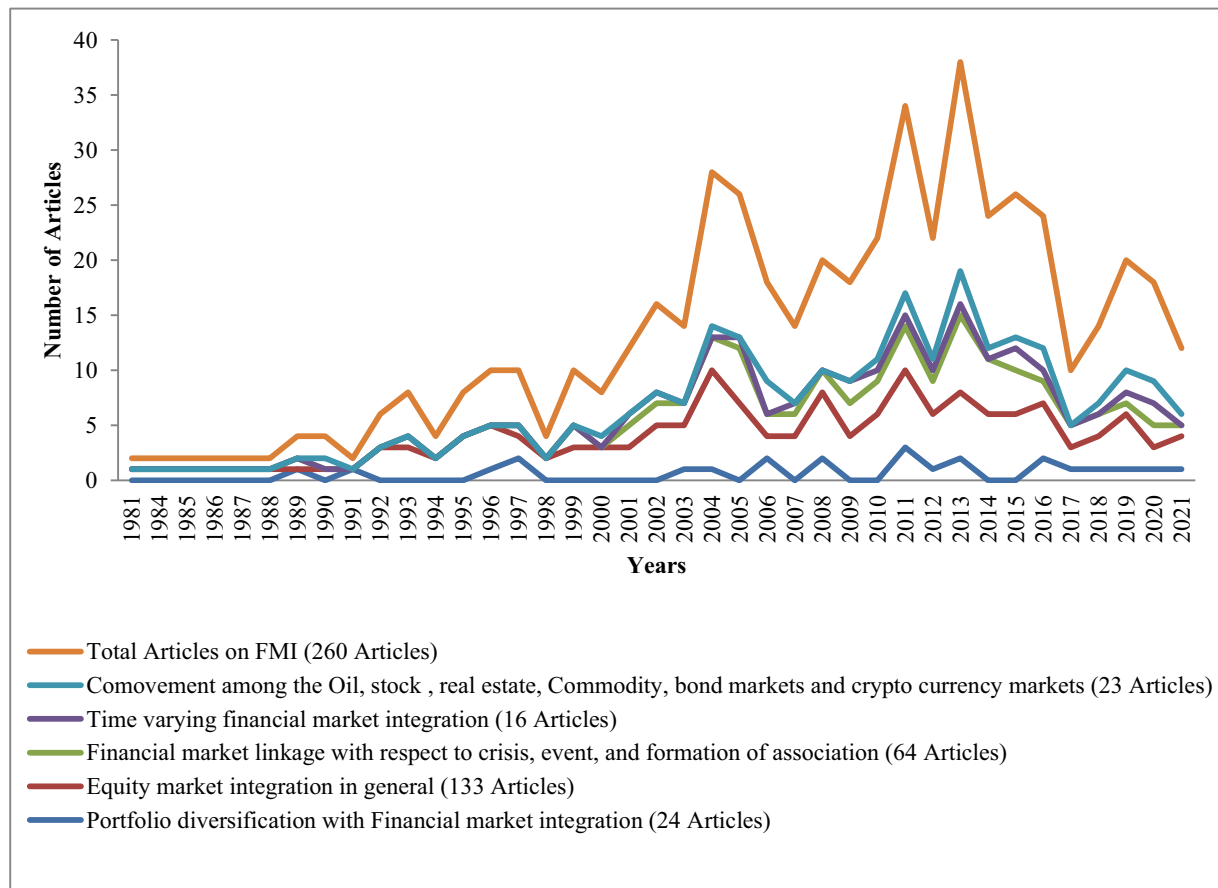


Fig. 6. Growth in FMI literature 1981–2021. The figure shows the distribution of 260 articles per year, and each research stream, author's calculation.

But due to Integration, the long-term shocks are transmitted among currency and bond markets (Gravelle, Kichian, & Morley, 2006).

Studies also investigate oil-equity integration with respect to financial crises, and outbreaks of global conflicts (Corbet et al., 2020). Integration among the equity and commodity markets increased after the global financial crisis 2008 (Delatte & Lopez, 2013; Ghosh & Kanjilal, 2016; Jiang & Yoon, 2020). Studies also find that war and terrorist attacks impact the integration of oil and stock prices (Kollias, Kyrtsov, & Papadamou, 2013). The oil demand shocks-based crisis influences the oil-stock markets integration (Ftiti et al., 2016).

There are very few studies on the integration among the crypto currency markets. According to Ji, Bouri, Lau, and Roubaud (2019), the cryptocurrency markets are partially integrated with each other. The Bitcoin and Litecoin and the most influential one for the volatility spillover and co-movements. The integration among the crypto currency markets is the least explored domain and hence in future more studies should be undertaken to get more from this area. Overall, as co-movements among the oil, stock, real estate, commodity, bond markets and cryptocurrency markets are studied in limited context, more research is required in this domain.

5.5. Portfolio diversification considering financial market integration

'Portfolio diversification considering financial market integration' is the fifth research stream we identify. Levels of financial market integration naturally impact portfolio diversification opportunities and benefits (Elfakhani, Arayssi, & Smahta, 2008; Graham & Nikkinen, 2011; Gupta & Guidi, 2012). This extends to investigations of bond market integrations with stock, energy, and commodity markets (Reboredo, 2018). Other studies investigate integration at the regional level (Billio, Donadelli, Paradiso, & Riedel, 2017; Lee, 2017); as well as

whether frontier markets are integrated with world markets or offer portfolio diversification benefits (Berger, Pukthuanthong, & Yang, 2011). Cagliesi and Guidi (2021a, 2021b) find that due to lack of strong integration, emerging and frontier markets provide diversification benefits. Brooks and Del Negro (2004) and Meric and Meric (1989) find that county-based portfolio diversification results in greater risk reduction as compared to the diversification across industries within countries. Vermeulen (2013) posits that investors should actively rebalance their portfolios towards low correlation during the financial crises. Patel (2019a, 2019b, 2019c) finds that when the markets hold weak or no integration, investors should diversify their funds to other markets. Boako, Alagidede, Sjo, and Uddin (2020) finds that during crises home-bias in portfolios comes at greater cost. D'Ecclesia & Costantini, 2006 find that common-cycle components diminish the benefits of diversification. There is still a need to conduct further research to explore the portfolio diversification benefits. We summarize the key papers in Table 6.

6. Identifying FMI research streams with cartographic analysis

As it is important to investigate the growth of various research streams of financial market integration, we use cartographic analysis to identify keywords in each stream and to indicate the growth of various research streams (Apriliyanti & Alon, 2017). These results are presented Table 1. These keywords are used to examine the growth of studies in each research streams. The growth of all the five streams is presented in Fig. 6.

7. Future research questions

7.1. Equity market integration in general

There is no consensus regarding the levels of market integration among developed, emerging, and frontier markets. Consequently, there are opportunities for scholars to further assess integration among financial markets of developed, emerging and frontier countries, focusing on groups of countries from either similar or different geographical areas or countries comprising economic-regional and trade associations, such as ASEAN, SAARC, and the EU. There is wide potential for future market-integration studies focusing on how market integration varies with types of distances (e.g., geographic, institutional, cultural), including variation in the qualities and sources of financial market integration.

Financial market integration can be examined using various advance approaches such as wavelet analysis (e.g., Goodell & Goutte, 2021), multivariate modeling (e.g., Gębka and Karoglou, 2013); and total spillover analysis (Diebold and Yilmaz, 2012). Examining international financial market integration using higher frequency data is also receiving more attention from researchers (e.g., Borgioli et al., 2020). Financial integration among the trade partners is also important as global trade increases among markets (e.g., Chambet and Gibson, 2008). Future studies can also explore further the topological structures of financial networks in financial market integration. Current studies in this respect focus on single-country analysis (Bougheas and Kirman, 2015), suggesting the utility of future cross-national studies.

7.2. Impacts on financial market linkage of crises, extraordinary events, and formations of associations

How financial market linkages are impacted by crises, extraordinary events, and formations of association has wide potential scope. This includes exploring impact on financial market integration with respect to regional and global level financial crises. (Ahrend and Goujard, 2014; Sehgal et al., 2016; Pardal et al., 2020). Further, integration between developed and emerging markets is still under explored, especially with regards to financial crises, and how crises change integration. Other areas of research include exploring changes in market integration post establishment of regional organization, such as the forming of the Euro area, or, more recently finalizing of Brexit, the establishing of the Eurasian Economic and African Monetary Unions. Further, studies can be done to examine financial market integration with respect to a) free trade zone formation, b) institutional reforms taken to reduce the trade barriers, c) globalization, d) launching the regional economic integration schemes, and e) undertaking programs for domestic institutional investors and foreign institutional investors.

7.3. Time varying financial market integration

The stochastic variability of financial market integration is less explored, as are the conditioning roles of investor risk preferences, portfolio outcomes, and stock-bond time-varying co-movements. An under-explored area is the impact on integration of time-varying investor risk preferences resulting from financial shocks. This extends to considering the impact of integration on portfolio optimization.

7.4. Co-movements among oil, stock, real estate, commodity, bond, and crypto currency markets

While linkages between stock and bond markets are explored in studies, levels of integration between these markets can be further assessed by adopting new approaches. Co-movements between real estate and stocks, while also examined, have only been studied for a limited number of countries. Only lightly studied as well is the distinction between short- and long-term linkages between markets. Granted

Table 8
Future research questions.

Research cluster	Q#	Research question
Equity market integration in general	1	What is the relationship between illiquidity premia in diversified portfolios and international financial market integration using higher frequency data?
	2	What is the relation between equity market integration and respective international economic linkages?
	3	What roles do China and USA, and other specific countries play in financial market integration?
	4	What is the nature and source of financial market integration?
	5	Can market integration be quantified?
	6	Is financial market integration affected by business cycles and changes in financial regulation?
	7	How does the integration of developed and emerging markets hold with cross-national differences in macroeconomic variables, religion and culture?
	8	Do the ASEAN markets and other specific regions have consistent financial market integration?
	9	How is financial integration related to the structure of trade partnerships?
	10	What are the causes of the positive association of trade partner concentration and financial integration?
	11	Why within integration of the markets is poor. This study can be conducted on the financial markets on one single country.
	12	Do economic factors lead to shifts in market integration? To what extent is this particularly true for regions, such as Latin America?
	13	Are there any non-linearities in the market integration process?
	15	Are markets integrated with respect to cross-listed stocks?
	16	Do the economically, geographically, institutionally, or culturally closer markets have more co-movement?
	17	What role does the topological structure of financial networks play in determining cointegration during crises?
	18	How does isolation from contagion effects in regional and business-cycle synchronization of inter-regional capital allocation affect global bank capital allocation strategies?
	19	Does market integration exist when the global managers make up a small share of two or more markets?
	20	How does integration differ for emerging and frontier markets?
	21	What factors drive country-specific investment risks?
	22	Do markets manifest long-run co-movement? (multivariate analysis)
	23	Are equity or money markets linked across countries?
	24	Are there any potential benefits of accounting for persistency of price changes in financial markets? (frequency domain methods.)
	25	Are international equity markets integrated?
26	High frequency data analysis of integration applying wavelet approaches, multivariate approaches	

(continued on next page)

Table 8 (continued)

Research cluster	Q#	Research question	
Financial market linkage with respect to crises, events, and formations of association	28	What cause the Information trading and liquidity trading on order flow shocks?	
	29	Do corporate-information and liquidity tradings hold interdependencies? What is the effect of such interdependencies on the order flow imbalance?	
	30	Does GDP per capita and other macroeconomic variables condition the explanatory power of market integration?	
	31	Does international financial integration affect macroeconomic performance?	
	32	Are the equity and bond markets are integrated? Portfolio analysis in periods of extensive quantitative easing.	
	33	Which factors lead to increases in co-movement and integration?	
	34	Do qualified domestic and foreign institutional investors programs affect financial market integration?	
	35	Is there any relationship between financial market linkages and business cycle synchronization with international-level events?	
	36	Do the institutional reforms taken to reduce trade barriers affect to capital market integration?	
	37	How is integration between developed and emerging or frontier markets impacted by extraordinary events or crises?	
	38	Do countries and regions co-move between market returns, implied volatility, and policy uncertainty?	
	39	Do the regional economic integration schemes affect stock market integration?	
	40	What leads to country heterogeneities in response to financial crises	
	41	Are the Baltic markets which have joined the Euro area co-moving more closely with Euro-area stock markets?	
	42	Do financial shocks and their interactions affect the time-varying risk preferences of investors?	
	Time varying financial market integration	43	How do systematic events or contagion occurrences impact optimal portfolio design?
		44	Do bond and stock markets holds time-varying integration with each other at the firm level?
45		How does sentiment condition co-movements?	
46		What is the nature of time-varying integration at industry or firm levels?	
47		What drives time-varying integration at industry or firm levels?	
Co-movement among oil, stock, real estate, commodity, bond and crypto currency markets	48	Do the changes in oil prices impact integration?	
	49	Are there linkages between gas and Brent crude oil futures contracts post 2002?	
	50	What are the regional differences in the linkages of gas and crude oil futures contracts?	
	51	How to forecast optimal weights and hedge ratios using out-of-sample, for oil and gas stock markets	
	52	How do the common drivers of stock and oil prices impact the hedging effectiveness of risk management strategies?	

Table 8 (continued)

Research cluster	Q#	Research question
Portfolio diversification with Financial market integration	53	Do the oil and stock prices have consistent integration? (Using asymmetric models or cyclical structures)
	54	Do the commodity and stock prices have consistent integration?—in short- and long-terms?
	55	Are there linkages between real estate and stock markets in short-and long-terms?
	56	Does international diversification affect asset pricing and systematic risk?
	57	Is international portfolio diversification always beneficial in terms of risk and return?
	58	How does growth of tail risk in one market exacerbate systemic risk in another?

examinations of such linkages are challenging in many instances.

Also underexplored is integration among commodity and stock markets. Co-movements between oil and stock prices can be explored further, especially during extraordinary periods (see Corbet, Goodell & Gunay). The impact of changes in oil prices on integrations among financial markets is relatively underexplored. By using asymmetric models or cyclical structures, the relationships between oil prices and stock markets can be further studied. Further, regional differences in linkages between various energy markets can be further studied.

7.5. Portfolio diversification with financial market integration

The impact of market integration on optimal portfolio diversification can be explored with respect to asset financial pricing, and asset allocation. For instance, is international portfolio diversification always beneficial in terms of risk and return? What are the impacts of international diversification on the asset pricing and systematic risk? Further, research evidences that frontier markets are the least integrated. This motivates further study to identify portfolio opportunities vis-à-vis frontier markets. Another important area to explore is asset allocation for the purpose of portfolio rebalancing.

We outline gaps in the literature in our identified five research streams in the form of 67 research questions. These are presented in Table 8.

8. Conclusions

This paper is the first study to utilize both qualitative (content analysis) and quantitative (bibliometric citation analysis) techniques to conduct a meta-review of the financial market integration (FMI) literature. We analyze 260 articles, over that last 40 years, as identified from the Scopus database. We use the VOSviewer software program for the bibliometric analysis; as well as conduct several additional analyses to establish a meta-literature review: (i) co-citation analysis; (ii) co-authorship analysis; (iii) cartographic analysis; and (iv) content analysis.

We contribute by identifying important aspects of FMI literature, including top journals, authors, most studied and least studied countries, and influential and trending articles and topics. We also identify five main research streams in the literature: (1) portfolio diversification with financial market integration; (2) equity market integration in general; (3) financial market linkage with respect to crises, other events, and formations of association; (4) the characteristics of time varying financial market integration; and (5) co-movement among oil, stock, real estate, commodity, bond, and crypto currency markets. Additionally, we

highlight the co-authorship network of FMI researchers, recognizing influential authors; as well as present a wide array of questions for future research.

Given the ongoing interest of finance scholarship in market integration, as well as the relevance of market integration for policy makers and portfolio managers, our encapsulating assessment of FMI literature should be of great interest.

Compliance with ethical standards

We confirm that we have complied with ethical standards.

Declaration of Competing Interest

We confirm that we do not have any conflict of interest.

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