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Competition or cooperation? Disentangling the Bank-FinTech interaction through a hybrid literature review

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ABSTRACT

The advent of FinTech companies (FTCs) in the banking sector has sparked a transformative shift, encouraging banks to navigate responses ranging from competition to collaboration. Through a comprehensive hybrid literature review and structured exploration of Bank-FinTech interaction models, we provide an actionable framework for understanding cooperative and competitive dynamics in Bank-FinTech relationships. Our analysis highlights a prevailing consensus within the literature favouring a cooperative strategy over competition between banks and FTCs. We examine the prevalent types of collaboration, their underlying rationales, and their effects on banks' performance and activity. Through the identification of emerging themes and specific strategic gaps, we also suggest a targeted pathway for further inquiry, pointing at potential directions for future research.

1. Introduction

The financial landscape is undergoing a significant reshaping due to the convergence of financial technology (FinTech) and traditional banking. The entry of FinTech companies (FTCs, hereinafter) into the financial sector presents both threats and opportunities for banks.

On one hand, traditional banks face significant challenges from innovative, technology-driven firms. Consumer demand is a major factor supporting the growth of the FinTech industry around the world (Propson and Zhang, 2024) and revenues in the FinTech industry are expected to grow almost three times faster than those in the traditional banking sector between 2022 and 2028 (McKinsey and Company, 2024). FTCs often operate under less stringent regulations compared to banks, which allows them to innovate and deploy new services more rapidly (Stulz, 2019). Moreover, FTCs typically have lower operational costs due to their digital-first approach, which enables them to offer competitive pricing and services (Wang et al., 2021; Zhang and Li, 2025). Furthermore, by leveraging technology such as blockchain and APIs, FTCS improve customer experiences through faster, more accessible services, and personalized financial solutions (Kou et al., 2021; Shodiev, 2024). In addition, FTCs can penetrate underserved market segments that traditional banks may overlook, providing services like alternative lending and payment systems (Elsaid, 2021; Kowalewski and Pisany, 2022).

On the other hand, the entry of FTCs also offers chances. Banks can partner with FTCs to enhance their technological capabilities and offer more flexible and efficient services (Romãnova and Kudinska, 2016; Elsaid, 2021; Murinde et al., 2022). By integrating FinTech solutions, banks can improve customer experience through better functionality, increased service options, and more

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personalized offerings (Boustani, 2020; Varma et al., 2022). Moreover, banks embracing FinTech solutions can gain a competitive edge over other banks that are slower to integrate such technologies (Meinert, 2017). Additionally, by adopting new technologies such as blockchain, AI, and machine learning, banks can expand their market reach and reduce operational costs (Vučinić and Luburić, 2022). Thus, banks should "embrace disruption" and proactively develop adequate responses to operate and thrive in the evolving landscape, harnessing the transformative potential of groundbreaking FinTech innovations (Gomber et al., 2018).

What the prevailing response of the banking sector is to the entry of FTCs, is still an open question. Our study aims at filling this research gap, exploring whether banks and FCTs primarily compete, cooperate, or adopt hybrid strategies of coopetition.[1] In addition, we provide a detailed classification of collaboration and competition models, critically analyse the motivations underlying the chosen interaction strategy, and highlight the effects of these strategic choices. To this aim, we examine 1242 search materials, spanning from 2008 to 2024, by implementing a hybrid literature review that combines the principles of both bibliometric and structured reviews (Paul and Criado, 2020).

To the best of our knowledge, this is the first contribution of this kind. Even though there are previous literature reviews on the Bank-FinTech relationship (Thakor, 2020; Elsaid, 2021; Patel et al., 2022; Murinde et al., 2022; Pandey et al., 2024),[2] they adopted a macro-level approach, primarily examining how FinTech is reshaping the financial and the banking sectors. Differently, our study embraces a micro-level view, investigating the strategies that banks employ interacting with FTCs. Although, among others, Elsaid (2021) similarly discusses potential cooperation between banks and FTCs, their view remains broad, with an emphasis on the long-term impact of FinTech on financial stability, economic welfare, and customer demographics. Our review, by contrast, is more specialized in its exploration of Bank-FTCs interactions, prioritizing relational models, collaborative strategies, motivations behind partnerships, and performance effects of these strategies. This makes it a distinctive approach, diverging from previous general examinations of FinTech's impact on the banking industry and emphasizing an in-depth synthesis of interaction types.

Our analysis provides several contributions. First, through our comprehensive review and structured exploration of the interaction models between banks and FTCs, we fill a significant gap in the literature by providing an actionable framework for understanding cooperative and competitive dynamics in Bank-FTCs relationships. Our focus on concrete interaction types, along with an agenda for future research, underlines the paper's unique contribution. Second, by identifying emerging themes and pinpointing specific strategic gaps, we aim to advance a targeted pathway for future inquiry, providing scholarly value in an area less comprehensively addressed by broader studies.

Moreover, understanding how banks respond to the entry of FTCs is crucial from both a strategic and a regulatory point of view. The comprehension of the evolving dynamics in the financial services industry can inform market players' strategic decisions by highlighting the benefits and risks of the different choices, be they cooperation, competition or coopetition. Additionally, the interaction between banks and FTCs highlights the need for adaptive regulatory policies that support innovation while ensuring financial stability. Having a grip on market dynamics allows for effective regulation that can mitigate risks associated with FinTech adoption and foster a collaborative environment where both banks and FCTs can thrive. This balance is essential for maintaining consumer trust and the integrity of the financial system.

The remainder of the paper is organised as follows: Section 2 frames our research questions and describes our methodology; Section 3 depicts our preliminary findings, consisting of two subsections detailing the bibliometric analysis and the clusters identified from a systematic review of the corpus. Section 4 outlines directions for future research and finally; Section 5 concludes.

2. Research questions and methodology

Our analysis of the literature on the relationship between banks and FTCs intends to answer to the following research questions:

RQ1. How do banks and FTCs interact? Do they compete or cooperate?

RQ2. What are the motivations underlying the chosen Bank-FinTech interaction strategies?

RQ3. What are the types of interactions between banks and FTCs?

RQ4. What are the bank-specific drivers of Bank-FinTech interactions?

RQ5. What are the effects of interactions with FTCs on banks?

By providing answers to the above-mentioned RQs, this study maps the geographical regions in which the topic has been studied predominantly, and the methodological approaches mainly used. Moreover, it identifies the influential research as well as the leading scholars in the field for guidance and collaboration opportunities. Furthermore, it distinguishes thematic clusters and highlights key focus areas, therefore helping researchers identify the research hot spots on the Bank-FTCs relationship. Finally, our study proposes a future research agenda to enhance knowledge about the bank-FTCs relationship.

To explore the Bank-FTCs relationship we implemented a hybrid literature review, integrating the principles of both bibliometric and structured reviews (Paul and Criado, 2020). This approach was chosen because our case sits in between the specificity of the topic and a corpus numerosity that is hardly manually manageable. In fact, while systematic literature reviews are more appropriate for

[1] Competition traditionally focuses on firms vying for profits and advantages, leading to divergent interests and self-interested behaviours, while cooperation emphasizes collaborative interdependencies, pooling resources for mutual enhancement, fostering commitment and trust. The hybrid strategy of coopetition acknowledges win-win interactions within competitive arenas, bridging competition and cooperation by recognizing both positive and negative interdependencies, offering a synthesis of convergent and divergent interests inherent in these relationships (Padula and Dagnino, 2007).

[2] Previous literature reviews are summarized in Appendix A1.

confined or niche research areas, bibliometric analysis can handle large amounts of literature and provides a colourful summary of a given field (Donthu et al., 2021).

Our hybrid literature review was carried out by conducting systematic screening employing the methodology by Tranfield et al.'s (2003), enriched by performance analysis and science mapping (Donthu et al., 2021) interpreted through the sensemaking approach for bibliometric analysis proposed by Lim and Kumar (2024).

Specifically, the Tranfield et al.'s (2003) methodology follows three key steps: (1) identifying relevant articles by defining the research scope and establishing a protocol, (2) executing a keyword-based query, and (3) synthesizing the findings to clarify what is known about the topic. In this final step, we integrated the sensemaking approach for bibliometric analysis proposed by Lim and Kumar (2024), enriching it through systematic and systematic reading of the corpus. This method bridges the gap between quantitative data and qualitative interpretation by employing a three-pronged process - scanning, sensing, and substantiating - allowing for both analysis and deeper insight into bibliometric results (scanning, sensing, and substantiating will be elaborated upon within the specific steps where they are applied).

The relevant articles for our study are those investigating the Bank-FinTech relationship at a micro-level. Thus, we included in our analysis only the works studying the strategies of banks towards FTCs and excluded those regarding the broader theme of FinTech adoption by banks. We executed a systematic query within the Web of Science database, targeting specific keywords in the "topic" field encompassing "title, abstract, and authors", and excluding filters such as language and manuscript type (e.g. articles, working papers, book chapters, etc.). This approach provided a broad overview of the literature on banks and FinTech, enabling us to determine which articles to include or exclude. The Web of Science database was chosen for its significance in providing not only data and tools essential for empirical scientific investigations, but also for facilitating studies aimed at reconciling disparities among a collection of reports or identifying new research domains built upon existing endeavours (Li et al., 2018).

We chose to start our inquiry from 2008, even if the interlinkage of finance and technology has a long history and it is difficult to identify when the development of FTCs exactly began. However, the aftermath of the 2008 global financial crisis is considered a watershed (Lorente and Schmukler, 2018; Miguel and Duval, 2019; Gopal and Schnabl, 2020; Arner et al., 2022), presenting an alignment of market conditions that supported the emergence of new market players applying technology to financial services[3].

Based on previous literature (Alt et al., 2018; Liu et al., 2020; Elia et al., 2023; Geetha and Biju, 2024) and preliminary runs of the database, we selected the following keywords, using the wildcard operator "* " to capture plural forms: [bank* AND (FinTech* OR "fin tech*" OR "financial technolog*" OR BigTech* OR "big tech*")]. Further refinement was undertaken by restricting the search to categories within the Web of Science, specifically "Business finance", "Economics", "Business", and "Management", as shown in Table 1. Following the recommendations by Webster and Watson (2002), we included not only academic journal publications but also book chapters and conference proceedings, which enhances depth in understanding the selected topic structure (Rethlefsen et al., 2021) and ensures a more comprehensive literature search (Benzies et al., 2006). Even if conference proceedings are unpublished material, they serve as valuable scientific venues for exchange of ideas and a major incubator for the future research directions (Rethlefsen et al., 2021) and offer valuable insights by capturing knowledge often underrepresented in journal articles (Adams et al., 2017). For emerging disciplines, this "grey literature" (Benzies et al., 2006) assumes even greater importance than articles in the process of knowledge transmission (Butler, 2008; Visser and Moed, 2005; Cosma and Rimo, 2024).

Our final sample retained only three proceedings, two conference papers, and three book chapters from reputable international conferences and authors.

This approach yielded 1.242 initial results. Subsequently, 10 duplicate entries were identified and removed, leaving a corpus of 1.232 unique articles. The screening phase entailed a thorough examination of titles and abstracts, facilitating the delineation of both the overarching literature and the specific area of interest. The literature review papers were excluded from the sample to obtain more coherent results from the bibliographic analysis. Following this screening process, 54 papers were deemed suitable for our further analysis. However, given that only 54 articles out of an initial 1.242 addressed the selected topic, it was necessary to determine whether this limitation was due to the database or the topic itself. We ruled out the possibility that the limited number of articles was due to the query string, as it was deliberately designed to provide the broadest possible overview of the topic and to ensure the inclusion of all relevant articles related to the banking and FinTech relationship. Consequently, an additional search was conducted in the Scopus database, given its broad coverage and ability to extract references, institutional and national affiliations, and other key attributes (Corbet et al., 2019). The new search yielded 14 more papers. Thus, the final sample comprises 68 articles, spanning from 2016 to 2024. Indeed, as highlighted in Pandey et al. (2024), the first two articles on the investigated topic were published in 2016.

Finally, in the third stage, we synthesized the research papers to shed light on what and how is known about this relationship, by applying the sensemaking approach (Lim and Kumar, 2024). The first step consists in scanning the bibliometric results to familiarise with them. While, in performance analysis, scanning involves identifying prominent trends in the data; in science mapping, it involves locating clusters of related topics, wherein topics could include theories, concepts, contexts, and methods. More specifically, by employing performance analysis through Bibliometrix R-tool (Aria and Cuccurullo, 2017), we outline the corpus' main information, the scientific annual production, the most relevant sources and the countries they belong to, and the most prolific authors. While,

[3] For an analysis of the evolution of the FinTech sector, see Arner et al. (2022) who identify the main factors that catalysed the growth of this industry in the US: the deterioration of the public perception of the traditional banking system; post-financial crisis regulation that increased the compliance obligations of banks and altered their commercial incentives and business structures; increased unemployment and reduced availability of credit; the enforcement of the Jump Start Our Business Startups (JOBS) Act in 2012 that created an alternative and less onerous means for P2P lenders to comply with the securities laws.

Table 1
Selection and Skimming process.

Selection Process	
Database A	Web of Science, Clarivariate
1st Query	Refine results for [bank* AND (FinTech* OR "fin tech*" OR "financial technolog*" OR BigTech* OR "big tech*")] (Topic) and 2024 or 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2011 or 2010 or 2009 or 2008 (Publication Years) and Business Finance or Economics or Business or Management (Web of Science Categories)
Preliminary results	1.242 articles
Duplicates Removal	−10
Off topic items and Literature Reviews removal	−1.178
Secondary Results	54
Additional Search	
Database B	Scopus, Elsevier
2nd Query	TITLE-ABS-KEY ([bank* AND (FinTech* OR "fin tech*" OR "financial technolog*" OR BigTech* OR "big tech*")]) AND PUBYEAR > 2007 AND (LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI"))
Results from the second query	14
Final Sample	68

Source: authors' elaboration

through science mapping we elucidate the relationships within topics, thereby facilitating a more organized and coherent view of the literature. This not only allowed us to uncover a wide spectrum of themes and the latest developments within our field of interest (Donthu et al., 2021), but it also facilitated our efforts to systematically read and summarise the corpus. We consolidated the two samples extracted from WoS and Scopus databases (encompassing 54 and 14 articles, respectively), in accordance with the methodology elucidated by Caputo and Kargina (2022).

Next, we performed a thematic mapping of the corpus using Bibliometrix (Aria and Cuccurullo, 2017). We opted for authors' keywords, as only four items lacked keywords compared to six in Keyword Plus, and the R-tool does not support the simultaneous use of both types. In thematic analysis, centrality is plotted on the x-axis to represent a theme's significance within the literature, while density is shown on the y-axis to indicate the development level of the theme. The resulting thematic map is divided into four quadrants, taking the names of niche, motor, emerging/declining, and basic themes. The themes are assigned to these quadrants based on their centrality and density values. We opted to analyse the thematic evolution dividing the sample in two periods (2016–2019 and 2020–2024) in order to observe the literature before and after the shock caused by the Covid-19 pandemic.

We then used the visualization software VosViewer to conduct the co-occurrence network analysis. This software was chosen for its capacity to accommodate both Author's Keywords and Keyword Plus data sourced from WoS and Scopus. Given that the analysis focuses on individual words, we found this software ideal for our purposes. Our approach encompassed all keywords, employing fractional counting to ensure an unbiased analysis. To streamline our results and avoid redundancy, we compiled a list of synonyms. Terms like "FinTech," "financial technology," and "fin-tech" were deemed synonymous, as were words with identical meanings but differing spellings, such as those reflecting American versus British English conventions.

Setting a threshold of three occurrences for a keyword ensured that only the most significant relationships were highlighted among the 337 keywords in our sample, resulting in 30 keywords meeting this criterion. Our analysis revealed four clusters encompassing a total of 183 links.

Among citation analysis methods, which are typically categorized into bibliographic coupling and co-citation analysis (Aria and Cuccurullo, 2017), we opted to employ the bibliographic coupling technique using the VosViewer visualisation software. This approach is recognised as the most accurate for delineating the research frontier (Boyack and Klavans, 2010). Unlike co-citation analysis, which is generally applied to map older publications, bibliographic coupling effectively clusters recently published works (Boyack and Klavans, 2010). Given that most articles in our dataset are recent, we deemed bibliographic coupling particularly suited to our objectives due to its capacity for retrospective analysis and its classification as a time-independent method (Aria and Cuccurullo, 2017). This technique operates on the premise that publications sharing common references also show similarity in content. Following the fractional counting technique, documents were selected as the unit of analysis with a minimum threshold of twenty citations per document (Rasul et al., 2022). Out of 68 documents, only 14 met these criteria. For each of the 14 articles, VosViewer calculated the total strength of bibliographic coupling links with other documents. From these, we selected the option, offered by the software, of showing only the largest set of interconnected items to streamline and declutter the results while retaining the key and most insightful documents (9 items).

For both co-occurrence network analysis and bibliographic coupling, we applied the sensing approach. This approach consists in diving deeper into understanding the relationships between topics within a cluster and establishing themes that could encapsulate them (Lim and Kumar, 2024). This process requires a thorough exploration of the content within each cluster to fully understand their thematic focus. Thus, building on this methodology, we deepened the clustering and the sensing approach thanks to the systematic review and reading of the full corpus. We were able to form categories - based on those obtained through the bibliographic coupling - representing a distinct analytical lens through which the Bank-FinTech interaction has been explored. We grouped articles that treat the topic from similar angles, even when variations in methodology or geographic focus were present within clusters. This approach enabled a cohesive yet flexible structuring of the literature, focusing on the conceptual underpinnings of each study rather than

methodological or regional specifics.

Clusters were refined primarily through thorough reading and content review, ensuring that each article's main themes aligned with the broader perspective of its assigned cluster. This method allowed for distinctions between clusters, even when individual studies intersected multiple themes and thus belonged to more than one group. Articles that examined the Bank-FinTech relationship from overlapping viewpoints were included in multiple clusters to maintain thematic fidelity and account for multidimensional analyses.

Lastly, substantiating is the final stage in the sensemaking process, a crucial step where we established the trustworthiness of our findings by demonstrating the credibility, confirmability, dependability, and transferability of our interpretations. Specifically, we confirmed credibility by the cross verification of the co-occurrence network with the bibliographic coupling(Donthu et al., 2021; Lim and Kumar, 2024) and the systematic reading analyses. This methodological triangulation ensures that interpretations are based on multiple techniques, thereby boosting their credibility (Lim and Kumar, 2024). To ensure confirmability, we documented our methodologies and analytical processes transparently, enabling replication of results. Relevant citations were also used to support our interpretations, following the suggestions of Lim and Kumar (2024). To ensure dependability, which refers to the consistency and reliability of findings, we conducted cross-checks, triangulating our findings with existing reviews and similar studies to verify the solidity of our interpretations of the touched topics (Lim and Kumar, 2024). In conclusion, to support transferability, we engaged in discussions about the broader implications of our findings, highlighting their relevance to other contexts and research areas (Lim and Kumar, 2024).

3. Results

3.1. Performance Analysis

3.1.1. Main Information

In Fig. 1, we present key information on the final sample of 68 articles. The annual growth rate of 45.42 % in the scientific production demonstrates the significant scholarly interest for the Bank-FinTech relationship.

This heightened interest is further underscored by the observed annual scientific production trends depicted in Fig. 2. Particularly noteworthy are the pronounced peaks in 2022 and 2024 with 12 and 20 documents published respectively.

3.1.2. Most relevant contributors: Sources, Countries and Authors

Fig. 3 shows the most relevant sources based on the number of papers they published. The most prolific journal are *Finance Research Letter* and *Research in International Business and Finance* each with three publications in the topic, while *Financial Innovation, International Journal of Bank Marketing, and Journal of Economics and Business* have two publications each. These findings are in line with those of Raval and Desai (2024).

Fig. 4 shows which sources, among those included in our sample, have received the most citations. The Small Business Economics, the Journal of Economics and Business, and Financial Innovation obtained 171, 168, and 116 citations, respectively.

Most publications appeared in UK journals (18 items), with others in journals from the Netherlands and the USA (Fig. 5). The discrepancy in the total number of papers (less than 68) is due to the inclusion in our sample of book chapters (2), conference papers (2) and proceedings (3). Similar results were also found in the bibliometric analyses by Alrawashdeh et al., (2022), and Sanga and Aziakpono, (2023).

The impact factor and rating of the sources were analysed using the Chartered Association of Business Schools Journal Guide (CABS) and SCImago (SCImago, n.d). The CABS Journal Guide rates journals from 1 to 4 * , with higher ratings indicating greater distinction and excellence. Considering our sample, 18 items were not included in the Academic Journal Guide (AJG), comprising 3 book chapters, 5 conference papers, and articles from newer journals not covered in the latest 2024 Association of Business Schools (ABS) ranking. This prompted us to analyse the sample also based on the ratings provided by SCImago's Scientific Journal Ranking (SJR2) indicator, which weights citations by the prestige and thematic relevance of citing journals. Journals are divided into four quartiles (Q1-Q4), with Q1 representing the highest values. This more current ranking allowed us to evaluate 17 additional papers and to assign the ranking of the publication year for almost all the papers, to 14 of these articles was attributed the score of the first

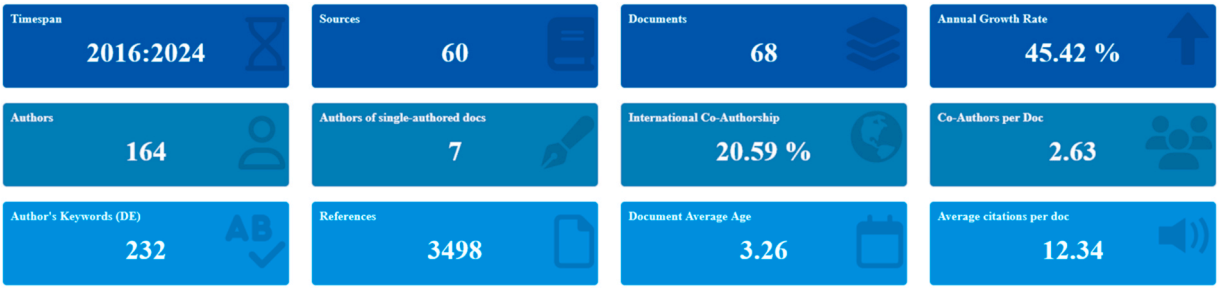

Fig. 1. Main Information. Source: Authors' elaboration through Bibliometrix.

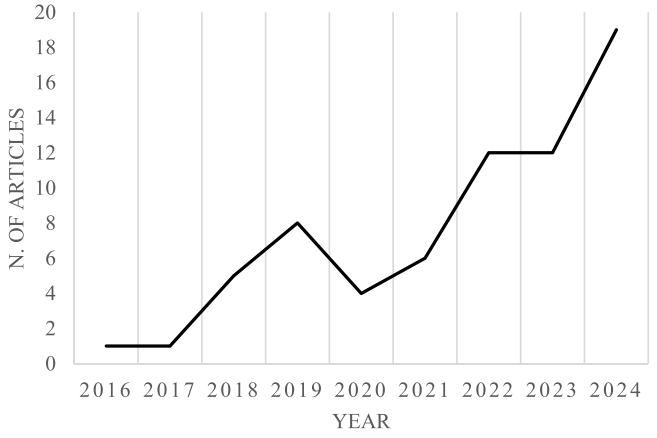

Fig. 2. Annual Scientific Production. Source: Authors' elaboration through Bibliometrix.

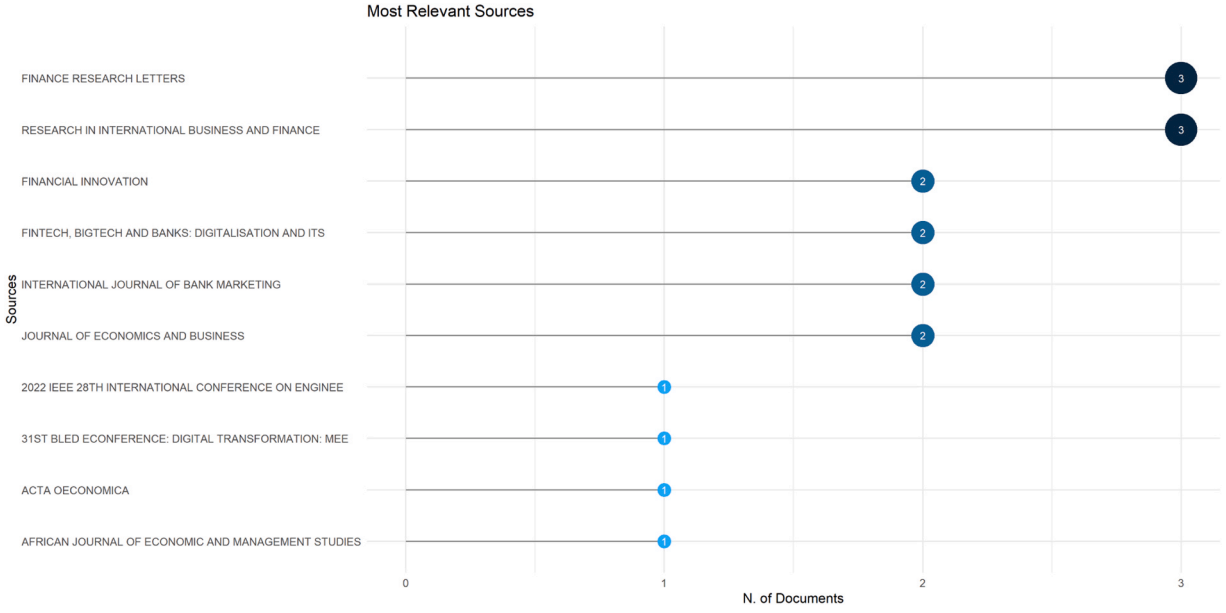

Fig. 3. Most Relevant Sources. Source: Authors' elaboration through Bibliometrix.

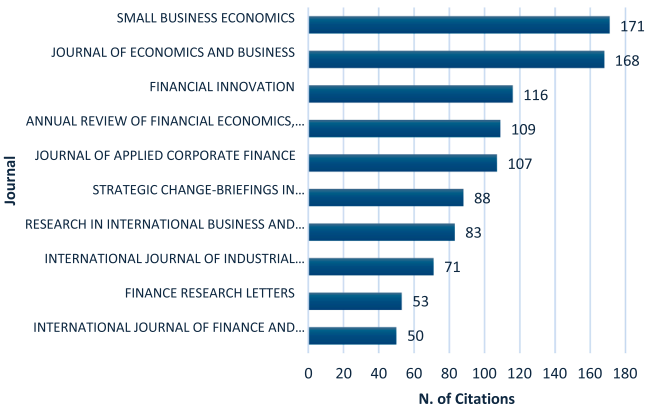

Fig. 4. Most Cited Journals. Source: Authors' elaboration through Bibliometrix.

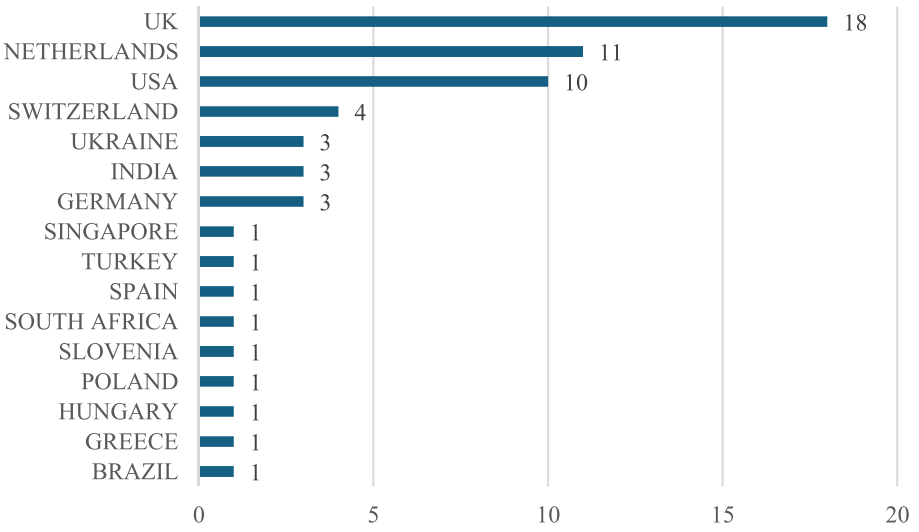

Fig. 5. Source country. Source: Authors' elaboration.

disposable year closer to the publication. Fig. 6.A shows that 46 % of the articles were published in Q1 journals and 31 % in Q2, indicating the overall high quality of the sample. As for the ABS the results are more divided, as seen in Fig. 6.B, the most items belong to the ratings 3, 2 and 1, while only one was assigned the rating of 4.

The most prolific author in the sample was Del Gaudio, who co-authored four papers on the Bank-FinTech relationship between 2022 and 2024, collaborating with a total of eight other authors (approximately three per paper). During the same period, Collevecchio and Cappa co-authored two articles, each involving collaboration with two additional authors. While the second most prolific author (Yudaruddin) wrote two articles single handed and co-authored an additional one with other five authors. Eleven other authors each wrote two articles, typically in collaboration with colleagues, with only one of these eleven writing a paper individually. The remaining authors each contributed one article, with the majority co-authoring with at least one other scholar, and only four having written a single-author paper (Fig. 7).

3.1.3. Most employed methodologies and targeted Countries

Table 2 summarizes the methodologies used in our sample. We find that 37 articles employ quantitative approaches while 31 employ qualitative approaches to examine the relationship between banks and FTCs. For quantitative studies, regression models are the most common (21 times), followed by the event study technique (7 times), and the generalised methods of moments (5 times). For qualitative studies, exploratory qualitative analysis involves examining documents (e.g., official reports, press releases, scientific literature) and real-world cases, along with conducting interviews with experts, bank and FTC employees, and other subjects. These techniques were used 17 times. Theoretical works such as those of Vives (2019) and Tanda and Schena (2019b) appear 7 times. Lastly, the analysis of case studies was utilised 7 times. Therefore, we find almost an equal distribution of methodologies between qualitative and quantitative approaches (the latter being the most employed).

The literature analysed focuses on a variety of countries and geographical areas (Table 3). Particularly, studies involving USA were the most common (10 papers), followed by studies on a global basis (8). Importance was also given to Europe (6), China, Germany, and Italy, (5).

3.2. Science Mapping

3.2.1. Thematic Mapping

Using the Bibliometrix R-Tool, we applied Callon et al.'s (1991) thematic mapping to analyse the evolution of research themes over two periods (2016–2019 and 2020–2024), that were chosen to observe the literature before and after the shock caused by the Covid-19 pandemic.

This method positions the research themes based on centrality - indicating their relevance and connections to other themes - and density - reflecting their internal development.

In the 2016–2019 period (Fig. 8), "FinTech", "banking", "digitalisation", and "cooperation" formed the basic themes, highlighting their foundational role in the literature. The cluster containing "bigtech", "blockchain", "regulation", and "strategy" occupied a median position, indicating a well-established theme with strong internal and external connections. This aligns with the results of the bibliometric analysis by Bhatt et al. (2022), who found that financial regulation emerged as a key theme in 2018–2019. Meanwhile, "innovation", "startups", "stock returns", and "technology" appeared as highly specialized themes, offering in-depth contributions but with a more limited impact on the broader research field.

The 2020–2024 period (Fig. 9) reveals both continuity and change. Themes such as "FinTech", "banking", and "innovation"

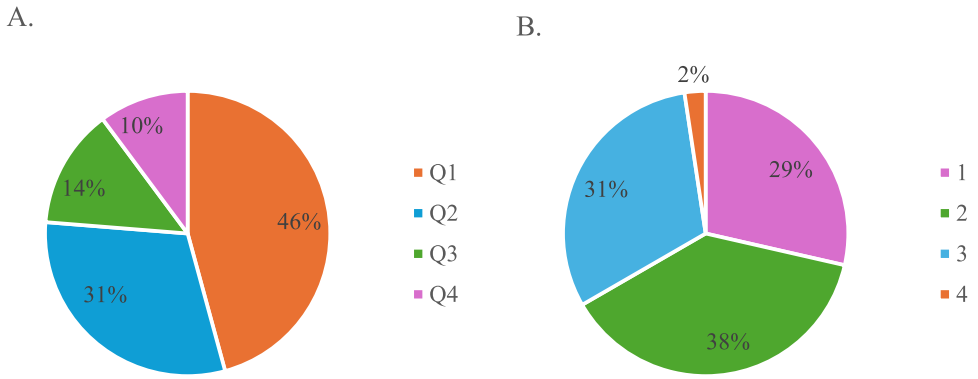

Fig. 6. A. SJR2 Indicator; 6.B. ABS journal ranking. Note: the percentage was calculated based on the number of articles that received a rating (59 for the SCiMago's pie chart, and 42 for the ABS'). Source: Authors' elaboration.

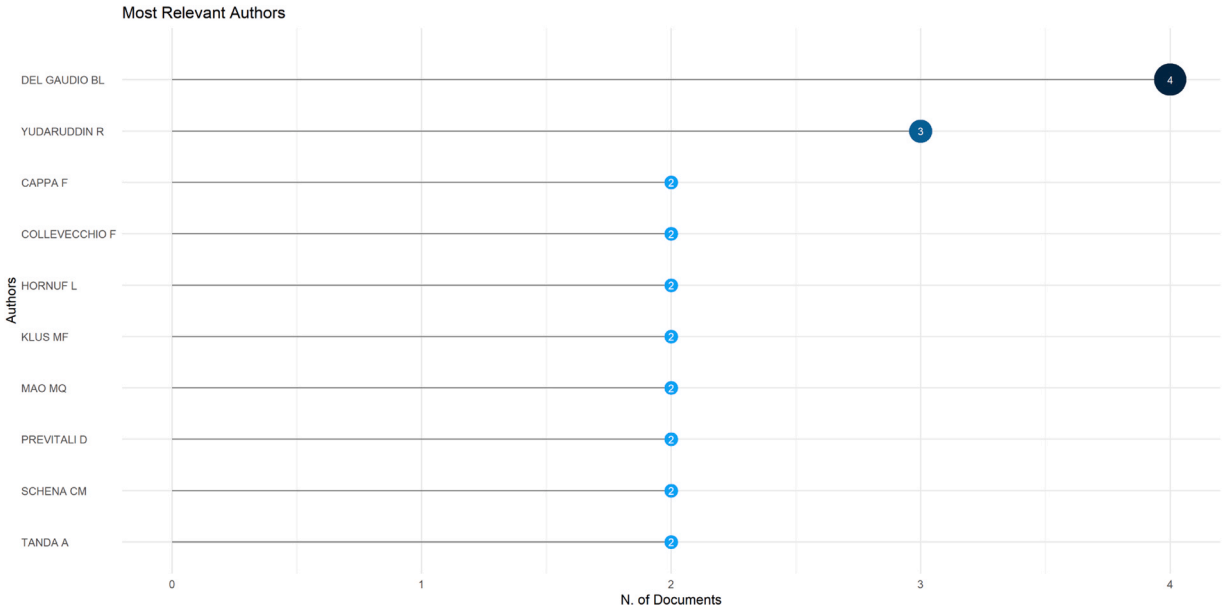

Fig. 7. Most Relevant Authors. Source: Authors' elaboration through Bibliometrix.

remained central, but their focus expanded to include "mergers and acquisitions", reinforcing their role in shaping financial sector dynamics. "Digitalisation", "startups", and "business models" gained prominence, signalling an increasing emphasis on technological transformation. New niche themes emerged, including "performance", "risk", "liquidity", and "bank performance", reflecting more specialized but relatively isolated discussions. The Covid-19 pandemic played a focal role in accelerating FinTech adoption and the digitalization of financial services, the keyword "Covid-19" made its first appearance in the period 2020–2024, highlighting its impact on bank-FinTech interactions. Similar results were found by Bhatt et al., (2022).

The theme "Bigtech", previously more established, shifted toward the emerging or declining quadrant with the word "coopetition", suggesting their role in the literature is either fading or undergoing transformation, requiring a more thorough analysis and reading of the corpus.

3.2.2. Co-occurrence Network

In our endeavour to delve into both present and prospective relationships within our research domain, we turned to co-occurrence analysis through the VosViewer software, leveraging the intrinsic content of publications, which operates on the premise that words frequently appearing together signify thematic connections (Donthu et al., 2021). The analysis revealed a network of 29 keywords grouped into three areas.

We computed Network Density Analysis (1) to quantify how closely interconnected the nodes (keywords) in our network are. Network density is defined as the ratio of the number of actual connections to the maximum number of connections that could possibly exist.

Table 2
Applied Methodologies.

Methods	Application Times	Sample Articles
Qualitative Approach		
Case Study	7	Bömer and Maxin, (2018); Riikkinen and Pihlajamaa (2022); Galeone et al. (2024)
Exploratory Qualitative Analysis	17	Ramesh (2019); Fonseca and Meneses (2020); Larsson et al. (2023)
Theoretical	7	Stulz (2019); Tanda and Schena (2019b); Vives (2019a,b)
Quantitative Approach		
Correlation Analysis	1	Pu et al. (2021)
Data Envelopment Analysis (Dea)	1	Cao et al. (2022)
Dynamic Comparative Structural Analysis	1	Zveryakov et al. (2019)
Event Study	7	Bartolacci et al. (2022); Cappa et al. (2022); Carlini et al. (2022)
Generalized Method Of Moments (Gmm)	5	Litimi et al. (2024); Yudaruddin (2023); Le et al. (2024)
Malmquist Index Analysis	1	Cao et al. (2022)
Network Analysis	1	Brandl and Hornuf (2020)
Paired Sample T-Test	2	Singapurwoko (2018); Akhtar and Nosheen (2022)
Prognostic Model	1	Vovk et al. (2021)
Regression Model	21	Li et al. (2023); Del Gaudio et al., (2024)); Kwon et al. (2024)
Stochastic Frontier Approach	1	Fang et al. (2022)
Structural Equation Model (Sem)	1	Hoang et al. (2021)
Technology Acceptance Model (Tam)	1	Hoang et al. (2021)
Variation Structure-Conduct-Performance Modelling Approach	1	Andrikopoulos, Dassiou (2024)

Note: The "Application Times" column in Table 1 does not sum to the total number of articles in our sample (68) because multiple methods may be used in a single study.
Source: Authors' elaboration

Table 3
Analysed Countries (by number of studies).

Country of Analysis	*Number of studies*
USA	10
WORLD	8
EU	6
CHINA	5
GERMANY	5
ITALY	5
CANADA	4
INDONESIA	4
UK	4
FRANCE	3
HOLLAND	2
SPAIN	2
SOUTH AFRICA	2
BRAZIL	1
DENMARK	1
ESTONIA	1
FINLAND	1
GULF COOPERATION COUNCIL REGION	1
HUNGARY	1
INDIA	1
JAPAN	1
LITHUANIA	1
LUXEMBOURG	1
NORTH AMERICA	1
OECD	1
SOUTH KOREA	1
SWEDEN	1
TAIWAN	1
TURKEY	1
UKRAINE	1
VIETNAM	1
JORDAN	1

Source: Authors' elaboration

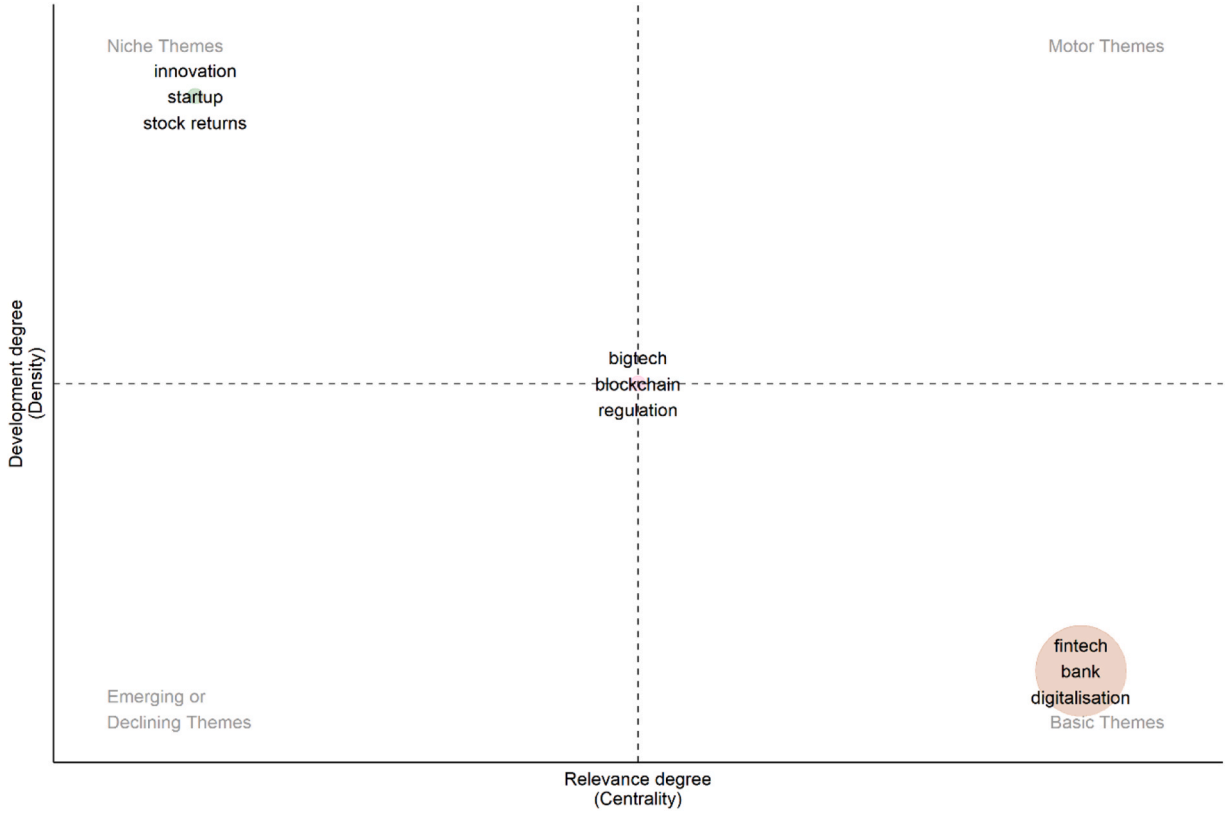

Fig. 8. Thematic Map 2016–2019. Source: Authors' elaboration through Bibliometrix.

Essentially, it indicates what percentage of all potential links between pairs of nodes is realized in the network.

For an undirected network, network density (D) is calculated using formula [1]:

$$D = \frac{2E}{[N(N-1)]} \quad [1]$$

where N is the total number of nodes and E is the total number of actual edges.

This measure serves as a critical parameter in network science, often used to evaluate and compare the connectedness of different networks in experimental settings (Bedru et al., 2020).

We obtained a density of 43.6 % with 177 links among 29 keywords, meaning that 43.6 % of all potential connections are present. This moderately dense structure indicates robust interconnection in the banking and FinTech literature, yet it also suggests potential for incorporating new ideas and expanding the research in the field. The central keywords, "FinTech" and "bank", have emerged prominently, in alignment with our initial research inquiry; the two also share the strongest link (Fig. 10). These terms are also the most frequently occurring and the most connected, with 55 and 35 occurrences and 28 and 26 links, respectively. Therefore, they represent the main hubs of the network. The keywords "innovation" (18 occurrences and 20 links), "cooperation" (13 occurrences and 19 links), and "performance" (10 occurrences and 17 links) each represent the most frequent and connected words in their respective clusters ("cooperation" being the most important after "bank" and "FinTech"). Additionally, in the visualization of the map, thicker lines represent stronger links between two items. "FinTech" shows robust links with "cooperation" (3.68 link strength), "innovation" (3.57), and "performance" (2.42) while "bank" is notably linked to "innovation" (2.87), "cooperation" (1.98), and "investment" (1.50), indicating frequent co-occurrence of these keywords.

We identified three thematic areas named as follows:

- "Innovation and Transformation", in green;
- "Strategic interactions", in red;
- "Performance outcomes", in blue.

The first area groups keywords such as "innovation", "technology", "digital transformation", "business model", "startups", "incumbents", and "strategy". This indicates that a stream of the literature investigates how themes related to innovation and transformation are linked to the business models and strategies of incumbents and startups.

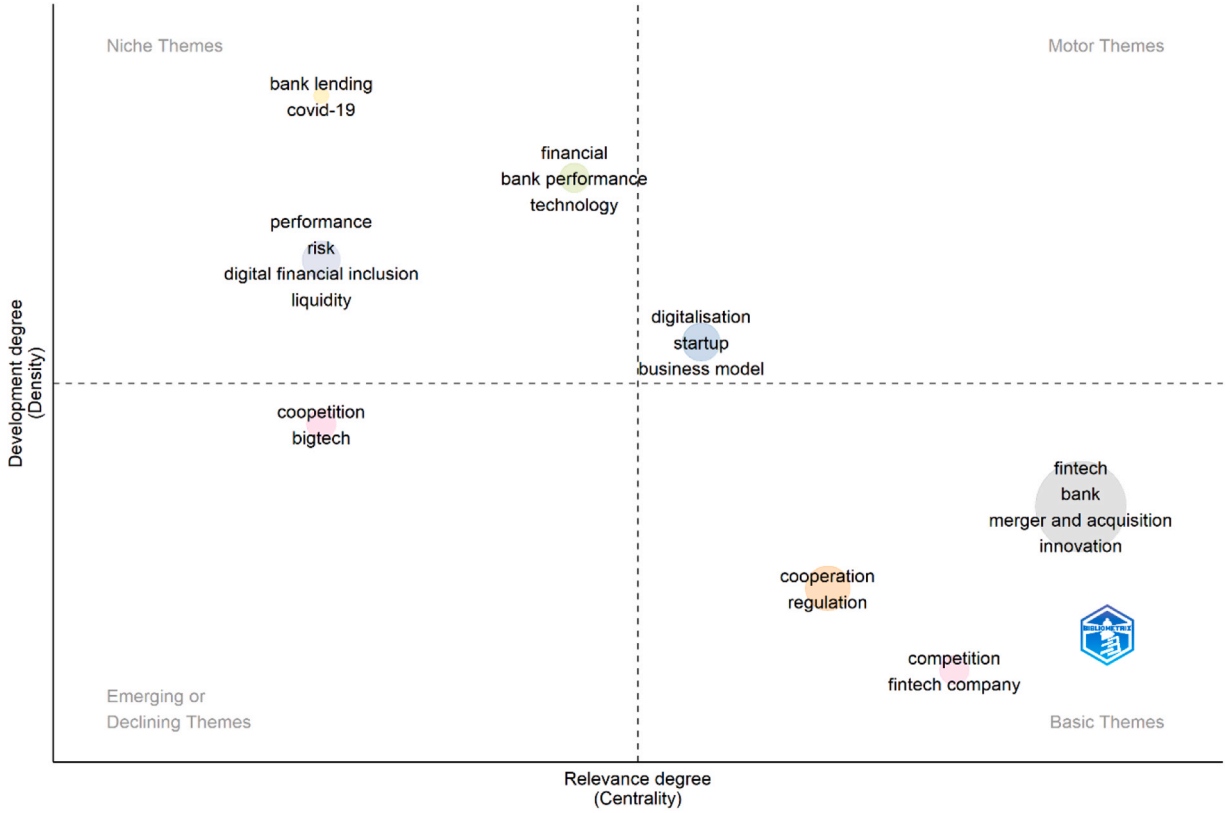

Fig. 9. Thematic Map 2020–2024. Source: Authors' elaboration through Bibliometrix.

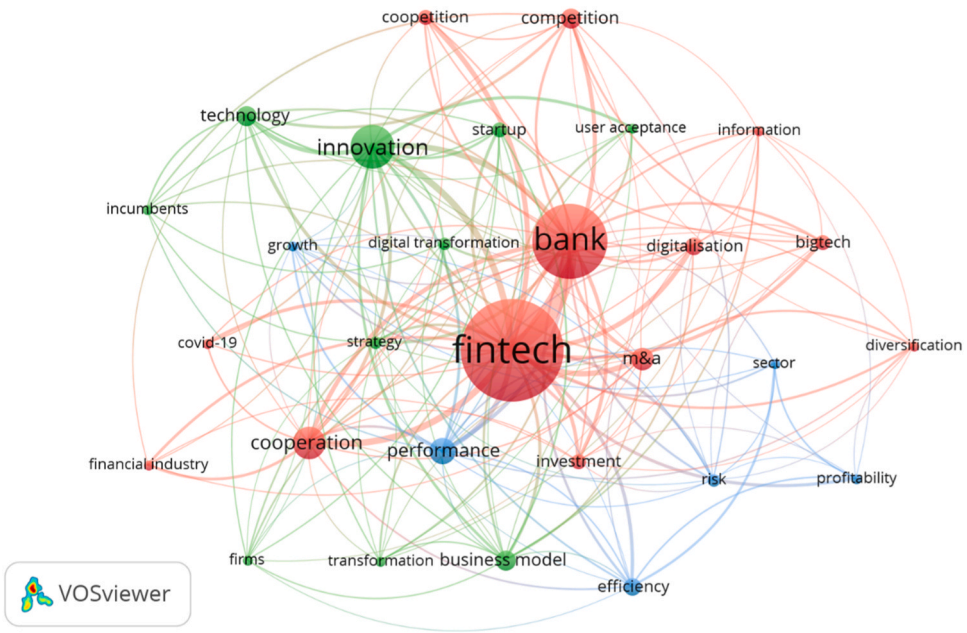

Fig. 10. Co-occurrence Network. Source: Authors' elaboration through the VOSviewer software.

Central keywords to the second area are “bank”, “bigtech”, “FinTech”, “competition”, “cooperation”, and “coopetition”. This suggests that literature often studies strategic interactions between banks, FTCs and Bigtechs together.

Finally, “Performance”, “profitability”, and “efficiency” belong to the third area. As these keywords share strong links with “bank” and “FinTech”, we may conclude that a stream of literature investigates these topics related to both subjects.

3.2.3. Bibliographic coupling

Our additional analysis revealed 12 items that we grouped into three clusters (Fig. 11):

- "Banking Transformation and Competition", in red;
- "Bank-FinTech Collaboration Types", in blue;
- “Bank-FinTech Investment Dynamics”, in green.

The first cluster comprises Stulz (2019) and Vives (2019a) and (2019b). Stulz (2019) examines the competition among banks, FinTech, and BigTech firms, analysing their respective advantages, as well as banking business models’ evolution towards specialization. Vives (2019a) investigates the relationship between the new entrants and banks and the effect of competition on the stability in banking, while Vives (2019b) explores technological disruption in banking, focusing on competition, efficiency, and customer welfare, and analyses strategies of incumbents, FinTech, and BigTech firms, emphasizing the role of regulation.

The second cluster includes the empirical studies of Brandl and Hornuf (2020), Hornuf et al. (2021). Brandl and Hornuf (2020) investigate bank-FTCs interactions, through a network analysis, spanning from 2010 to 2017, showing that German banks tend to form strategic partnerships (meaning that one company uses the software of the other company, usually by paying a transaction-based fee) with FTCs rather than directly integrate them; Hornuf et al. (2021) examine how banks, in a sample comprehending Canada, France, Germany and the UK, typically collaborate with FTCs, how intensely they do so, and which form of alliance they prefer.

The third cluster groups the taxonomy of Drasch et al. (2018), and the empirical articles of Dranev et al. (2019) and Carlini et al. (2022). Drasch et al. (2018) offers a taxonomy describing the bank-FTC cooperation and identify prevailing cooperation patterns, in Europe and the US; Dranev et al. (2019) study the performance of acquirer firms (including banks) measured by abnormal returns after acquiring a FTC; Carlini et al. (2022) aim to understand the effect of investments in FTCs on stock returns. The results of the examined studies will be described in the subsequent sections.

3.3. Systematic Reading

3.3.1. Bank-FinTech interactions: Key Themes

Our bibliometric analyses reveal two primary themes: i) the potential disruption of FTCs in banking and banks’ strategy towards them, and ii) the emerging partnerships between banks and FTCs and their specificities. The first theme aligns with the “Innovation and Transformation” and “Strategic Interactions” thematic areas from the co-occurrence network, as well as the “Banking Transformation and Competition” area from the bibliographic coupling analysis. The second theme encompasses “Strategic Interactions” - which serves as a conceptual bridge between themes - along with “Performance Outcomes” from the co-occurrence network and “Bank-FinTech Collaboration Types” and “Bank-FinTech Investment Dynamics” from the bibliographic coupling analysis. This dual narrative in the literature necessitates a deeper exploration to grasp the dynamics between the two subjects. Therefore, in this section, we conduct a further clustering of the literature based on the two above-mentioned primary themes. This step entailed the systematic

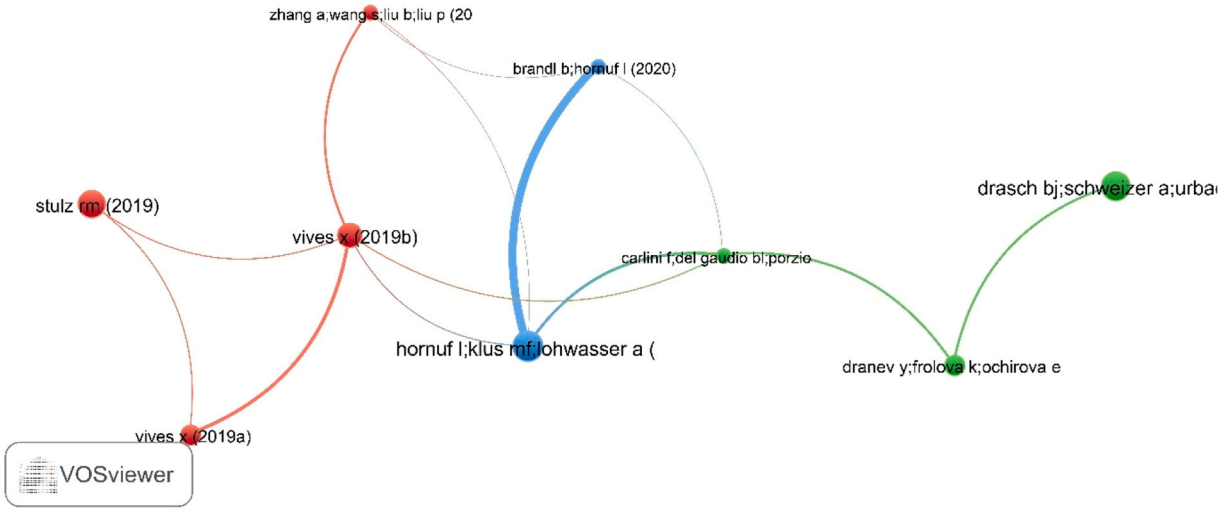

Fig. 11. Bibliographic Coupling. Source: Authors’ elaboration through VOSviewer software.

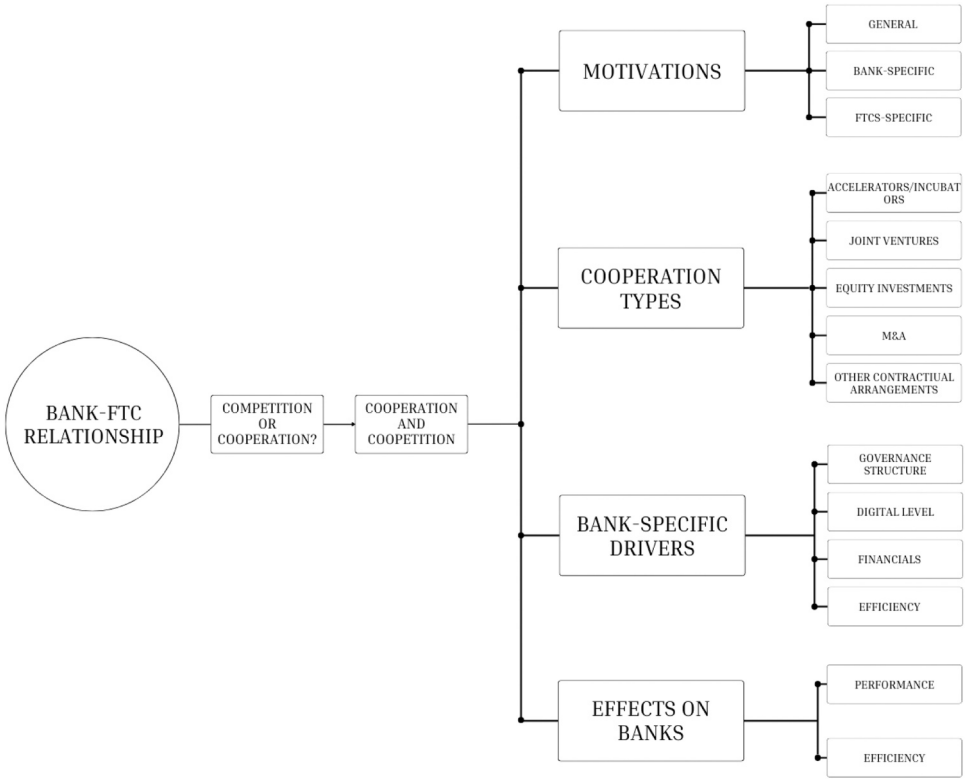

Fig. 12. Literature Landscape. Source: Authors' elaboration.

reading of the full corpus.

From our systematic reading, the two main themes emerge even more clearly. They conceptually align with the themes identified in the bibliometric analyses and address our five research questions. The first theme probes whether this relationship leans towards competition or cooperation (RQ1), mirroring the distinctions found in the co-occurrence network's "strategic interactions" area and in the bibliographic coupling's "banking transformation and competition" cluster. The second theme, focusing on cooperation and coopetition strategies, concerns the motivations behind cooperation (RQ2), the types of cooperation built (RQ3), the bank-specific drivers underlying these strategies (RQ4), and the effects of these interactions on banks (RQ5). This aligns with the bibliographic coupling clusters "Bank-FinTech Collaboration Types" and "Bank-FinTech Investment Dynamics," as well as the "Performance Outcomes" area in the co-occurrence analysis**.** This literature landscape is synthesized by Fig. 12**.** The themes and the articles included are shown in Tables A2.1 to A2.5 in the Appendix A2.[4]

3.4. Do Banks and FTCs compete or cooperate?

Within our sample we have identified 24 papers that investigate whether banks compete or cooperate with FTCs, providing findings to answer RQ1.

As new players enter the industry, banks face increased competition, particularly in markets where they serve overlapping customer segments, such as peer-to-peer (P2P) lending. Borrowers' preference for FTCs, combined with their ability to cater to financially excluded populations, contribute to this trend (Singapurwoko, 2019; Langi et al.2024). However, competitive pressure is not uniform across all contexts, as banks and FTCs also engage in collaborative dynamics. For instance, during the Covid-19 pandemic, interactions between traditional banks in Indonesia and P2P platforms, particularly among smaller institutions, created complementary benefits rather than purely competitive tensions (Langi et al., 2024). This is connected to the fact that the pandemic has accelerated the need for digital transformation in the banking sector as banks that failed to adapt to digital changes risked losing market share and solvency (Vovk et al., 2021).

Although FTCs challenge banks in consumer interaction and convenience, banks retain advantages due to their regulatory expertise, extensive customer bases, and diverse product offerings (Stulz, 2019). While competition from FTCs may drive efficiency, it does not necessarily enhance financial stability, as it can erode banks' unique advantages and push them toward riskier behaviour. In the Gulf Cooperating Council Region, for example, the growing presence of FTCs has negatively impacted bank performance, with

[4] The number of articles does not sum up to 60, as one article may appear in more than one cluster.

declines in return on assets (ROA), return on equity (ROE), and net interest margins (NIM). In response, banks have opted to integrate FTCs' innovations into their business models by investing in or partnering with these firms, mitigating the risk of disruption (Litimi et al., 2024). This is in line with the emergence of narratives such as "if you can't beat them, join them", reflecting the growing perception that collaboration may be more beneficial than outright competition, leading to the adoption of strategic alliances to foster innovation and service development ((Faes et al., 2022; Ashta and Biot-Paquerot, 2018). In Jordan, for example, over the period 2016–2022, it has been found that FTCs and banks are moving towards cooperation rather than competition, as collaboration enhances service quality and financial inclusion (Karaki et al., 2024). Similarly, Taiwan's T Bank, in the market of mobile payments and e-wallets, have preferred working alongside FTCs rather than competing directly, viewing these services as essential offerings that can be sourced from solution vendors. Across 24 European banks, digital payment services - initially developed by FTCs and BigTech firms - have prompted diverse strategic approaches, including shareholding acquisitions, partnerships, and in-house innovation projects. Notably, smaller banks belonging to this sample often view FTCs and BigTech firms as opportunities for collaboration rather than worrying competitors (Tanda and Schena, 2019a). More broadly, banks frequently adopt cooperation-based strategies, but concurrently, they recognise BigTech companies as the most direct competitors. Therefore, they may choose cooperation (creating partnerships in specific sectors, like payments) or competition by exploiting their apparent superior trust from customers and enhanced data privacy. As for BigTech companies, they have also shown a preference for partnerships, but they could also compete head-to-head with banks (Valverde and Fernández, 2020). This relationship is further evidenced by findings from Denmark, Estonia, the Netherlands, and Sweden, where 39 respondents among banks, FTCs, associations, hubs, employer organizations, and trade unions and public and organizational reports, policy documents, statements, and national FinTech development web pages, all agree that banks and FTCs engage in selectively cooperative interactions rather than outright competition (Larsson et al., 2023).

The likelihood of cooperation over competition depends on the complementarity of resources, skills, and strategic objectives. Banks, characterized by stability and regulatory expertise, often lack the agility and cutting-edge technologies that FTCs bring (such as AI, blockchain, or mobile payments). Ramesh (2019) explores how FinTech innovations can help banks enhance the customer digital experience, which includes the usability, convenience, and personalization of digital touchpoints like mobile apps, websites, and online banking platforms. By embracing FinTech innovations, banks can offer more personalized, efficient, and secure services, which can lead to stronger customer relationships and improved business outcomes. Indeed, partnerships allow banks to meet evolving customer expectations regarding speed, convenience, and digital offerings. This is especially important as the client of today needs speed and quality (Pu et al., 2021) and in such collaborations, the control of the customer interface is essential (Vives, 2019). Thus, traditional financial market players need not to compete with new entrants but must act searching to achieve the highest clients' satisfaction (Pu et al., 2021).

In emerging markets, the cooperative tendency is even more pronounced, as traditional banks leverage FinTech partnerships to enhance service delivery without compromising their core strengths. Harasim (2021) argues that while competition and coopetition are more prominent between banks and BigTech firms, banks and FTCs generally find their roles to be complementary rather than conflicting. FTCs bring innovative solutions to financial services, particularly in areas like payments, lending, and financial management, while banks provide the regulatory infrastructure, security, and trust that customers value. FTCs can help banks enhance their digital capabilities, and banks offer the established trust and customer base that FTCs may lack

Extending this perspective, several studies suggest that the relationship between banks and FTCs will continue evolving in a cooperative direction (Ramesh, 2019; Brandl and Hornuf, 2020; Nabiyev and Ovenc, 2023; Veronese and Bertran, 2023; Andrikopoulos, Dassiou 2024; andKalai and Toukabri, 2024). Market power shifts within the banking sector have implications for both FinTech and non-FinTech firms' performance, with competition indices (Lerner and Boone indices) indicating a symbiotic rather than adversarial relationship (Andrikopoulos, Dassiou 2024). FTCs have pressured banks to modernize their business models through strategic alliances and technological integration. For example, in 2021, Turkey, 430 banks have engaged in product-related collaborations with FinTech startups rather than investing directly, favouring partnerships with non-payment FTCs over payment service providers (Nabiyev and Ovenc, 2023). Similarly, 400 U.S. and 80 Canadian banks embraced a partnership model with FTCs, suggesting that despite regulatory challenges, cooperation remains the dominant strategy (Kalai and Toukabri, 2024). Finally, P2P lenders and similar FTCs may gain market share in areas where banks face capital constraints (Thakor, 2020), but the prevailing trend suggests that banks will respond by acquiring, collaborating with, or launching their own digital platforms (Thakor, 2020; Murinde et al., 2022). Therefore, the idea that FTCs will replace traditional banks remains unlikely (Murinde et al., 2022).

These findings allow us to answer our RQ1, concluding that the literature generally agrees banks are most likely to pursue a cooperative strategy rather than compete with FTCs.

Although not pertaining to our sample due to the different scope of their analysis, also Navaretti et al. (2017), Capgemini and EFMA (2017), Gomber et al. (2018), Bank of Italy (2021), Elsaid (2021), and Murinde et al. (2022) agree with the statement, reinforcing our finding. In particular, the survey carried out among banking executives by Capgemini and EFMA (2017) revealed that 91.3 percent of banks planned to collaborate with FTCs, while only 4.3 percent of respondents planned to compete with them.

3.5. Cooperation and Coopetition

3.5.1. Motivations

Our analysis of the relevant literature also highlights the reasons underlying Bank-FTCs cooperative interaction strategies (RQ2).

Banks and FTCs can mutually benefit from cooperating with each other. On the one hand, banks often lack innovation (Anagnostopoulos, 2018), thus they take advantage from FTCs' expertise in technology, adaptable processes, and market segment specialization (Collevecchio et al., 2024). On the other hand, FTCs benefit from banks' market intelligence, extensive reach, and

resources, including knowledge and funds (Bömer and Maxin, 2018). Banks and FTCs also share common motivations for collaboration, such as enhancing customer satisfaction, achieving financial returns, acquiring new knowledge, and increasing market competitiveness (Ruhland and Wiese, 2023).

Banks aim to access external and rapid innovation, adapt business models, outsource services, attract top talent, and gain strategic and competitive advantages. They also seek profits by developing new customer segments, products and services, reducing costs, enhancing services, expanding into new markets, and integrating into FinTech ecosystems and networks (Drasch et al., 2018; Holotiuk et al., 2018; Bartolacci et al., 2022; Faes et al., 2022; Ruhland and Wiese, 2023; Kang and Sohn, 2023). Furthermore, partnerships help banks adopt advanced technologies, speed up project implementation, reduce time to market, and recruit professionals with new skills (Bank of Italy, 2023), offload the risks of the development of new products (Larsson et al., 2023), and enhance technological capabilities through digitalization and innovation (Fonseca and Meneses, 2020). Dranev et al. (2019) also states that many financial companies are seeking to acquire FTCs because they can potentially lower acquiring firms' expenses, improve business processes, solve complex IT problems, and reduce cybersecurity risks. Kang and Sohn (2023) identify also: faster reaction to environmental changes (e.g., the threat of BigTech companies), expansion of the product and service portfolio and increase the commitment of current segments, enhance customer centricity, collaboration can also provide access to direct feedback from potential customers, reduced reputational risk, provide developments based on agile approaches and methodologies, banks can also benefit from the exploitation of the domain knowledge of startups and scaleups, flexible, cost-efficient solution (free demand generation, consultancy activities as pre-sales processes), financial benefits, and avoid potential future rivalry. Additionally, the T Bank case study shows that the motivations for seeking strategic partnerships with FTCs include co-developing distinct financial services and leveraging innovative startups' expertise (Hung and Luo, 2016).

Holotiuk et al. (2018), collected data from 15 cases, based on identification of digital innovations emerging from alliances between banks and FTCs as well as industry reports on alliances, in Germany. They conducted 18 interviews to map the motives of individual partners of Bank-FinTech alliances. They find that banks partnered with FTCs to accelerate innovation processes that would otherwise require extensive time and financial and managerial resources. This trend, observed across the entire sample, indicates that banks value not only advanced ideas but also well-developed turnkey solutions for their operations. In most cases the respondents of their survey confirmed that banks partnered with FTCs to gain a competitive advantage and enhance customer value. Notably, banks recognized that FTCs could offer differentiated, superior, more advanced, or highly appealing solutions to customers. Banks avoid using their own resources on new and risky innovations with uncertain outcomes to save costs, noting that "smaller firms with only a few employees can produce considerably cheaper and offer more attractive market prices." By leveraging FinTechs, banks reduce their workload, allowing their employees to concentrate on core activities. It is also crucial for banks to learn from FTCs' innovative approaches to "disrupt and adjust existing processes, which becomes harder the longer the process exists. Other companies, starting from scratch, can more easily create a blueprint for arranging a whole new process." The authors also observe that banks worry that FTCs will reach a level of digital transformation capable of replacing current business models with scalable, digital, and intelligent solutions. Consequently, banks are actively "searching for new business" due to "high regulatory pressure and low-interest margins." Interviews reveal that banks view digital financial services as an "extremely interesting and exciting business area," but acknowledge that their technological capabilities are not as advanced as those of FTCs, prompting strategic partnerships. These alliances help banks "identify and launch new business models and consider various approaches." However, some banks lack a clear strategy, and there is concern about missing opportunities to establish sustainable business models. Banks recognize the necessity for organizational and mindset changes to keep pace with digital advancements. As such, investments in FTCs are perceived as M&A activities aimed at fostering innovation and competitiveness.

With specific reference to FTCs, they aim to enhance reputation and credibility, to obtain market entry support, customer access, trust-building, resources, to foster synergies, loan provision, banking licensing, economies of scale and develop products (Drasch et al., 2018; Holotiuk et al., 2018; Ruhland and Wiese, 2023; Bartolacci et al., 2022). But also reduce entry barriers, exploit market knowledge, opportunities arising from banks' social capital and brand, benefits of banks' infrastructures, larger resource base (e.g. financial), access to customer base and database, reduce the challenges of the traditional sales process and learning about business and banking process (Kang and Sohn, 2023).

Shifting the attention toward coopetition strategies, banks and FTCs benefit from accessing new market segments and resources, sharing knowledge, developing new products and market standards, incorporating new technologies, improving competitive advantage, reducing risk, and fostering innovation (Fonseca and Meneses, 2020).

3.5.2. Cooperation Types

Enterprises have various strategic options for partnering with startups (Ruhland and Wiese, 2023) ranging from acquiring an equity stake through M&As and corporate venture capital (CVC), to forming agreements like corporate partnerships, establishing joint R&D units, and creating incubators and accelerators.

Our investigation of the literature regarding the banking field allows us to answer to our RQ3, bringing to light that interactions between banks and FTCs mainly develop through strategic partnerships, while equity investments and accelerator-incubator models are less frequent.

Drasch et al. (2018) offer a taxonomy of Bank-FinTech relationships, finding that alliances, defined by the authors as "a contractual arrangement between companies to share resources and knowledge to achieve shared goals" are the most common form of collaboration, followed by incubation, acquisition, and joint ventures.

Bellardini et al. (2022) demonstrate a consistent increase in the number of banks' equity investment rounds in FTCs over the period 2008–2018, with a marked acceleration from 2013 onwards. This trend aligns with the findings of Hornuf et al. (2021) and with those

of Bank of Italy (2023) which finds that the nominal value of shares held by Italian banks in FinTech entities amounts to 1114 million euros, five times the 2021 shareholdings. Despite the rise of investments in FTCs, Faes et al. (2022) analyse 90 public partnerships (corporations included in the partnerships resulted in banks, insurance companies, FinTech start-ups, insurtech start-ups, and other companies) and find that most alliances do not include equity investments. Bank of Italy (2023) also identifies collaborations as the main approach to the implementation, of FinTech projects by banks, followed by in-house production and direct acquisition of IT services, and provides evidence that Italian banks mainly collaborate with technology providers, FinTech firms, and other supervised intermediaries, while collaborations with consortia, consulting firms, universities, BigTech firms, and accelerators and incubators are less frequent. Brummer and Yadav (2018) show that banks may indeed function as incubators providing critical evaluation for emerging startups and facilitating potential partnerships. Brandl and Hornuf (2020) find evidence that banks primarily utilize strategic partnerships rather than direct integration of startups to access desired technologies. Their analysis reveals that only 19 % of all contractual links are investments, whereas 74 % are strategic partnerships and 7 % are spin-offs (they define strategic partnership as a contractually established relationship between two firms). Similarly, Hornuf et al. (2021) discover that most banks prefer non-aggressive strategies when dealing with FTCs. The empirical results of Nabiyev and Ovenc (2023) suggest that large banks mainly establish product-related collaborations with FinTech startups rather than invest in them in Turkey. Tanda and Schena (2019a) find in their sample that that most banks adopt a plurality of strategic approaches concurrently. This is in line with Riikkinen and Pihlajamaa (2022), who find that attaining a strategic fit between banks and their FinTech targets is a dynamic process aimed at acquiring technological and market insights from startups, just like the Nordea Bank case study. The authors show that Nordea engaged initially in exploratory collaborations with various startups. Then, Nordea refined its strategic goals selecting compatible startups. As its technological and market knowledge grew, it restructured the collaboration into an accelerator-incubator model, aligning more closely with its business interests. The case analysis indicates that a company's learning objectives can evolve from broad exploration to the exploitation of identified opportunities.

3.5.3. Bank-specific drivers

Our review of literature on Bank-FinTech relationship highlights the bank-specific factors that drive banks' choice of cooperation type with FTCs, answering our RQ4.

Board characteristics are a central determinant. Specifically, board size, qualifications, seniority, social network ties, gender, socioeconomic, and cultural diversity all influence equity investment decisions. Del Gaudio et al. (2024) examined 234 listed banks in the US, EU, and UK and found that smaller, younger, highly qualified boards with greater female representation and broader network ties favoured equity investments in FTCs. Smaller boards tend to have less complex decision-making processes, allowing quicker and more coordinated actions. Younger boards often show greater openness to innovation and are more likely to pursue risky strategies with long-term returns, due to longer career horizons. More qualified boards possess better analytical skills and deeper industry knowledge, leading to informed investment decisions. The authors also found that gender diversity contributes to a broader range of perspectives, which reduces groupthink and stimulates creativity; female directors are generally more cautious in risk-taking, supporting balanced investment decisions. In addition, socioeconomic diversity among board members can also enhance innovation. Finally, board social network ties offer valuable connections and information channels, enabling access to better deals, more comprehensive insights, and stronger stakeholder relationships. This reduces information asymmetry and enhances the board's ability to accurately assess investment opportunities, significantly influencing the decision to invest in FTCs. Analysing 808 banks across 65 countries from 2008 to 2018, Reghezza and Vasilakis (2024) found that culturally diverse boards were more likely to acquire FinTechs. Cultural diversity broadens expertise and brings in different perspectives, helping executives identify opportunities and promote investments in FTCs. Similar findings were reached by Kwon et al., (2024), who analysed 105 international FinTech acquisitions by 80 banks in 15 OECD countries between 2010 and 2018. Furthermore, they demonstrated that banks with younger CEOs, or CEOs who also served as board chairmen, were more likely to engage in multiple acquisitions.

Kwon et al. (2024) also find that banks with better capitalization, higher profitability, higher liquid assets, and lower NPL volumes are more inclined towards acquiring FTCs. Additionally, banks with high cost-to-income ratios and low IT spending were also more aggressive in acquiring FTCs, being multiple acquirers, likely aiming to improve efficiency through technology adoption. The authors also suggest that higher liquidity provided banks with the financial flexibility needed to fund acquisitions, while better asset quality allowed banks to assume greater risks. Banks with higher equity-to-total-assets ratios have greater financial flexibility, allowing them to fund acquisitions without significantly increasing leverage or compromising financial stability. This makes them better equipped to absorb the costs and risks of integrating new technologies and business models. Similarly, more profitable banks have more resources to support strategic investments and may be more inclined to invest in new technologies to maintain their competitive edge. Acquiring FTCs gives them access to innovative technologies and business models that enhance service offerings, improve operational efficiency, and attract new customer segments.

Bank size also influences collaboration strategies. Hornuf et al. (2021), studying 400 banks involved in 500 alliances (defined as equity investments and product-related collaborations) with FTCs in Canada, France, Germany, and the UK, show that larger banks tend to invest in the equity of smaller FTCs. Larger banks possess the financial resources and market influence necessary to undertake to the risks associated with early-stage investments in innovative companies. The authors also find that larger banks prefer equity investments in FTCs over credit lines due to the enhanced control and influence these investments offer. Equity stakes allow banks to participate directly in the decision-making processes of FTCs, aligning strategic goals and facilitating technology integration. Moreover, larger banks prefer to invest in smaller FTCs as these subjects are often more agile, innovative, and more attractive as investment targets.

In a study involving 623 FTCs and 803 international investment rounds from 2008 and 2018 by 263 banks in advanced economies,

Bellardini et al. (2022), show that investment size correlates positively with bank size and efficiency (cost-to-income ratio). In addition, banks with higher capital levels tend to invest more in fin-native FTCs (i.e. FTCs that specialise in financial services and solutions that are directly related to traditional banking activities) due to lower perceived risk, and these investments align with a commercial banking model. Fin-native firms are preferred for in-country investments, while tech-native firms (i.e. FTCs that specialise in technology and leverage technological innovations to provide advanced and improved financial services) are favoured for cross-country investments (Del Gaudio et al., 2024). Differently, Nabiyev and Ovenc (2023) show that large Turkish banks make more strategic alliances with FTCs in the non-payment services and prefer product-related collaborations with FinTech startups, rather than equity investments.

Another research area involves the intersection between Sustainable Finance and FinTech, a topic still underexplored despite being a major policy focus (Arner et al., 2020). Examining 60 worldwide FinTech M&A deals from 2010 to 2020, Collevecchio et al. (2024) find a U-shaped relationship between the acquiring banks' sustainability (measured by ESG scores) and their expected performance. Low to moderate levels of sustainability incur costs (e.g., compliance, CSR activities) that may not be offset by tangible benefits. These costs might be perceived as a resource diversion from more strategic activities, potentially leading to value erosion. High levels of sustainability, however, signal a credible commitment to environmental and social governance, which enhances stakeholder trust, reduces risk associated with high-tech, innovation-driven M&As, helps align innovations with broader social and environmental goals, and facilitates better integration with FTCs, especially since sustainability is becoming a pressing concern.

Our analysis highlights that the level of banks' digitalisation is another significant driver.

Hornuf et al. (2021) suggest that the number of alliances (defined as equity investments and product-related collaborations) is associated with the implementation of a digital strategy and the presence of a Chief Digital Officer (CDO). Recognizing the opportunities and challenges posed by digital transformation, most banks have by now adopted comprehensive strategies to guide their digital evolution. Banks starting from a higher technological baseline can more easily achieve advanced levels of digitalization, while those with traditional models must first digitalize basic functions (Tanda and Schena, 2019). Furthermore, banks with a high digital level may prefer in-house development, possessing the necessary expertise and knowledge, while banks with a lower digital level may opt for external collaborations, not having the sufficient familiarity with new technologies and market. But the relationship may not be so straightforward, as bank incumbents must combine strong internal capabilities with partnerships to innovate and deliver high-value services, in order, in order to maintain their leadership, as shown by Stefanelli and Manta (2023). The authors analyse the 18 largest banks in Italy, Germany, Spain, France, the Netherlands, and the UK, finding that a higher degree of technological specialization and openness, measured by the number of application program interfaces (APIs), positively influences the formation of partnerships with FTCs. Nevertheless, their analysis also show that even banks with the minimum number of APIs required by PSD2 can have numerous of strategic partnerships, frequently driven by corporate strategies increasingly involving the adoption of digital business models. However, banks with a lesser knowledge of the FinTech ecosystem may have difficulties in finding the most relevant partners, technologies and markets, as shown by the Nordea Bank case study proposed by Riikkinen and Pihlajamaa (2022). Nordea engaged in a broad exploration of new opportunities with only a general sense of direction. This lack of specific focus initially made it difficult to find a strategic fit with Nordea's existing businesses. However, this exploration gradually increased Nordea's understanding of new technologies and market spaces, allowing it to narrow its search focus in subsequent years. Once sufficient technological and market knowledge had been accumulated, Nordea could align these activities more closely with its internal operations.

Understanding these dynamics is important for banks' managers and investors. Managers can use these insights to strategically allocate resources between internal development and external collaborations. Investors can better evaluate the potential risks and returns of banks' digitalization strategies.

3.5.4. Effects of cooperations on banks

Our further sifting of the extant literature on Bank-FinTech relationship yielded 36 articles that provided elements to answer our RQ5, highlighting that cooperation with FTCs affects banks' performance and efficiency.

Fang et al. (2022) analyse collaborations between Chinese city commercial banks and FTCs spanning from 2014 to 2019 that these interactions significantly enhance both cost and interest revenue efficiency across banks. Interestingly, the positive impact on cost efficiency is influenced by bank ownership concentration, while the effects on revenue efficiency vary between state-owned and non-state-owned city banks. Similarly, Ntwiga (2020) shows that between the 2009 and the 2018 in Kenya some banks have set up their own FinTech subsidiaries while others have formed partnerships with FTCs. The author defines these relationships as collaborations and provides evidence of a beneficial impact on banks' technical efficiency. The study highlights significant enhancements in loan intensity (loans to assets ratio), return on assets (ROA), and cost of intermediation (net interest income over average total assets ratio) as factors influencing technical efficiency (Ntwiga, 2020). Differently, Cao et al. (2022) analyse banks' resource management and performance when collaborating with FTCs, from 2010 to 2016. They find that bank holding companies have inefficiently utilized resources, and they propose a new model for resource allocation. The authors also suggest banks to enhance innovation and diversification to improve efficiency, especially in technology-related expenses. Additionally, they show that larger bank holding companies especially benefit from partnerships.

Galeone et al. (2024) show that FinTech plays a pivotal role in promoting sustainable economic development by directing capital towards environmentally and socially beneficial projects; they do this by studying the case of BNP Paribas Group. They highlight diverse types of collaborations between banks and FTCs as crucial for enhancing the efficiency of sustainability initiatives.

Turning to discuss the effects of the collaborations between banks and FTCs on bank performance, Le et al. (2024) analyse the diversity of Bank-FinTech collaborations across seven sectors in the Vietnamese market, including payments and mobile wallets, point of sale, digital banks and infrastructure, lending, financing SMEs, and retail investments and wealth. They find that collaborations

positively influence banks' profitability measured by the risk-adjusted returns on equity and assets, although the impact varies across the seven FinTech sectors. More specifically, State-owned commercial banks benefit more from increased Bank-FinTech collaborations, resulting in higher earnings, a trend also observed among listed and large banks.

Arena et al. (2023) using data from Italian banks from 2016 to 2020, analyse in-house provisions of FinTech solutions as well as collaboration with external FinTech firms. Their findings show that in-house provisions of financial technologies and collaborations with external FTCs (comprising all the sectors) enhances bank competitiveness (logarithm of the total number of customers) in gathering deposits.

Bank-FinTech partnerships, therefore, seem essential for banks to maintain a competitive edge and achieve strategic sustainability in the evolving financial landscape. This is reinforced by the study of Panday et al. (2024), focused on a case study on a South African bank (kept anonymous), demonstrating how partnerships with FTCs drive business model evolution and sustainable growth. Thanks to this case study they confirm that partnerships between banks and FTCs drive business model evolution and sustainable growth by providing access to advanced technologies, enhancing client experience, improving cost efficiency, ensuring regulatory compliance, and fostering innovation. These collaborations enabled the bank to quickly integrate solutions, such as APIs for personalized banking, without the need for extensive internal development. By focusing on client needs, it was possible to offer more personalized and efficient services, thereby increasing client satisfaction and loyalty. Partnerships also allowed the bank to reach new markets and client segments more cost-effectively, optimizing resource allocation. Moreover, FTCs helped navigate complex regulatory environments, building trust with regulators and clients. This collaborative approach fosters a culture of innovation and adaptability, allowing banks to stay ahead of technological trends and adapt quickly to changing market conditions.

Recent studies have also shed light on the relationship between banks' investments in FTCs and stock market reactions. Carlini et al. (2022) demonstrate that European and North American banks' investments in FTCs (i.e. "artificial intelligence and machine learning", "blockchain", "big data", "payments", "capital markets tech", "bitcoin", "mortgage tech", "real estate tech", "insurtech", "cybersecurity") are associated to negative stock markets reactions. These negative abnormal returns are larger particularly when the bank investment concerns young and technology-oriented FCTs, and in cases of multiple investments. Interestingly, bank size, leverage, and profitability do not moderate abnormal returns, suggesting the significance of the relationship between FinTech investment and bank stock returns. Takeda et al. (2021) analyse, from April 2016 to June 2019, the stock price reactions of Japanese regional banks to announcements related to banks' information technology (IT) investments in three FinTech categories: i) traditional services, such as credit, deposit, and capital-raising services; ii) settlement FinTech, related to payments and clearing; iii) asset management, including robo-advisory services. They find that stock prices of regional banks tend to react negatively in response to news regarding equity investments in FTCs.

Dranev et al. (2019) provide insights into stock market reactions to M&As between banks and FTCs, highlighting positive abnormal returns in the short term for acquiring companies in their sample, which includes firms belonging to the financial technology sectors and banks. However, long-term value creation appears limited, suggesting potential overreaction by initial investors to FinTech M&A announcements. Interestingly, cross-border acquisitions by companies from developed countries yield higher cumulative abnormal returns, signalling positive investor sentiment towards expansion strategies leveraging advanced enabling technologies. Contrastingly, Cappa et al. (2022) emphasize the negative effect on stock market reactions associated with full acquisitions made by banks of FTCs, attributing it to the challenges of integrating disparate business models and to the fact that full acquisitions, often require radical transformations, may signal backwardness, and result in negative effects on banks' future profits and stock market performance. Partial acquisitions, on the other hand, are perceived more positively by the market, signalling a commitment to gradual integration of new technology-based services and business models. Moreover, Akhtar and Nosheen (2022) investigate M&As between banks and FTCs based in developed countries, from 2010 to 2020, analysing their impact on acquirers' performance. Results reveal a positive effect of M&As on banks' operating performance (ROA and net profit margin), liquidity (current ratio), and financial leverage (total debt to equity), but a negative impact on their market performance (average share price) in the long run. Similarly, using data on M&As of FinTech companies by U.S. public banks, nonbank financial institutions, and tech companies, Zheng and Mao (2024) observe a rising trend in FinTech M&As driven by large and high-growth acquirers. However, the analysis reveals no significant added value from these deals in terms of short or long-term performance for the acquirers. Particularly, there are significantly negative stock market reactions to deal announcements for banks, suggesting potential overestimation of benefits. The authors speculate that integration costs, regulatory compliance, and adjustments to business practices may outweigh potential benefits. Moreover, they find limited evidence of improved operating or innovation performance (the former measured by ROA i.e. net income scaled by lagged total assets, and profit margin i.e. net income scaled by total sales; the latter measured by patent quantity and quality) in the long run for the acquirers compared to matched firms, raising doubts about the overall benefits of such deals, especially for banks.

Exploring the effects of collaborations between banks and FTCs, Elliehausen and Hannon (2024) investigate a different type of partnership between the two: FinTech firms, hindered by interest rate ceilings in some countries, partner with specialised banks to bypass these restrictions. In these partnerships, the bank acts as the "true lender," issuing loans on behalf of the FinTech company and leveraging its ability to export interest rates from its home country. This arrangement allows FTCs to offer joint personal loan products, with the bank holding the loan and potentially retaining a portion of the loan production. It is in this regard that Elliehausen and Hannon (2024) examine the impact of interest rate regulation on credit availability for marginal consumers in personal loan markets. The research reveals that FinTech-bank partnerships focus on near- and low-prime consumers, particularly in countries with stringent interest rate ceilings.

Meanwhile, Zhang et al. (2022) underscore the role of FinTech in alleviating the risks of pre-loan concession activities, connected to information asymmetry, particularly in banks with higher levels of managerial ownership (i.e. managers owning their company's share). However, their analysis indicates limited efficacy in controlling post-loan risks, which remain primarily under regulatory

control.

Lastly, the Covid-19 pandemic has significantly impacted the global economy, posing unprecedented challenges for financial institutions. Recent studies have explored how collaborations have influenced banks during this period. Vovk et al. (2021) emphasized that the symbiosis of banks and FTCs can significantly enhance the competitiveness and profitability of the banking sector in the long run. This was particularly relevant during the Covid-19 pandemic, which accelerated the need for digital transformation in the financial industry. The study highlighted that FTCs offer innovative business models and technologies that can reduce costs and improve service quality for customers. This was crucial during the pandemic, as customers increasingly prefer remote and digital banking services.

In the context of the Indonesian banking sector, Yudaruddin et al. (2023) investigate the collective impact of Covid-19, alliances, and digital strategies on bank lending, having studied a sample of 91 commercial banks from 2020 to 2021. Their findings reveal a significant negative effect of the Covid-19 pandemic on bank loans. They also find that collaboration (defined as any contractual or financial contract between a bank and a FinTech with the goal of partnering) between banks and FTCs has little influence on bank lending, as both banks and FinTech companies were similarly affected by the economic downturn, limiting their ability to expand lending. But he development of mobile banking as part of digitalization efforts enhances loan bank expansion, particularly among private and small banks. Moreover, the study of Langi et al. (2024) investigates the dual impact of peer-to-peer (P2P) FinTech lending and the Covid-19 pandemic on bank lending in Indonesia. The study analysed data from 121 banks over the period from 2016 to 2022. When the study examined the joint impact of P2P lending and the COVID-19 pandemic, a positive effect on bank lending emerged, particularly benefiting smaller banks. This suggests that P2P lending activities complemented traditional bank lending during the challenging period of the pandemic. Smaller banks demonstrated adaptability and resilience by strategically leveraging P2P lending to counter disruptions. This finding indicates that P2P lending can serve as a supplementary source of financing, especially during economic crises. The findings suggest that strategic partnerships between banks and FinTech companies can enhance the resilience and adaptability of banks, particularly during economic crises. Smaller banks, especially, can benefit from these partnerships by leveraging FinTech innovations to improve their lending activities and customer services (Langi et al., 2024).

4. Research agenda

Our exploration of the extant literature on Bank-FinTech relationship highlighted the complexity of this interaction, though cooperation emerges as the predominant approach both for the present and the near future.

While there is a flourishing literature examining the underlying reasons for non-financial companies to undertake specific types of cooperation strategies, motivations driving banks' choice could be different, given the peculiarities of their activity and the specificity of the context in which they operate. Thus, we identify a research gap in exploring the motivations leading banks to choose specific forms of cooperation over others, or combinations of partnerships. A deeper understanding of these motivations would enable strategists to optimize collaboration models that align with banks' specific operational and regulatory contexts. In addition, better awareness on these aspects could support regulators in the design of policies that encourage beneficial partnerships while maintaining stability in the financial system.

Furthermore, while attempts to measure the level of bank digitalization have been made, there is a lack of studies on how banks' innovation levels, digital propensity, change culture, and capacity for change affect their strategies towards FTCs. A digitalization index to measure the level of innovation of a bank, based on text mining and/or web scraping techniques, may be useful in this regard. Exploring how these factors impact banks' strategies towards FTCs can offer significant insights for bank executives, financial analysts, and regulatory authorities. For bank leaders, a thorough understanding of these internal dynamics could shape strategic decisions on whether to engage in cooperative, competitive, or mixed approaches with FTCs, especially as they evaluate their institution's preparedness for digital transformation. Investment analysts could leverage this framework as a consistent metric to evaluate a bank's innovation and digitalization capabilities, providing a valuable indicator of the bank's potential for future growth and success in partnerships. For regulatory authorities, creating a digitalization index—utilizing tools such as text mining and web scraping—would provide an impartial method for assessing the industry's digital maturity. This, in turn, could assist in developing policies that support sustainable collaboration, ensuring that financial institutions are equipped to meet the digital demands of today's market.

Future studies could also delve into how Artificial Intelligence (AI) and Machine Learning (ML) technologies promote collaboration, enhance operational efficiency, and generate valuable customer insights. While AI and ML applications are now key to risk assessment, personalized banking, and fraud prevention, their effects on partnership structures, privacy, and regulatory compliance remain insufficiently understood. The influence of AI and ML on partnerships between banks and FinTech companies is an especially promising area for further research, given these technologies' potential to transform operational practices and decision-making frameworks. Gaining a deeper understanding of AI and ML's role in these collaborations could yield meaningful insights for industry professionals and regulators alike. For practitioners in banking and FinTech, understanding how AI and ML drive customer service improvements, risk management, and efficiency could guide strategic investments in these tools, reinforcing competitive advantages and personalizing customer interactions. For regulators and policymakers, an in-depth analysis of AI and ML's impact on privacy and compliance within these partnerships could support the development of more adaptive regulations, ensuring data security and consumer protection while fostering innovation. Such research is essential to creating balanced frameworks that encourage sustainable technological growth within the financial sector.

Moreover, as for banks being proactive towards sustainability has become a strategic action in the current competitive scenario and the interaction with FinTech is far from being fully explored, future research could investigate whether banks employ strategic collaborations with "green FTCs", and the underlying rationales. Only recently, some reviews have explored the integration of FinTech

and sustainability through the lens of the banking activity (Rahman et al., 2024; Garg and Kumar, 2024), providing insights to understand the role of FinTech in promoting sustainable banking practices. Nonetheless, research on the relationships between ESG and FinTech issues is still in its infancy (Trotta et al., 2024) and the integration of digital technologies with sustainability initiatives in the banking sector needs a considerably greater exploration. Investigating whether banks strategically collaborate with "green FTCs" to enhance sustainability initiatives would offer valuable insights for both bank executives and sustainability-focused investors. As sustainability increasingly shapes competitive positioning, understanding the motivations for such alliances could guide banks in leveraging FinTech partnerships to meet environmental goals and appeal to socially responsible investors. Additionally, insights into

Table 4
Future research directions (summary).

	Research Streams	Future Research Questions	Relevance
1	Motivations	What are the motivations leading banks to choose specific forms of cooperation over others, or combinations of partnerships?	For banks' strategists: enabling the optimization of collaboration models that align with banks' specific operational and regulatory contexts. For regulators: supporting the design of policies that encourage beneficial partnerships while maintaining financial stability.
2	Measure of digitalisation	Do banks' innovation levels, digital propensity, change culture, and capacity for change affect their strategies towards FTCs? If so, how?	Suggestion: measuring the level of innovation of a bank through a digitalization index, based on text mining and/or web scraping techniques. Bank leaders: shaping strategic decisions on whether to engage in cooperative, competitive, or mixed approaches with FTCs, especially as they evaluate their institution's preparedness for digital transformation. Investment analysts: enabling to evaluate a bank's innovation and digitalization capabilities, providing a valuable indicator of the bank's potential for future growth and success in partnerships. Regulatory authorities: providing an impartial method for assessing the industry's digital maturity; developing policies that support sustainable collaboration, ensuring that financial institutions are equipped to meet the digital demands of today's market.
3	Artificial intelligence (AI) and (ML)	How do AI and ML technologies promote collaboration, enhance operational efficiency, and generate valuable customer insights?	Bank and FinTech practitioners FinTech: guiding strategic investments in these tools, reinforcing competitive advantages and personalizing customer interactions. Regulators and policymakers: supporting the development of more adaptive regulations, ensuring data security and consumer protection while fostering innovation.
4	Sustainability and Green FTCs	Do banks employ strategic collaborations with "green FTCs"? If so, what are the underlying rationales?	Bank executives: guide to leverage FinTech partnerships to meet environmental goals and appeal to socially responsible investors. Sustainability-focused investors: identifying banks that are genuinely committed to environmental impact, providing a clearer basis for investment decisions aligned with ESG criteria.
5	Board specific characteristics	Is there a link between ownership structures and the propensity to engage in collaborations with FTCs? If so, how do ownership structures influence the decisions of partaking in partnerships with FTCs?	Corporate governance specialists: assessing how ownership variations drive collaboration strategies, while giving institutional investors clearer insights into how ownership patterns align with innovation and growth objectives, ultimately aiding in more strategic investment choices.
6	Effects of regulations and country specific factors	What are the effects of regulations (e.g., PSD2) and country-specific factors (e.g., households' and firms' financial literacy, households' and firms' digital education, economic growth, innovation rank, availability of a skilled workforce) on Bank-FinTech relationship and on banks' decisions to invest in FTCs?	Policymakers: tailoring regulatory frameworks more effectively, fostering productive collaborations while considering local economic conditions. Financial institutions: supporting more informed, context-sensitive strategies that align with national characteristics.
7	Effects on talent acquisitions, training programs, composition of boards, and on boards' view of changes	Do banks' investments in FTCs lead to talent acquisition (e.g., technology specialists, digital technology managers) and/or training programs within banks? Do they lead to potential changes in the composition of the board of directors, and on how the boards oversee the progress of digital transformation?	Banks: optimizing workforce and governance structures for digital transformation.

Source: authors' elaboration

these collaborations could help sustainability-focused investors identify banks that are genuinely committed to environmental impact, providing a clearer basis for investment decisions aligned with ESG criteria.

Also, while board-specific characteristics were explored, the relationship between banks' ownership structures and the propensity to engage in collaborations with FTCs could be worth studying, since ownership structure can significantly impact strategic decisions and risk tolerance and may lead to distinct priorities and approaches to innovation and collaboration. Exploring how banks' ownership structures influence their propensity to collaborate with FinTech companies would be highly valuable for corporate governance experts and institutional investors. Ownership structure often shapes strategic priorities, risk tolerance, and innovation approaches, which in turn affect decisions around partnerships. Understanding these dynamics would help corporate governance specialists assess how ownership variations drive collaboration strategies, while giving institutional investors clearer insights into how ownership patterns align with innovation and growth objectives, ultimately aiding in more strategic investment choices.

In addition, future research could focus on the effects of regulations (e.g., PSD2) and country-specific factors (e.g., households' and firms' financial literacy, households' and firms' digital education, economic growth, innovation rank, availability of a skilled workforce) on Bank-FinTech relationship and on banks' decisions to invest in FTCs. Studying these gaps is especially beneficial for policymakers and financial institutions. Such research would enable policymakers to tailor regulatory frameworks more effectively, fostering productive collaborations while considering national economic conditions. While, for financial institutions, understanding how these factors impact investment choices would support more informed, context-sensitive strategies that align with national characteristics.

Lastly, regarding the effects of banks' investments in FTCs, future research could investigate whether these deals lead to talent acquisition (e.g., technology specialists, digital technology managers) and/or training programs within banks, potential changes in the composition of the board of directors, and how the boards oversee the progress of digital transformation. This line of research could provide critical insights for human resources and boards in the financial sector. Understanding whether and to what extent such investments attract tech specialists, lead to training initiatives, or influence board composition and oversight practices would help banks optimise their workforce and governance structures for digital transformation.

Table 4 offers a summary of the future directions here suggested and the implications of such potential research.

5. Conclusions

The Bank-FTCs relationship shows prominent and increasing importance, reflected by both the rising number of collaborations between the two market players and the rising interest of the scientific community.

To explore this relationship, we employed a hybrid literature review that combines systematic and bibliometric approaches to provide a thorough overview of research on Bank-FinTech interaction. Our investigation was aimed at understanding whether banks and FTCs compete or cooperate (RQ1), while identifying the motivations behind the chosen interaction strategies (RQ2), the interplay types (RQ3), the bank-specific factors underlying these strategies (RQ4), and the effects of such interactions on banks (RQ5).

Within a final sample of 68 articles, our elaboration showed a growth rate of 45.42 % in the scientific production concerning Bank-FTCs relationship, particularly intensified in the last years.

We also found that 37 articles employed quantitative approaches, while 31 were based on qualitative methods. This indicates a balanced distribution of methodologies between the two approaches. Research is developed on a variety of countries, but most studies were conducted on USA, Chinese, European (Germany and Italy, especially), and global data.

First, our analysis allows us to answer to our RQ1, finding that although the complexity of the relationship between banks and FTCs, the literature agrees that their interaction has evolved cooperatively rather than competitively. Recognizing each other as valuable partners, banks and FTCs can exploit complementarity between their resources, skills and features, realizing profitable synergies and achieving shared business goals.

Second, our sifting of the studies included in our sample brings to light the answers to our further research questions, pertaining to the motivations underlying Bank-FinTech cooperation (RQ2), the cooperation types (RQ3), the bank-specific factors influencing banks' decisions to cooperate (RQ4), and the effects of these collaborations on banks (RQ5).

Our findings show that Bank-FinTech cooperation is based either on bank-specific, or FinTech-specific, or general motivations (RQ2). From banks' point of view, cooperating with FTCs results in gaining access to external innovations and business models, securing top talent with new skills, obtaining strategic advantages, and speeding up project implementation times. FTCs, in turn, aim at enhancing reputation and credibility, obtaining necessary support to enter the market, and fostering synergies. General motivations include achieving financial returns, acquiring new knowledge, increasing competitiveness in the market.

Regarding the cooperation types (RQ3), strategic partnerships, equity investments and M&As (with banks being the acquirers and FTCs being the targets) emerge as the predominant ways of interaction, while other types such as joint ventures, incubators, and accelerators were less studied and less common.

The bank-specific factors influencing banks' choice of the cooperation type (RQ4) include the implementation of a digital strategy, the presence of a CDO, the board of directors' features (i.e. board size, qualifications, seniority, gender diversity, social network ties, bank size, capitalization, ROA, liquid assets, NPL volumes, specialization on specific industries and/or business segments, and cost efficiency.

Finally, regarding the effects of collaborations on banks (RQ5), strategic collaboration with FTCs appears to positively influence banks' efficiency in terms of interest revenue, expenses, and technical efficiency, while also impacting performance indicators such as profitability, competitiveness, share prices and stock returns (with mixed results), operating performance, liquidity, and financial leverage.

While our study embraces a micro-level approach, the dynamics in the relationship between banks and FTCs have been undoubtedly shaped by context-specific factors. Among them, the Covid-19 pandemic had a significant impact on how traditional banks responded to the rise of FCTs. Several factors influenced this response, which hastened trends already underway forcing banks to adapt in new ways. banks were already investing in digital transformation, but the pandemic accelerated these efforts. With lockdowns and social distancing measures in place, physical branches saw a sharp decline in operation, prompting banks to further invest in digital services like mobile banking, digital wallets, and online customer support. Banks realized that to meet changing customer expectations and stay competitive, they needed to speed up the adoption of fintech solutions, such as AI-driven services, blockchain for secure transactions, and digital lending platforms. The economic impact of the pandemic on consumers and businesses has also pushed them towards fintech platforms for payments, loans, and investments, which may have forced traditional banks to partner with FTCs to avoid losing customers. In response to the Covid-19 pandemic, traditional banks had to accelerate their digital transformation, shift toward more customer-centric digital services, and explore partnerships with FTCs to align themselves more closely with customers' expectations. The pandemic highlighted the importance of agility, technology adoption, and innovation, pushing banks to adapt quickly to meet the growing demand for digital financial services. This led to a more collaborative, rather than purely competitive, relationship between traditional banks and FTCs, ultimately reshaping the financial landscape.

Overall, our study offers insights to scholars to deepen the understanding of the dynamics in Bank-FTCs relationships and suggests pathways for future researchers to advance knowledge on the field. Second, our analysis provides elements to market players to make more informed decisions regarding partnerships, investments, and strategic shifts, which are key to staying relevant in the rapidly evolving financial landscape. Finally, understanding the interplay between banks and FCTs is crucial for regulators to develop appropriate rules to ensure the financial system's stability and soundness, as well as for policymakers to create policies that foster innovation while addressing potential risks.

CRediT authorship contribution statement

Francesca Querci: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Rosalia Santulli:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Davide Costa:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A1

A1.1 Prior literature reviews

The relationship between banks and FTCs is a dynamic and evolving area of study. Previous literature reviews highlighted both the challenges and opportunities presented by FinTech innovations in the banking sector.

Specifically, Thakor (2020) examined the intersection of FinTech and banking, offering insights into the effects of technological innovations on financial services. The author analyzed the implications of FinTech on traditional banks, providing a comprehensive review of existing literature and empirical evidence on the topic. The paper points to the fact that while FinTech poses challenges to traditional banking models, it also provides numerous opportunities for growth, efficiency, and service innovation. According to the author, the future of banking will likely involve a hybrid system where banks and FCTs coexist and collaborate, while regulatory frameworks evolve to address emerging risks.

Elsaid (2021) reviewed the existing literature on the impact of FTCs on the banking industry, with a focus on identifying trends, challenges, and opportunities for future research. The paper discusses the various ways in which FinTech is transforming the banking sector and explores key themes from the literature surrounding this topic. According to his analysis it seems unlikely that FTCs would replace traditional banks soon for two main reasons. First, commercial banks have decades of trust built through client relationships. Second, banks could cooperate with FTCs to benefit from the development of new customer segments, products and services, expand into new markets, develop new capabilities and access new technologies. In turn, FTCs could benefit from banks' financial resources, infrastructures, access to customers and security reputation. Thus, both banks and FTCs may benefit by partnering rather than competing in the market.

Patel et al. (2022) performed a meta-bibliometric analysis focused of the academic literature on the use of blockchain technology in the banking and finance sectors. The authors underlined the potential of blockchain technology for revolutionizing banking and

finance, while highlighting that blockchain adoption in those fields is still in its early stages, with many banks competing to create their own blockchain systems. However, there are strong technological, organizational, educational, and environmental barriers that may hinder blockchain diffusion in banking and finance.

Murinde et al. (2022) explored how the FinTech revolution is reshaping the banking industry, focusing on the opportunities it presents and the risks that arise from its rapid growth, providing a balanced view of both the transformative potential and the challenges that come with the FinTech revolution in the banking sector. The authors argue that while FinTech holds immense potential to revolutionize banking by improving efficiency, inclusivity, and customer experience, it also brings significant risks that need to be addressed through thoughtful regulation, security measures, and risk management practices. The future of banking will likely involve a hybrid system, where traditional banks and FTCs collaborate and compete to provide consumers with better services.

More recently, Pandey et al. (2024) aimed to map the trends, major themes, influential papers, and future research directions in the field of FinTech within the context of financial services, through a bibliometric review of the existing academic literature in the field. The authors emphasized that FinTech has significantly disrupted the traditional banking and financial services industries, driving efficiency, innovation, and greater access to financial products. However, to fully capitalize on FinTech's potential, there is a need for continued research, particularly in areas related to regulation, cybersecurity, and integration with the traditional banking system.

All these literature reviews emphasize the significant role that FinTech plays in driving technological innovation in the banking sector. Key innovations such as mobile payments, blockchain, and digital banking services are seen as crucial to improving efficiency and accessibility in financial services. A recurring theme across these papers is the disruption caused by FTCs to traditional banking institutions. FCTs are often more agile and able to offer cost-effective and customer-friendly solutions, which puts pressure on traditional banks to adapt. However, these studies also highlight that banks may respond by embracing FinTech partnerships and digital transformations rather than resisting them.

Appendix A2

Table A2.1
Competition or Cooperation?

Year	Authors	Title	Source	Doi
2016	Hung Jl; Luo B	FinTech in Taiwan: a case study of a bank's strategic planning for an investment in a FinTech company	Financial Innovation	10.1186/s40854–016–0037–6
2017	Li Y; Spigt R; Swinkels L	The impact of FinTech start-ups on incumbent retail banks' share prices	Financial Innovation	10.1186/s40854–017–0076–7
2018	Ashta A; Biot-Paquerot G	FinTech evolution: strategic value management issues in a fast-changing industry	Strategic Change-Briefings in Entrepreneurial Finance	10.1002/jsc.2203
2018	Singapurwoko A	Analyzing the impact of financial technology startup's emergence (peer-to-peer lending) on incumbent firm's performance in Indonesia	Vision 2020: Sustainable Economic Development and Application of Innovation Management	
2019	Ramesh L	FinTech: a new avenue of banks to enhance customer digital experience (dx)	International Journal of Innovative Technology and Exploring Engineering	
2019	Stulz Rm	FinTech, BigTech, and the future of banks	Journal of Applied Corporate Finance	10.1111/jacf.12378
2019	Tanda A; Schena C	Bank strategies in the light of the digitalisation of financial activities	Fintech, Higtech and Banks: Digitalisation and its Impact on Banking Business Models	10.1007/978–3–030–22426–4 _4
2019	Tanda A; Schena Cm	An attempt at synthesis: financial market digitalisation scenarios, opportunities and challenges	fintech, bigtech And Banks: Digitalisation And Its Impact On Banking Business Models	10.1007/978–3–030–22426–4 _6
2019	Vives X	Competition and stability in modern banking: a post-crisis perspective	International Journal o Industrial Organization	10.1016/j. ijindorg.2018.08.011
2019	Vives X	Digital disruption in banking	Annual Review of Financial Economics	10.1146/annurev-financial−100719–120854
2020	Brandl B; Hornuf L	Where did FinTechs come from, and where do they go? The transformation of the financial industry in Germany after digitalization	Frontiers in Artificial Intelligence	10.3389/frai.2020.00008
2020	Valverde Sc; Fernández Fr	Financial digitalization: Banks, FinTech, BigTech, and consumers	Journal of Financial Management, Markets and Institutions	10.1142/s2282717x20400010
2021	Harasim J	FinTechs, BigTechs and banks-when cooperation and when competition?	Journal of Risk and Financial Management	10.3390/jrfm14120614
2021	Pu R; Teresiene D; Pieczulis I; Kong Xg	The interaction between banking sector and financial technology companies: qualitative assessment-a case of Lithuania	Risks	10.3390/risks9010021

(*continued on next page*)

Table A2.1 (*continued*)

Year	Authors	Title	Source	Doi
2022	Faes A; Gunnella V; Giorgino M	Collaborate or perish: a conceptual framework for banks and FinTechs partnerships	Proceedings of the European Conference on Innovation and Entrepreneurship	10.34190/ecie.17.1.593
2023	Larsson B; Rolandsson B; Ilsoe A; Larsen Tp; Lehr A; Masso J	Digital disruption diversified-FinTechs and the emergence of a coopetitive market ecosystem	Socio-Economic Review	10.1093/ser/mwad046
2024	Litimi H; Bensaida A; Raheem Mm	Impact of FinTech growth on bank performance in GCC region	Journal of Emerging Market Finance	10.1177/09726527231218423
2023	Nabiyev Ab; Ovenc G	The symbiotic relationship and collaboration between commercial banks and FinTechs in Turkey	Humanities & Social Sciences Communications	10.1057/s41599–023–02429–9
2023	Veronese Df; Bertran Mp	FinTechs and traditional banks: regulation, competition, and cooperation in Brazil	Revista Direito Gv	10.1590/2317–6172202317
2024	Andrikopoulos A; Dassiou X	Bank market power and performance of financial technology firms	International Journal of Finance & Economics	10.1002/ijfe.2727
2024	Le T; Ngo T; Nguyen Dt; Do Ttm	FinTech and banking: friends or foes? Evidence from bank–FinTech cooperation	International Journal of Bank Marketing	10.1108/ijbm−09–2023–0525
2024	Kalai L; Toukabri M	Risks, Regulations, And Impacts Of Fintech Adoption On Commercial Banks In The United States And Canada: A Comparative Analysis	Thunderbird International Business Review	10.1002/tie.22404
2024	Langi Cr; Raharjo S; Mahardika Sg; Pramono At; Yudaruddin R; Yudaruddin Ya	Fintech P2p Lending And Bank Loan In Time Of Covid−19	Risk Governance And Control: Financial Markets And Institutions	10.22495/rgcv14i1p8
2024	Karaki Ba; Al-Kasasbeh O	Analyzing The Banking Sector-Fintech Companies Nexus In Jordan	Wseas Transactions On Business And Economics	10.37394/23207.2024.21.25

Source: Authors' compilation.

Table A2.2
Motivations

Year	Authors	Title	Source	Doi
2016	Hung Jl; Luo B	FinTech in Taiwan: a case study of a bank's strategic planning for an investment in a FinTech company	Financial Innovation	10.1186/s40854–016–0037–6
2018	Bömer M; Maxin H	Why FinTechs cooperate with banks—evidence from Germany	Zeitschrift fur die Gesamte Versicherungswissenschaft	10.1007/s12297–018–0421–6
2018	Drasch Bj; Schweizer A; Urbach N	Integrating the `troublemakers': a taxonomy for cooperation between banks and FinTechs	Journal of Economics and Business	10.1016/j.jeconbus.2018.04.002
2018	Holotiuk F; Klus Mf; Lohwasser Ts; Moormann J	Motives to form alliances for digital innovation: the case of banks and FinTechs	31st Bled Econference: Digital Transformation: Meeting the Challenges, Bled 2018	10.18690/978–961–286–170–4.20
2019	Dranev Y; Frolova K; Ochirova E	The impact of FinTech m\&a on stock returns	Research in International Business and Finance	10.1016/j.ribaf.2019.01.012
2020	Fenwick M; Vermeulen Epm	Banking and regulatory responses to FinTech revisited— building the sustainable financial service 'ecosystems' of tomorrow	Singapore Journal of Legal Studies	
2020	Fonseca C; Meneses R	Motivations for coopetition strategies between banks and FinTechs	Proceedings of the International Conference on Business Excellence	10.2478/picbe−2020–0027
2022	Bartolacci F; Cardoni A; Lasak W	An analytical framework for strategic alliance formation between a cooperative bank and a FinTech start-up: an Italian case study	Journal of Entrepreneurship Management and Innovation	10.7341/20221844
2022	Faes A; Gunnella V; Giorgino M	Collaborate or perish: a conceptual framework for banks and FinTechs partnerships	Proceedings of the European Conference on Innovation and Entrepreneurship	10.34190/ecie.17.1.593
2023	Kang D; Sohn Sy	Ctm and qfd analysis: framework for FinTech adoption priority in commercial banks	Plos One	10.1371/journal.pone.0287826
2023	Ruhland P; Wiese F	FinTechs and the financial industry: partnerships for success	Journal of Business Strategy	10.1108/jbs−12–2021–0196
2024	Panday L; Nyawo Jc; Vilakazi Mbf	Financial Technology In A South African Banking Institution To Achieve Strategic Sustainability	South African Journal Of Business Management	10.4102/sajbm.v55i1.4587

Source: Authors' compilation.

Table A2.3
Cooperation types

Year	Authors	Title	Source	Doi
2018	Drasch Bj; Schweizer A; Urbach N	Integrating the `troublemakers': a taxonomy for cooperation between banks and FinTechs	Journal of Economics and Business	10.1016/j.jeconbus.2018.04.002
2019	Tanda A; Schena Cm	Bank strategies in the light of the digitalisation of financial activities	Fintech, Bigtech and Banks: Digitalisation and its Impact on Banking Business Models	10.1007/978–3–030–22426–4_4
2019	Vives X	Digital disruption in banking	Annual Review of Financial Economics	10.1146/annurev-financial−100719–120854
2020	Fenwick M; Vermeulen Epm	Banking and regulatory responses to FinTech revisited— building the sustainable financial service 'ecosystems' of tomorrow	Singapore Journal of Legal Studies	
2021	Hornuf L; Klus Mf; Lohwasser A	How do banks interact with FinTech startups?	Small Business Economics	10.1007/s11187–020–00359–3
2022	Bellardini L; Del Gaudio Bl; Previtali D; Verdoliva V	How do banks invest in FinTechs? Evidence from advanced economies	Journal of International Financial Markets Institutions & Money	10.1016/j.intfin.2021.101498
2022	Faes A; Gunnella V; Giorgino M	Collaborate or perish: a conceptual framework for banks and FinTechs partnerships	Proceedings of the European Conference on Innovation And Entrepreneurship	10.34190/ecie.17.1.593
2022	Riikkinen M; Pihlajamaa M	Achieving a strategic fit in FinTech collaboration - a case study of Nordea Bank	Journal of Business Research	10.1016/j.jbusres.2022.05.049
2023	Kang D; Sohn Sy	Ctm and qfd analysis: framework for FinTech adoption priority in commercial banks	Plos One	10.1371/journal.pone.0287826
2023	Nabiyev Ab; Ovenc G	The symbiotic relationship and collaboration between commercial banks and FinTechs in Turkey	Humanities & Social Sciences Communications	10.1057/s41599–023–02429–9
2023	Stefanelli V; Manta F	Digital financial services and open banking innovation: are banks becoming `invisible'?	Global Business Review	10.1177/09721509231151491
2024	Turki A; Nahidi N	Do European Fintech Benefit From Bank-Affiliated Vcs?	International Review Of Economics And Finance	10.1016/j.iref.2024.03.061
2024	Reghezza A; Vasilakis C	Why Do Banks Acquire Fintech? The Role Of Board Cultural Diversity	British Accounting Review	10.1016/j.bar.2024.101424

Source: Authors' compilation.

Table A2.4
Bank-specific drivers

Year	Authors	Title	Source	Doi
2019	Tanda A; Schena Cm	Bank strategies in the light of the digitalisation of financial activities	Fintech, Bigtech and Banks: Digitalisation and its Impact on Banking Business Models	10.1007/978–3–030–22426–4_4
2019	Tanda A; Schena Cm	An attempt at synthesis: financial market digitalisation scenarios, opportunities and challenges	Fintech, Bigtech and Banks: Digitalisation and its Impact on Banking Business Models	10.1007/978–3–030–22426–4_6
2021	Harasim J	FinTechs, BigTechs and banks-when cooperation and when competition?	Journal of Risk and Financial Management	10.3390/jrfm14120614
2021	Hornuf L; Klus Mf; Lohwasser A	How do banks interact with FinTech startups?	Small Business Economics	10.1007/s11187–020–00359–3
2022	Bartolacci F; Cardoni A; Lasak W	An analytical framework for strategic alliance formation between a cooperative bank and a FinTech start-up: an Italian case study	Journal of Entrepreneurship Management and Innovation	10.7341/20221844
2023	Li E; Mao Mq; Zhang Hf; Zheng H	Banks' investments in FinTech ventures	Journal of Banking & Finance	10.1016/j.jbankfin.2022.106754
2023	Nabiyev Ab; Ovenc G	The symbiotic relationship and collaboration between commercial banks and FinTechs in Turkey	Humanities & Social Sciences Communications	10.1057/s41599–023–02429–9
2024	Collevecchio F; Cappa F; Peruffo R	When do m\&as with FinTech firms benefit traditional banks?	British Journal of Management	10.1111/1467–8551.12701
2024	Del Gaudio Bl; Gallo S; Previtali D	Exploring the drivers of investment in FinTech: board composition and home bias in banking	Global Finance Journal	10.1016/j.gfj.2024.100944
2024	Kwon Ky; Molyneux P; Pancotto L; Reghezza A	Banks and FinTech acquisitions	Journal of Financial Services Research	10.1007/s10693–022–00396-x
2024	Reghezza A; Vasilakis C	Why Do Banks Acquire Fintech? The Role Of Board Cultural Diversity	British Accounting Review	10.1016/j.bar.2024.101424

Source: Authors' compilation.

Table A2.5
Effects of cooperation on banks

Year	Authors	Title	Source	Doi
2017	Li Y; Spigt R; Swinkels L	The impact of FinTech start-ups on incumbent retail banks' share prices	Financial Innovation	10.1186/s40854–017–0076–7
2018	Singapurwoko A	Analyzing the impact of financial technology startup's emergence (peer-to-peer lending) on incumbent firm's performance in Indonesia	Vision 2020: Sustainable Economic Development and Application of Innovation Management	
2019	Dranev Y; Frolova K; Ochirova E	The impact of FinTech M&A on stock returns	Research in International Business and Finance	10.1016/j.ribaf.2019.01.012
2019	Vives X	Digital disruption in banking	Annual Review of Financial Economics	10.1146/annurev-financial−100719–120854
2021	Hoang Yh; Nguyen Dtt; Tran Lht; Nguyen Nth; Vu Nb	Customers' adoption of financial services offered by banks and FinTechs partnerships: evidence of a transitional economy	Data Science in Finance and Economics	10.3934/dsfe.2021005
2021	Takeda F; Takeda K; Takemura T; Ueda R	The impact of information technology investment announcements on the market value of the Japanese regional banks	Finance Research Letters	10.1016/j.frl.2020.101811
2021	Vovk V; Denysova A; Rudoi K; Kyrychenko T	Management and legal aspects of the symbiosis of banking institutions and FinTech companies in the credit services market in the context of digitization	Estudios de Economia Aplicada	10.25115/eea.v39i7.5013
2022	Akhtar Q; Nosheen S	The impact of FinTech and banks m \&a on acquirer's performance: a strategic win or loss?	Borsa Istanbul Review	10.1016/j.bir.2022.08.007
2022	Bertin C; Schaeffer V	Local ecosystem open innovation intermediaries as key enablers for the development of incumbents' digital technology partnerships	2022 Ieee 28th International Conference on Engineering, Technology and Innovation (ICE/ITMC) & 31st International Association for Management of Technology, Iamot Joint Conference	10.1109/ice/itmc-iamot55089.2022.10033193
2022	Cao T; Cook Wd; Kristal Mm	Has the technological investment been worth it? Assessing the aggregate efficiency of non-homogeneous bank holding companies in the digital age	Technological Forecasting and Social Change	10.1016/j.techfore.2022.121576
2022	Cappa F; Collevecchio F; Oriani E	Banks responding to the digital surge through open innovation: stock market performance effects of M&As with FinTech firms	Journal of Economics and Business	10.1016/j.jeconbus.2022.106079
2022	Carlini F; Del Gaudio Bl; Porzio D	Banks, FinTech and stock returns	Finance Research Letters	10.1016/j.frl.2021.102252
2022	Faes A; Gunnella V; Giorgino M	Collaborate or perish: a conceptual framework for banks and FinTechs partnerships	Proceedings of the European Conference on Innovation and Entrepreneurship	10.34190/ecie.17.1.593
2022	Fang Y; Ye L; Wen Gf; Wang R	Do commercial banks benefit from Bank-FinTech strategic collaboration? Evidence from Chinese city banks	International Journal of E-Collaboration	10.4018/ijec.305235
2022	Horvath D; Kerenyi A; Szabo Rz	Intended benefits and challenges of cooperation between FinTechs and commercial banks	Acta Oeconomica	10.1556/032.2022.00023
2022	Zhang A; Wang S; Liu B; Liu P	How FinTech impacts pre- and post-loan risk in Chinese commercial banks	International Journal of Finance & Economics	10.1002/ijfe.2284
2023	Arena C; Catuogno S; Naciti V	Governing FinTech for performance: the monitoring role of female independent directors	European Journal of Innovation Management	10.1108/ejim−11–2022–0621
2023	Huang Rh; Wang Cm	FinTech-bank partnership in china's credit market: models, risks and regulatory responses	European Business Organization Law Review	10.1007/s40804–023–00269–3
2023	Li E; Mao Mq; Zhang Hf; Zheng H	Banks' investments in FinTech ventures	Journal of Banking & Finance	10.1016/j.jbankfin.2022.106754
2024	Litimi H; Bensaida A; Raheem Mm	Impact of FinTech growth on bank performance in GCC region	Journal of Emerging Market Finance	10.1177/09726527231218423
2023	Stefanelli V; Manta F	Digital financial services and open banking innovation: are banks becoming `invisible'?	Global Business Review	10.1177/09721509231151491

(*continued on next page*)

Table A2.5 (*continued*)

Year	Authors	Title	Source	Doi
2023	Veronese Df; Bertran Mp	FinTechs and traditional banks: regulation, competition, and cooperation in Brazil	Revista Direito Gv	10.1590/2317–6172202317
2023	Yudaruddin R	Bank lending during the covid−19 pandemic: do alliances and digital strategies matter?	Managerial Finance	10.1108/mf−04–2022–0167
2023	Yudaruddin R	Financial technology and performance in Islamic and conventional banks	Journal of Islamic Accounting and Business Research	10.1108/jiabr−03–2022–0070
2024	Andrikopoulos A; Dassiou X	Bank market power and performance of financial technology firms	International Journal of Finance & Economics	10.1002/ijfe.2727
2024	Collevecchio F; Cappa F; Peruffo R	When do m\&as with FinTech firms benefit traditional banks?	British Journal of Management	10.1111/1467–8551.12701
2024	Cosma S; Pennetta D	Enhancing online visibility through strategic alliances: the case of Bank-FinTech relationships	International Journal of Bank Marketing	10.1108/ijbm−02–2023–0071
2024	Elliehausen G; Hannon Sm	FinTech and banks: strategic partnerships that circumvent state usury laws	Finance Research Letters	10.1016/j.frl.2024.105387
2024	Galeone G; Ranaldo S; Fusco A	Esg and FinTech: are they connected?	Research in International Business and Finance	10.1016/j.ribaf.2024.102225
2024	Le T; Ngo T; Nguyen Dt; Do Ttm	FinTech and banking: friends or foes? Evidence from bank–FinTech cooperation	International Journal of Bank Marketing	10.1108/ijbm−09–2023–0525
2024	Zheng H; Mao Mq	FinTech mergers and acquisitions	Journal of International Money and Finance	10.1016/j.jimonfin.2024.103076
2024	Emuron A; Van Der Nest Dp; Coffie Cpk	Fintech And Financial Development: The Role Of Traditional Financial Institutions	African Journal Of Economic And Management Studies	10.1108/AJEMS−10–2023–0406
2024	Kalai L; Toukabri M	Risks, Regulations, And Impacts Of Fintech Adoption On Commercial Banks In The United States And Canada: A Comparative Analysis	Thunderbird International Business Review	10.1002/tie.22404
2024	Langi Cr; Raharjo S; Mahardika Sg; Pramono At; Yudaruddin R; Yudaruddin Ya	Fintech P2p Lending And Bank Loan In Time Of Covid−19	Risk Governance And Control: Financial Markets And Institutions	10.22495/rgcv14i1p8
2024	Panday L; Nyawo Jc; Vilakazi Mbf	Financial Technology In A South African Banking Institution To Achieve Strategic Sustainability	South African Journal Of Business Management	10.4102/sajbm.v55i1.4587
2024	Turki A; Nahidi N	Do European Fintech Benefit From Bank-Affiliated Vcs?	International Review Of Economics And Finance	10.1016/j.iref.2024.03.061

Source: Authors' elaboration.

Data availability

No data was used for the research described in the article.

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