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An Eco-Systematic View of Cross-Sector Fintech: The Case of Alibaba and Tencent

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Abstract: This paper explores the most recent Fintech (financial technology) phenomenon from an ecosystem perspective. Differentiated from the earlier Fintech evolution led by traditional financial institutions, "cross-sector" Fintech that operates at the intersection of financial services and information technology disrupts existing business models of banks while creating novel ecosystem dynamics. This study explores the Fintech ecosystem composition to understand better business model innovation based on underlying ecosystem dynamics while focusing on the specific role of cross-sector actors. These actors have escaped scrutiny despite being mature and experienced and having strong resource bases. Adopting a comparative case study method by considering the China-based Alibaba Group and Tencent, the study's findings indicate that novel business model developments based on strong technological expertise and scale-based resources by cross-sector Fintech render a functional perspective on fast-developing Fintech industry less practical. Apart from cross-sector Fintech, investors constitute a new dimension in the conceptualization of the Fintech ecosystem. Overall, the interconnectedness of the cross-sector Fintech beyond the Fintech sectors drives the fuzzy boundaries between ecosystems, established business models, terminology definitions, ecosystem actors' roles and relationships, which appear to become more heterogeneous and changeable over time. The study contributes to the scant literature on Fintech ecosystems and their sustainable development.

Keywords: ecosystem; Fintech business model; cross-sector Fintech; financial technology; Alibaba; Tencent; Asia; China

1. Introduction

The intrusion of digital technology into financial services, commonly referred to as financial technology (Fintech), has triggered significant growth in new business models and unprecedented changes in the finance sector [1,2]. Nearly every financial service is nowadays being targeted by Fintech, either to reduce costs or serve customers better, while ultimately disrupting the financial incumbents [3–5]. Fintech has been deemed important as a key driver for financial development, inclusion, social stability and integrity, and consequential sustainable development through building an infrastructure for an innovative digital financial ecosystem [6].

Innovation is a perpetuating part of Fintech's nature base, not only on product-focused logic in financial services [3] but also on building a Fintech ecosystem including customer-oriented logic [6,7]. Tech-savvy customers now expect a seamless experience across various services, responsive and personalized to their needs and wide access [8–10]. New business models arose [2,11,12] often based on value creation for customers that became much more disintegrated both vertically and horizontally, requiring and creating the opportunity for interfirm relations [13]. Fintech not only contributed to major improvements in efficiency and customer orientation by cooperating with traditional incumbents,

but they also embarked more recently to differentiate themselves from traditional financial firms with personalized niche services, data-driven solutions, an innovative culture, and a nimble organization [12]. To keep pace with Fintech market dynamics, sharing development risks, access to synergistic knowledge, and to gain legitimacy, interfirm relations and networks amongst Fintech are important [14,15]. Hence, Fintech differs from traditional financial innovation but fundamentally is disruptive in terms of the financial system and other infrastructures, which in turn impacts the sustainability of economic development as well as societal aspects [16].

While the ecosystem perspective has been advocated to be a particularly useful conceptual framework to capture essential network dynamics between key players and resources [13], the analysis of the Fintech ecosystem is still in its infancy. The scant research largely focuses on Fintech startups and incumbent banks [5,15,17], overlooking the potential role of cross-sectoral technology players operating and offering financial products and services [2,7]. To make the Fintech ecosystem an innovation platform for sustainable economic growth [18], the comprehensive capabilities of these cross-sectoral technology players have been critical. Indeed, Fintech has been seen as important not only for the generation of economic value, but also for sustainable development as they allow for financial inclusion and more balanced sustainable development at the same time [6,16,19].

The purpose of this study is to explore the position of cross-sector Fintech in the Fintech ecosystem composition to better understand its drive to business model innovation and development. We assess the specific role of cross-sector players by carrying out a comparative case study analysis. We map their role to provide a foundation for future predictive or prescriptive analyses on the converging structures and dynamics of the Fintech ecosystems. This furthers our understanding of the role of cross-sector Fintech companies for a sustainable ecosystem that provides lasting benefits for clients and society at large. In addition, the unique focus on empirical research on Chinese Fintech companies helps to contrast Western theory in a new context that, despite a sharp rise in importance internationally, is less scholarly analyzed.

2. Literature Review

Without a doubt, we live in an era where an increased number of actors provide financial services and develop technology faster [20]. Fintech is an enticing phenomenon and has caught the attention of many. A search on Google Scholar on 4 July 2020, found 48,000 results of publication in 0.03 s. The result of the search increased to 48,300 items only six hours later. This number augmented to 52,800 publications on 7 August 2020 with a 9.3% increase in 34 days, meaning an average of 141 new scholarly publications per day. However, the surge in interest and publication is accompanied by ambiguity over just what the term Fintech covers [21]. For our study, we adopt the straightforward definition by Dorfleitner, Hornuf, Schmitt and Weber, according to which Fintech is "companies [. . .] that combine financial services with modern, innovative technologies [. . .], offer[ing] Internet-based and application-oriented products" [22] (p. 5). To understand the existing literature of the Fintech ecosystem, we first searched the literature on Web of Science (WoS) with keywords Fintech, ecosystem, and their related terms. From the identified literature, we further extended the literature review to the related fields. As innovation is an inherent part of Fintech's nature since its inception, differing from traditional financial innovation [16], we next share the broader understanding of the field about Fintech and its business model innovation before discussing the relevance of the ecosystem perspective to understand better the Fintech phenomenon and the role of cross-sector actors in Fintech business model innovation.

2.1. Fintech and Its Business Model Innovation

The use of the term Fintech dates back to the early 1990s' "Financial Services Technology Consortium" to foster technological cooperation amongst banks [20]. In a broad sense of Fintech, regarding the evolution of Fintech 1.0 (1866–1967, analog revolution) and Fintech 2.0 (1967–2008, global and digital era), banks took the lead in technological innovation to grow the banking and financial

services [20,23]. This technological innovation led to product innovation thereby not only provoking organizational process transformation to adapt to new technology, but also generating new business models to maximizing the value appropriation of the returns created by the innovation.

However, since Fintech 3.0 (2008-present) [20], Fintech start-ups rather than traditional actors have led the Fintech business model innovation which is characterized by strong customer-oriented digitization [7]. Fintech applications are centered around customers and their processes, which redefined the previously product-centered logic. Traditionally, consumers accessed financial services through one or more large institutions, which typically offered a broad product portfolio including retail, private, commercial, investment and transaction banking, along with wealth, asset management, and insurance, also called the "universal model" [24]. Nowadays, consumers, rather than relying on a single institution for their needs, are beginning to pick and choose services they would like from a variety of Fintech companies, rendering the bank-based model less relevant [8,12,24]. Today's customers are more informed, demand a higher level of transparency related to products and services; they are more tech-savvy and expect an all-in-one and flowing experience across various services, responsive and personalized to their needs, while accessible any time [8–10,25]. This demand for seamless experience requires business transformation at the system level, rather than singular product innovation. Hybrid and overlapping forms of interaction-based customer processes and journeys became the center of present-day financial products and services design [7,26]. Financial services were increasingly digitized through mobile wallets, payment apps, automated wealth and retirement planning advisors, crowdfunding, online lending platforms amongst others [27–29].

The strong impact of digitization of the financial service industries is explained through the fact that the financial sector products and services are closely tied to information, if not to say almost exclusively [7]. For instance, payment transactions and credit contracts tend not to require any physical component; online payment or stock trading processes are almost entirely implemented without any physical interaction [3,7]. Even traditional client advisory tasks, which tended to include more personal interaction as part of the customer relationship management, can now be automated through robo-advisors or the use of artificial intelligence [3,11]. Some of these advancements have become even more popular due to COVID-19, with people across the globe fearing touching cash [30]. Moreover, banking and insurance are highly transaction-based industries that create large amounts of data. The automatic processing of the generated data allows Fintech to operate far more efficiently and enables them to make use of technologies, such as data analytics or artificial intelligence, to retain and expand their customer base while managing their risks [31].

These technological advances vastly improve the connectivity that exists within financial services and explain Fintech's success and its disruptive potential [5]. At the same time, they also explain the incursion of cross-sector actors amongst Fintech [7]. The strong technological component in these developments, which digitally transformed other segments of the economy such as tourism (AirBnB), retail (Amazon, Alibaba), telecommunication or multimedia (Apple, WhatsApp, Netflix), have allowed such technology companies to enter into financial services, across the world. These firms exploit their technological expertise to their competitive advantage. Puschmann, for example, points to the cooperation between O^2 Telefonica and Fidor Bank, a German online bank [7] and highlights the increasing cross-industry competition with formerly pure technology companies such as Apple or Alibaba to develop financial services on their own platforms [15,17].

The rate of technological change has been exponential and hence novel technology itself hardly creates a sustainable competitive advantage when implemented as a standalone element [32]. By contrast, novel business models and their designs enable the reconfiguration of business capabilities to adapt the firm to the changing business environment and thereby constitute a key ingredient toward Fintech success [33]. Research on Fintech business models has grown fast in recent years with 1013 citations in 2017, in contrast with only 14 in 2007 [34]. As an emerging field of research, however, it is not surprising that Fintech has been categorized in various forms and Fintech business models have also been interpreted differently [1,2,11,35,36]. Fintech can be classified according to subsectors or from

a functional perspective [11,35]. For instance, Arner et al.'s typology of the Fintech industry comprises five categories, finance and investment, internal operations and risk management, payments and infrastructure, data security and monetization, and customer interface [19]. Palmié et al. take a broader approach and identify six business sectors, which are called Fintech applications, including banking, payments, crowdfunding, InsurTech, RegTech, and wealth management [5]. Other scholars start to categorize the ever-growing number of Fintech according to their distinct business models, as these reflect better the specific value propositions and operating mechanisms of the firms [12]. Lee and Shin identify six business models—payment, wealth management, crowd-funding, lending, capital markets, and insurance services [12]—while Liu, Li and Wang integrate extant conceptualizations and employ their scientometric analysis on nine business model categories: Online lending/online peer-to-peer lending/P2P lending, crowdfunding/crowd investing, transaction and payment terminals, personal finance management, digital currency/cryptocurrency, mobile point of sale, Robo-advisors, e-banking, and InsurTech [34].

Though terminology used for Fintech business models varies depending on the scholars, Liu, Li and Wang conclude that traditional theories largely no longer apply to understand the Fintech sector [34]. In the beginning, Fintech focused on improving specific parts of the so-called "universal model", where Fintech revolutionized financial services with major improvements in efficiency, customer orientation [1,3]. However, Fintech then embarked to differentiate themselves from traditional financial firms with personalized niche services, data-driven solutions, an innovative culture, and a nimble organization [12]. These continuous dynamics in the financial service sector, particularly driven by the rapid spread of mobile phones, rendered Fintech´s ability to adapt and to innovate in personalized services [37], based on platform- and system-level transformation. To facilitate such adaptation and innovation processes, Fintech acquires, combines, integrates and develops internal and external know-how [38]. Hence, an understanding of Fintech and its business model innovation can be better approached from a Fintech business ecosystem perspective. The conceptualization of industries and markets as business ecosystems is an established perspective both in the management and strategy academic or practitioner-oriented literature [39,40]. In service science, this perspective has been particularly advocated as a conceptual lens to capture the essential network dynamics between actors and resources [13].

2.2. Fintech Ecosystem and Its Business Model Innovation

Ecosystems, in the biological literature, are communities of organisms interacting over time and space, with other organisms and adopting by themselves. Business strategist James Moore adopted this biological concept by comparing companies operating in the increasingly interconnected world of commerce to a community of organisms adapting and evolving to survive [39]. Moore suggested that a company needs to be viewed not as a single firm in an industry, but as a member of a business ecosystem with participants spanning across multiple industries. Adopting an actor-to-actor orientation, the ecosystem perspective assumes that markets consist of a heterogeneous, interconnected, and continuously evolving set of actors that adopt specific roles, co-create value, and depend on each other for development and existence [13,41].

Typical business ecosystems are characterized by a few prominent actors (keystones) and many smaller ones (complementors and niche players) [12,39]. With the increasing complexity of Fintech products and services, value creation is disintegrated both vertically and horizontally, requiring and creating the opportunity for interfirm relations across the network of unique relationships among Fintech startups, key industry partners, financial regulators, investment community, B2B partners and end customers [13]. These interfirm relations are found to be particularly valuable in highly dynamic and newly created markets as they permit actors to share risks in the development, have access to synergistic knowledge, and to gain legitimacy [14,15]. Indeed, the Fintech ecosystem has been shown to be an effective organizational form to improve firm performance, innovation speed, and sustainable economic growth [17,18,40], since external knowledge apart from internal R&D is important for innovation and

sustained business success [42,43]. To support innovation, companies enter cooperation, bring their expertise to and benefit from other companies' knowledge, technologies, and resources [44]. However, the ecosystem actors are far from being homogeneous; they are differently motivated and respond in a different way to changes [45]. Hence, effective value creation and customer delivery require a cautious orchestration between these actors [40]. Business model innovation in the Fintech ecosystem is about "multilateral negotiations with multiple stakeholders that have potentially diverging preferences" [46] (p. 477). A symbiotic Fintech ecosystem is instrumental for Fintech business model innovation as the actors need to take themselves into account when developing services and adapting the organization [15,44].

At the same time, the evolving innovation occurring in the Fintech sector strengthens the platform building and eco-systematic effects in the financial industry. It is commonly acknowledged that Fintech's innovativeness impacts the entire financial sector, and even all areas of business [47–50]. This is evident in the alterations and changes in products and service offerings, market segments, operations, organizational structures, risk management, consumer experiences and industry dynamics [51]. The disruptive impact of Fintech is so profound that the competitive structure of the financial industry and the Fintech ecosystem is spreading across such areas as insurance and investment decision making [52]. Fintech companies are devoting on ecosystem building to amplify their business expansion opportunity, converting into technology providers not only for financial institutions, but also for insurance, agriculture, transportation, manufacturing, and so on [53–56].

The Fintech ecosystem is unique in the sense that an established industry with large actors (banks) is being transformed not only by the entry of small players across a variety of market segments [1], but also by cross-sector players all of which develop Fintech solutions [7,15]. The latter may have a profound impact not only through the creation of new products, services, and business models, but also on the financial services value chain [55,56], which would change the collaborative and competitive fabric of the overall ecosystem [25,57]. At the present day, the interactions of these cross-sector players with other actors within the Fintech ecosystem are just beginning to come out. The popular conceptualization of the Fintech ecosystem by Lee and Shin includes five elements, including Fintech startups, technology developers, government, financial customers, and traditional financial institutions [12]; and thereby leaving aside cross-sector Fintech. While there is an increasing number of studies focused on the structure and dynamics of business ecosystems [58,59], research on the Fintech ecosystem is still in its infancy [1]. Extant scant Fintech ecosystem research focuses on the evolution of the Fintech ecosystem [5], its characteristics [12,37] and its further cultivation [17,34] largely with a focus on Fintech startups. Research at present has hardly articulated the role of larger cross-industry actors, normally technology companies entering the financial market by developing in-house Fintech [2,7]. This is surprising because these cross-sector actors such as Apple, Alibaba amongst others not only possess the appropriate technologies and the capability to develop them further, but also have a large existing customer base as potential targets for their Fintech services.

Additionally, Fintech startups need to compensate for their lack of technological capabilities and engagement in R&D activity by relying on the market to drive changes and by subsequently engaging in new marketing, design, or organizational practices [60,61]. The cross-sector actors, by contrast, have often access to central company resources to rely on R&D activity and to drive Fintech innovation. They are experienced eco-system players with brand recognition, scale economies and resource leverage, while Fintech startups often confront a "liability of newness", in other words, they struggle for visibility, influence and legitimacy within a competitive market [15,62].

3. Research Methodology

3.1. Case Selection

Haddad and Hornuf consider that Fintech occurs more frequently in well-developed economies or more fragile financial sectors [63]. However, we infer that these may not necessarily be conditional

factors for the occurrence of Fintech. China, for instance, is an emerging market economy [64], while its financial sector is relatively well established with tight central control and a highly developed banking system; The Banker magazine had Chinese banks taking the top four spots in their 2020 ranking of global banks based on Tier 1 capital, a key measure of banking strength [65]. However, China has been at the forefront of Fintech growth and is the largest Fintech market in the world [66]. The 2019 Fintech100 report indicates that Chinese Fintech has continued to lead the Fintech 100 [67]. According to the UBS Group, 80% of smartphone users in China pay by mobile, the highest rate in the world [68]. Most users (54%) employ third-party mobile payment providers, most commonly WeChat Pay (Tencent) and Alibaba's Alipay [64]. Therefore, we selected Chinese cross-sector Fintech companies for the purpose of this study.

Moreover, it can be said that since the publication of The Principles of Scientific Management by Fredric Taylor, management theory has been dominated by Western thinking [69]. Despite the rising research interests and publications of the Chinese context [70], the proportion of English publishing articles on Chinese businesses, including Fintech, is still disproportionate, compared to Chinas relevance and rise as the second-largest economy in the world. Given the Fintech ecosystem is still in the infancy stage, and cross-sector Fintech is under-studied, we employed a multiple case study design. This design allows for exploration and is deemed to be advantageous because the subject Fintech is a recent and underexplored phenomenon that requires documentation, interpretation and explanation [71].

With respect to Fintech, Alipay and WeChat Pay are two major actors in the Chinese Fintech sector which started as mobile payment service providers. Alipay belongs to Ant Group, which is part of Alibaba Group, while WeChat Pay belongs to Tencent. Mobile payments expanded to other financial services. In 2018, WeChat Pay and Alipay processed an incredible 1.7 billion transactions per day, enabling both companies to evaluate consumers´ creditworthiness based on transaction data. With this information, WeChat Pay and Alipay began to lend to consumers and moving into B2B, focusing on small businesses [64]. Alibaba's and Tencent's influence extends beyond the Chinese economy and both rival each other, scrambling for new growth opportunities outside China [72]. By 2019, Alipay and WeChat Pay users spanned 54 and 49 countries respectively [64]. Alipay gained more prominence recently as it expected to become the most valuable Fintech company in the world when listed in Hong Kong and Shanghai stock exchanges [73]. Hence, we consider it would be important to explore the cases of Alibaba and Tencent to understand their Fintech business model in building Fintech ecosystem.

The Chinese contextualized cases may also provide an opportunity to further extend theoretical development generated in the Western Fintech ecosystem field. We intend to explore both the similarity and differences across these two cases, providing their high level of comparability (see Table 1).

Table 1. Comparative Data of Alibaba and Tencent.

	Alibaba	**Tencent**
Founding Time	1999	1998
Original Business	E-Commerce	Messaging
Cross-sector Fintech	Yes	Yes
Other Main Businesses	Entertainment, Logistics, Travel, etc.	Entertainment, Social Networking, Literature, etc.
Business Position	Top Ranked	Top Ranked
Employees Number	117,600	62,885
Comparative Annual Employees Number Change	15%	16%
Revenue 2019	509,711 million RMB	377,289 million RMB

Table 1. *Cont.*

	Alibaba	**Tencent**
Comparative Annual Revenue Change	+35%	+21%
Net Income	140,350 million RMB	98,888 million RMB
Total Assets	1,312,985 million RMB	963,986 million RMB
Market Capitalization	558.30 billion USD	459,621 million USD
Market Capitalization July 24 2020	633.55 billion USD	670,977 million USD
Mobile MAUs *	846 million	1164.8 million

Note: All data are of 31 December 2019 for Tencent, and of 31 March 2020 for Alibaba, except stated otherwise. 1 USD = 7.09886 CNY (RMB) as mid-market rate on 31 March 2020; 1 USD = 6.98708 CNY on 31 December 2019. * MAUs = Monthly Active Users. Source: Own elaboration based on data collected from Company website, Annual reports, Macrotrends.net, and Statista.com.

3.2. Data Collection and Analysis

Though there is justifiable and growing interest in exploring Chinese Fintech, extant research remains fragmented, partially due to the application and testing purpose of Western theories. To provide a more encompassing picture of the eco-systematic view on the cross-sector Fintech business model, we collected data via multiple sources to triangulate data to strengthen the validity of the case study evaluation [74]. A comprehensive and integrative review of the literature was conducted to collect existing scholarly works about Alibaba and Tencent in Fintech. Given that research publications often have some time lag with the business reality, particularly for the digital economy where change is accelerating at a faster pace than traditional business contexts, we complemented the review with appropriate authoritative publications such as reports by international institutions, e.g., the OECD, or Reuters news via Google Search or other snowball search means to create a database for comprehensive analysis. As the main data sources are secondary data, we also invited field experts and Fintech users to provide feedback and comments. Such analyst triangulation aimed at contrasting the secondary data [74].

In order to ensure the reliability of the data quality in data source triangulation, we controlled the source of the secondary data. The scholarly work for review was retrieved from the database of Thomson Reuters' Web of Science (WoS). WoS contains Social Science Citation Indexed (SSCI) journals, which guaranteed a certain level of research quality and sequentially their reliability. We approached WoS through a Chinese university because WoS in China contains not only the classical WoS Core Collection, but also the Chinese Science Citation Database. As Alibaba and Tencent are China-based, we consider it relevant to incorporate Chinese scholars' quality research work and their insights but who may be held back from international management journals due to linguistic barriers.

The search was conducted on 22 June 2020, with the keywords defined in the area of themes: (Alibaba or Tencent) AND (Fintech or financ* or bank*). The search results showed 71 outcomes covering the period of publication from 2008 to 2020. We applied the inclusion criterion of using WoS Core Collection and Chinese Science Citation Database, and in this way the results were reduced to 60 items, covering the research domain of social sciences (51), science technology (39), and arts humanities (3). We further filtered the 60 articles by screening their manuscripts' title, abstract and full text to identify the relevance of the content for our study focus. We consequently categorized them into three clusters: core (24), peripheral (14), and marginal (22). In addition, we collected 95 documents from company websites, annual reports, industrial reports, and journalistic type of contents, complemented the scholar review. In order to ensure the reliability of the information, we only took data for analysis once it could be traced to a reliable or reputed source. That is, official sources like company's web pages or annual reports, or from industry experts like Deloitte, Goldman Sachs, Boston Consulting Group, and KPMG, or from reputed media like Forbes, Nikkei Asian Review, Independent, Fintech News, BBC, Bloomberg, Techinasia, EqualOcean and Wall Street Journal. If the encountered data were

not from a reliable or reputed informant, we traced the information in an attempt to triangulate its reliability from other credible sources. If this was impossible, we did not incorporate these data for analysis. Indeed, this occurred during the data collection process with some data which were not incorporated for further analysis due to the disconformity of data reliability.

We focused on the thematic content analysis of selected 24 core papers and 95 documents, to identify the Fintech business models and the eco-systematic relationship of these two studied cross-sector Fintech companies. We first deployed the Fintech business model innovation definition of Liu et al. and complemented with Palmié et al. to codify the Fintech innovative business models of the two studied cases [5,34]. The choice of these two Fintech definition and categorization lists is mainly due to their recentness, published in 2020 in a high-quality journal of the field. As the Fintech phenomenon evolves rapidly, it is critical to refer to the latest publications which comprehend the updated literature. Then, we extended the codification of relationships with multiple stakeholders that the studied cross-sector Fintech companies interact with, within their Fintech ecosystem and interconnecting with their business ecosystem. In order to secure the internal construct validity, two researchers contrasted the preliminary findings with the conceptual definition checked with a Fintech expert, which resulted in an agreement level at the ratio of 92%. Further discussions were carried out to debate on the data and analysis with the final consensus reached. A third researcher participated in the further step of analysis and results discussion with a final agreement of 100% reached among three researchers.

3.3. Studied Cases: Alibaba Group and Tencent

3.3.1. Alibaba Group

Founded in 1999 by 18 people, led by Jack Ma, the Alibaba Group (hereafter Alibaba) successfully launched an initial public offering (IPO) in 2014 on the New York Stock Exchange, making it more well-known than ever in the global business world [75]. Its IPO was a record, surpassing previous ones and beating e-commerce rivals like Amazon and eBay [76].

Known as an e-commerce giant, Alibaba indeed has grown to a multi-channel platform embedded with multiple platforms for various business sectors [77,78]. Its major businesses like Alibaba.com, Taobao Marketplace, Tmall, 1688, Alibaba Cloud, Alimama.com, AliExpress, Ant Financial and CaiNiao cover the online business of B2B, B2C, auction, travel, games, software, technological infrastructure, social networking, logistics and financial services [79].

Ant Financial Services Group (hereafter Ant), also called Ant Group on LinkedIn, is to be changed to Ant Technology after the approval received from a Chinese regulator in June 2020 [80]. As the Fintech business unit of Alibaba, Ant is defined as a technology company offering inclusive financial services, and targeting consumers, and small and micro businesses [79]. Ant family includes Alipay, Ant Fortune, Zhima (Sesame) Credit, MYbank, and Ant Financial Cloud [81]. Ant filed for an estimated 150 to 200 billion USD valuation in its 2020 IPO, raising 30 billion USD, making it the biggest IPO ever, at the time [73].

Alipay is China's leading online third-party payment solution provider, supplying in-store payment, online payment, red packet QR code (promotional tool), and solutions (industrial specific solutions) to their customers [82]. Yu'e Bao, a money market fund, part of Ant Fortune, was the world's largest in 2019 [83].

MYbank, as a Chinese leading online private commercial bank, has served 29 million small and medium sized enterprises (SMEs) in its five years of foundation, by leveraging Ant's AI, computing and risk management technologies. It takes less than three minutes to apply for SMEs financing via mobile phone, less than one second to get approval, and zero human intervention (so-called 310-model). Reportedly, 98% of SMEs repay the loans on time with an average loan size of about 5000 USD; 80% of them had never received any business loans from banks before [79].

3.3.2. Tencent

To our surprise, Tencent is much less studied in academic work compared to Alibaba. According to our WoS searches, only 3 out of 24 core papers address Tencent while the remaining 21 manuscripts concern Alibaba's Fintech business. Founded in 1998 in Shenzhen, the firm has become a major technology conglomerate, with USD 47 billion in revenues in 2019, USD 14 billion in operating profits, 54,309 employees in 2018 and the fifth market capitalization among Internet companies in the world (USD 481 billion as of February 2020) [64], not far from giants such as Google, Amazon or Alibaba Group.

Initially notorious for its instant messaging service QQ, Tencent turned into a multinational conglomerate with an all-in-one internet platform serving entertainment, artificial intelligence and technology products around the globe. Tencent's WeChat (WeiXin in Chinese) is now the most popular messaging app with over 1.2 billion monthly active users [84]. In addition, Tencent has developed a substantial market share in the gaming industry and social networking in China [64].

With respect to its Fintech activity, Tencent strives to drive payment innovation, add payment use cases, and expand the wealth management portfolio. Tencent has been strengthening its leadership in mobile payment services, via WeChat Pay, by improving the penetration rate among offline merchants. By the end of the fiscal year 2019, there have been more than 1 billion daily average transactions, covering more than 800 million monthly active users (MAUs), and 50 million monthly active merchants (MAMs). WeChat Pay scores enhance the user's purchase propensity and loyalty to merchants. LiCaiTong is its wealth management platform, which had increased the aggregate customer assets by over 50% year-on-year according to the latest annual report; WeBank also rapidly increases its loan balances of micro-loan products [85]. Today, Tencent is one of the most active investors in Fintech along with Alibaba Group and Ant Financial [86].

The original success of Tencent in Fintech lays on the mobile payment. Tencent's WeChat Pay is one of the two most popular mobile payment methods in China along with AliPay [64]. In December 2018, the total daily transaction volume of Tencent's mobile payment services exceeded 1 billion. Upon receiving approval from the Hong Kong Monetary Authority in May 2019, Tencent entered the Fintech market in Hong Kong [85]. Business can launch promotional events via the mini-program of "in-app apps" through Red Packet QR to obtain virtual coins which can be exchanged for real currency. The "in-app apps" mini-program platform of WeChat allows Tencent to own an "app store" without owning a mobile operating system (OS) and ties its users to its expansive ecosystem. Recently Tencent sets up the MiniShop tool which simplifies largely the process to facilitate vendors build their WeChat Shops quickly without the need to request external developers' help. This accelerates the merchants of all sizes to access and sell their products on WeChat and expands the e-Commerce business unit of Tencent [84].

4. Empirical Results and Findings

4.1. Fintech Business Model Innovation

We started to categorize Alibaba and Tencent's Fintech activities according to the conceptualization of Fintech business models by Liu et al., complemented by Palmié et al. [5,34]. This process of classification was less straightforward than expected. We identified conceptualization overlaps and omissions in the pre-established definition and categorization by contrasting with Alibaba's and Tencent's Fintech business models. It indicates that even the most recent conceptualizations are outpaced by actual Fintech developments and may not explain the activities by cross-sector players. While credit rating is a relevant Fintech activity for both Alibaba and Tencent, it has been largely omitted in most current Fintech business model categorization. Many other definitions and categorization discrepancies were also discovered. The definition and categorization challenges of innovative Fintech business models exist. The next subsections describe these findings and Table 2 presents the Fintech

business models that Alibaba and Tencent have been actively involved in together with corresponding examples illustrated in the same row.

Table 2. Fintech Business Models of Alibaba and Tencent.

Fintech Business	Alibaba Examples	Tencent Examples
Electronic Payment	Alipay launched as an online payment platform (2004) Joint project with the Bank of China for quick payment with a credit card (2010) International remittance service empowered by blockchain technology (2018)	TenPay launched as an online payment system (2005)
Mobile Payment	Mobile payment service launched (2009)	WeChat Pay launched (2013)
Electronic Point-of-sale (POS)	Dragonfly as a facial recognition payment device (2018)	Frog Pro, POS machine allowing shoppers to make transactions by scanning faces at checkout (2019)
Digital Currency	N/A	Tencent QQ Coins (Q Bi) launched (2002, Virtual Currency)
Wealth Management; Micro Investing; Personal Finance Management	Yu'E Bao launched with Tianhong Wealth Management, even if with RMB1 (2013)	LiCaiTong (Wealth Management Platform) launched (2014)
E-Banking; Online Lending; Micro Finance	Alibaba Microfinance Company established (2010) MYBank received license from the China Banking Regulatory Commission (2014) MYbank established with a focus on SME financing (2015)	WEbank cofounded (2014) MOU with Asian Digital Bank Corporation to develop cloud-based financial services (2020, e-Banking)
Credit Rating	Aliloan in partnership with ICBC and CCB * to help SMEs with limited assets or credit history based on transaction histories and credibility rating at Alibaba (2007) Sesame Credit established as the first Chinese credit agency (2015)	Tencent Credit launched (2017)
InsurTech	Co-invested in Zhong An Insurance, the first Chinese online-only insurer (2013) Alihealth Internet insurance cofounded (2016)	WeSure cofounded as an insurance platform (2016) Tencent led investing in WaterDrop, a healthcare crowdfunding platform (2016, Crowdfunding)
RegTech	Uncovering insurance fraud conspiracy with NetWork Learning	ProGuard system for malicious accounts detection in online promotion with virtual currency (2015) e-Receipts Solution launched with Zi Tax Innovation Lab, cofounded with Shenzhen Tax Bureau (2018)

Note: * ICBS is Industrial and Commercial Bank of China; CCB is China Construction Bank. Source: Own elaboration based on data collected from Company website, Annual reports, other public sources or magazines like Forbes, Financial Times, CNBC and Bloomberg.

4.1.1. Electronic Payment and Mobile Payment

Liu et al. classify the payment-related Fintech business models into two categories: Transaction and payment terminals, and Mobile point of sale. From the data collected at Alibaba and Tencent, we found Electronic payment, Mobile payment, and Point of Sale (POS) [34]. Liu et al. define "Transaction and payment terminals" as "Software on the mobile devices that allows consumers to store their credit and debit cards digitally to pay for things at retailers" [34]. We found that this definition corresponded more to the mobile payment definition. From the case of Alibaba, we could see that Alipay was initially

established in 2004 as an online payment method to facilitate the e-commerce of Alibaba's mainstream business units. It was not until 2009 mobile payment was launched. Similarly, in the case of Tencent, TenPay was launched as an online payment in 2005 but WeChat Pay as a mobile payment in 2013. We refer to the former as electronic payment as any kind of payment transaction transfers (both to B2C or B2B) via electronic means. Thus, we consider mobile payment as part of electronic payment, but due to its specificity of utilizing mobile devices for payment and the popularity of the utilization of this mode, it is classified separately. In the studied cases, we also identified the differences from Liu et al.'s definition of storing "credit and debit cards digitally" [34], which both Alipay and WeChat Pay also do by recharging from an online banking account, recharge code, and call charge card while accomplishing the transaction. This adds to customers' convenience as many in developing countries do not have a debit card or credit card, and also reduces the transaction cost

4.1.2. Electronic POS

Palmié et al. include this function in the category of payments [5]. In the categorization of Liu et al., only the mobile point of sales is enlisted with the definition "The ability to process payments with credit cards or contactless with a smartphone and a credit/debit card reader" [34]. Both Alibaba and Tencent have recently developed facial recognition POS devices (Dragonfly and Frog Pro respectively) which allow consumers to scan their faces at checkout to make the payment. In this case, no credit cards or contactless, or mobile device is needed for POS. Therefore, we classify this innovative Fintech business simply as POS and define it in a broader way: Electronic POS is the ability to process payments with credit or debit cards or contactless with a smartphone and a credit/debit card reader, or any specialized devices such as facial recognition linked to financial payment data.

4.1.3. Digital Currency

Palmié et al. implicitly include digital currency and cryptocurrency in the payments category [5], while Liu et al. classify the category separately and define it together with them; "Alternative stores of value to established currencies. Many of them are encrypted" [34]. Though Alibaba and Tencent do not possess their own cryptocurrency, Tencent has a kind of virtual currency, called QQ Coins for value exchange in the communities and interchange with real currency. We also differentiate it from what commonly digital currency is understood, and the Chinese central bank launched an official digital currency to reduce the dominance of Alibaba and Tencent in the payment Fintech area [87]. As it plays a role in value and good exchanges, we include it within this category.

4.1.4. Wealth Management and Micro Investing

While Palmié et al. as well as Lee and Shin set wealth management as a category of the Fintech business model [5,12], Liu et al. only highlight robo-advisors in the Fintech business model [34]. In the case of Tencent and Alibaba, both have wealth management through their online platforms, not specifically focused on Robo-advisors, but investment platform, portfolio management, etc. Remarkably, Ant's Yu'E Bao allows customers to invest her idle balance in the money market fund with a minimum investment of RMB1 and no time restrictions or maturity regulations for fund redemption. Since its launch in June 2013, Yu'E Bao enjoyed a huge surge in popularity in China, and by February 2014 it has accumulated more than RMB500 billion of assets, with around 81 million investors, becoming the largest money market fund in China [88,89]. Along with the general wealth management through Fintech, micro-investing has been less discussed as a Fintech business model. Allowing platform users to invest at a minimum level of 1 unit of currency disrupts the current traditional investment fund model which requires a minimum amount. In this way, micro-investing collects a large amount of disposable money and makes its powerful source of money market fund. The flexibility that the platform offers with a high return—above 6% in 2014 annualized interest rate—makes it attractive [88], in addition to the trustworthiness that the giant tech company offers to back it up [90].

4.1.5. E-banking, Online Lending, and Microfinance

Liu et al. set e-banking, online lending/online peer-to-peer lending/P2P lending, and personal finance management into three separate categories [34], while Palmié et al. include banking Fintech with digital lending, personal finance, online and mobile banking, P2P lending, and investment management [5]. The Tencent and Alibaba affiliated e-banking are WEbank and MYbank which are online-only banks. Like online banks, both mainly concentrate on the small number of loans as investments, and personal finance has been taken care of by other digital financial products like Yun'E Bao. It is especially in microfinance where they outcompete with loan services from traditional banks. Of SMEs, 80% have not received any loan from bank previously [79]. Therefore, our studied cases blend micro-finance, online lending with e-Banking rather than separating them into different categories. Again, like in micro-investing, microfinance has relevance in the social and inclusive financial services providing, which has been overlooked in most previous Fintech business model studies.

4.1.6. Regtech

Liu et al. do not have any category of RegTech for Fintech business model definition [34], while Palmié et al. do consider it as a Fintech application, referring it as helping customers with the compliance process, providing tools for implementing and monitoring compliance with regulations or reforms using innovative technology [5]. We consider Tencent's ProGuard system, e-receipts for tax management (partly also e-finance) are part of Regtech activities. Giving the rapid disruption of Fintech in financial services, the growth of the digital economy and the virtualization of money, governments and regulators have been working on new regulations in different countries. Therefore, including Regtech into the Fintech business model is a necessity.

4.1.7. Credit Rating

Neither Liu et al. nor Palmié et al. have discussed credit rating as part of Fintech business models or applications [5,34]. The studied cases have highlighted the relevance of credit rating for Fintech businesses of both Tencent and Alibaba. It is especially in terms of loan lending and microfinance where most SMEs have no previous credit record which impedes their loan from a traditional bank. However, with the credit rating system of Sesame Credit (Alibaba) and Tencent Credit, their online banks can process lending in seconds with an efficient and low-cost manner. Credit rating has been considered a relevant issue, especially after the 2008 financial crisis. We consider it necessary to establish a "credit rating" as a separate category in the Fintech business model.

4.2. Fintech Ecosystem: Components, Drivers and Interrelations

The findings from the comparative case analysis lead to a refinement of the ecosystem conceptualization initiated by Lee and Shin [12] (see Figure 1). The scope and scale of Fintech activity by Alibaba and Tencent provides a strong argument to extend the current conceptualization of the Fintech ecosystem by adding cross-sector Fintech and investors to the extant five elements (Fintech startups, technology developers, government, financial customers, and traditional financial institutions). Outside of the ring of the Fintech ecosystem, there is another broader ecosystem of business. Thus, our conceptualization of the Fintech ecosystem is much wider involving a large business ecosystem composed of a value chain of suppliers, enterprises and consumers in addition to the Fintech ecosystem envisaged by Lee and Shin [12]. Table 3 exhibits the cross-sector Fintech ecosystem mapping with examples from the studied cases.

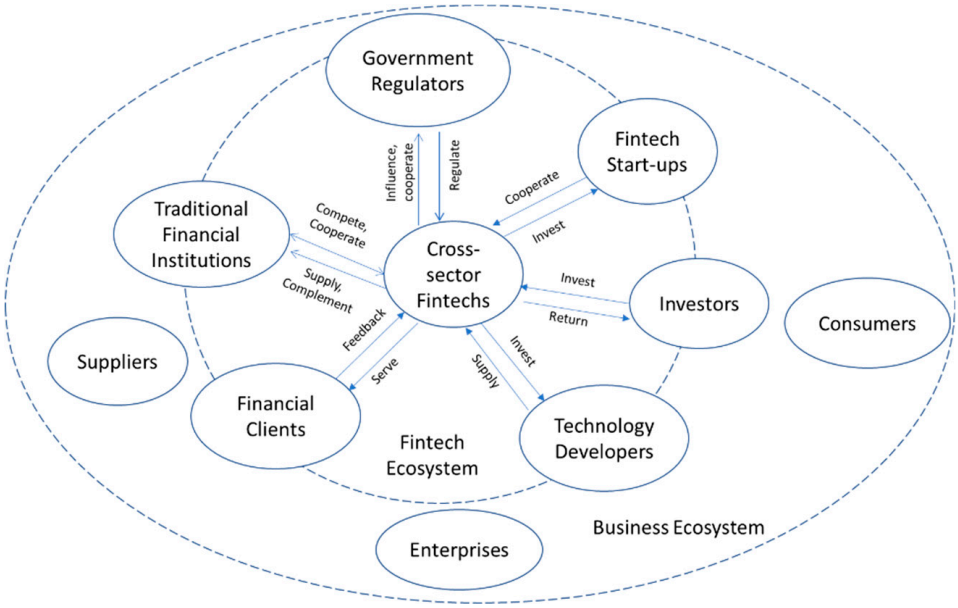

Figure 1. An Eco-Systematic View of Cross-sector Fintech.

Table 3. Cross-sector Fintech Ecosystem Mapping.

Eco-Systematic Relation	Alibaba Examples	Tencent Examples
Business Ecosystem	Alibaba founded as an e-Commerce platform (1999) Environmental protection initiatives announced (2010, environment responsibility) Agriculture finance business implemented (2014, interconnection with a sustainable business ecosystem)	Online avatar product QQ Show launched (2003, entertainment provider) QZone launched for social networking service (2005, networking service provider) Tencent Charity Foundation established (2007, social responsibility) WeChat launched as social media platform (2011)
Financial Investors	Yu'E Bao launched with Tianhong Wealth Management, even if with RMB1 (2013, micro investor) Investing in One97 Communications, an Indian Fintech startup that operates Paytm (2015)	Naspers purchased 46.5% of Tencent (2001, investment reception as Fintech Startup) Tencent led investing in WaterDrop, a healthcare crowdfunding platform (2016)
Fintech Startups	Alipay launched as online payment platform (2004) Mobile payment service launched (2009)	TenPay launched as online payment system (2005) WeChat Pay launched (2013)
Traditional Financial Institutions	Aliloan launched in partnership with ICBC and CCB to help SMEs with limited assets or credit history based on transaction histories and credibility rating at Alibaba (2007, cooperate) Joint project with the Bank of China for quick payment with a credit card (2010, supply)	LiCaiTong (Wealth Management Platform) launched (2014, compete) WEbank cofounded (2015, complement) Tencent Credit launched (2017, supply) MOU with Asian Digital Bank Corporation to develop cloud-based financial services (2020, cooperate)
Financial Clients	Alipay's "Online Inquiry System" for online customer service (2005) Alibaba Microfinance Company established (2010)	Wexin Red Packet launched (2014, serve SME clients) WEbank's Particulate Loan gave credit to over 10 million people with transaction amounts over7 billion RMB in 10 months after launching (2015)

Table 3. *Cont.*

Eco-Systematic Relation	Alibaba Examples	Tencent Examples
Government Regulators	Ant Financial established to take over Fintech business of Alibaba due to the regulation restriction (2014) Green Digital Finance Alliance, an international alliance with UNEP (2017, cooperate) Ant Financial changed to Ant Technology due to regulation sensitivity to financial (2020)	Tencent limited the functionality and usage volume of Q Bi (Virtual currency) after governmental regulation (2007) e-Receipts Solution launched with Zi Tax Innovation Lab, cofounded with Shenzhen Tax Bureau (2018, cooperate)
Technology Developers	Sesame Credit established as the first Chinese credit agency (2015, Big Data application) International remittance service (2018, blockchain technology) Dragonfly as a facial recognition payment device (2018, electronic POS technology development)	Tencent Cloud services launched (2013) ProGuard system for malicious accounts detection in online promotion with virtual currency (2015) MiniPrograms launched for E-Commerce advertising (2017, Super Apps technology)

Undoubtedly, cross-sector Fintechs are active participants in a Fintech ecosystem than the economic geography approach proposed in Lai and Samers [55], and Wojcik [56], as an unfolding of "Fintech Cube". Our findings clearly confirm that the role of cross-sector players evolved over time and they adopted specific roles, co-create value and depend on other actors for development and existence. Both Alibaba and Tencent initially developed business activities such as e-commerce and instant messaging before launching into Fintech. However, weak credit card penetration prompted Alibaba and Tencent to look for other solutions to expand their business in the Fintech area [64]. With the expansion of their corresponding business and diversification, both entered the field of Fintech for its prosperity and related strategic diversification needs. Launching Alibaba's Alipay, in 2004, and Tencent's Tenpay, in 2005, facilitated their e-commerce and other purchasing transactions, in addition to ensuring a better purchase convenience and security. Due to the close relation to e-commerce, it proves advantageous for e-commerce-related high-tech companies to enter the Fintech area, and become cross-sector Fintech, through electronic payment in this case, with the adoption of related technology in online transactions [89]. The justification of cross-sector extension enables us to solidify the true impact of what we call the "cross-sector Fintech" as exemplified by Alibaba and Tencent, with the following characterizations.

4.2.1. Size

Cross-sector Fintech played a major role to drive the Fintech sector development and growth, instead of traditional financial institutions, or Fintech start-ups. The influence of giant tech companies like Tencent and Alibaba's participation in the Fintech sector is so large that their sheer scale and speed had made differences. Their mobile monthly active users are respectively 1164.8 and 846 million according to the last annual reports (see Table 1), larger than the population of any country other than China and India. Both have market capitalization higher than 500 billion USD in July 2020, more than any traditional financial institution in the world. Brackert et al. highlight that global retail banking is racing for relevance and scale [91], whereas cross-sector Fintech had already achieved such relevance and scale.

4.2.2. Multiple Relationships

The multiple relationships between cross-sector Fintech and traditional financial institutions are more varied than the current debate on cooperation and competition [45,92]. They compete, cooperate, supply and complement; thus, mere analytical focus on cooperation and competition in relationships would be incomplete. Though the two studied cross-sector Fintechs have been regarded as a principal

business threat for traditional banks with some collaborations, Alibaba and Tencent are also technology developers, providing traditional banks with digital platforms for social media, big data analytics, cloud computing, artificial intelligence, and so on. As a supplier, the credit rating agencies Sesame Credit (Alibaba) and Tencent Credit offer their Fintech services to traditional banks to improve the incumbents' accuracy in credit assessment and loan lending decisions. In addition, much of the online microfinance lending carried out by WEbank and MYbank, is targeting SMEs that never received any loan from traditional banks. Cross-sector Fintech thereby covers a niche market whose needs were unattended before with a complementary role to the existing competitors.

4.2.3. Financial Inclusion

In the cross-sector Fintech ecosystem role of investors is noteworthy; we identify two types: major investors and micro investors. Alibaba received significant financial investment from Softbank, a major high-tech investing company based in Japan, to support its initial launch and continuous development, including for the expansion of its activities in Fintech. Alibaba also established a direct interlocking directorate with its principal investor to gain greater coherence in business actions and to facilitate a community of interest among Fintech actors [93]. This direct interlock ended in May 2020. Likewise, Tencent depended on venture capitalists' investments and, later, Naspers' investment. Once established as significant players and active in the Fintech ecosystem, both actors become frequent investors in other Fintech start-ups. Examples are Tencent in Indonesian Gojek, and Alibaba and Ant Financial in Indian Paytm Karo [86]. Other types of investors in the ecosystem are the numerous micro investors who are often financial customers or business clients or social media users at the same time. Here, the cross-sector players monetize their enormous customer or user base and allow them to invest in the financial market without an established minimum limit, drastic deviation from traditional investment business models that commonly require a minimum amount in order to participate. These inclusive financial activities of cross-sector Fintech are also reflected in the above microfinance to SMEs who were used to be excluded from bank loan obtaining.

4.2.4. Interconnectivity and Flexible Technology Platform

Both Tencent and Alibaba function within a larger business ecosystem rather than limiting themselves to the Fintech ecosystem. Indeed, the Fintech ecosystem and business ecosystem interconnect and interact for mutual benefits. Tencent's slogan is connecting ecosystems, from connecting people, services and devices, to connecting enterprises and future technologies, fostering win-win ecosystems for everyone [87]; while Alibaba specifies that their ecosystem consists of four layers of platforms, which are independent but also interconnected [79]. These two players have developed what is called "Super Apps" by designing single technology platforms that allow ecosystem entities to smoothly plug-in their own "Mini-Apps", to run a more efficient system to grow than the individual entities can do. At the bottom of this Super App ecosystem, there is cloud intelligence and data technology to provide general support for an efficient and advantageous ecosystem business model. Above this layer, there are financial services, which closely link with technology innovations providing competitive advantages in the Fintech sector. The competitive financial service relies on the higher-level layer of logistic and supply chain management to make the channel to market smoothly. The final but not the least important layer is the platform of customers, which is on the top of the whole ecosystem driven by four elements: online sales and distribution, data-driven product innovation, digital marketing and branding, and channel management [94,95]. Red Packet is one of these examples that both WeChat and Alipay launched. As an innovative Fintech product, Red Packet is a virtual red envelope containing money for gift-giving, which is very particular in China. However, more than simply a means for money transfer, Red Packet has provoked a social phenomenon and attraction, and has become an effective promotional tool for business.

4.3. Fintech Ecosystem Evolution: Fuzzy Boundaries

From the studied cases, we found government regulators play an important role in the evolution of Fintech business model innovation and ecosystem development. Sender describes that two tech giants had special love from the People's Bank of China (PBoC) which allowed them to grow into monsters, while all the banks and the China Banking Regulatory Commission (CBRC) complained [82]. Without the green light of the regulator, it would have been impossible for Alibaba and Tencent to have such rapid growth in Fintech areas, as many activities require government-issued licenses to legally operate. Recently, however, PBoC is experimenting with a new digital currency, hoping to reduce the dominance of Alibaba and Tencent in digital payment [87].

In addition to its large population size, Revesz reported that Chinese consumers' trust and willingness to accept new technology is higher and faster than any other country [96]. Trustworthiness is a crucial element for financial services, especially for Fintech, as it influences the repurchase intention of consumers [89,97]. The scale and relevance that Tencent and Alibaba possess have been due to their ethical and social values embedded in their corporate culture. Compared to Fintech startups, the cross-sector players do not have a "liability of newness" [63], but constitute a competitive advantage in attracting financial clients [5,15]. Chong describes the trustworthy reputation building of Tencent's and Yu'E Bao (Alibaba) by having people believe that "WeChat and Alibaba are big companies; their scale already guarantees that they won't steal your money" [90] (p. 300). Cross-sector Fintech enjoys this reputation and trust from users generated from their earlier experience and size. Because cross-sector Fintech operates at the intersection of financial service and technology, the boundary of the two is very fuzzy. We can identify several forms of fuzziness.

4.3.1. Finance vs. Tech

Indeed, both Alibaba and Tencent have changed their corresponding Fintech brands from financial to technology in 2020. Ant changed its name from Ant Financial to Ant Technology in 2020, in order to present them as technology companies to prevent regulation scrutiny and expand further into technology business areas; top executives even prefer to call them "techfin" instead of "Fintech" to emphasize their technology prowess over financial services [98]. Alibaba and Tencent created their integrated business ecosystem with multiple applications to serve a variety of customers within a single platform. Red Packet QR and facial recognition POS are some of these Fintech examples with underlying common technologies like blockchain which could be applied in other business contexts. Chinese Fintech like Alibaba and Tencent are top-ranked in terms of Fintech patent applications [99]. In a digital-enabled platform or a platform of multiple platforms, Pollari and Ruddenklau highlight the Fintech emergence as blurring of traditional industry boundaries around the customer, i.e., the industries converge and players from adjacent sectors invent business models to solve customer problems or remove friction points in expanding financial services offering [67].

4.3.2. Terminology

Fuzziness in cross-sector Fintech occurs due to terminology and categorization as well. As discussed in Section 4.1, questions may arise on whether microfinance could have its own category, or be part of the online lending category; whether online lending in a separate category or being part of e-banking; whether there should be a category of e-banking, and so on. A similar question could be asked regarding credit rating, micro-investing, wealth management, securities trading with the capital market business model, Insurtech and Regtech, etc.

4.3.3. Role

Traditional Western business models often explicitly define the role of different stakeholders in the value chain, e.g., investors, consumers. In the case of Yu'E Bao, the innovative business model provides customers a double-account service [88]: Consumption payment and investment, which bundle the

services on the same users to maximize the performance. Additionally, a supplier of an e-commerce portal could be a customer of financial credit services. A buyer of a retailing business could be a cash depositor as a source for financial investment. It may be Fintech ecosystem specific or cross-ecosystem like the example illustrated in the above to have e-commerce suppliers as users of supply chain finance.

4.3.4. Stakeholder Relationships

Due to the multiple roles involved, the relationships between different stakeholders also become fuzzy. For instance, Ant, as a cross-sector Fintech, has well discovered the financial services to the end consumers but is also supplying its technology to 200 other financial institutions as a technology developer [100], with whom they also compete to attract financial clients, and cooperate in many occasions to build common projects to serve (e.g., contactless lending initiatives during COVID-19). In the area of SMEs lending, the majority of their clients are first-time borrowers which is a niche market uncovered and complementing traditional banks' offering. Similarly, an individual may start the relationship with Tencent as a QQ account user, moving then to WeChat messaging service where they start with WeChat Pay as a mobile payment user. Yu'E Bao's users are investors and Alipay users at the same time. This relationship fuzziness creates complexity in stakeholder management.

5. Discussions, Conclusions and Limitations

5.1. Conclusions and Propositions

The purpose of this study was to explore the position of cross-sector Fintech in the Fintech ecosystem domain to better understand its drive, business model innovation, and development. The findings not only show that the Fintech ecosystem continues to evolve due to the dynamic changing of player structures. Moreover, the findings demonstrate that cross-sector players such as Alibaba and Tencent are different from traditional Fintech startups due to their maturity levels, resources and capabilities, economy of scale, and being experienced ecosystem players. They require the attention of academics and practitioners alike due to their importance for sustainable development and for providing lasting benefits to people and society at large. With respect to business model innovation and development, our study revealed three key issues in the Fintech ecosystem and Fintech business models enabling us to derive 3 propositions, as below.

First, the competitive advantage in the Fintech sector is no longer solely based on finance specific technical knowledge but also on technological expertise and innovative business models. When Wilson and Campbell propose analyzing the Fintech phenomenon from a functional perspective [101], they adopt Merton and Bodie's six core financial functions: clearing and settling payments, pooling resources and subdividing shares, transferring resources across time and space, managing risk, providing information, and dealing with incentive problems [102]. This definition also differs from existing terminology commonly used for categorizing Fintech business models. Our research shows the overlapped and fuzzy conceptualization of categories, which were largely ignored in most previous Fintech ecosystem studies.

We infer that the rapid pace of technological change renders such categorization rapidly obsolete when applied to cross-sector Fintech. Our findings reinforce the call of Gimpel et al. according to which researchers should consider alternative taxonomies for a better understanding of the Fintech phenomenon and the role of cross-sector Fintech [11]. Consistency of terminology and approach is claimed to be important as "if there were agreement and standardization of what is meant by "functions", this would enable greater comprehension of the system and between systems operating in different countries thus enhancing oversight and regulation" [101] (p. 419). Fintech researchers have not unified the terminology to be used in Fintech business models or functions as yet. Therefore, we propose the following proposition for future research or eventual conversion into hypotheses for quantitative testing:

Proposition 1. *The fuzziness of the Fintech business model conceptualization impedes the appreciation of changes and innovation in business models in the Fintech sector.*

Second, the role of cross-sector players in Fintech to compete with traditional incumbents creates a large scale impact on society. The Fintech applications by Alibaba and Tencent provide financial services at an affordable cost to all parts of society, aiding their financial inclusion [6], apart from supporting economic growth through increasing financial resources to support real economic activity, particularly for individuals and small and medium enterprises. For instance, the capability of Yu'E Bao to accumulate more than RMB500 billion of assets in nine months of its launch in a post-2008 financial crisis-era largely supports the financial sourcing for economic growth. Its involvement of 81 million investors as micro-investors, with the majority holding thousands of RMB in the account, illustrates the democracy in the Fintech market, with most of those included having never invested in the money market before. Similar to MYbank, Tencent's WEbank has also addressed inclusive finance targeting SMEs. Its small business loan, WeiYeDai, debuted in 2017, with 66% of clients who had never borrowed money before. This inclusive financing opportunity provided jobs to more than 2 million people [103]. While the emergence of the cross-sector players also brings new challenges and risks, the potential benefits to sustainable economic value creation and financial inclusion are considerable. Qu, Zhang and Ding's study suggests that Chinese banks cooperate with high-tech industries to improve the technical quality of patents and learn Alibaba's international patent strategies to increase the overseas patent application quantity, expand market share, and gain competitive advantages [104]. This suggestion is proved by the fact that Chinese insurer Ping'An ranked first in 2019 in terms of Fintech patent applications according to the World Intellectual Property Organization (WIPO), ahead of Alibaba [99]. Our current data could not verify if such a learning process occurred. Thus, further research on the relationship and network among Fintech and traditional financial institutions is desirable to understand the underlying ecosystem creation and development as well as the potential societal implications, such as the risk of a new digital divide between the technologically able and others [6].

The technology capability and scale-based resources of cross-sector Fintech allowed Alibaba and Tencent not only to fill a gap in the market offerings to new customer groups, complementing extension of existing services, but most importantly, to become technology drivers for processes of traditional actors. Though it is fair to say that Chinese enterprises are better at business model innovation than breakthrough technological innovations [105], Alibaba and Tencent are some of the Chinese enterprises which broke this stereotype. Alibaba filed 798 Fintech patents in 2019, ranked second in WIPO Fintech ranking [99]. In 2018, Tencent Foundation donated 1 billion RMB (about 143 million USD in July 2020 value) to set Xplorer Prize award for young scientists in areas of basic science and cutting-edge technologies [85]. Data from April 17, 2020, shows that Alibaba (Ant) and Tencent are two top-ranked enterprises in the global blockchain patent applications. Alibaba has been in this first position since 2017 with 1005 patents in 2019; WeBank of Tencent was also ranked fifth on this list [106]. Innovation capability in terms of technology, product, process and business model seems to be integrated into cross-sector Fintech. Further integrated innovation studies in the Fintech ecosystem is necessary to better understand the trends, terminology and categorization of Fintech. As the Fintech's payment evolution illustrated, payment methods using QR codes replaced cash and cards in a period of five years. It is very probable that in the next few years, new and better products will replace QR codes, according to a top manager in Tencent [107]. Therefore, we propose the following:

Proposition 2. *Technological, product, process and business model innovation are integrated in the cross-sector Fintech ecosystem, which leads to more democratic financial activity participation and inclusive finance for multiple stakeholders.*

Third, the participation of cross-sector actors is relevant for Fintech ecosystems to be a key player rather than a niche player as most Fintech startups do. This also brings several boundary fuzziness in the finance vs. tech, terminology, role, and stakeholder relationships, as presented in the

finding section. For example, 83% of financial institutions reported that their businesses are at risk of Fintech in some aspects [8]. Further, banks are facing an existential crisis [4,23], in contrast to earlier studies, which highlighted cooperation and coexistence between Fintech and traditional commercial banks [88,92,104]. Our findings extend their relationships further by adding a dimension of supply and complementarity to the Fintech ecosystem. The multiple roles among different stakeholders in the cross-sector Fintech create network relations and build synergetic and integrative effect for sustaining competitive advantages. The network effects in the multiple role platforms and ecosystems in a large business ecosystem deserve further investigation on their interdependent effects and co-evolutional development.

The development of electronic finance (e-finance) rapidly advanced after the 2008 financial crisis by combining internet technologies, social networking, artificial intelligence, and big data [12]. Furthermore, cross-sector Fintech leads the Fintech transformation which broke down the boundary of several industries between banking, insurance, social media, e-commerce and IT; in addition to fostering business model innovation in numerous sectors like retailing, logistics, food delivery, and restoration. The recent COVID-19 pandemic has triggered worldwide deployment of remote work, social distance, and contactless practices which challenges several industries with profound impacts [108]. The financial industry is one of them and Fintech has taken a much larger role since then and the Fintech ecosystem has become an irreversible trend for the future. Therefore, we suggest the following proposition:

Proposition 3. *Multiple roles and boundary fuzziness in the cross-sector Fintech ecosystem foster network accessibility among Fintech actors with the opportunity to gain and sustain competitive advantages.*

5.2. Discussions and Limitations

All of this indicates that the sustainability of the Fintech sector is currently driven by technological firms rather than the traditional bank and financial-institution-based systems [19]. This is a dramatic change in Fintech ecosystem dynamics. Palmié et al. argue that disruptive innovations often originate at the ecosystem or system level rather than in individual firms, and the Fintech ecosystem's disruptive innovation needs and deserves further attention [5]. Therefore, the eco-systematic approach to Fintech that we take in this paper confirms and goes beyond what Anand and Mantrala claim: the most recent trend is a coopetition and co-existence relation between Fintech and traditional banks rather than competition and substitution [23]. A much more complex relationship between cross-sector Fintech and traditional banks, also with other stakeholders like Fintech startups, is presented in this study along with a co-existential eco-system to co-evolve.

As innovation has been the essence of the business development and corporate culture of the studied firms, we can also observe their positive social effects for business sustainability in a critical moment like COVID-19. China's economy has been largely affected since late January 2020, triggering a series of lockdowns, social distancing practices and travel restrictions, as well as in the rest of the world. Enterprises have been concerned with business continuity, supply chain disruptions, cost reductions, new opportunity identification, cash flow improvement, and remote workforce management. Affected but also taking it as an opportunity, Alibaba made a 20% revenue increase as the close of the fiscal year on 31 March 2020. Together with Ant and other partners, they have implemented a comprehensive set of financial and business supports to alleviate some near-term challenges. As of 30 April 2020, approximately RMB130 billion (about USD 18.4 billion with the value of the day) has been provided to merchant customers to provide liquidity, and over RMB 12 billion in twelve-month loans with preferential interest rate. Billions of RMB in value in the form of subsidies and technical support have been provided such as waivers of platform technology fees, annual service fees and warehouse fees, and reductions of commissions and logistics costs. The further program was launched in April 2020 to develop digitalized manufacturing clusters, accelerate the digital transformation of China's agriculture sector, and alleviate financing challenges of SMEs, etc. [79]. The social dimension of the cross-sector

Fintech ecosystem has been understudied in general. However, due to the cost-efficiency provided by big data analytics and other technological advancements, Fintech has empowered less resourceful segments to have a better opportunity to sustain business and alleviate poverty. The further exploration of this dimension will be fruitful for creating a more harmonious, democratic and sustainable society.

Palmié et al.'s study on the disruptive innovation in the Fintech ecosystems has remained at the level of disruptive and non-disruptive innovation, arguing the need for further study on how different types of innovation relate to ecosystems, for instance, competence-enhancing versus competence-destroying innovation, architectural versus generational innovation, and incremental versus disruptive innovation [5]. Though we do not follow the innovation typology that Palmié et al. propose, we do add new insights from the viewpoint of an alternative innovation approach to Fintech ecosystems as business models. From a business and management perspective, business model innovation is gaining more and more attention from scholars and practitioners as it breaks through the traditional market status-quo [109]. Alibaba and Tencent provide the example of this Fintech-driven ecosystem evolution, essentially based on their innovative business models tackling untapped market demands supported by technological efficiency and effectiveness, converting technological innovation into product innovation, process innovation and, dramatically changed, whole business models.

Organizations must blend digital and human capabilities to succeed in the digital transformation era [91]. The future of the financial industry seems to center on the customers, creating a trend for a platform-based industry structure with multiple layers, and a race for relevance and scale among banks and new entrants. Whether Fintech normalizes, or incumbent banks will consolidate to take over the customer interfaces, may vary depending on the market and country context. Our study context is China, a leading emerging market with regulator support and a huge population to allow cross-sector Fintech to gather scale at a fast pace. Large cross-sector Fintech may drive the Fintech ecosystem in a more global context. Regardless, the drivers of extraordinary innovation around the world going to be critical for underlying sustainable development.

Due to space restrictions, we concentrated on exploring the differentiated innovative Fintech business models of Chinese cross-sector giants, and their interrelations from an eco-systematic view. This limits the possibility to further understand the cause and generation process of these innovative Fintech business models within and beyond the existing ecosystems. We call for further discussions on the categorization of Fintech business models from the ecosystem perspective on the one hand, and the critical determinants for the interaction of Fintech ecosystem and business ecosystem development on the other hand. Our limitation also lies in the employed methodology though deemed appropriate for the current study purpose. For example, in analyzing the Fintech ecosystem composition to better understand business model innovation and development, our study employs multiple case study data from China and does not involve studies from other countries. In future research, we aim to conduct a comparative analysis of the impact of Fintech on sustainable business model innovation from emerging markets and developed country organizations. A quantitative survey study could also contribute to collect extensive data to test hypotheses once the Fintech categorization and ecosystem frame are better established. Indeed, the complexity of business model innovation driven by cross-sector actors has enabled the possibility of a mixed-method approach for future studies. In addition, an exploration between the Fintech ecosystem and sustainability is worthy of further attention. The evolution of Fintech-related technology has made inclusive finance more feasible than ever, even in emerging market economies. Micro-investing and microfinance through efficient access and evaluation are some of these examples for financial inclusion.

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