



FinTech and the transformation of the financial industry

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Dear readers,

This preface introduces the special issue on FinTech in Electronic Markets. The issue includes a total of eight papers, which cover diverse aspects in the broad FinTech universe. Seven papers emerged from the special issue call that was published in 2016 and one paper from a fast-track that was organized with the Business Information Systems Conference (BIS) from 2016. Taken alone, the number of submissions for the FinTech special issue call was larger than for regular special issues in Electronic Markets, which might suggest that FinTech is an active research field. This is remarkable since the term itself has only recently gained broad attention.

For example, a simple query on Google Trends reveals that it was only in 2014 that the compound term “FinTech” emerged on a broad scale and made the transformation of the financial industry visible to everybody (Arner et al. 2016). An industry that had remained rather stable over decades was apparently confronted all of a sudden with new market participants and the acceleration of digital innovation. A surge in the foundation of new companies (“start-ups”) occurred, which promised to change the entire industry with some even claiming that this will be the beginning of the end of banks. This would confirm statements from the 1990s whereby “banking is essential, banks are not” or whereby “banks are the steel industry of the [nineteen]nineties” (Beck 2001, p. 7). Some 25 years later, we may see the beginning of this (digital) transformation. Although the financial industry as a whole and many of the traditional players from the world

of “big banks” exist, the “FinTech” movement has substantially influenced this sector.

FinTech (r)evolution

Like similar compound terms, such as “BioTech”, “FinTech” is a rather simple and obvious combination of an application domain (“financial”) and “technology”. The financial sector has grown over the last centuries with the first bank being established in 1472 and a large variety of other businesses (e.g., securities firms, insurance companies, real estate agents) following since (Alt and Puschmann 2016, p. 9). Financial companies are often referred to as service providers since they support firms in a primary market to conduct their business and have over time shaped a secondary market in which financial service providers (e.g., mortgage brokers, commercial banks, investment bankers) interact among each other (Zhu et al. 2004). From this “an extensive network of interrelationships that is more complex, reciprocal, and less linear than traditional manufacturing and retailing industries” resulted (Zhu et al. 2004, p. 21). Technologies - the second element of the FinTech term - have become key in handling financial processes. Following Bouwman et al. (2005) a technology is a manner of organizing things, coordinating processes, and performing tasks more easily. This general definition recognizes analog as well as digital technologies, which have both spread in the financial sector. Previous work on the evolution of FinTech already suggests that financial technologies have a longer legacy than the term FinTech itself. For example, Lee and Shin (2018, p. 36) link the roots of FinTech to the diffusion of the internet since the 1990s. Arner et al. (2016) paint a broader picture and recognize financial technologies already in the mid-nineteenth century. A historical perspective may even start earlier with the emergence of financial institutions (see Fig. 1).

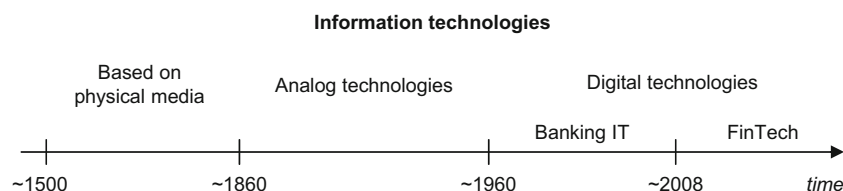
The first applications of technologies used by banks and trading companies relied on physical media containing the information/value (e.g., paper, coins). Since transferring these documents and values across distances was only feasible via

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Fig. 1 Evolution of financial technologies

physical modes of transportation, markets were primarily limited to a regional scope. This changed with innovations in information and communication technology (short “IT”). In particular, the visual and later the electrical telegraph, enabled to separate information from its physical representation and to transmit it faster over larger distances. The economic implications were fundamental, and the telegraph was recognized as an element of industrialization in modern societies (Malone et al. 1987). These analog technologies may be seen as a second phase of financial technologies and lasted until the mid-twentieth century.

Starting with the inception of digital information and communication technologies, the era of digital financial technologies – sometimes also referred to as “e-Finance” (Gomber et al. 2017, p. 540) – started and Arner et al. (2016, p. 1282) assert that “certainly, by the late 1980s, financial services had become largely a digital industry, relying on electronic transactions between financial institutions, financial market participants, and customers around the world.” In the banking sector, the technologies spread along the banking value chain, which has evolved to comprise four clusters (Bons et al. 2012, p. 198; Marinč 2013): customers (e.g., retail, commercial, investment), channels (e.g., branches, brokers, web, mobile, social), financial service providers (e.g., banks, non-banks) and interbank providers (e.g., exchanges, networks). Examples of this technological diffusion are:

- Since the 1960s large financial service providers – in particular banks – have emerged as pioneers in using IT inhouse. Especially large banks have established IT departments that often comprise several thousand employees. These organizational units have developed proprietary application systems and operate corporate networks linking internal units including their branch offices. Over the years, these systems also enabled electronic interfaces to customers (e.g., ATMs, online banking) and to external stakeholders (e.g., other banks, financial exchanges).
- In the interbank area, multinational electronic networks emerged, such as the Society for Worldwide Interbank Financial Telecommunication (SWIFT) in 1973 and the Trans-European Automated Real-time Gross Settlement Express Transfer System (TARGET) in 1999. They were an important building block for digitalization between banks, which established interfaces to their internal

systems (interbank area). A more recent network is the European Single Euro Payments Area (SEPA), which started in 2009 and has only recently been enhanced to handle real-time processes among banks (e.g., SEPA Instant Credit Transfer). In addition, providers of exchanges began a substitution of physical trading floors by electronic trading and clearing systems in the 1980s. Meanwhile, most exchanges worldwide (e.g., CBOT in Chicago, EEX in Leipzig, NYSE in New York, XETRA in Frankfurt) are fully electronic and allow trading stocks, certificates and other derivatives in real-time.

- Overall, the need for standardization became evident with the variety of individual and incompatible information systems along the banking value chain. Initiatives for interface standards (e.g., HBCI for online banking, FIX for stock trading, UNIFY for loans) were driven by financial service providers and packaged software systems became available by IT vendors (e.g., Finastra, SAP, Temenos). Both developments (i.e. interface standards and standard software) aimed at alleviating the inefficiencies that came along with proprietary systems.

Similar developments occurred in the insurance industry, albeit at a smaller scale due to less interactivity of the insurance business. Overall, the phase of digital financial technology illustrated that products and services in the entire financial industry may be supported by IT. This also led to considerations whether the regulatory institutions were in place to take advantage of these innovations and to contain the risks inherent in activities that occurred electronically. While the benefits have outweighed the risks in many cases (for online banking see Arner et al. 2016, p. 1285), the financial crisis starting in 2007 and the subsequent regulatory restrictions emphasized their role for enabling as well as for inhibiting transformations in the financial industry. In fact, the competitive landscape during the digital phase remained rather stable and IT largely improved existing structures.

Various factors suggest this observation: First, although the diffusion of IT has led to an increase of outsourced processes and activities, the degree of vertical integration in the banking industry has remained high. For example, research from Gellrich et al. (2005) found a reduction of only 5 % in their analysis of 859 European banks. Their measure of vertical integration dropped from an average of 82.2% in 1995 to an average of 77.2% in 2002. Since then the sector has

presumably seen further reductions of in-house production and a thrust towards more outsourcing, specialization and diversification. Second, the number of banks has decreased during the digital phase and the number of employees (i.e. manual workforce) has increased. Between 1980 and 2009, the number of institutions diminished from 37,090 to 15,801 in the US and from 3006 to 1774 in Germany (OECD 2018). In contrast, the workforce grew from 2,019,341 (1990) to 2,302,628 in the US and from 495,700 (1980) to 633,550 in Germany (OECD 2018). This may be seen as a potential for automation and for digital processes that overcome the problem of manual activities between various information systems. A statement from a report from 2013 on the support of business processes with IT may support this: “Across Europe, retail banks have digitized only 20 to 40 percent of their processes; 90 percent of European banks invest less than 0.5 percent of their total spending on digital” (Olanrewaju 2013). Such low innovation investments may sound surprising since banks are known as early adopters of IT and reportedly invested higher amounts of their revenues in IT than businesses in other industries. For example, Gopalan et al. (2012, p. 30) report that “globally, the banking sector spends an average of 4.7 percent to 9.4 percent of operating income on IT, while other sectors spend less: insurance companies and airlines, for example, spend 3.3 percent and 2.6 percent of income, respectively.” It seems that high IT investments were not similar to driving the digital transformation of business processes and business models.

The inefficiencies inherent in this situation have led to a fertile ground for the current phase of the FinTech movement, which roughly coincided with the financial crisis. It builds on four driving forces that were summarized in a position paper from the last special issue on banking published by Electronic Markets in 2012 (Alt and Puschmann 2012, p. 204f). These were the:

- growing pace of diffusion of innovative downstream IT solutions. When the position paper was published in 2012, the FinTech “ingredients” were foreseeable, but the notion “FinTech” only saw its broad diffusion shortly thereafter. Instead, the position paper referred to the developments as “Banking IT innovations”. Following the main business services in banking, a collection of new digital services in the areas financial information, planning & advisory, payments, investments, financing, and cross-process support provided a glimpse on the broad spectrum of FinTech solutions in banking. Very often, the solutions were limited in scope and addressed a specific customer problem.
- emergence of non-banks and new start-up businesses offering focused financial services. After the financial crisis, an uptake of investments in financial start-up businesses took place. For example, the global volume of annual venture capital funding rose from USD 3.7 bn in 2013 to USD 16.5 bn in 2017 (CBInsights 2018). The start-up

mentality may be seen as a key element of FinTech and although incumbents began to create new organizational units (e.g., innovation labs, think tanks, spin offs), it seems that neither banks nor insurance companies were capable of exhibiting the same creative, dynamic and “digital” mindset that was – and still is – at the core of many start-up businesses.

- changing behavior of banking customers towards online banking and multi-bank-relations. The diffusion of mobile devices and digital financial services has enabled customers to obtain ubiquitous access to financial information. In addition, the electronic tools offer functionalities that were previously reserved to bank advisors. Overall, the loyalty to a main bank has decreased and customers tend to favor relationships with multiple financial service providers. For example, more than half of Germany’s retail banking customers already use services from rival suppliers and are open for financial products offered by IT companies (Bain and Company 2017).
- regulatory and competitive consequences of the financial crisis that occurred in 2007. They included new rules for separating retail and investment banking (e.g., Dodd-Frank Act), for protecting consumers and markets (e.g., MiFID), reporting schemes to prohibit fraudulent behavior (e.g., AIA, FATCA) and requirements for higher capital coverage (e.g., the Basel agreements). These growing legal restraints mainly increased the pressure on traditional financial service providers.

The Electronic Markets special issue in 2012 concluded that banks were only at the beginning of seeing the potential offered by mobile and Internet technology (Bons et al. 2012; Alt and Puschmann 2012). In 2018, we may say that this development has taken place. Besides a further growth of FinTech start-up funding, many incumbents have increased the digitalization of their processes and sometimes even introduced new products and services (e.g., enhanced online banking, customer apps and video conferencing, crypto assets). Thus, the emergence of FinTech is impressive, but has not come “all of a sudden” and relies on a long legacy of financial technology. Is it a revolution or rather an evolution? FinTech may indeed be conceived as a simple evolution if a linear development path could be observed. However, the advances in IT (e.g., artificial intelligence, big data, platforms, social media), the adoption of a customer-oriented perspective and the start-up mentality may represent aspects that lead to discontinuities. This is also reflected in definitions of FinTech, which have been coined since 2014. In this vein, Gimpel et al. (2018) refer to FinTech when “digital technologies such as the Internet, mobile computing, and data analytics to enable, innovate, or disrupt financial services”. Process disruption and service transformation are named as key forces for FinTech besides technology innovation (Gomber et al. 2018, p. 224f)

and as a main differentiator in relation to the previous terms “digital finance” or “e-Finance” (Gomber et al. 2017, p. 541f).

Levels of transformation

To characterize the level of IT-induced change, the five degrees of business transformation from Venkatraman (1994) have become a well-known framework. They comprise two evolutionary levels (localized exploitation, internal integration) and three revolutionary levels (business process redesign, business network redesign, business scope redefinition). For the sake of simplicity, the three intra-organizational levels shall be combined, which leads to three levels. They first serve to characterize how the FinTech phase is different from the previous digital banking phase (referred to as “Banking IT” in Table 1): IT may either improve activities and processes within the organization, improve the interplay with participants in the business network or influence “business scope and the logic of business relationships within the extended business network” (Venkatraman 1994, p. 83):

- At the internal organization level, FinTech comprises a change in business focus from internal business processes into adopting a customer-centric perspective (Alt and

Puschmann 2016, pp. 36–40, pp. 94–102; Davies et al. 2016; Marjanovic and Murthy 2016; Pousttchi and Dehnert 2018; Goodale 2012). Multiple aligned online channels complemented and partly substituted the classical branch offices (Shim and Shin 2016, pp. 170–173; Davies et al. 2016; Goodale 2012) and core competencies shifted from customer service, products and transaction handling towards the management of online channels, data analytics and platforms (Alt and Puschmann 2016, pp. 33–34; Dhar and Stein 2017). This comes with a growing number of digitalized (automated) processes (Ehrenfeld 2017), which are less integrated in core banking systems, but are often developed inhouse following agile methodologies with defined API interfaces (Alt and Puschmann 2016, pp. 153–185).

- At the business network level, businesses in the FinTech era are more networked with specialized external partners (Shim and Shin 2016, pp. 172–176; Gimpel et al. 2018) and competition tends to be more intense with lower margins (Alt and Puschmann 2016, pp. 31–35; Davies et al. 2016). In addition to the traditional financial services world, the competitive landscape of FinTech now includes new start-ups and lateral entrants (Davies et al. 2016), who feature distinctive different corporate cultures than traditional financial services firms (Gomber et al. 2017, p. 540). Due to reduced switching costs among FinTech

Table 1 Specifics of FinTech on three transformation levels

Transformation level	Banking IT (up to around 2008)	FinTech (after 2008)
External organization		
- Regulation	low equity requirements, low supervision	stricter rules; less protection
- Business model innovation	branch business & offline services	online & mobile services
- Governance of infrastructures	centralized institution as focal firm	distribution of tasks
- Payment style	majority of customers using cash	non-cash payments increase
Network organization		
- Networking	small number of network partners	many specialized partners
- Margins and cost structure	high margins in core business	lower margins, higher competition
- Competitors	other traditional financial service providers	start-ups, lateral entrants
- Culture	hierarchical	cooperative, agile
- Customer retention	high customer loyalty	reduced switching costs
Internal organization		
- Business focus	process-oriented	customer-centric
- Customer interaction	offline first	online first, omni-channel
- Core competencies	distribution, products, transactions	online distribution; platforms
- Vertical integration	high integration	low integration
- Service portfolio	banks are general service providers	small diverse providers
- Automation	processes require manual steps	fully-automated processes
- IT-architecture	monolithic systems, inhouse development	modular systems, APIs

providers, customer retention also tends to be lower (Pousttchi and Dehnert 2018).

- At the external organization level, regulation changes from lower equity requirements, less supervision, and high protection from national legislation towards stricter rules for held equity, more supervision on an international level, and less protection offered by national laws (Alt and Puschmann 2016, pp. 25–27; Arner et al. 2017; Lawrence 2016; Pousttchi and Dehnert 2018). This is also required since the key infrastructures (e.g., central bank, payment networks) will no longer be provided by centralized national bodies or focal firms but by electronic systems that are operated by various network partners for specific tasks (e.g., payments, investment, financing) or even work on a fully decentralized basis (e.g., blockchains) (Alt and Puschmann 2016, pp. 94–102; Němcová and Dvořák 2013). The widespread use of digital infrastructures allows cost-efficient operations and the move towards cashless societies.

Based on the evolution of financial technologies as described above, the term “FinTech” stands for all applications using analog and primarily digital IT to deliver financial solutions (Arner et al. 2016, p. 1272). It comprises a broad variety of innovative ideas and new business models enabled by digital technologies. FinTech solutions may be found for customer interactions (e.g., personal finance management), for payment services (e.g., payments based on blockchain technology), for funding and lending (e.g., crowdsourcing/funding), and for insuring (e.g., usage-based insurance). Note that this represents a functional perspective, which differs from an institutional perspective that sees FinTech as specific types of (start-up) businesses. This functional perspective opens the view to three sub-areas of FinTech:

- The specific nature of the insurance business, in particular its focus on managing risks, has given rise to the term “InsurTech”, which may be observed from 2015 onwards. In this regard, Stöckli et al. (2018) conceive InsurTech as “A phenomenon comprising innovations of one or more traditional or non-traditional market players exploiting information technology to deliver solutions specific to the insurance industry.”
- The relevance of compliance and regulatory issues for the financial industry has led to the combination of “regulatory” and “technology”, i.e. “RegTech”. It describes the use of technology, particularly IT, in the context of regulation, monitoring, reporting and compliance (Deloitte 2016). RegTech solutions “aim to ease regulatory compliance and substitute for manual labor in standard regulatory and compliance processes” (Gomber et al. 2018, p. 250).
- Finally, to emphasize the traditional banking business within FinTech, some authors have chosen the notion of BankTech (e.g., Schwab and Guibaud 2016). Despite recognizing technologies and innovations in the banking sector more precisely, it admittedly has not gained broad attention.

Special issue contributions

A combination of these three FinTech sub-areas and the three transformation levels yields a two-dimensional matrix. It provides a suitable frame for positioning the papers submitted to the present special issue (see Fig. 2). From the eight papers, two are cross-domain and relevant to all three FinTech domains (papers 1 and 6), whereas five have a distinct focus on BankTech (papers 2, 4, 5, 7, 8) and one paper (paper 3)

Fig. 2 Transformation aspects addressed in the special issue papers (numbers refer to individual papers)

		1	Startups taxonomy of service offerings		
		2	Consumer decisions in retail banking		
Transformation level	External Organization	4	Participation in mobile ecosystems	3	Typology of Insurtech innovations
	Network organization	5	Sustainable bitcoin mining		
		6	Crowdsourcing investment decisions		
Internal Organization	7	Robo advisor platforms			
	8	High frequency trading			
			BankTech	InsurTech	RegTech
			FinTech domain		

on InsurTech. Following the scope of Electronic Markets, most papers address transformations affecting the network and/or the external organizational level. The paper that presents research on the internal level (paper 8) refers to potentials within an electronic market organization.

The first paper is titled “Understanding FinTech start-ups” and authored by Henner Gimpel, Daniel Rau and Maximilian Röglinger. It presents a taxonomy of service offerings based on non-functional characteristics to classify consumer-oriented FinTech start-up service offerings that is derived from 227 cases (Gimpel et al. 2018). Although the authors do not explicitly apply a specific theoretical lens, they pursue a systematic taxonomy development process. The empirically validated taxonomy serves to define the mechanics underlying FinTech service offerings, thereby creating a foundation for the design of innovative services. It helps to understand the logic of consumer-oriented start-ups and is therefore assigned to the external organization level.

The second paper explores “the digitalization impact on consumer decision making in retail banking”. Key Pousttchi and Maik Dehnert focus on how digitization of financial services influences consumer decision-making in retail banking (Pousttchi and Dehnert 2018). The paper contributes to understanding customer contacts and applies decision theory to specify (personal, social, attitudinal, and other) factors that influence decisions by retail banking consumers to search, purchase, and finally use a new financial service. In the FinTech transformation matrix, it may be assigned to the network transformation level (design of external relationships with customers) and the BankTech column.

The third article investigates “transformational characteristics and transformational capabilities of InsurTech innovations”. Emanuel Stöckli, Christian Dremel and Falk Übernickel analyze 200 InsurTech innovations and distinguish between innovations that create value on the firm level and those that create value on the network level (Stöckli et al. 2018). The paper provides a broad perspective on transformation since besides internal and network level aspects, the logic of InsurTech businesses is discussed as well. The authors apply grounded theory to derive a typology of six InsurTech innovations and resource-based view theory to identify 14 transformational capabilities that influence the six innovation types.

The fourth paper contributes to “Understanding financial institutions’ participation in the nascent mobile payments ecosystem”. Kui Du aims to explain why US credit unions innovate their financial services by participating in the nascent mobile payments ecosystem – or not (Du 2018). The author uses three theories to define the three factors: prospect theory to define the factor “performance loss”, resource dependency theory to define the factor “customer facing IT capabilities”, and institutional theory

to define the factor “competitive pressure”. The research contributes to BankTech with an emphasis on the external organization level.

The fifth contribution is titled “From chaining blocks to breaking even” and analyzes the long-term sustainability of bitcoin proof-of-work mining between 2012 and 2016. Jona Derks, Jaap Gordijn and Arjen Siegmans analyze the actors involved in the Bitcoin network as well as the value flows between these actors, using publicly available data (Derks et al. 2018). They conclude that the Bitcoin network has not been sustainable over most of the investigated period and that the network will only become sustainable if more computationally efficient algorithms become available (leading to 50% reduction of electricity costs) or if miners receive substantially higher Bitcoin mining fees (+50%). The research applies network theory and the E3 value modeling method to calculate profitability and sustainability of the Bitcoin financial network, in particular for the proof-of-work mining method.

The sixth research raises the question “How do investors decide?” and investigates factors that influence how crowd-investors make investment decisions. Andreas Hoegen, Dennis M. Steininger and Daniel Veit find that decision making in crowdfunding differs from traditional financing decisions. They provide insight in crowdsourcing processes at the network level and apply decision theory to analyze investment decisions in crowdfunding (Hoegen et al. 2018). Based on a meta-analysis of 68 published studies, they find differences between factors influencing investment decisions in crowdfunding versus traditional financial decisions. Social capital is identified as a key factor for crowdfunding investment decisions and requires not only personal contacts to important individuals and investors but also a wide social reach to create awareness for the campaign and win many early investors. Other factors required for attracting crowdfunding investments are digital platforms as well as platform design and features.

The seventh contribution from the special issue call is on “Designing a robo-advisor for risk-averse, low-budget Investors”. Dominik Jung, Verena Dorner, Christof Weinhardt and Hakan Puzmaz observed that customers were reluctant to adopt new FinTech solutions from banks and identified a lack of usability as a main inhibitor (Jung et al. 2018). They address this problem by applying a combined approach based on technology acceptance theory (“ease-of-use” and “usefulness of technology”) and cognitive load theory (“cognitive limitations of the user”) to derive four design principles for firms that aim at developing robo-advisor solutions in banking. The validation shows that these principles are helpful in implementing and improving the customer-oriented

perspective, which has been recognized as an important ingredient of FinTech.

The eighth and final paper “Computational speed and high-frequency trading profitability” was authored by Alexandru-Ioan Stan and focuses on high frequency traders in equity markets. It pursues the research question of how data processing power, news accuracy, and news arrival intensity may affect trading profitability under different trading strategies (Stan 2018). Based on IT productivity theories the author evaluates how the performance of high frequency securities trading is affected by the trading behavior of the traders, the market conditions for securities trading, and the news accuracy and news intensity offered to the traders. The Monte Carlo simulation experiments reveal that IT investments enhance the trading performance of ultra-high-frequency traders more than high-frequency traders.

Summary and outlook

The goal of this preface was to introduce the FinTech special issue with a summary on the evolution of the FinTech phenomenon and to derive the formative elements, which may serve to explain why FinTech provides disruptive potential for the financial industry and goes beyond a simple linear continuation of existing developments. As described in the retrospective, financial technologies date back to the beginning of financial institutions and the current FinTech phase started around 2008. On the one hand, this phase builds on the evolution and convergence of multiple technologies (e.g. mobile devices, wireless networks, web technologies), on the other hand, neither customer-orientation nor innovation or entrepreneurial spirit featured the same presence and combination prior to the FinTech movement. To structure how FinTech-induced transformation of the financial industry might occur, the preface introduced a framework that divides FinTech regarding the subdomains banking (BankTech), insurance (InsurTech), and regulations (RegTech) at the three transformation levels: internal, network and external.

First, the submissions to the special issue reflect the dominance of the banking sector within the FinTech domains. Although these papers provide additional insights in focused areas of the broad field of FinTech, more research on the two other FinTech domains (InsurTech, RegTech) deems necessary. While the paper on InsurTech points at the existence of numerous innovations, a brief analysis undertaken on Google Scholar confirmed the impression of only limited available research in the RegTech domain. This is remarkable since legal and regulatory requirements and checks have accrued in view of the growing regulation that has occurred in the financial industry after the financial crisis of 2008. RegTech

solutions aim to automate standard procedures and to provide suggestions for more complex decisions. As the analysis from Deloitte (2016) suggests, RegTech start-ups not only focus on compliance, but also on identity management, risk management, regulatory reporting and transaction monitoring. From these new business models, an increased outsourcing of regulatory activities may be expected, which will lead to more digitalization and networking in the financial value chains.

Second, only little attention has also been given to the link of FinTech innovations to the primary sector. As mentioned in the third paragraph of this preface, the main purpose of the financial sector is to enable transactions in the primary market. Among the examples payment and cash flow solutions, that support supply chains in the manufacturing industry, are integrated. Another example is the diffusion of (smart) service models (e.g., seamless transactions within the sharing economy) which are more transaction-intensive than the goods-oriented models. Such innovations provide opportunities for incumbents, start-ups, and intermediaries, thereby blurring the boundaries between industry sectors and the finance sector. Besides an increased integration of FinTech solutions with the primary sector, another path of integration points at a stronger integration in the secondary sectors. With the maturity of FinTech businesses, questions of interoperability between FinTech systems and traditional core banking systems will have to be addressed to overcome the isolated nature of many today's FinTech models. New business models emerge at these interfaces, which will further propel the FinTech movement at the network level. Clearly, more research on business model innovations across industries is needed here.

Third, these blurring boundaries are fueled even further by the debate on blockchain (or distributed ledger) technologies. By changing the transfer of digital assets and property rights within and across industries they are believed to create new FinTech business opportunities. Although research in this area has emerged from the banking domain (e.g., electronic currencies, in particular Bitcoin), broader research on the use of these infrastructures of value is only evolving and more engaged scholarly attention is needed to fully grasp the developments at the interface of different technologies and industries as well as the related flows of assets and services. One possible path of evolution was suggested in a recently published editorial of *Electronic Markets* on the “co-evolution hypothesis”, whereby the availability of decentralized technological infrastructures might also enable decentralized forms of conducting business (Alt 2018).

Fourth, FinTech businesses are more IT companies than financial providers were before. However, even for FinTech companies IT supports a business purpose and they also have to meet the classical and recurring challenge in IT organizations known as “misalignment between business and IT” (Peppard and Ward 1999). The difference in organizational

cultures between the existing finance industry and entrepreneurial startups is also visible in the way IT architecture is envisioned: IT managers in the incumbent industry tend to focus on designing architectures, definitions and ontologies, instead of focusing on business impact or customer-orientation. In contrast, business managers often demand “tell me which technology we need, then I will deal with the business impact”. This misalignment between IT and business needs to be solved for establishing an organization-wide digital mindset and for adopting the entrepreneurial spirit that is known from start-up companies. While incumbents need to learn how to generate innovation from “inside out” and to implement the outcome of their innovation entities (e.g., research/innovation labs, think tanks, satellite start-ups) on a larger scale, start-up businesses will also need to meet the challenge of scaling up and of maintaining the innovative start-up momentum with their organizational growth.

This special issue aimed to shed light on several fields that merit further research. Hopefully, the collection of research articles included in the special issue provided some impulse in this regard and towards financial services to become more customer-oriented. We wish to thank all authors, reviewers and editors that were involved in making this special issue possible and hope you enjoy reading it.

References

- Alt, R. (2018). Electronic Markets and current general research. *Electronic Markets*, 28(2), 123–128. <https://doi.org/10.1007/s12525-018-0299-0>.
- Alt, R., & Puschmann, T. (2012). The rise of customer-oriented banking - electronic markets are paving the way for change in the financial industry. *Electronic Markets*, 22(4), 203–215. <https://doi.org/10.1007/s12525-012-0106-2>.
- Alt, R., & Puschmann, T. (2016). *Digitalisierung der Finanzindustrie – Grundlagen der Fintech-Evolution*. Springer, Berlin/ Heidelberg.
- Amer, D. W., Barberis, J., & Buckley, R. P. (2016). The evolution of FinTech: A new post-crisis paradigm? *Georgetown Journal of International Law*, 47(4), 1271–1319.
- Amer, D. W., Barberis, J., & Buckley, R. P. (2017). FinTech, RegTech and the reconceptualisation of financial regulation. *Northwestern Journal of International Law and Business*, 37(3), 371–413.
- Bain & Company (2017). Evolving the customer experience in banking. http://www.bain.de/en/Images/BAIN_REPORT_Evolving_the_Customer_Experience_in_Banking.pdf, accessed July, 23, 2018.
- Beck, H. (2001). Banking is essential, banks are not. The future of financial intermediation in the age of the internet. *Netnomics*, 3(1), 7–22. <https://doi.org/10.1023/A:1009927623530>.
- Bons, R. W. H., Alt, R., Lee, H. G., & Weber, B. (2012). Banking in the internet and mobile era. *Electronic Markets*, 22(4), 197–202. <https://doi.org/10.1007/s12525-012-0110-6>.
- Bouwman, H., den Hooff, V., van de Wijngaert, L., & van Dijk, J. (2005). *Information and communication technology in organizations: Adoption, implementation, use and effects*. Sage Publications. <https://doi.org/10.4135/9781446211519>.
- CBInsights (2018). Global Fintech report Q1 2018. <https://www.cbinsights.com/research/report/fintech-trends-q1-2018/>, accessed July, 23, 2018.
- Davies, S., Jackett, D., Kashyap, M., Nicolacakis, D., Qureshi, M., & Shipman, J., (2016). Customers in the spotlight: How FinTech is reshaping banking - Global FinTech Survey 2016. PricewaterhouseCoopers. <https://www.pwc.com/il/he/bankim/assets/fin-tech-banking.pdf>, Accessed June 9, 2018.
- Deloitte (2016). RegTech is the new FinTech: How regulatory technology is helping firms better understand and manage their risks. Deloitte. https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/FinancialServices/IE_2016_FS_RegTech_is_the_new_FinTech.pdf, Accessed July, 23, 2018.
- Derks, J., Gordijn, J., & Siegmans, A. (2018). From chaining blocks to breaking even: A study on the profitability of bitcoin mining from 2012 to 2016. *Electronic Markets* 28(3).
- Dhar, V., & Stein, R. M. (2017). FinTech platforms and strategy - integrating trust and automation in finance. *Communications of the ACM*, 60(10), 32–35. <https://doi.org/10.1145/3132726>.
- Du, K. (2018). Complacency, capabilities, and institutional pressure: Understanding financial institutions' participation in the nascent mobile payments ecosystem. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0267-0>.
- Ehrenfeld, J. (2017). Securities market automation from standards to self-learning machines: Current state and future perspectives. *Journal of Securities Operations & Custody*, 9(3), 245–252.
- Gellrich, T., Hackethal, A., & Holzhäuser, M. (2005). Vertical integration and bank performance. In O. K. Ferstl, E. J. Sinz, S. Eckert, & T. Isselhorst (Eds.), *Wirtschaftsinformatik 2005* (pp. 547–566). Heidelberg: Physica. https://doi.org/10.1007/3-7908-1624-8_29.
- Gimpel, H., Rau, D., & Röglinger, M. (2018). Understanding FinTech start-ups - a taxonomy of consumer-oriented service offerings. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0275-0>.
- Gomber, P., Koch, J.-A., & Siering, M. (2017). Digital finance and FinTech: Current research and future research directions. *Journal of Business Economics*, 87(5), 537–580. <https://doi.org/10.1007/s11573-017-0852-x>.
- Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the FinTech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of Management Information Systems*, 35(1), 220–265. <https://doi.org/10.1080/07421222.2018.1440766>.
- Goodale, J. (2012). Bank 1.0 and Bank 2.0 success entails learning from each other's best practices. Whitepaper TSYS, <https://digitalpayments.files.wordpress.com/2013/03/bank-1-0-and-bank-2-0.pdf>, Accessed June 9, 2018.
- Gopalan, S., Jain, G., Kalani, G., & Tan, J. (2012). Breakthrough IT banking. *McKinsey on Business Technology*, 26(Spring), 30–35.
- Hoegen, A., Steininger, D.M., & Veit, D. (2018). How do investors decide? An interdisciplinary review of decision-making in crowdfunding. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0269-y>.
- Jung, D., Dörner, V., Weinhardt, C., & Pusmaz, H. (2018). Designing a robo-advisor for risk-averse, low-budget consumers. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0279-9>.
- Lawrence, G. B. (2016). Adaptive financial regulation and RegTech - a concept article on realistic protection for victims of bank failures. *Duke Law Journal*, 66(3), 567–604.
- Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges. *Business Horizons*, 61(1), 35–46. <https://doi.org/10.1016/j.bushor.2017.09.003>.
- Malone, T. W., Yates, J., & Benjamin, R. I. (1987). Electronic markets and electronic hierarchies. *Communications of the ACM*, 30(6), 484–497. <https://doi.org/10.1145/214762.214766>.

- Marinč, M. (2013). Banks and information technology: Marketability vs. relationships. *Electronic Commerce Research*, 13(1), 71–101. <https://doi.org/10.1007/s10660-013-9107-2>.
- Marjanovic, O., & Murthy, V. (2016). From product-centric to customer-centric services in a financial institution – Exploring the organizational challenges of the transition process. *Information Systems Frontiers*, 18(3), 479–497. <https://doi.org/10.1007/s10796-015-9606-x>.
- Němcová, Z., & Dvořák, J. (2013). Technology payment cards communication with banking institutions in the field of cashless payment. Scientific papers of the University of Pardubice. *Series D, Faculty of Economics & Administration*, 18(26), 116–128.
- OECD (2018). Income statement and balance sheet. <https://stats.oecd.org/>, accessed July, 23, 2018.
- Olanrewaju, T. (2013). The rise of the digital bank. *Financial Times*, Oct. 25.
- Peppard, J., & Ward, J. (1999). ‘Mind the gap’: Diagnosing the relationship between the IT organisation and the rest of the business. *Journal of Strategic Information Systems*, 8(1), 29–60. [https://doi.org/10.1016/S0963-8687\(99\)00013-X](https://doi.org/10.1016/S0963-8687(99)00013-X).
- Pousttchi, K., & Dehnert, M. (2018). Exploring the digitalization impact on consumer decision making in retail banking. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0283-0>.
- Schwab, F., & Guibaud, S. (2016). The rise of BankTech—the beauty of a hybrid model for banks. In S. Chishti & J. Barberis (Eds.), *The FinTech book* (pp. 245–247). Wiley, Chichester.
- Shim, Y., & Shin, D. (2016). Analyzing China’s fintech industry from the perspective of actor–network theory. *Telecommunications Policy*, 40(2–3), 168–181. <https://doi.org/10.1016/j.telpol.2015.11.005>.
- Stan, A.-I. (2018). Computational speed and high-frequency trading profitability: An ecological perspective. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-017-0264-3>.
- Stöckli, E., Dremel, C., & Uebernickel, F. (2018). Exploring characteristics and transformational capabilities of InsurTech innovations to understand insurance value creation in a digital world. *Electronic Markets*, 28(3). <https://doi.org/10.1007/s12525-018-0304-7>.
- Venkatraman, N. (1994). IT-enabled business transformation: From automation to business scope redefinition. *Sloan Management Review*, 35(2), 73–87.
- Zhu, K., Kraemer, K. L., Xu, S., & Dedrick, J. (2004). Information technology payoff in E-business environments: An international perspective on value creation of E-business in the financial services industry. *Journal of Management Information Systems*, 21(1), 17–54. <https://doi.org/10.1080/07421222.2004.11045797>.