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Research on financial innovations: an interdisciplinary review

Mohammad G. Nejad
Gabelli School of Business, Fordham University, New York, New York, USA

Abstract

Purpose – The financial industry offers a unique setting to study innovations. Financial innovations have fueled the growth of economies, markets and societies. The financial industry has successfully become the breeding ground for innovative services, processes, business models and technologies. This study seeks to provide a holistic view of the literature on financial innovations, synthesize the research findings and offer future directions for research in light of three market developments that are disrupting the industry and opening up a new era for the financial services industry. Disruptions from within and outside the industry offer new generations of radically innovative services. Moreover, new generations of consumers differ from previous generations in their needs and wants and look for innovative ways to handle their financial needs. Finally, significant developments related to financial innovations have emerged in Asia and developing countries.

Design/methodology/approach – This study systematically reviews the academic research literature on financial innovations in two phases. The first phase provides a quantitative review of 546 journal articles published between 1990 and 2018. In the second phase, the study synthesizes the extant research on financial innovations and maps them in five research areas: firms' introduction and adoption of FIs, financial innovation development, the outcomes of financial innovations, regulations and intellectual property, and consumers.

Findings – The analysis found that disciplines differ with regard to the employed research methodologies, the units of analysis, sources of data and the innovations they examined. A positive trend in the number of published articles during this period is observed. However, studies have primarily focused on the USA and Europe and less so on other parts of the world. The literature synthesis further identifies research gaps in the available research that highlight future research opportunities in light of the three market disruptions. The financial services industry is on the brink of a new era due to disruptions from within and outside the industry and the entrance of new generations of consumers. Moreover, the financial industry has successfully become the breeding ground for innovative services, processes and business models. Therefore, financial innovations offer promising opportunities for bridging the gap between research on product and service innovations.

Research limitations/implications – The work provides a holistic and systematic overview of extant research on financial innovations and highlights future research opportunities in light of the three disruptive market developments. It helps researchers take advantage of the opportunities in studying financial innovations while maintaining industry relevance.

Originality/value – The study is the first to review and synthesize the academic research literature on financial innovations across marketing, finance and innovation disciplines. In addition, the study highlights three primary disruptive forces in the financial industry and identifies future research directions in light of these disruptive forces.

Keywords Financial innovations, New financial services, New financial products, Market disruptions, Fintech, Literature review

Paper type Research paper

Introduction

Financial innovations (hereafter referred to as FIs) have played an important role in the business world and consumers' daily lives by revolutionizing how we handle financial transactions. Examples are Internet and mobile banking (hereafter referred to as IB and MB), platforms and mobile apps, such as PayPal and Chime, online payment systems, virtual currencies, robo-advisors and peer-to-peer lending. FIs have broadened investment choices

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through electronic-trading platforms, derivatives, hedge funds and exchange-traded funds, and securitization of new instruments for risk management. The COVID-19 pandemic has acted as a catalyst for expanding FIs, which is the "real financial transformation story of the COVID-19 era" (Browne, 2021).

Three market developments are disrupting the financial industry and the environments in which previous studies explored FIs. Many FIs are introduced by firms outside the traditional boundaries of the financial industry, such as technology companies and fintech startups. Moreover, the preferences of Millennials and Generation Z consumers for financial services differ from previous generations. Finally, FIs are no longer limited to a particular geographical area, as the financial industry and markets outside the USA and Europe are growing substantially.

Previous literature reviews are either outdated (Miller, 1986; Tufano, 2003), have a limited scope (Nejad, 2016) or have focused on IB and MB (Tam and Oliveira, 2017; Waite and Harrison, 2015). The paper highlights three market disruptions that are revolutionizing the financial industry and reviews the extant research on FIs in two phases.

The first phase comprises a quantitative review of 546 journal articles published between 1990 and 2018. The analysis revealed key differences across the disciplines concerning research methodologies, unit of analysis, nature of FIs and the research teams' composition and size. In the second phase, the study synthesizes the extant research on FIs in light of the market disruptions. This synthesis further identifies research gaps that highlight opportunities for future research.

In the next section, we will identify three critical disruptions underway in the financial industry. A definition of FIs is then offered, followed by a description of the methodology and the results of the analysis. The paper then synthesizes the extant research, which offers directions for future research. The paper concludes with a discussion of the key findings and recommendations for future research in light of the three market disruptions.

Financial innovations: three key market disruptions

The financial industry is an evolving industry that provides the infrastructure for exchange activities. Modern financial systems provide the foundation for innovative firms in every industry to handle their financial needs. FIs often comprise new technologies, services, business models and processes, thus offering a unique setting to study innovations and interdisciplinary research. Three fundamental developments are disrupting the financial industry and challenging the assumptions and the environments studied by previous researchers on FI. As outlined below, these developments include the emergence of a new era of competition, the rise of new generations of consumers and geographical market changes (See Figure 1).

A new era of competition

Until recently, FIs were introduced primarily by traditional financial institutions. These institutions incorporated technological advances into their existing services to offer their customers new or improved financial services. The deregulations in the 1980s and the Bank Modernization Act of 1999 in the USA allowed financial institutions to offer products in other lines of business outside of their traditional product portfolio. For example, commercial banks were allowed to underwrite insurances, and insurance companies could provide deposit and credit products (Nejad and Estelami, 2012). Nonetheless, financial institutions competed within the industry; thus, the extant research has primarily explored FIs within the traditional boundaries of the financial industry.

However, the financial industry is entering a new era in which nontraditional firms from within and outside the industry, such as technology companies and startup fintech firms, are

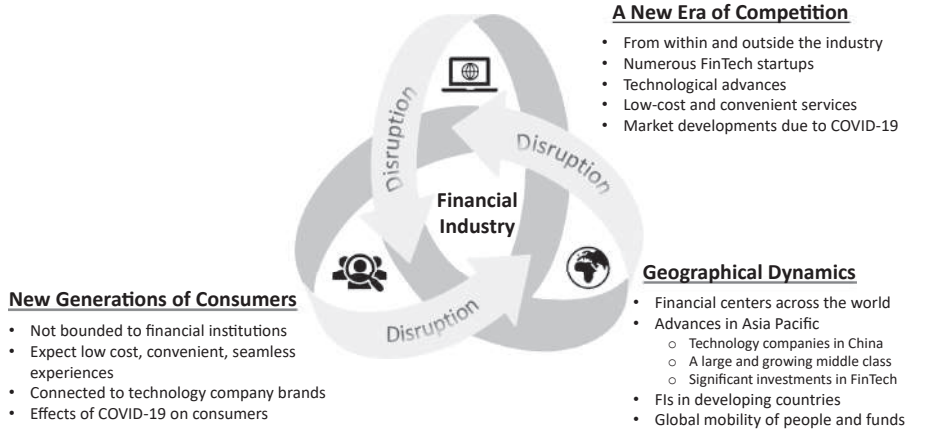

Figure 1.
The three disruptive market developments in the financial industry

introducing innovative financial services. The cost of consumer acquisition in traditional financial institutions is about $1,000 vs roughly $20 for digital wallets (Friedrich, 2020). It took JPMorgan Chase more than 30 years and several acquisitions to reach 60 million customers, while it took less than a decade for Square's Cash App and PayPal's Venmo to reach this number (Friedrich, 2020). PayPal added 16 million new customers only in the fourth quarter of 2020, serving 360 million users with a market cap of $330 bn as of February 2021, which is more than any other bank other than JPMorgan Chase (Clifford, 2021).

Technologies such as artificial intelligence, machine learning and blockchain introduce new possibilities to deliver financial activities. Fintech startups are often agile and offer a better customer experience and convenience at much lower prices than traditional financial institutions (Browne, 2021; Egan, 2020). Unlike major financial institutions, fintech startups do not have a large customer base or various stakeholders to satisfy, leading to less inertia. They introduce convenience at lower costs to customers who seek innovative ways to handle their financial needs. For example, Chime, the most popular financial app in the USA, does not charge monthly or overdraft fees, eliminating consumers' anxiety about their balances and transactions. Its flexibility, convenience and low cost are appealing to the younger generations. The business model is also appealing to investors due to its predictability, recurrence, margin structure and less subjectivity to credit cycles (Egan, 2020). Fintech startups serve various areas, from predicting and detecting credit card fraud and money laundering to evaluating loan eligibility by distinguishing between high-risk vs credit-worthy applicants who lack credit history (Castelli, 2019; Huber, 2020).

Fintech startups differ from traditional financial institutions in their objectives and approaches to new technologies and business models. Traditional financial institutions often seek to save money and reduce costs, while new fintech companies employ strategies to connect to younger generations and serve their needs differently (PWC, 2020). Moreover, in most traditional banks, the teams that run business lines define business goals. The technology and analytics teams are structured separately, often as cost centers, and have little control over satisfying customer needs and wants. This structure lacks an aligned test-and-learn mindset and feedback loops between the two groups. In contrast, the business and technical teams are aligned closely in smaller fintech firms, enabling rapid experimentation and iterative improvement processes (Biswas, 2020; Egan, 2020).

The COVID-19 pandemic accelerated the digital revolution and firms' investments in advanced technology, operations, cybersecurity and cloud services. It has also significantly

increased remote working and collaboration, cutting business travel and in-person meetings (Mckinsey, 2020). These changes will likely lead to innovative financial services offered by competitors from inside and outside the traditional financial services sector. The rise of cryptocurrencies and digital currencies is another development that enhances disruptions.

New generations of consumers

Customer demographics and their needs and wants are evolving rapidly as the Millennials and Generation Z enter the workforce. These generations feel less bound to a particular service provider and do not believe that they need a traditional financial institution for their financial needs (PWC, 2020). This shift is partly because of their memories of the 2008 financial crisis when they grew up or entered adulthood. Their parents' negative experiences and impressions with the financial meltdown have adversely affected their trust in financial institutions. They do not want to experience the hardships that their families and acquaintances went through, and as such, they look for alternatives that offer better user experiences and value (Rooney, 2018). They grew up using Big Tech brands, such as Apple and Amazon, so they perceive a connection to these brands and trust them (Rooney, 2018).

Millennials and Generation Z expect a seamless experience in their financial journey from beginning to end. They want to complete their financial activities conveniently and at a low cost, similar to handling their other service needs, such as shopping online, ordering car service from Uber or booking a vacation on their phones. They are more comfortable using mobile apps, such as Robinhood, Venmo, Chime and Stash, that entail little or no explicit fees (Hoffmann, 2014; Streeter, 2020). Younger generations often have limited income, fewer assets and higher debt levels compared to older generations. Using these apps gives them a sense of empowerment over their finances. Rather than trusting another person to manage their finances, they believe they can handle their finances using the available technology and information they receive from news, publications, social media and acquaintances (PWC, 2020; Sardon, 2020).

These preferences have been further reinforced since the outbreak of the COVID-19 pandemic. Due to the pandemic, social distancing forced consumers and firms to rely less on face-to-face meetings and handle customers' service needs remotely. Consumers and employees had no choice but to use distance meetings and remote work, overcoming their resistance to adopting these technologies. As a result, consumers' preferences for digital services over face-to-face interactions have accelerated. A recent study found that 88% of consumers expect their financial institutions to offer the same level of individualized personal services they receive from Amazon and Netflix. A majority preferred digital recommendations over conversations and face-to-face interactions. Moreover, consumer preferences for contactless and mobile payments increased following the pandemic, with concerns over virus transmission through the use of cash (Bond, 2020; Mckinsey, 2020; Streeter, 2020).

These developments have created opportunities for financial institutions while increasing the threat of disruptions. Many bank branches were closed following the pandemic outbreak, forcing customers to use other online and remote means to address their financial needs. The majority of future consumers may never step into a bank branch and instead handle all their financial needs with innovative financial solutions.

Geographical dynamics

A fundamental shift is currently taking place in the geographical locations of firms that introduce FIs, customers who use FIs and investments in FIs. While financial centers were concentrated in certain cities a few decades ago, they are now scattered across North America, Europe and Asia. China has the largest peer-to-peer lending industry in the world and the largest number of smartphone users. Nine out of the 20 largest technology companies are Chinese (Ross, 2020). Moreover, the size of the fintech industry in China is currently second to the USA. The middle class in the Asia Pacific region is growing, expecting to

become the largest middle-class population by 2030, about ten times that in the USA. Asia Pacific countries and China are ideal markets to develop and test disruptive innovations because of the large and fast-growing fintech industry, favorable government policies and a large young generation of consumers (PWC, 2020).

In addition, many developing countries have adopted modified versions of FIs that suit their country's customer profiles and infrastructures. For example, about 90% of adults in Kenya use M-Pesa, a mobile service for depositing and making payments (Berger and Nakata, 2013; PWC, 2020). Mobile technology has allowed developing countries to make a leapfrog move over telecommunication infrastructures based on wires and cables. Investors and entrepreneurs have recently shown interest in Africa due to the lack of legacy systems, a young population and population growth (Rooney, 2020). Developing countries offer vast opportunities for future research on FIs, as discussed throughout this work.

Finally, the mobility of people and funds across countries has created opportunities for FIs. Apps such as Transferwise and Wave have introduced low-cost remittance technology, allowing expatriates to send money back to their home countries. These advances have enhanced the industry while disrupting traditional service providers, such as Moneygram and Western Union. Despite slowdowns due to COVID-19, the World Bank estimates that remittances be $470 bn in 2021 (World Bank, 2020), which entails economic and societal consequences.

Summary

We are entering a new era in financial services. The three fundamental developments discussed above are transforming the environment and assumptions in previous studies on FI. For example, in the past, the competition was within the traditional boundaries of the financial industry that followed similar structures, managerial styles and competencies. Consumers felt bounded to complete their financial needs with institutions, such as banks and credit unions. Nowadays, big technology firms and fintech startups provide competitive services, and the new generations feel comfortable, or may even prefer, completing their financial needs with these new competitors. Academic research needs clear directions on topics that demand further study and focus in order to keep up with the rapid advances in the industry and evolving customer preferences. In the balance of the paper, we will synthesize existing research and offer future research directions in light of the three outlined disruptive forces at work in the industry.

Defining financial innovations

This section defines FIs to clarify what will and will not be an FI and identifies the articles to include in the study. Innovation is an outcome and a process. As an outcome, it may be a new product, service, process or business model. It may seek to reduce costs, improve performance and capabilities, extend functionality, offer new ways to address customer needs or introduce new production methods. As a process, innovation is an iterative process of developing, producing and introducing a new product to the market. It includes the development, commercialization, introduction and management of complex diffusion processes in the market (Garcia and Calantone, 2002; Hauser *et al.*, 2006; Kahn, 2018; Rogers, 2003).

A first step in defining FIs is to identify the key functions of a financial system. Researchers have offered various taxonomies for these functions, each proposing a parsimonious set of functions for financial services. These taxonomies may be synthesized into four primary functions in a financial system (BIS, 1986; Finnerty, 1992; Merton, 1992; Tufano, 2003), which includes providing the mechanisms and information for

(1) transferring resources (or funds) across time and space;

(2) pooling of resources (or funds) and subdividing shares in various enterprises;

(3) managing and controlling risks and

(4) providing information and the means to support decision-making and reduce the incentive problems arising from information asymmetry.

An FI may focus on one or more of the above-mentioned key functions. For example, while loans, mortgages and credit cards primarily transfer funds across time and space (the first function), they also include aspects of the second function (loans and mortgages) and the third function by managing and controlling risks. Stocks, bonds, mutual funds and Exchange Traded Funds (ETFs) primarily pool resources, but they also handle the fund transfers and risk management. Insurance and credit scoring systems primarily seek to manage and control risks, but they are also necessary for pooling resources. Finally, credit default swaps and venture capital firms primarily serve the fourth function, but they also help manage and control risks.

To be considered an FI, an innovation must facilitate or increase the efficiency of at least one of the four primary functions of a financial system or reduce the costs of performing them. Researchers have provided various definitions for FIs (see Appendix). Common themes across these definitions are (1) advances in financial systems, markets and technology; (2) innovative products, services, processes and business models; (3) both the development and commercialization aspects of FIs and (3) serving a function related to financial activities. Following a synthesis of these definitions, this paper defines FIs as follows:

> The development, introduction, and management of an innovation – a product, process, business model, or technology – to assist or facilitate one or more of the four core functions of a financial system.

FIs may manifest within or outside financial institutions and by established financial institutions or new entrants (Guidotti, 1993; Laeven *et al.*, 2015). Some FIs, such as IB, MB and online-trading tools, primarily serve the financial system. Others may arise from adopting an innovation by the financial industry, leading to significant improvements in the financial system. For example, customer relationship management systems are not FIs *per se*, but their adoption by financial firms has led to significant improvements in their core functions.

Another consideration is the beneficiaries of FIs. The 2008 Financial Crisis demonstrated that FIs that may serve a financial institution might not necessarily benefit consumers and the national or the global economy. The focus of the definition presented here is not on who benefits from an FI but what constitutes an FI. We will discuss the positive and negative outcomes of FIs later in the section titled Outcomes of financial innovations.

Research methodology

The methodology used in this study includes two phases. The first phase follows previous literature review articles (e.g. Biemans *et al.*, 2016; Nejad, 2016). In this approach, articles are categorized based on research methodologies, publication year, sources of data and unit of analysis, the innovations examined and the geographical areas covered. The dependent variable is the number of published articles, which enables researchers to review research objectively and identify the less-studied areas. The second phase includes an in-depth review of the articles and synthesizing the findings that offer future research directions. Special attention is given to the three market disruptions discussed earlier in the paper – new competitors, new generations and geographical dynamics.

The first step entailed identifying journals ranked as A or B within each discipline by previously published studies, leading to an initial list of 96 journals (see Appendix). The first phase of the study – the quantitative analysis of the publications – used the journals listed in Appendix. In the second phase, which focused on synthesizing the literature and offering future research directions, the journals ranked as B by previous studies were excluded. For this phase of the review, three top sub-disciplinary journals specializing in the topic were also included – the *International Journal of Bank Marketing*, *Journal of Financial Services Research* and *Journal of Financial Services Marketing*.

Articles within each journal were included if they primarily examined a relevant topic, such as the FI's development, adoption, commercialization, implementation and outcomes. Different search phrases and criteria were prepared for each discipline. For example, the terms innovation, innovative, diffusion, new product, new service, introduction, development and adoption were emphasized for finance journals. In contrast, terms such as financial, finance, bank and insurance were used when searching in innovation journals. The search criteria covered each discipline extensively. The search commands were examined in the titles, the abstract and the keywords of the articles on the EBSCO Business Source database. The abstract and full text of all articles were reviewed in several rounds for relevancy. Sample searches on the ABI/INFORM database and sample manual searches were also conducted to ensure accuracy and comprehensive coverage. These additional steps did not identify any additional articles. Every effort was made to eliminate the chances of systematic and individual errors. The final dataset includes 546 studies published in 62 journals between 1990 and 2018 (see Appendix). During this period (1990–2018), Internet and mobile technologies revolutionized the financial industry, and two global financial crises (2001 and 2008) occurred.

Phase I – Quantitative analysis of the published articles

Table 1 displays an overview of the quantitative analysis using the number of published papers as the dependent variable. The analysis explores various aspects of the papers, including the trends, journals, innovations, geographical distribution, research methodologies, units of analysis and the number of coauthors. In the interest of space, this section presents an overview of the key findings. Please see Appendix for details of the analysis and findings.

Overview and trends

Table 2 presents a list of the top journals that have published 5+ articles on FIs. These journals cover 492 out of a total of 546 articles (for the list of all journals, please see Appendix). The top journals in finance and innovation disciplines and journals such as *Management Science*, *Harvard Business Review* and *the Journal of Business Research* are on this list. However, the top four marketing journals (*the Journal of Marketing*, *Journal of Marketing Research* and *Journal of Consumer Research* and *Marketing Science*) have published few papers on FI. This finding aligns with those previous studies on service innovation, suggesting that this may be due to the top journals' editorial preferences and norms (i.e. the review process, the topic interests) or that innovation scholars submit their works elsewhere (Biemans *et al.*, 2016).

During the 1990–2018 time period, there has been a positive trend in the number of publications, primarily on consumer adoption of IB and MB and the outcomes of FIs. There has also been an increase in the number of publications in general business journals since 2016, led by *Harvard Business Review,* indicating practitioners' attention to FIs. However, the number of studies in finance and innovation journals has declined since 2013, and the number of marketing studies has fluctuated. This finding raises concerns regarding whether researchers are taking advantage of opportunities resulting from innovations in the financial industry.

Research approaches across the disciplines

The top FIs studied are as follows: IB and MB in marketing journals, wealth management/investment instruments and securities/securitization markets in finance journals, IB and

Topic	Insight summary
Trends	
	- Overall, the number of publications has increased over the years
	- Consumer adoptions and innovation outcomes show the greatest increase
Journals	
	- Very few articles are published in the top four marketing journals, while top journals in other disciplines have published fairly on the topic
	- Journals in different disciplines differ in the innovations they explored, research methodologies they employed and the unit of analysis and the samples they used
Innovations explored in the studies	
	- The top FIs studied: IB and MB in marketing journals, wealth management/instruments and securities in finance journals, IB and various technologies in innovation journals and IB and business models/processes in general business
	- A large number of studies in each group of journals is generic or unspecified
Geographical distribution	
	- Empirical studies published in finance journals are concentrated on the USA. While empirical studies in other disciplines are more balanced across continents, these studies primarily focused on Western countries
	- The country affiliation of researchers shows a similar pattern
Research methodologies	
	- Overall, 79.5% of studies were empirical, and 20.5% were nonempirical. The percentage of nonempirical studies ranged from 9.7% in marketing to 40.3% in finance
	- The disciplines differ in the methodologies they employed. Empirical studies in finance have primarily relied on modeling approaches, while survey studies are the most popular research methodology used in marketing studies followed by qualitative studies
	- No studies employed meta-analysis ($n = 0$), and few used experiments ($n = 8$) and simulation modeling ($n = 18$)
Unit of analysis	
	- Journals in different disciplines differ in the unit of analysis and the sample they employed
	- The top unit of analysis groups in marketing is customers, followed by products/services. In finance and innovation, these are products/services followed by firm/firms as they are in general management journals but with firm/firms on the top
	- Few studies have taken advantage of the opportunities that the recent advances offer for collecting data from social media/online environments, behavioral and transactional data, among others
Number of coauthors	
	- The average number of coauthors has increased from 1.52 in 1990–1993 to 2.66 in 2016–2018, indicating more collaborative research
	- The mode is two coauthors and less than 10% of studies have 4+ coauthors

Table 1.
The summary of key findings of the quantitative analysis

various technologies in innovation journals, and IB and business models/processes in general business. A large number of studies in each group of journals are generic or unspecified.

Previous research has primarily focused on specific geographical regions. Studies published in finance journals are concentrated on the USA, with 57 out of 93 empirical studies using US data. Moreover, 11 studies are global, which may include the USA as well. While studies in other disciplines are more balanced across continents, these studies primarily focused on Western countries. With the fundamental developments in Asia and developing countries, studies must expand across geographical areas, such as Asia, Africa, South America and Eastern Europe.

The country affiliation of researchers shows a similar pattern. In finance journals and general business journals, 61.3 and 53.5% of studies, respectively, have at least one coauthor

Journal	No. of articles	Area
International Journal of Bank Marketing	119	Marketing
Journal of Banking and Finance	38	Finance
Journal of Financial Services Marketing	32	Marketing
Journal of Business Research	25	General
Service Industries Journal	23	Marketing
Journal of Product Innovation Management	17	Innovation
Journal of Financial services research	16	Finance
Technovation	15	Innovation
Journal of Services Marketing	15	Marketing
Journal of Money, Credit and Banking	15	Finance
Journal of Financial Economics	13	Finance
Journal of Risk and Insurance	12	Finance
Management Science	11	General
Research Policy	11	Innovation
Harvard Business Review	9	General
Review of Financial Studies	9	Finance
IEEE Transactions on Engineering Management	9	Innovation
Journal of Marketing Management	9	Marketing
International Journal of Technology Management	8	Innovation
European Journal of Marketing	8	Marketing
International Journal of Services Technology and Management	8	Innovation
Journal of Portfolio Management	8	Finance
Journal of Futures Markets	7	Finance
Journal of Financial Intermediation	7	Finance
Financial Management	6	Finance
International Journal of Innovation and Technology Management	6	Innovation
Journal of Services Research	6	Marketing
Journal of Service Management	5	Marketing
Journal of Business and Industrial Marketing	5	Marketing
Journal of Service Research	5	Marketing
European Financial Management	5	Finance
International Journal of Retail and Distribution Management	5	Marketing
Industry and Innovation	5	Innovation
Total	492	

Table 2.
The top journals that have published articles on financial innovations

from the USA. Studies published in innovation journals follow a similar pattern but with a far narrower difference between the USA and the second country, the United Kingdom (UK). In marketing journals, however, more publications have coauthors from the UK than the USA, followed by several countries with comparable numbers.

Overall, 74.2% of the studies were empirical, and 25.8% were nonempirical. The ratios of nonempirical studies are 9.7% in marketing, 14.8% in innovation, 24.5% in general business and 40.3% in finance, which have remained roughly the same over time. More conceptual work is needed in marketing and innovation journals to enhance research frameworks and theories.

Researchers often focus on the problems in their discipline and employ research methodologies that address their purposes. The analysis demonstrates that the disciplines differ in the employed research methodologies, data/the unit of analysis and the types of innovations studied. For example, 67.5% of finance studies used a modeling approach, while 61.6% of marketing studies used surveys. Few studies used experiments ($n = 8$) and simulation modeling ($n = 18$) and none used meta-analysis ($n = 0$). Concerning the unit of analyses and the data, the top groups in marketing are consumers and products/services, and in finance, these are products/services followed by firms. Very few studies have taken

advantage of the new opportunities that technological advances have offered to collect user-generated, online/social media, objective behavioral and transactional data. Expanding the boundaries across the disciplines requires more-diversified research approaches. Diversity in research ensures the development of a dynamic and rigorous literature stream that offers a more holistic view of FIs and increases the practical relevancy of research.

Finally, the analysis of the number of coauthors demonstrates that the average number of coauthors has increased from 1.52 in 1990–1993 to 2.66 in 2016–2018, indicating that research is becoming more collaborative. Please see Appendix for details of the analysis.

Phase II – Research synthesis and future research

The paper so far has highlighted three disruptive developments in the financial industry and offered a quantitative analysis of the number of studies on FIs. We next synthesize the research findings and offer future research directions. We identified research topic categories by reviewing three resources: (1) previous review studies (Biemans *et al.*, 2016; Nejad, 2016); (2) the *Journal of Product Innovation Management*/*PDMA* article-by-subject categories index and (3) a content analysis of the studies identified in this research. This process identified five topics: firms' introduction and adoption of FIs, FI development, the outcomes of FIs, regulations and intellectual property and consumers (See Table 3). This section reviews and synthesizes research findings in these topics and offers future research directions, focusing on the disruptive marketplace developments (see section "FIs: Three Key Market Disruptions").

Firms' introduction and adoption of FIs

This area comprises four subareas – innovative vs less-innovative firms, firm size, market competition and innovation. We first synthesize research findings in each subarea and then offer future research directions at the end of the section.

Topic	Sub-topics
Firms' introduction and adoption of FIs	
	– Innovative vs less-innovative firms
	– Firm size
	– Market competition
	– The innovation
	– Financial system and environmental factors
FI development	
	– Communication in developing FIs
	– Cross-functional teams
	– Spillovers
	– In-house development vs adoption
The outcomes of FIs	
	– Positive outcomes of FIs
	– Adverse outcomes of FIs
Regulations and intellectual property	
	– Regulations and FI
	– Patentability of financial innovations
Consumers	
	– Consumer adoptions
	– Consumers – others

Table 3.
A framework for synthesizing the existing research on FIs

Innovative vs less-innovative firms

Previous research has explored how innovative financial institutions differ from less-innovative ones. Innovative institutions have a more proactive strategy toward technology investments, which increases their access to technological infrastructure and complementary technologies. Such investments also increase the firm's expertise in incorporating technology into business practices to serve customers better (Hernández-Murillo *et al.*, 2010). However, investments in technology infrastructure may hinder a firm's future technological enhancements if new technologies and standards are introduced shortly after adopting a previously existing technology. Such investments increase the switching costs and act as a short-term substitute, delaying the adoption of the latest technology. For example, firms that invested in client-server technology were slower in moving to IB(Forman, 2005; Milne, 2006).

Innovative firms are more efficient and have a well-defined strategy in taking a market-based approach to identify opportunities in serving customers. They seek to satisfy customer needs and wants rather than focusing on technology. Such firms develop better internal and external communication channels and rely on marketing expertise to capitalize on opportunities to address customer needs (Dandapani *et al.*, 2018; Johne and Davies, 2000). For example, fintech lenders use different criteria from those used by traditional lenders in evaluating potential borrowers and setting their interest rates (Buchak *et al.*, 2018).

During the 1990–2002 period, innovative firms were less leveraged and maintained their innovative strategies, even sacrificing profits for several years. For firms that succeeded, their profits significantly increased following the market success of their innovations (Lerner, 2006). Finally, firms that separated different business lines were more innovative. This could be due to these firms focusing on solutions that better served customers' needs than on platforms that served different business lines under a single umbrella. For example, innovations in banking institutions that encompass commercial and investment banking have been lower than those that separated their commercial and investment banking operations (Boot and Thakor, 1997).

Firm size

Following earlier studies, research has generally found that larger financial institutions are more innovative and more likely to adopt FIs than smaller firms. The reasons include (1) access to more resources to invest in research and development (R&D); (2) economies of scale and the ability to share setup costs across various services to produce lower incremental costs for each service; (3) larger markets to address with the technology, greater expected returns and higher chances of profit-maximization; (4) ability to absorb losses from their mistakes and (5) having dedicated compliance teams to deal with regulations and legal issues (Bhattacharyya and Nanda, 2000; Dandapani *et al.*, 2018; Forman, 2005; Hernandez and Mazzon, 2007; Knott *et al.*, 2009; Rogers, 2003; Serifsoy and Weiss, 2007). There is a counterargument expressed in few papers, arguing that smaller firms should account for a large percentage of innovations because they are not bound by a large customer base and are faster in decision-making (Fuentelsaz *et al.*, 2003; Lerner, 2006; Scott *et al.*, 2017).

Another consideration is intrafirm adoptions among different units or branches following the institution's initial adoption of an FI. They are slower among financial firms with larger customer bases and more branches (Corrocher, 2006). Moreover, the employees' geographical dispersion increases firms' technology adoption due to facilitating employee interactions and reducing costs (Forman, 2005). Firm size can slow intrafirm adoptions but gives larger firms more access to resources, enhancing intrafirm adoptions (Fuentelsaz *et al.*, 2003).

Market competition

Competition is a critical factor in motivating financial firms to innovate and adopt FIs. It has a more immediate effect on adopting FIs than the management's perceived benefits or

profit expectations. Financial institutions are more likely to adopt an innovation that represents a threat to the institution's existence than when it offers a new business opportunity (Forman, 2005; Hernández-Murillo *et al.*, 2010; Molyneux and Shamroukh, 1996; Mullan *et al.*, 2017).

Earlier researchers suggested that market share positively affects firm innovative activities as firms seek to protect their market by differentiating their offerings. However, market share also reduces uncertainties and competitive pressures that motivate firms to innovate and invest in FIs. While concentration and market growth increase innovation, market size and market share decrease it (Fuentelsaz *et al.*, 2003; Knott *et al.*, 2009).

Research has also explored the dynamics between incumbents vs new entrants. Incumbent financial institutions have accumulated industry knowledge over time and have the resources to invest in new technologies. These resources include (1) an existing customer base; (2) experience with the products and processes in the industry and (3) access to resources and new technologies either through internal development or outsourcing. On the other hand, new entrants are not constrained by their existing customers' preferences and prior investments in older technologies. They can employ new technologies to radically modify work processes and offer products and services not yet envisioned by incumbents (Desyllas and Sako, 2013; Gopalakrishnan *et al.*, 2003; López and Roberts, 2002). The dynamics between the incumbents' existing resources and the flexibility of new entrants, particularly in light of market disruptions, offer potential areas for future research on FIs.

The innovation

There has been less research on the relationships between the attributes of an FI and firm strategies than the areas discussed earlier. Researchers have primarily focused on two aspects of an innovation that influence firm adoptions or strategies. These are the degree to which an innovation is radical vs incremental and the network effects of FIs.

Successful radical FIs enable financial institutions to differentiate themselves. They are more difficult to imitate by competitors, allowing financial firms to charge premium prices and target customer segments who are willing to pay the extra money. Successful radical FIs offer new solutions to serve customer needs, thus enabling financial activities that were not previously possible and creating entirely new markets. They also improve a firm's cash flow and reduce the intensity of abnormal stock market returns (Cooper and De Brentani, 1991; Schöler *et al.*, 2014; Tufano, 2003).

Depending on the degree to which an FI is radical vs incremental, firms may postpone their adoptions or even reject an innovation entirely. For example, in the early days of IB, some firms focused on using IB to attract new customers. In contrast, others focused on strengthening their relationship with existing customers by using IB as an added service. Other banks have moved to Internet-only banks, and the technology gradually became an inseparable part of retail banking (Corrocher, 2006; Gopalakrishnan *et al.*, 2003).

Researchers have studied network effects in financial transaction systems, such as payments and securities. The utility of these systems to each participant – user or provider – increases as more users join. For example, payment cards that are accepted at different places or brokerage accounts that allow investing in various securities are more attractive to consumers, businesses and the service provider. Setting up such systems requires significant initial investments. The variable cost of each transaction reduces as more participants join the system. All participating financial firms often share the considerable costs of creating an infrastructure to facilitate transactions. The creation of this infrastructure does not provide any competitive advantage to individual institutions, as all financial institutions share it. However, the network effects enhance transaction processing activities and indirectly increase participants' revenues and profits (Milne, 2006; Nejad and Estelami, 2012; Serifsoy and Weiss, 2007).

Financial system and environmental factors

The availability of financial resources, technology, human capital and strategic capabilities facilitates the development and adoption of FIs. For example, payment infrastructures increase bank performance by generating more fees and revenues. Governmental organizations that support financial institutions, investments in FIs and infrastructure are critical in enhancing FIs in emerging economies (David-West *et al.*, 2018; George and Prabhu, 2003; Hasan *et al.*, 2012).

Future research

The literature review found that larger firms have traditionally been more innovative than smaller firms. Previous studies have compared institutions of similar types that were all within the boundaries of the traditional financial industry. However, fintech startups and big technology companies significantly differ from traditional financial institutions.

The literature review found that firms that separate different business lines are more innovative than others. Innovative firms take a market-based approach and use better internal and external communication channels to identify opportunities to serve customer needs. Nontraditional fintech companies, such as *SoFi, Chime, Affirm* and *Lemonade,* offer specialized and convenient services in specific sectors at a low cost. These specialized offerings, coupled with changing consumer demographics, have introduced a new generation of financial services. Meanwhile, large financial institutions have also invested heavily in FIs and fintech. They have access to extensive customer data to generate business intelligence and a large customer base. Comparing the approaches by different types of firms offers opportunities for fruitful research.

> *Future Research Direction 1:* Examining the similarities and differences in approaching FIs by traditional financial institutions, large technology companies, and fintech startups. What are the factors that affect which type of company would lead in certain types of FIs? How do these different companies compare in terms of their knowledge of markets and customers' financial behaviors and needs? Are modern FIs technology-driven or customer needs-driven?

Fintech startups come in large numbers, offering radically new means of addressing financial needs, not just a new channel for the same type of service. Unlike older times when smaller financial institutions had limited resources, fintech startups often can access financial resources required for their projects via venture capitals, angel investors and issuance of initial public offerings.

Competition, collaboration and alliances between major financial institutions, big technology firms and fintech startups are fruitful areas for future research. While Apple and Google are already in the financial sector through Apple Pay and Google Pay, they also collaborate with financial institutions. For example, Apple and Goldman Sachs have introduced Apple Card. While Chime offers checking and savings accounts to consumers, it also partners with banks for its Federal Deposit Insurance Corporation (FDIC)-insured accounts.

The evolving role of financial intermediaries is another critical topic. The review found that banks and major financial institutions have actively responded to innovations over the last several decades and maintained their position in the market by changing the structure of their earnings and offerings. Innovative business models, such as crowdfunding and peer-to-peer lending, have eliminated the intermediaries by connecting the two sides of investing/lending. Cloud-based services nowadays help firms launch FIs without investing heavily in the backend IT infrastructure. For example, Plaid is a company that offers the infrastructure needed for integrating banking systems and provides the means for fintech apps to connect to financial systems across the world. This infrastructure enables smaller firms to focus on the customer needs they seek to serve rather than the backend processes. Future research is

needed to explore how the role of financial intermediaries may evolve in light of the market disruptions.

> *Future Research Direction 2:* Exploring the competition, collaboration, and co-opetition between incumbent financial institutions and new entrants, including large technology companies and the numerous fintech startups. What are the optimal strategies for incumbent financial institutions and the new entrants? How do financial intermediaries evolve in light of innovative financial instruments that bundle various credit, insurance, and deposit services? How will the structure and suite of services offered by mainstream financial service providers change due to the market's rapid developments?

This quantitative review found that research has primarily focused on the USA and Europe. There are two promising areas for future research. One is FIs in geographical regions that are advanced in fintech, such as the Asia Pacific, and the other is the developing countries. The future research directions presented earlier are all applicable across geographical regions. Future research may also study how various degrees of concentration of financial institutions and different financial and legal systems across countries influence the introduction of FIs. The barriers to the diffusion of FIs from one country to another are additional issues that require research attention. For example, cultural barriers play a critical role in the diffusion of FIs from leading countries to others (Ang and Kumar, 2014). The adaptability of FIs to the other markets and the resources required for the transference of FIs is another promising area for research.

> *Future Research Direction 3:* Exploring FIs in different geographical regions beyond the US and Europe. How may previous research findings differ in these geographical areas in light of the three market disruptions? How does the concentration of financial institutions coupled with financial and legal systems influence the adoption and introduction of FIs?

FI development

Research on developing FIs may be grouped into four areas: communication in developing FIs, cross-functional teams, spillovers and in-house development vs adoption.

Communication in developing FIs

FI development can be viewed as a distributed innovation process that integrates technological advances, financial services, business models, technology and regulations (Consoli, 2005). Research has focused on communications between various groups involved in this process. Communication in this literature captures information exchange, idea generation, teamwork, culture, leadership, management style and organization structure to coordinate between various groups (Eisingerich *et al.*, 2009; Patel and Husairi, 2018; Storey and Easingwood, 1999).

The primary objectives of communication in developing FIs are gathering information and reducing risks (Lievens and Moenaert, 2000). Developing FIs is a cooperative and interactive process among different members and is not always a formal one. Over time, learning takes place at the individual, team and organizational levels. The developed services ultimately transform the communication networks and internal and external processes (Jaspers *et al.*, 2012; Stevens and Dimitriadis, 2004). Moreover, communication with lead users and the sales force during FI development may result in more economical and functional FIs (Athanassopoulou and Johne, 2004; Rajatanavin and Speece, 2004).

Cross-functional teams

The successful development of FIs is contingent on the level of cross-functional cooperation. A key challenge is preserving the heterogeneity and diversity among individuals within and

across departments to ensure information exchange (Lievens *et al.*, 1999). The team architecture must bring together people from various industries, facilitate connections and resolve potential conflicts. The team must include specialists from information technology (IT), business departments, sales and marketing, and legal and compliance business units. A team may need to include various groups from each unit, as they are often not connected and differ in their routines and ways of doing things. For example, the experts on the existing technology and those on the latest technology may be two distinct groups (Eisingerich *et al.*, 2009; Jaspers *et al.*, 2012).

Cross-ties can be horizontal or vertical. Horizontal ties capture relationships between units that cooperate on developing the FI, and vertical ties facilitate the necessary support for the project. Horizontal cross-unit communication spans unit boundaries and facilitates information flow and access to alternative ideas that are critical in developing FIs. Successful teams have a greater number of horizontal and vertical ties than unsuccessful ones. These teams comprise people with diverse sets of expertise, and they are in touch with those who can support their needs. Moreover, concentrated vertical ties are more effective than scattered ones, as more robust support from a few is more effective than weak support from many. A project climate that reduces uncertainties and balances formal and informal ties enhances communications (Aalbers *et al.*, 2016; Jaspers *et al.*, 2012; Lievens and Moenaert, 2000; Lievens *et al.*, 1999).

Research has identified several patterns of FI development – problem-, proactivity-, market- and strategy-driven. A problem-driven approach is a firm's response to a problem or issue, while the proactivity-driven approach begins with exploring ideas and exploring various options. Market-driven FI development begins with analyzing the business with a focus on increasing profits. Finally, a strategy-driven approach focuses on idea generation within the scope of business goals by developing a new service (Martovoy and Mention, 2016).

Spillovers

Spillovers have long influenced innovative behavior in the financial industry. The primary source of new ideas for FIs is other financial institutions. Financial firms learn about innovations through various spillover mechanisms, such as during regular meetings between executives and employees of various financial institutions, through accounting firms that offer services to several financial firms and by reviewing competitors' marketing materials and reports (Knott *et al.*, 2009; Patel and Husairi, 2018).

Most spillovers in the past were asymmetric from large financial firms to smaller ones. Small firms were inferior in their FI development capabilities and resources and hence derived more benefits from R&D already produced and tested by larger institutions. Financial firms often synthesize their learnings from other institutions and integrate them with their internal knowledge and skills. Thus, the degree to which financial firms benefit from FIs in the industry depends on leading firms' collective knowledge (Bhattacharyya and Nanda, 2000; Knott *et al.*, 2009). Interorganizational relationships facilitate spillovers, reducing a firm's competitive advantages and the positive effects of innovation on firm performance. Interorganizational relationship commitment, however, promotes collaborative innovations and increases the effect of innovation on firm performance (Eisingerich *et al.*, 2009).

In-house development vs adoption

A key question for firms is whether to adopt an FI, develop FIs in-house or outsource FI development. A fundamental challenge for incumbent firms is adopting strategies to succeed during ferment stages when facing disruptive innovations. Developing a radical innovation

requires solving complex technical and business problems with imperfect information. Firms with already-accumulated knowledge through previous in-house experiences possess the know-how to address these challenges. Developing radical FIs in-house allows firms to apply their know-how to solve technical and managerial problems. Incremental innovations, however, address less-complicated and more-structured problems by outsourcing the development tasks. Thus, employing external sources to address the needs during incremental changes would be more efficient (Christensen *et al.*, 2018; Patel and Husairi, 2018; Schöler *et al.*, 2014).

Future research

Previous research has primarily focused on how traditional financial institutions build innovation teams and the role of communications in developing FIs. These approaches likely differ from those of fintech startups and big technology companies. Research is meager on the similarities and differences between approaches to FI development in these groups of companies. Previous research has found that those who understand future technologies may differ from those who possess expertise in existing technologies. Researchers may therefore need to compare and contrast how different groups of firms build and manage interdisciplinary FI development teams comprising experts from finance (financial activities and offerings), marketing (customer side) and innovation (design and development). Researchers may also explore these firms' approaches to communicating and engaging with employees and customers during the development and commercialization phases. An emerging question is how traditional financial institutions can respond to the market's fast-paced and disruptive changes while satisfying their existing customer base. A related topic is developing an FI in-house, outsourcing it, adopting an FI developed by a different company, cooperating with another company or acquiring a fintech startup. These decisions entail complexities in light of the emerging developments in the financial industry.

> *Future Research Direction 4:* Comparing and contrasting the approaches by traditional financial institutions, fintech startups, and big tech firms to FI development, team building, and team communications. Research is also needed on in-house development, outsourcing, or adopting an already-existing FI.

The literature synthesis also found that spillovers have long existed in the financial industry, mainly from larger companies to smaller ones. However, thousands of new fintech startups are nowadays introducing novel business models and innovative financial services. Many nontraditional competitors have introduced innovative services that well-established financial institutions later mimicked. In these cases, the direction of financial spillovers was from the smaller companies to the larger ones. For example, the large banks in the USA introduced Zelle to facilitate payments in response to other convenient money transfer services. Exploring spillovers in light of market disruptions can therefore be a promising area for future research.

> *Future Research Direction 5:* How do spillovers in the financial industry evolve due to market disruptions? What are the mechanisms, the direction, and the moderating factors of spillovers and innovation characteristics that affect these spillovers?

Finally, the quantitative review of the literature found that extant research is concentrated in the USA and Europe. Future research should explore FI development in other countries that differ in terms of regulations and policies, customer needs and wants, and the development of economic and financial systems and technology. The Asia Pacific region and China are particularly interesting as they comprise advanced technological infrastructures, a large and evolving young and middle-class population, and significant investments in fintech.

Similarly, innovative approaches to new financial services in developing countries that seek to serve their market needs are fruitful areas for future research.

> *Future Research Direction 6:* Studying the approaches to FI development in the Asia Pacific and developing countries. How do these approaches compare with those in the US and European countries?

The outcomes of FIs

Due to the fundamental role that financial systems play in the business world, FIs profoundly affect businesses, societies and individuals. This section reviews research findings regarding both the positive and negative effects of FIs and identifies future research areas.

Positive outcomes of FIs

Research has established the relationship between FIs and several positive outcomes. FIs facilitate financial transactions, reduce the associated costs and time for firms and customers, and increase the quality of financial activities. They enhance relationships, customer loyalty, customer advocacy and employee performance. FIs create opportunities for firms and develop or expand markets by attracting new customers or providing new services that better suit existing customers' needs. For example, following IB adoption, many consumers moved their deposits from checking accounts to more profitable accounts, such as investments. Consequently, these adoptions increased sales, profitability, growth, market share and financial performance measures, such as return on assets and equity. These effects are more robust in the long term (Deyoung *et al.*, 2007; Krasnikov *et al.*, 2009; Pagano and Schwartz, 2003; Scott *et al.*, 2017; Yeh, 2015).

Choosing the best measure to evaluate an FI requires attention. From a firm's perspective, the best measure for performance and success may depend on a firm's strategic objectives and strategic orientation. Prospectors focus on introducing new products, so firms with this strategic orientation may emphasize measures relating to the newness of a FI, such as the innovation's consumer adoption rate. Defenders and analyzers may emphasize unit volume, cost reduction and margin goals (Manion and Cherion, 2009). From a consumer's perspective, the effects may be direct, such as convenience and cost, or indirect, such as consumer well-being or enabling a consumer to do new things they could not do previously. These aspects need to be considered when evaluating the outcomes of an FI.

FIs may also help unserved or underserved consumers. Innovations such as new banking services, low-cost remittance, crowdfunding and peer-to-peer lending have provided low-cost means to fulfill financial needs. Structured finance activities may improve consumer welfare by pooling and trenching assets and creating various risks and cost structures. These activities will hopefully improve financial inclusion and offer financial services to the unbanked or underbanked population. Moreover, developing countries benefit from mobile technology to take leapfrogging steps toward enhancing financial services to geographically remote areas (Berger and Nakata, 2013; Galak *et al.*, 2011; Martin and Parigi, 2013; Nejad, 2016).

Research has also documented several moderators and control variables for the positive outcomes of FIs. The positive outcomes of FIs are more robust in several situations: (1) in countries with larger securities markets and those with more established regulatory frameworks; (2) in countries and markets that offer better growth opportunities; (3) in the USA more so than in Europe; (4) during economic recessions than expansions; (5) for smaller financial firms than for larger ones; (6) for FIs with more potent network effects; (7) for radical than incremental innovations; (8) when the market is less competitive and regulations give more freedom to firms and (9) when the firm offers incentives, such as introductory pricing

(Anning-Dorson *et al.*, 2017; Nejad and Kabadayi, 2016; Schöler *et al.*, 2014; Scott *et al.*, 2017; Tufano, 2003). Another consideration is whether leadership comprises a team or is sole-managed. Funds managed by teams that use innovative complex products often outperform sole-managed funds. However, during economic downturns, funds managed by individuals outperform team-led ones, possibly due to a faster decision-making process during times of volatile market conditions (Adam and Guettler, 2015). Finally, a financial firm's innovativeness and its performance reflect an inverted U-shaped relationship. Firms with a moderate degree of innovativeness performed better than highly innovative financial firms or the less-innovative ones (Avlonitis *et al.*, 2001).

The positive outcomes of FIs go beyond firms or consumers because they facilitate economic growth, and without them, economic growth will slow down. As technology advances, new approaches, technologies, financial instruments and financial institutions are needed to identify new business opportunities and fund economic development (Laeven *et al.*, 2015). The lack of adequate FIs that bring technological advances into the financial system leads to lower efficiency and economic downturns. In the 2000s, efficiency and productivity decreased due to the lack of innovations in the US securities markets. Most financial firms failed to catch up with the production frontier pushed forward by a few large financial institutions. In addition, the lack of FIs in the few years leading to the 2008 Financial Crisis contributed to the recession. More FIs were needed to deal with the challenges arising from technological advances, innovations and industry practices (Hausman and Johnston, 2014; Zhang *et al.*, 2006).

Finally, FIs may alter the relationship between economic and financial variables. For example, the introduction of FIs improved access to money markets in the 1990s. This led to a more efficient allocation of money, which ultimately weakened the relationship between money demand and interest rates (Berentsen *et al.*, 2015).

Adverse outcomes of FIs

Studies have associated certain FIs with neglecting risks, issuing risky securitizations and trading with credit derivatives. These risky activities contributed to the Financial Crisis of 2008. The instabilities resulted from risky instruments, investors' biased beliefs and estimations and false expectations under institutional constraints in competitive markets (Gennaioli *et al.*, 2012; González *et al.*, 2016; Laeven *et al.*, 2015; Shleifer and Vishny, 2010).

FIs have been criticized for predatory practices, especially toward vulnerable consumers. The cost structure and expected risks and benefits of financial products are often complex and challenging for most consumers to comprehend. For example, consumers are more likely to choose "Alternative mortgage products" or "Interest-only mortgages" than other mortgages that lead to debt reduction. Some FIs have exploited consumers' lack of understanding of the cost structure by misleading them on the total associated costs for paying off the loan. Others presented risky securities to consumers as if they were safe investments. Such activities reduce lending standards and increase loan delinquency rates while boosting the supply of loans and financier profits (Dell'Ariccia *et al.*, 2012; Gathergood and Weber, 2017; Henderson and Pearson, 2009; Loutskina and Strahan, 2009; Mian and Sufi, 2009; Nejad and Estelami, 2012). As automated financial services become more prevalent, these risks may increase as consumers receive more automated self-service advice and recommendations. These advances may increase implicit biases due to consumer profiles, which enhances systematic discriminations. There are concerns that fintech products may not follow the same level of responsibility, transparency, auditability and predictability as traditional ones (Bostrom and Yudkowsky, 2014).

Moreover, ethical issues surround some financial products, such as payday loans, certain derivatives, predatory behaviors and hidden fees that may exploit consumers. Ethical concerns further lead to the question of whether firms seek to privatize profits and socialize

risks. Interestingly, merely increasing regulatory scrutiny does not address this issue as it encourages loophole exploitation activities (Bhattacharyya and Nanda, 2000).

Future research

Previous studies have primarily focused on the direct and more tangible outcomes of FIs. The outcomes of FIs go beyond the financial industry as they affect consumers, society, markets, countries and the global economy. FIs shape the way individuals and businesses handle their financial activities, leading to long-lasting effects on business practices and consumer well-being. As such, evaluating FIs should go beyond direct outcome measures. The review found that FIs may have unforeseen or unintended consequences over time, which may be positive or adverse. Such effects are observed for consumers, firms, and the economic and financial variables used to assess impact. Future research should thus explore possible unforeseen consequences of FIs in light of market disruptions and the automation of financial decision-making tools that rely on technologies, such as machine learning and artificial intelligence.

> *Future Research Direction 7:* The indirect and unintended outcomes of FIs, favorable or adverse, beyond the direct measures. What are the long-term effects on consumers, society, firms, and the financial and economic variables that can be used to measure the impact in light of the market disruptions?

Previous research identified several moderating factors for the relationship between FIs and their outcomes. Examples are the size of security markets, the growth opportunities, firm size, network effects, the degree to which an FI is radical and whether an individual or a team manages financial products. As discussed, these findings were examined in studies that focused only on financial institutions in certain geographical regions. An emerging question is whether the effects of these moderating factors alter as the result of market disruptions?

> *Future Research Direction 8:* The variables that moderate the relationship between FIs and outcomes. How do the previous research findings regarding the moderators of FI outcomes change in light of the market disruptions in different financial markets?

Finally, research is needed to explore the ethical and social issues surrounding FIs compared to their positive outcomes. Many FIs have benefitted consumers and facilitated financial inclusion by enhancing financial services to unserved and underserved consumers. However, the dark side of certain FIs has also been concerning. Millennials and Generation Z consumers increasingly pay attention to social justice and ethical and environmental issues. As technology further automates various processes, it is essential to understand both aspects to enhance the positive outcomes. Another topic of interest is the systematic discriminations and biases that may arise as decision-making processes are further automated and rely on algorithms.

> *Future Research Direction 9:* Understanding the ethical and social issues around FIs. How can we further enhance the positive outcomes of FIs while minimizing adverse effects and potential ethical dilemmas? How can we avoid further financial exclusion as processes and decisions become more automated?

Regulations and intellectual property

Regulations and FI

Regulations are motivated by the gap between private and social interests (Martin and Parigi, 2013). They seek to maintain the stability of financial systems, protect consumer interests and constrain greedy firm behaviors. Political systems and institutions, private-interest groups and public opinion affect financial policies and regulations for protecting consumers. These regulations affect financial institutions' motivations and abilities to develop and introduce

FIs. As much as 60% of the growth in FIs is associated with regulations, such as regulatory capital requirements, mortgage servicing rights, mortgage-related lawsuits, insured/uninsured funds and tax savings (Ang and Kumar, 2014; Beard *et al.*, 1997; Benston *et al.*, 2003; Buchak *et al.*, 2018).

A well-developed financial and legal system supports innovative financial firms' long-term rights and enhances the success and growth of FIs. The legal rights of creditors and the availability of information to financial firms through information sharing and other means are critical to financial development. When lenders are able to enforce repayments, seize collaterals and access information about customers, they are more willing to extend credit through innovative means (Ang and Kumar, 2014; Djankov *et al.*, 2007; Khorana *et al.*, 2005).

Regulation may also hinder the growth of FIs and affect the types of firms that introduce them. For example, traditional banks were unable to innovate and serve in markets with stringent financial constraints, giving fintech lenders the opportunity to serve those markets (Buchak *et al.*, 2018; Marakkath and Attuel-Mendes, 2015). Strict regulations related to the availability of bank branch services slow traditional retail banks' ability to switch to lower-cost technologies and reduce their performance (Anning-Dorson *et al.*, 2017; Beard *et al.*, 1997). Regulations in the financial system also affect the risks for businesses and consumers who use the financial system. Consumers' investments in the US and UK companies are exposed to greater risks than those made by consumers in Japan and Germany. Companies in Germany and Japan hold more liquid reserves and a greater degree of intertemporally smoothing in these markets. To remain competitive, financial firms in the UK and the USA manage risks using other techniques, such as derivatives, which increase investors' risks (Allen and Santomero, 2001).

Finally, banks have historically responded to technological advances, competition, the changing regulatory environment and the decline of temporal smoothing and have maintained their position relative to the gross domestic product (GDP). They have accomplished this by innovating and modifying their services and offerings. Examples include switching from directly-held assets to pension funds and mutual funds, switching to more profitable innovative products and moving toward more innovative real estate backed loans (Allen *et al.*, 2002; Asaftei, 2008; Zarutskie, 2013).

One fundamental development in the market is cryptocurrencies and the introduction of digital currencies by governments. Countries differ in their approaches to adopting digital currencies and their regulations and policies toward cryptocurrencies. In addition, the future of cryptocurrencies is also not clear. The way that digital currencies and cryptocurrencies may develop (or fail) will have a fundamental effect on the financial system and business.

Patentability of financial innovations

Until recently, most FIs were not eligible for patent protection; hence, innovators were unable to protect their rights to FIs. The court ruling known as the Street Decision in 1998 allowed firms to patent their business model and FIs (Kumar and Turnbull, 2008; Lerner, 2006). The new America Invents Act passed in 2011 enhanced patenting of FIs and allowed for enforcing patents in courts. Following these advances, larger financial institutions filed an extensive number of patents to protect their markets and acquire more market power (La Belle and Schooner, 2013). Yet, imitating FIs is still prevalent.

Stronger intellectual property protection laws reduce patent piracy and increase financial institutions' market cap value over time. In developed financial markets, regulations provide more-balanced opportunities to firms of various sizes, leading to a more level playing field for competition and FI development. Established laws that protect intellectual property enhance FIs, social impact and firm value (Ang and Kumar, 2014; Hsu *et al.*, 2013). Patents reduce the probability of a firm's failure. They also may help firms prevent competitors from entering the market early on, which gives them time to develop and adjust their offerings to suit

market needs before competitors enter (Desyllas and Sako, 2013; Kumar and Turnbull, 2008; Pederzoli *et al.*, 2013).

In industries, such as pharmaceuticals and high tech/electronics, patents provide adequate protection of innovation rights. The markets for FIs, however, entail certain complexities; thus, firms tend to protect their intellectual property through formal and informal means. Formal means comprise patents, trademarks, copyrights and trade secrets. Informal means include first-mover advantages, market share superiority, market power and retaining an intellectual property as a secret for as long as possible (Desyllas and Sako, 2013; La Belle and Schooner, 2013).

Even when regulations allow for the patenting of FIs, not all firms may choose to do so. For FIs that offer better returns or an efficient service to clients, firms often seek patenting their FIs. In such cases, patenting allows firms to differentiate themselves while protecting their FIs. However, patenting may not be the optimal decision for FIs that spread risks, such as securities, or innovations that require developing a secondary market and participation of other actors. FIs such as cross-border securitization services often benefit from brand awareness, tacit knowledge and gained market share. Patenting in these cases may hinder market-wide participation and the success of FIs (Kumar and Turnbull, 2008; Lerner, 2006).

Smaller and unprofitable firms are less likely to patent their FIs. The positive outcomes of patents occur only when a firm has adequate equity to take advantage of the patents. While patents increase firm incentives to innovate, extensive patenting may hinder innovation by giving larger financial institutions more market power. Some patents filed by banks are irrelevant to FIs, even though US Federal laws require banks to only engage in financial activities. For example, major US banks have obtained patents for light fixtures, golf balls, video technology and night vision systems (La Belle and Schooner, 2013; Lerner, 2006; Pederzoli *et al.*, 2013). The right balance between patenting and promoting innovation requires further research.

Future research

A competitive environment that offers favorable incentives for FIs and has established laws that protect innovators' rights enhances the introduction, growth and success of FIs. However, stringent financial policies may hinder FIs and shift the development from one group of financial services providers to others. Future research may explore the optimal level of regulatory balance for fostering innovation while maintaining market stability and protecting customer interests.

> *Future Research Direction 10:* A fundamental challenge arising from recent developments in the financial industry is how to foster innovations while (1) accomplishing the divergence between private and social interests and market stability; and (2) promoting innovation while maintaining a healthy competitive environment between fintech startups, big technology companies, and traditional financial institutions. How does the structure of the existing government policies and protection laws regarding innovation flourish or inhibit innovations by one group of firms compared to others?

The literature review found that protecting intellectual property using patents in the financial industry entails more complexities than other industries. The success of many FIs requires participation from other market participants. Thus, firms need to use a combination of formal and informal means of protecting intellectual property in competitive and evolving markets. Large financial institutions have used patents as a defensive strategy to protect their FIs and market position and inhibit new entrants. These institutions have legal and compliance departments, while the cost of obtaining and enforcing patent litigation is often a burden to smaller firms and a distraction from their primary business. Future research may explore challenges related to patenting FIs and the outcomes in light of the recent market disruptions.

Future Research Direction 11: What are the optimal strategies for firms of various sizes and types in adopting formal and informal means to protect their intellectual properties? What are the moderating factors (e.g. firm size, time frame, expected return, characteristics of innovation, network effects, etc.) that affect these strategies?

Extant research has primarily focused on the USA and Europe. The differences in regulations and policies, international laws and intellectual property protection across countries offer an opportunity to explore further the effect of regulations and intellectual property protection laws on FIs. One specific aspect is the rise of digital currencies and cryptocurrencies and the way different countries handle them. Future research may explore the expansion of cryptocurrencies and their effect on the financial industry and how differences in policies and regulations may alter these effects.

Future Research Direction 12: Exploring the differences between countries concerning regulations, policies, patents, and international laws and how they affect the development and diffusion of FIs. One particular aspect is exploring the acceptance of digital currencies and cryptocurrencies, how they affect markets, and the differences across countries.

Research on the consumer side

The majority of studies on the consumer side have focused on the factors, theories and frameworks for adopting an FI, primarily for IB and MB – mobile banking (169 out of 202 studies). Therefore, this section synthesizes the literature in two subsections – consumer adoption and other research on consumers.

Consumer adoption

Studies in this group have primarily explored consumers' initial adoption of a new financial service. Extant research has developed two overarching theoretical frameworks to explain these adoptions – diffusion of innovations (DOIs) and the technology acceptance model (TAM) and their variations. The DOI theory relies on communications among different groups of consumers. It explains why the number of adopters differs through different stages of the diffusion process (Rogers, 2003; Waite and Harrison, 2015). According to this theory, innovators and early adopters adopt an innovation early on because they are more in touch with the latest advances and can make their decisions independent of other consumers. Other consumers learn about the innovation from the adopters and firm marketing activities and finally adopt the FI. The primary variables that affect consumer adoption of an FI in this framework are the relative advantage, compatibility, complexity, trialability and observability of the innovation (Nejad *et al.*, 2014; Rogers, 2003). The TAM framework is grounded on the theory of reasoned action and the theory of planned behavior. According to this framework, consumers' perceived usefulness and ease of use of an innovation affect their attitude toward it, leading to their intentions to adopt and ultimately adoption (Davis *et al.*, 1989; Waite and Harrison, 2015; Yousafzai, 2012).

Extensive studies have used various combinations of DOI and TAM theoretical frameworks by including (1) individual consumer variables (demographics, familiarity, previous experiences, culture, self-efficacy, innovativeness, behavioral control, consumer readiness and motivation), (2) situational variables (access to services such as the Internet, voluntary/nonvoluntary nature of adoptions, collective/individual adoptions, social influence, imitation behaviors, role clarity, subjective norms, facilitating conditions and information quality), (3) affective response variables (trust or distrust in the service provider or on various channels, risks, credibility, security and hedonic motivation, such as enjoyment) and (4) The innovation (image, social variables, effort expectancy, interface quality, ease of

use, relative advantage, compatibility, complexity, trialability, observability and website design) (e.g. Gounaris and Koritos, 2012; Lee *et al.*, 2007; Mcneish, 2015; Tam and Oliveira, 2017; Waite and Harrison, 2015; Yousafzai, 2012).

Studies have also highlighted the importance of consumer resistance and factors that inhibit adoptions. Consumer inertia, or the tendency to maintain the status quo, is the most significant variable followed by functional and psychological barriers, including usage barriers, value barriers, risk barriers (performance, financial, security, social), tradition barriers and image barriers (Laukkanen, 2016; Laukkanen *et al.*, 2008).

Previous research has generated extensive knowledge regarding consumer adoption of IBs and MBs as synthesized by systematic review papers (Tam and Oliveira, 2017; Waite and Harrison, 2015). Studies on FI adoptions have collected survey data. Earlier studies used students for their surveys, whereas more recent studies typically utilize data from actual customers. The number of studies in this area has significantly increased since the turn of the century. Not surprisingly, far more studies are published in marketing journals on consumer adoptions than in journals in other disciplines. Researchers have used DOI and TAM frameworks to explore initial adoptions of ATMs/in-bank self-services, electronic payment systems, IB and MB (e.g. Al-Ashban and Burney, 2001; Alalwan *et al.*, 2015; Alsajjan and Dennis, 2010; Gounaris and Koritos, 2012; Gupta and Arora, 2017; Rugimbana, 1994; Shackleton, 2003; Szopiński, 2016; Xue *et al.*, 2011). Few studies in this category have examined the adoption of alternative insurance services (rainfall, pay-as-you-drive, tourism, health and weather), wealth management/investment instruments and Islamic banking (e.g. Amin *et al.*, 2013; Olya and Altinay, 2016). However, researchers have paid little attention to the market dynamics and the unique attributes and opportunities that FIs offer. For example, MB bridges temporal and spatial boundaries, offering opportunities to connect with consumers and engage them in designing and developing financial innovations. Instead of focusing on these novel aspects, most of the existing studies have simply used the TAM and DOI frameworks to explore initial adoptions of MB.

Researchers have sought to explore the same frameworks using new samples rather than developing new theories. Waite and Harrison suggest that researchers should examine adoption drivers using other lenses and suggest other frameworks for this purpose (Waite and Harrison, 2015). Such studies may lead to richer findings and a more accurate understanding of the relationships between the variables. However, given the amount of knowledge already generated, such studies may have only a marginal contribution to the body of existing knowledge. Research using the same frameworks does not reflect the financial industry's realities, particularly in light of the emerging market disruptions. The future research section offers paths for future research.

Consumers – others

These studies are scattered across several topics. One group of studies has found that consumers play a critical role in developing FIs. An analysis of all mobile financial services listed by the Global System for Mobiles Association found that consumers conceived the ideas behind more than half of all mobile financial services. About 5% were developed jointly by financial institutions and consumers (Van Der Boor *et al.*, 2014). These findings align with another study that has found that about half of then-computerized banking services were first developed and implemented by individual users rather than by financial services providers (Oliveira and Von Hippel, 2011). Moreover, user-originated services diffused at a rate more than double that of firm-originated services. Interestingly, 85% of then-all mobile financial services innovations originated in developing countries, possibly due to significant needs in those countries, flexible platforms (or lack of platforms) and less-stringent policies and regulations. Finally, 75% of the innovations that originated in non-Organisation for Economic Co-operation and Development (OECD) countries eventually diffused to OECD

countries (Van Der Boor *et al.*, 2014). These findings point out the critical role that both users and developing countries play in enabling the market growth of FIs.

Studies on crowdfunding have found that crowdfunding offers the opportunity to enhance relationships between firms and future customers. It may also lead to establishing communities around the firm or the innovation. Participants in crowdfunding see their contributions as serving a cause and perceive more meaningful self-identification with the firm (Bitterl and Schreier, 2018; Gamble *et al.*, 2017; Mollick, 2016). Lenders often prefer borrowers similar to them in terms of age, gender, occupation and interests (Galak *et al.*, 2011; Gamble *et al.*, 2017).

Communications between lenders and innovative projects through crowdfunding has several positive outcomes, including (1) increasing chances of receiving funds; (2) a better quality product due to customer involvement and comments regarding the innovation and (3) greater chances of adoption of the innovation by early adopters due to their knowledge and familiarity with the innovation (Crosetto and Regner, 2018; Stanko and Henard, 2017). Project description language and framing play a critical role in the communication between lenders and borrowers, which may occur at any stage of the project, particularly later stages (Crosetto and Regner, 2018; Herzenstein *et al.*, 2011). These studies show that adopting FIs goes beyond the apparent effects of using a new service or becoming a customer. Due to the fundamental role that financial services play in people's lives and the business world, their adoption can have profound and long-lasting effects that go beyond merely an adoption decision.

Several studies have examined the outcomes of adopting IB and MB. These adoptions increase consumer activities, service usage, number and volume of transactions, cross adoptions, customer retention and long-term firm profitability. Moreover, innovations have a more potent effect on consumer perceptions of service excellence than firm reputation, financial value and technology (Sekhon *et al.*, 2015). The effects were stronger for areas with a high penetration of bank services (online or in-person) and more-demanding consumers. Short-term profitability may drop due to increased costs for serving customers through both branches and self-service channels. Over time, consumers will increase their reliance on IB and MB, and firm profitability can increase (Campbell and Frei, 2010; Hitt and Frei, 2002; Xue *et al.*, 2011).

Finally, improving consumer inclusion and helping the unserved or underserved consumers using FIs is becoming increasingly important (Nejad, 2016). Research shows that consumers have disproportional degrees of access to financial services, depending on their urban/rural location, employment/unemployment levels, literacy level and socioeconomic status (Ansong *et al.*, 2015). A study on innovative insurance products in rural areas in a developing country found that consumer financial education, price and money-back guarantee effectively encouraged consumers to adopt it (Gaurav *et al.*, 2011). Moreover, FIs that seek to serve consumers with no access to banking or financial services should focus on consumer limitations with the technology and their financial literacy level and abilities. As consumers use these innovative services, financial service providers should monitor and adjust the services accordingly. Finally, such FIs should also take advantage of any possible support from regulators and other organizations (Berger and Nakata, 2013). Many innovative financial services claim that they seek to democratize financial services and information by making them available to broader consumer groups. We next discuss promising future research directions.

Future research

Previous research has generated extensive knowledge on consumer adoptions based on the DOI and Technology Acceptance Model frameworks (Davis *et al.*, 1989; Rogers, 2003). Further research using these frameworks would lead to rigorous research findings with

potentially more precise estimates of the relationships among the key constructs but less novelty and limited relevancy to the financial industry's modern realities, particularly concerning the three market disruptions discussed in this paper.

The review also found that adopting FIs affects various aspects of consumers' lives and behaviors and their relationship with the firm. Innovative financial apps offer low-cost and convenient means to transfer funds both domestically and internationally. Robo-advisors, machine learning and artificial intelligence apps offer consumers innovative ways to plan and manage their finances and invest. Research is needed on how consumers use these innovations and how these advances influence consumers' financial behaviors, well-being and access to essential financial resources. Moreover, the availability of information about investing from various sources, including formal and institutional (stock exchanges, specialized business news agencies, experts, market analysts, financial literacy educators and investment firms) as well as informal and noninstitutional sources (e.g. social media, blogs, acquaintances) have led to new forms of financial decision-making by consumers who may or may not have the ability to make optimal decisions.

> *Future Research Direction 13:* The effect of FIs on how consumers handle their financial needs, well-being, and access to financial resources. How do FIs couple with the abundant information influence consumer financial decisions and their behaviors, particularly in light of market disruptions?

Previous studies have documented the prominent role that consumers play in developing FIs. The new generations of consumers are tech-savvy; therefore, they are more likely to be involved in FI development and concept generation than previous generations. This trend, the advances in technology, and the developments worldwide offer opportunities to study user involvement in developing new apps and services for financial services.

> *Future Research Direction 14:* The role of consumers, particularly the new generations, in developing FIs. How do the three market disruptions affect consumer involvement in FI development in different regions of the world?

The consumer side of choosing between competing offerings from various FIs is another promising area for future research. Research needs to go beyond the traditional and static TAM and DOI models and consider the dynamics of market disruptions, primarily new market entrants and new generations of consumers. Many established financial institutions create entry barriers by offering incentives, such as private banking services, additional cashback on credit cards and free stock trades, to specific customers. They also seek to mimic some of the offerings from fintech companies. How does the relationship and trust between consumers and brands, such as Apple and Amazon, transfer into trust in financial services and adopting FIs? How do attractive incentives offered by traditional financial institutions coupled with various network effects and market disruptions influence consumer decisions at different developmental stages? Such questions are essential for future research to address.

> *Future Research Direction 15:* Understanding how consumers choose FIs from various service providers, based on their relationships with financial institutions compared to their relationships with technology brands and the novel services offered by fintech companies.

The consumer side of FIs related to serving the unserved or underserved population is another crucial area for future research. The COVID-19 pandemic has increased income inequality and inequality in accessing various financial services and resources. Decision-making by financial institutions using algorithmic approaches and big data may lead to unintended biases toward specific consumer groups. On the other hand, many FIs, such as remittance and personal finance apps, seek to democratize financial services to various consumer groups. Future research may explore how these offerings may help unserved or

underserved individuals manage their finances and those who lack the necessary financial literacy levels?

Future Research Direction 16: Exploring the positive and the adverse effects of FIs on the unserved and underserved consumers and those who lack financial literacy. How do the positive effects of democratizing financial services compare with the adverse effects such as systematic biases and how can we minimize such adverse effects?

Consumers in different countries differ in their financial needs and wants. Serving these consumers depends on other factors such as the financial systems, technological advances, regulations and policies. As a result, consumer engagement in development, adoption, usage of FIs and all the previously-mentioned research areas would also differ across countries, particularly in different regions, hence creating opportunities for future research.

Future Research Direction 17: Exploring consumers' reactions to FIs in various parts of the world and their engagement with firms that offer them. How does consumers' engagement with firms that offer FIs, including FI development, adoption, and usage, differ in different parts of the world?

Discussion

This study is the first to synthesize and map the extant research literature on FIs across marketing, finance and innovation disciplines and compare them to a group of other business journals. The work makes three key contributions. It highlights three market developments that are revolutionizing the financial industry and hence requires researchers' attention to maintain the relevancy of academic research. Moreover, a quantitative analysis of the research on FIs maps the extant research using the number of published articles as the dependent variable. This analysis pinpoints the areas that have received less attention and may require further research (See Table 1). Finally, the study synthesizes the findings of extant research on FIs in five areas and provides future research directions for each area in light of the three market disruptive developments.

Research on FIs has followed a positive trend in the number of published papers. However, studies have primarily focused on the USA followed by Europe and paid less attention to other regions and the developing countries. Moreover, studies in finance, marketing and innovation journals differ in the methodologies they employ. Financial studies primarily used modeling approaches, while marketing studies employed surveys. Across the disciplines, few studies used experiments or simulation modeling, and none used meta-analysis. Concerning the unit of analyses and the data, the top groups in marketing journals are consumers and products/services, and in finance journals, these are products/services followed by firms. Few studies have taken advantage of the opportunities that technological advances offer for collecting data, such as user-generated and online/social media, behavioral and transactional data. Researchers often employ research methodologies that address the problems in their discipline. Expanding the boundaries across the disciplines requires more-diversified research approaches. Diversity in research ensures the development of a dynamic, rigorous and relevant literature stream that offers a more holistic view of FIs.

Table 4 summarizes the future research directions discussed in this paper based on the three disruptive market developments. The fourth group in this table focuses on research regarding how FIs can better serve societies, economies and consumers, particularly the less-served groups. Further details about each future research direction may be found in the body of the paper using the identifying number for each area. This number is the same as the one mentioned in front of each future research direction in the paper (for example, the number 5 means that this is future research direction 5 in the paper).

The first group, a new era of competition, compares and contrasts traditional financial institutions, big technology companies and fintech startups in terms of (1) their knowledge of

Market disruption/Topic	Future research directions
A new era of competition	
	1: Similarities and differences between traditional financial institutions, big technology companies and fintech startups, in terms of their knowledge of markets, customers' financial behaviors and needs, and the factors that determine which group of companies would lead in each type of FIs
	2: Cooperation and competition (co-opetition) between incumbent financial institutions and new entrants, including big technology companies and the numerous fintech startups
	4: Comparing and contrasting the approaches by traditional financial institutions, fintech startups and big tech firms to FI development, team building and team communications
	5: The evolution of spillovers in the financial industry resulting from market developments
	8: The outcomes of FIs for each group of firms and the variables that moderate the relationship between FIs and firm outcomes
	11: The optimal strategies for firms of various sizes and types in adopting formal and informal means to protect their intellectual properties
New generations of consumers	
	13: The effect of FIs on how consumers handle their financial needs, their well-being and access to financial resources
	14: The role of consumers in developing new FIs, particularly the new generations
	15: Understanding how consumers choose FIs from various service providers, based on their relationships with financial institutions compared to their relationships with technology brands and the novel services offered by fintech companies
Geographical regions	
	3: FIs in different geographical regions beyond the USA and Europe. How may previous research findings differ in these geographical areas?
	6: The approaches to FI development in the Asia Pacific region and in developing countries
	12: The differences between countries concerning regulations, policies and patents and the international laws and how they affect the development and diffusion of FIs
	17: Consumers' reactions to FIs in various regions and their engagement with the firms
Fostering FIs to serve societies, countries and economies	
	7: The indirect and unintended outcomes of FIs beyond the direct outcomes
	9: Understanding the ethical and social issues around FIs
	10: Exploring how regulations and policies may foster innovations while (1) accomplishing the divergence between private and social interests and market stability and (2) promoting innovation while maintaining a healthy competitive environment between fintech startups, big technology companies and the traditional financial institutions
	16: Exploring the positive and adverse effects of FIs on the unserved and underserved consumers and those who lack financial literacy

Table 4.
Summary of future research directions

Note(s): The numbers beside each future research direction corresponds with the future research directions listed within the paper, listed under future research directions sections

markets and customers' financial behaviors and needs; (2) approaches to FI development, team building and team communications; (3) the competition, collaboration and co-opetition between these three types of firms; (4) the evolution of spillovers in the financial industry as a result of market developments; (5) the outcomes of FIs for each group of firms and (6) optimal strategies for firms of various sizes and types in adopting formal and informal means to protect their intellectual properties. Fintech startups, big technology firms and traditional financial institutions differ in their structure, customer bases, investors, leadership approaches and resources. Exploring the listed future research areas would help us better understand FIs in the current and future competitive markets.

The second group of future research directions pertains to consumers, particularly the new generations. Previous research on the consumer side has overwhelmingly focused on exploring factors that lead to consumers' initial adoption of an FI. These studies explored two

primary models, such as DOI and the Technology Acceptance Model (TAM), and their extensions. Studies used the same models for ATMs, phone banking, IB and MB in various geographical regions. These studies have generated an extensive body of knowledge. For the most part, however, research has yet to take advantage of the unique aspects of the more recent innovations. For example, mobile banking bridges spatial and temporal distances with consumers. However, studies used the same theoretical models to explore consumers' initial adoptions of mobile banking using surveys. Future research may explore (1) the effect of FIs on how consumers handle their financial needs, their well-being and access to financial resources; (2) the role of consumers, particularly the new generations, in developing new FIs and (3) understanding how consumers choose FIs from various service providers, based on their relationships with financial institutions compared to their relationships with technology brands and the novel services offered by fintech companies.

Moreover, the review found that research has primarily focused on North America and Europe. Research needs to expand beyond these areas. The Asia Pacific is one region of interest because of the advances in fintech in these areas and a large middle-class and young market. Developing countries are another promising area because their approaches to FIs differ from developed countries. Four directions are proposed for future research: (1) replicating previous research findings in these regions; (2) firm approaches to FI development; (3) the differences between countries and regions concerning regulations, policies, patents and the international laws and how they affect the development and diffusion of FIs and (4) exploring consumers' reactions to FIs and their engagement with firms that offer FIs.

Finally, beyond the disruptive market developments that guided this research, FIs have long-lasting and in-depth effects on consumers, society and markets. With all the positive and adverse outcomes of FIs, research needs to foster FIs that mutually serve consumers, society, firms and markets. This study offers four research directions to accomplish this objective: (1) the indirect and unintended outcomes of FIs, favorable or adverse; (2) the ethical and social issues around FIs, particularly fintech products; (3) effective regulations and policies that foster innovations while balancing the divergence between private and social interests, maintaining market stability and promoting innovation in a healthy competitive environment and (4) exploring the positive and adverse effects of FIs on the unserved and underserved consumers who may also lack financial literacy.

To conclude, FIs offer a fruitful area for studying disruptive offerings, competition from within and outside the industry, strict regulatory environments, evolving consumer needs and preferences, developed and developing markets, offerings with high network externalities, complex intellectual property protection practices and innovations that comprise novel services, processes, technologies and business models. The hope is that this study would help future research explore the listed untapped opportunities.

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Appendix

The appendix contents are available in online for this article.

Corresponding author

Mohammad G. Nejad can be contacted at: mnejad@fordham.edu