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Research on Fintech promoting Financial Inclusion in China

Supervisor: Prof. Filippo Maria Renga

Assistant Supervisor: Alessandro Faes

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Luping Shi, ID: 913365

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Abstract

With the advancement of technologies and its application in financial filed, a combination of finance and technology, Fintech, has emerged on the market and it has been developing rapidly in China in recent years, improving and even disrupting the traditional financial services with advanced technologies and innovative business models. Meanwhile, China is still toward the progress to achieve the financial inclusion, which is of great significance to its economic growth and financial stability. Anecdotal evidence suggests that Fintech is able to contribute to the development of financial inclusion, but there are few systematic approaches studying how Fintech promotes financial inclusion.

The objective of this paper is to explore how Fintech promotes the financial inclusion in China by coming up with a systematic framework through developing a handful of indicators from four critical elements of financial inclusion. The core idea of this paper is to break down the financial inclusion into a bunch of indicators from four key elements based on its definition, making it easier to examine the impact of Fintech on financial inclusion.

Therefore, the paper at first identifies four key elements of financial inclusion based on its definition and develops corresponding indicators based on four key elements, and these indicators can be used to examine the impact of Fintech on financial inclusion in the latter part of this thesis. Additionally, it is necessary to explore the overall level of financial inclusion in China through the comparison with other countries and understand the current development status of Fintech in China from the perspective of digital payment, P2P lending, Crowdfunding, Robo-advisory, and Internet banks, and then it analyzes the contribution of Fintech on financial inclusion through key elements of financial inclusion proposed by the paper. Moreover, a case study is illustrated to explore how WeBank, an Internet bank, contributes to financial inclusion in terms of indicators developed from critical elements of financial inclusion.

Keywords: Fintech, Financial Inclusion, WeBank

Abstract (Italian)

Con il progresso tecnologico e la possibilità di applicare le nuove tecnologie digitali in campo finanziario, una nuova combinazione di tecnologia e finanza, detta FinTech, si è affermata rapidamente in Cina negli ultimi anni, migliorando e talvolta rivoluzionando i servizi tradizionali con tecnologie avanzate e modelli di business innovativi. Allo stesso tempo la Cina è in corsa per raggiungere l'inclusione finanziaria, un aspetto chiave per la sua crescita economica e per la stabilità finanziaria. Evidenze aneddotiche suggeriscono che FinTech è in grado di contribuire in questi processi migliorativi, ma ad oggi sono ancora pochi gli approcci sistematici che si sono concentrati su FinTech e sui vantaggi che ne possono conseguire dalla sua diffusione.

L'obiettivo di questo documento è quello di esplorare come Fintech promuova l'inclusione finanziaria in Cina elaborando un quadro sistematico attraverso lo sviluppo di una serie di indicatori che comprendono quattro elementi critici dell'inclusione finanziaria. I quattro indicatori chiave sono basati sulla definizione di FinTech e rendono più agevole esaminare il suo impatto in termini di inclusione finanziaria.
Pertanto, il documento inizialmente identifica quattro elementi chiave dell'inclusione finanziaria e sviluppa gli indicatori corrispondenti, che vengono poi utilizzati per esaminare l'impatto del Fintech sull'inclusione finanziaria nella seconda parte di questa tesi. Inoltre, è necessario esplorare il livello generale di inclusione finanziaria in Cina attraverso il confronto con altri paesi e studiare l'attuale stato di sviluppo del Fintech in Cina per quanto concerne pagamenti digitali, prestito P2P, crowdfunding, robo-advisory e internet bank.
Infine, viene illustrato un caso di studio per esplorare come WeBank, una banca che eroga servizi online, contribuisca all'inclusione finanziaria in termini di indicatori sviluppati da elementi critici dell'inclusione finanziaria.

Parole Chiave: Fintech, Inclusion Finanziaria, WeBank

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1.Introduction

1.1 Research Background and Purpose

1.1.1 General Background of the Research

As the Internet technologies develop rapidly across the world in recent year, they are widely applied into the financial fields, as a result, a new business format, financial technology or Fintech, has emerged and drawn the great attention all over the world. Fintech significantly changes the way how people access to financial services and use financial products, and deeply strengthens individuals' understanding of the financial industry, as well as makes an outstanding contribution to the development of finance. At the same time, Fintech has disrupted the existing financial industry and reconstructed the economic structure to some extent given that it provides a new vison for the development of financial sector just as other innovations did in the history and it manages to break the bottleneck of a series of difficulties met by traditional financial institutions. In addition, it has exerted an increasing influence in the economy as it deeply penetrates into more financial activities, including payment, credits, investment, and so on. In China, Fintech has played a prominent role on the financial field and economy as it provides new perspectives for financial usage in peoples' life, thus, it has instantaneously attracted attention from individuals, businesses, and government extensively. The terms "digital finance", "Internet finance" and "Fintech" are interchangeable in China. In this paper, the term "Fintech" will be used to refer to the broader concept of applying financial technologies to the deliver financial products and services in the following part.

China has made a significant progress in the Fintech sector; however, the financial ecosystem is not fully liberalized, and the financial reform has far from over in China. In fact, there is a great number of people who are still underserved to financial services in China. In 2005, The United Nations firstly proposed the concept of financial inclusion, which is defined as providing reasonable and efficient financial services at a relatively affordable cost for all social classes that have financial needs, especially urban low-income groups and rural populations as well as small-and-medium sized enterprises[1]. Financial inclusion stems from the serious imbalances between high-end groups that enjoy excess financial services in large enterprises and vulnerable groups that cannot obtain basic financial services. In order to promote the financial services to stimulate

the real economy and alleviate the poverty, China has been prioritizing and pursuing financial inclusion since 2006. In recent years, the development of financial inclusion has become one of the most significant aspects in China's economic structural reform and serves as a basic component of financial ecosystem in China. The emergence of Fintech has promoted the existing financial ecosystem and enhanced financial companies' abilities to upgrade financial products. The innovative and disruptive Fintech will provide a new solution for the development of financial inclusion in China, thereby providing further support and guarantee to achieve financial inclusion in China.

1.1.2 Purpose of the Research

Fintech is capable of leveraging financial innovation and promoting financial services to serve real economy better. Will Fintech promote the development of financial inclusion in China? And how will Fintech contribute to the achievement of financial inclusion? Based on a comprehensive analysis of the current state of Fintech, the paper aims to explore the role of Fintech in promoting the development of financial inclusion in China. In addition, most of existing researches focuses on Fintech itself, or the regulation over Fintech, or the interaction between financial incumbents and Fintech. Furthermore, there are more and more studies concerning the impact of COVID-19 crisis on Fintech. However, there are limited papers studying how Fintech promotes financial inclusion in China. This article aims to discuss how Fintech promotes financial inclusion in China, therefore, it is complementary to the existing studies and fills the research gap to some extent. In addition, it also provides an overview about the development of Fintech and the level of financial inclusion in China.

1.2 Literature Review

1.2.1 Research on Financial Inclusion

Existing Research on Financial Inclusion concentrates on its development status and how to construct the inclusive financial index.

In terms of development status, there is existing regional disparity in the development of financial inclusion in China given that rural area and western region are still lag behind in financial inclusion compared to urban area and eastern region in China (Hasan, et al., 2020)[2]. In addition, the study conducted by Pan (2020) states the deficiency of existing inclusive finance ecosystem in China from the perspective of the overall level of inclusive finance, insufficient inclusive finance products and services and low financial literacy and risk awareness of residents[3]. Moreover, other researchers investigate the level of financial inclusion in China based on a cross-country benchmarking analysis and conclude that China has a relative high level in formal accounts and saving but a low level in credits (Fungacova & Weill, 2015 ; WBG&PBOC, 2018)[4,5]. And International Monetary Fund (2020)demonstrates the development of financial inclusion across 52 countries from two dimensions: access to payments and credits[6].

In light of construction of inclusive financial index, the research conducted by Noelia &Tuesta (2014), contributes to a construction of a multidimensional financial inclusion index covering 82 countries for the year 2011 from three perspectives: usages, barriers and access to financial services[7]. PBOC working paper (2015) calculates the 2013 Financial Inclusion Development Index at the provincial level in China by developing 19 indicators under three dimensions: accessibility, usage and quality of financial services[8], similarly, Peking University (2019) computes the Digital Financial Inclusion Index in China from 2011 to 2018 by developing 33 indicators from the perspective of the coverage, usage and digitalization of digital financial services[9], and both index indicators are used to compare the financial inclusion levels across provinces in China. In addition, International Monetary Fund (2020) constructs a comprehensive financial inclusion index which combines a traditional and a digital financial inclusion component across 52 countries from two dimensions: the accessibility and usage of traditional and digital payments services[10].

1.2.2 Research on Fintech

Existing research on Fintech focuses on the overall Fintech ecosystem, the interaction with banking system and the impact of regulation.

In terms of Fintech ecosystem, some researchers suggest that Fintech ecosystem usually consists of Fintech providers, financial services, and technologies (Shim & Shin, 2015; Liu, et al.,2020)[11,12]. Fintech providers contain traditional financial institutions, Fintech startups and Fintech incumbents such as Alibaba and Tencent in China. Technologies applied in Fintech include but not limited to big data, cloud computing, artificial intelligence, blockchain, etc. For example, Blockchain is fundamental to launch central bank backed currency (CBDC) and there are a lot of studies on CBDC recently. To be specific, a conceptual framework of CBDC was proposed to build a public-private partnership for the central bank to launch CBDC (Adrian &Griffoli,2019)[13]. Additionally, a two-tier remuneration system can be used to address the disintermediation of banking system and bank runs caused by CBDC (Bindseil, 2020)[14]. As for financial services, there is an overwhelming emergence of digital financial services, including digital payment, Internet banking, P2P lending platform, crowdfunding, Robo-advisory, etc. For instance, some researchers have discussed the information disclosure on the probability of P2P platforms default risk (Baltuk, 2019; Wang et al., 2020)[15,16]; furthermore, the causes of the setback of P2P lending platforms in China are analyzed by some studies and a sustainable business model would be the key driver for the survival of P2P lending in China proposed by some researches (Leong, et al., 2017; Gao, et al.,2020)[17,18].

Additionally, some researchers have studied Fintech's impact on banking system and indicate that digital finance will transform the traditional banking and push more banks to adopt the Fintech to keep their competitive advantages (Jüngera & Mietzner, 2019; Sheng, 2020)[19,20]. Some studies state that cooperation between Fintech and banking will be a dominant future trend and suggest a Fintech integration process for banks (Thakor, 2019; OECD 2020)[21,22]. However, Deloitte (2020) report emphasizes challenges associated with digital transformation for banks from the perspective of both external and internal environments[23].

In terms of regulation on Fintech, it has drawn a great attention from all over the world. The development of financial regulation on Fintech in China, US, and EU is elaborated by some

studies (Zhou, et al., 2018; Frazier &Walter, 2020; Agathokleou,2019)[24,25,26]. Bank for International settlements(2019) comes up with a framework of regulation over Fintech from three categories: financial activities (related to Fintech), Fintech technologies, and policy platforms[27]. In addition, quite a few researches focus on Regtech. For example, some researches regarding to the application of Regtech on financial regulation, banking, and financial activites(anti-money laundering) are conducted and a positive development trend of Regtech in the future are collectively suggested by these studies (Arner, et al., 2017; Anagnostopoulos, 2018; Kurum, 2020)[28,29,30]. Meanwhile, challenges and solutions associated with the development of Regtech at the current stage is also discussed (Chang &Hu, 2020)[31].

1.2.3 Research on Fintech in the context of COVID-19 pandemic

COVID-19 virus has exerted a progressing worldwide pandemic and has caused many direct and indirect effects on human behavior and economic activities. Meanwhile, an increasing number of research papers discuss the impact of COVID-19 crisis on the Fintech development as many billion people live a life in isolation and keep social distancing to reduce the possibility of spreading virus. And the existing research studies believe that COVID-19 pandemic will accelerate the development of fintech.

In terms of qualitative analysis, researchers state that digital financial infrastructure can be leveraged to overcome the immediate challenges presented by the global Covid-19 crisis and manage the impeding economic fallout (Arner, et al., 2020)[32]. Deloitte (2020) states that Fintech companies are harnessing their strength to meet challenge brought by Covid-19 pandemic by providing relief to individuals and businesses and by creating new products or services to address rapidly evolving economy environment[33]. Additionally, it is highlighted that there are opportunities associated with digital financial services in the context of the Covid-19 pandemic in terms of five areas: payments and transfers by governments, businesses, and households, as well as credit to business and households due to the need for social distancing to contain the spread of coronavirus (Itai, et al., 2020)[34]. Similarly, IMF (2020a) report states that digital solutions can help governments deliver cash transfers efficiently and quickly to their intended beneficiaries in the wake of COVID-19 pandemic[35], and some central banks encourage digital payments as they are concerned that the coronavirus could be transmitted by cash(Auer, et al.,

2020)[36]. Furthermore, mobile money serves as an invaluable tool for fostering resilience by facilitating safe and efficient money transfer and payment services particularly for the emerging and developing economies that are less resilient to withstand the lockdown shock brought by COVID-19 crisis (GSMA, 2020)[37]. In China, it is suggested that Fintech platforms can provide loans to small-and-medium sized enterprises (SMEs) to help them go through the hardships as SMEs subject to the financing difficulties severely in the context of COVID-19 pandemic (Huang et al.,2020; Bouey, 2020)[38,39]. In addition, many researchers believe that the COVID-19 Pandemic will accelerate the development of Fintech (Liu, 2020; He, et al., 2020)[40,41].

Very few research papers have yet examined the effects of COVID-19 on Fintech adoption and usage from a **quantitative perspective**. A study provides evidence on the acceleration of Fintech adoption by comparing the download rate of mobile apps in the financial sector during the Pre- and Post-Pandemic era (Fu& Mishra,2020)[42]. In addition, it is stated that the impact of social distancing under COVID-19 pandemic may affect the growth of digital payments by drawing the data from community mobility reports in 10 countries (Nader & Dabour, 2020)[43]. A report released by Ant Research Group and Renmin University of China (2020) states that the COVID-19 pandemic contributes to the uptake of online wealth management products purchased by customers by drawing the data provided by Ant Group from November 2019 to June 2020[44].

1.2.4 Research on how Fintech Promotes financial inclusion

Existing papers concerning how fintech promotes financial inclusion are not extended. Most of relevant researches, however, study the impact of Fintech on financial inclusion from a qualitative perspective and very few studies focusing on the quantitative perspective.

From a qualitative perspective, researches illustrate the positive impact on financial inclusion for those under or un-banked populations by lowering the transaction fees, expanding the coverage of services as well as increasing the transparency of financial institutions (Salampasis & Mention, 2017; Ozili, 2018; Hasan, et al.,2020)[45,46,47]. Similarly, it is also found that inclusive effects of Fintech can be expanded to lower the information asymmetry and improve the user experience by providing the tailored financial services (Li &Li, 2020)[48]. Apart from the general impact of Fintech on financial inclusion, some studies also focus on how a subsegment of

Fintech promotes financial inclusion in China. For example, Alliance for Financial Inclusion report (2018) states that mobile money has played a major role in advancing financial inclusion and suggests a framework for Fintech for financial inclusion based on four major pillars[49]. Additionally, the relationship between Robo-advisory and digital inclusive finance is investigated and it is suggested that China's current regulatory system should be improved in terms of market access mechanism, qualified investor system, information security and algorithm governance to leverage the further development of digital financial inclusion in China (Li &Yan , 2019)[50]. Furthermore, Internet banks can also effectively promote financial inclusion through reducing transaction cost, improving transaction efficiency and expanding service boundaries but will also be faced by a series of risks from both traditional banks and Fintech (Gong,2020)[51]. As regards to digital payment, WBG report (2020) provides an overview on how digital payment drives the development of accessibility and usage of transaction accounts, one of aspects of financial inclusion, and brings the new challenges to market as well[52]. Apart from the subsegment of Fintech stream, some studies concentrate the application of financial technology such as Machine Learning and Blockchain on financial inclusion. For instance, the Fintech credit assessment based on Machine Learning can be used as a promising solution to reduce the cost of credit and increase financial inclusion (Bazarbash, 2019)[53]. Meanwhile, the Blockchain based Fintech solutions can be used to revolutionize financial access by unlocking the true economic capital of the unbanked segment who lack the credit history (Popescu, 2020)[54]. On top of that, Fintech is also able to close the gender gap in financial inclusion particularly in some Asia-Pacific countries where the gap between the percentage of men and women owning an account is quite large (Sioson & Ju Kim, 2019)[55].

In terms of quantitative analysis, there are very few researches concerning how fintech promotes financial inclusion in China. IMF report (2020) conducts an empirical study with respect to assessing the impact of Fintech on financial inclusion through making a comparison between the traditional and digital financial inclusive index covering 52 countries around the world, revealing the heterogeneity of Fintech's impact on financial inclusion across different regions as well as the different extent on contribution to closing gender gap in terms of financial inclusion[56]. Additionally, it is highlighted that Fintech credit is able to fill the credit gap in the consumer segment in low-income countries by drawing data for 109 countries from 2015 to 2017 via

crowdfunding platforms to households and businesses (Bazarbash &Beaton, 2020)[57]. Meanwhile, there are some studies discussing the impact of Fintech on household consumptions and rural financial demand in China, which can be enlightened to explore Fintech's impact on financial inclusion. To be specific, some papers studied the effect of digital finance on household consumption by employing China household Finance Survey and digital finance index (Fu & Huang,2018; Song, et al., 2020; Li, et al., 2020)[58,59,60].

1.2.5 Literature Commentary

According to the existing literature review, a great amount of related literature has conducted in-depth research on the development status, regulation, as well as the future trend in the post-pandemic era regarding to the Fintech both in China and worldwide. Additionally, there is also a fair number of studies concerning financial inclusion in terms of qualitative and quantitative perspective. As regards to the contribution of Fintech on financial inclusion, almost all studies confirm the positive impact of Fintech on financial inclusion in a general perspective, and there are some studies exploring the connection between financial inclusion and subsegment of Fintech, such as digital payment, Robo-advisory, Internet banks, etc. In light of the quantitative analysis, there are rare studies exploring the promotion of Fintech on financial inclusion. As a matter of fact, existing quantitative concentrate on the relationship between Fintech and household consumption or studies the impact of Fintech on regional financial demand. In a word, there is rare analysis about the direct relationship between Fintech and financial inclusion.

Fintech is the future trend of financial ecosystem and is shaping the financial context in a much more innovative manner, which brings the huge challenge to the existing financial ecosystem and financial incumbents. In addition, Fintech is featured by significant convenience and accessibility, which apparently improve the level of financial inclusion. Financial inclusion is of significance for emerging economies in terms financial reform and sustainability, therefore, it is necessary to conduct a research on the impact of Fintech on the development of financial inclusion given that related research is relatively scarce.

1.3 Content and Structure of the Research

On the basis of relevant literature on Fintech and financial inclusion, the paper connects Fintech with the development of financial inclusion in China, and studies and analyzes the impact of Fintech on financial inclusion in terms of the four key elements of financial inclusion: accessibility, diverse and appropriate products, commercial viability and sustainability and responsibility and safety, providing an overview conerning the contribution of Fintech on financial inclusion in China. The rest of the paper is structured as follows.

Chapter 1 constructs the introduction for this paper. It analyzes the research background, research purpose, and research methodologies. Additionally, it reviews the relevant literature regarding to Fintech, financial inclusion, Fintech in the context of COVID-19 crisis, and the impact of Fintech on financial inclusion, and specifies the need to analyze how Fintech impacts financial inclusion.

Chapter 2 provides an overview of financial inclusion. It establishes the conceptual foundations of financial inclusion throughout the paper. To be specific, this chapter defines and explores the key elements of financial inclusion and develop corresponding indicators which will be used to examine the impact of Fintech on financial inclusion. In addition, it provides a quantitative benchmarking analysis of China's current status of financial inclusion through the comparison with G-20 countries in order to better understand the level of financial inclusion in China.

Chapter 3 summarizes China's primary Fintech subsegments in recent years, including digital payment, P2P lending, Robo-advisory, Crowdfunding, and Internet Banks. The introduction and analysis of these streams of Fintech are not meant to be comprehensive but roughly demonstrated. At the end of this chapter, it also briefly discusses the role of each subsegment of Fintech in promoting financial inclusion in terms of qualitative analysis with the application of key indicators and critical elements developed in the Chapter 2, however, not all the indicators are covered to examine the impact of each Fintech segment on financial inclusion.

Chapter 4 introduces a case to study the role of a Fintech company on contributing financial inclusion in China. It discusses how WeBank, an Internet Bank, promotes the financial inclusion

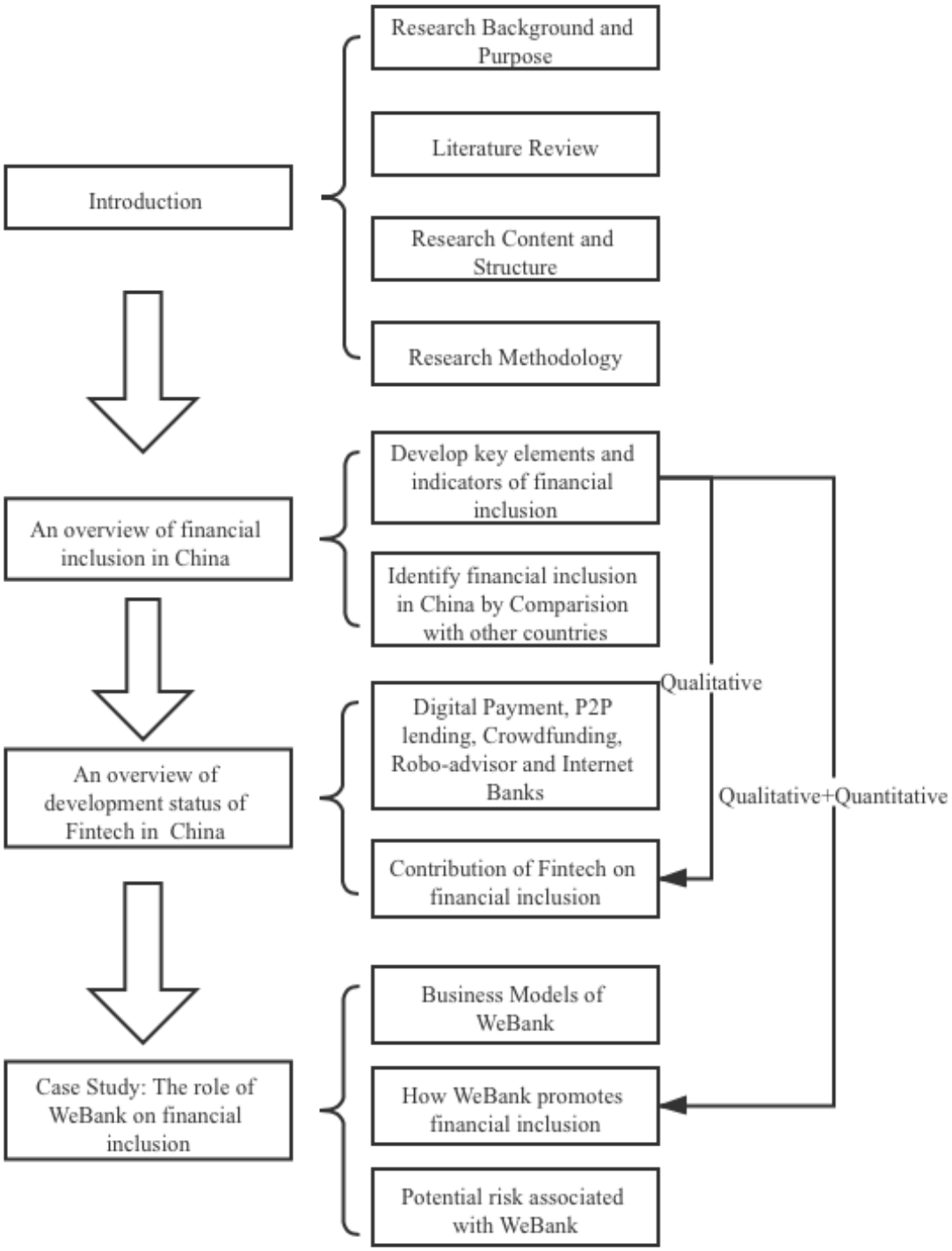
in China with the combination of qualitative and quantitative analysis in terms of key indicators and elements of financial inclusion proposed in Chapter 2.

Chapter 5 reaches the conclusion of the paper.

Chapter 6 indicates the limitation of paper and points out the future research direction.

1.4 Research Methodology

Figure 1: The Research Approach Mapping



The figure 1 indicates the structure of the paper and reflects the core methodology of this paper, that is to breakdown the concept of financial inclusion into four key elements, and then to develop corresponding indicators from perspective of four critical elements. As the figure 1 shows, these indicators are used to explore the contribution of Fintech on financial inclusion in terms of qualitative assessment and then are applied to a case study with the objective to demonstrate how a Fintech company contributes to financial inclusion in terms of both qualitative and quantitative analyze in the latter part of the paper. Thus, the key indicators and elements of financial inclusion are the core idea of this paper, providing a criterion to examine the role of Fintech on financial inclusion.

Based on the key indicators and elements of financial inclusion, the paper is structured with the combination of theory and practice, and research methodologies used in the paper are divided into the following four types:

1.4.1 Literature methodology

The thesis collects, identifies and organizes quite a few academic papers related to Fintech and financial inclusion development in China and worldwide through bibliographical databases, including ScienceDirect, Scoupus, and China National Knowledge Infrastructure (CNKI). Apart from the research bibliographical databases, a lot of documents are collected from Internet sources such as Research Gate and Google Scholar, providing useful insights concerning the research topic of this paper. On top of above databases and Internet sources, a handful of reports from World Bank Group, International Monetary Fund, and People's Bank of China are also cited in the paper as they provide a great deal of useful tips regarding to how to structure this research dissertation. As regards to the approach in which the literature was conducted, four main steps can be identified. The criteria to select the relevant literature is based on the idea that chosen papers must cover the keywords of Fintech and Financial Inclusion, and themes concerning the contribution of Fintech on financial inclusion as well as the impact brought by COVID-19 Crisis on Fintech.

The first step was to look for journals dealing with the theme related to Fintech. In the process of finding papers, the author found that three key words "Fintech", "Digital Finance" or "Internet Finance" are interchangeable in some countries, particularly in China. Thus, the author expanded

the searching scope from Fintech to digital finance and Internet Finance. The objective of the first phase was to discover what are the main research directions undertaken by academics when they studied this filed. From the relevant literature, the author had a very preliminary understanding about the framework of Fintech , and then the authored started to look for papers concerning the subsegments of Fintech, including digital payment, Peer-to-Peer lending, Crowdfunding, Robo-advisory, and Internet Banks, as they are the significant components of Fintech ecosystem. Therefore, the author attempted to understand the development status, the categories, challenges, the drivers behind emergence and setback of the stream of Fintech ecosystem.

The second step primarily dealt with the research papers dedicated to the phenomenon of financial inclusion and its current development status in China. Based on the available literature, many articles were concerned about the regional imbalanced development of financial inclusion in China and corresponding policy recommendations or proposals about how to improve or resolve this situation. Therefore, academics are more interested in the improvement of financial inclusion in China, while the author tend to learn the level financial inclusion in China at present in a systematical perspective. Fortunately, there are a couple of reports addressing the development status of financial inclusion in China through the comparison with other countries by citing the Global Findex Database, providing a practical insight for the author to comprehend the financial inclusion in China in terms of a systematical point of view. Additionally, a few papers deal with the construction of financial inclusion index in China, significantly contributing to the quantitative research for financial inclusion, however, it is not the main focus of this paper. The keywords in the second phase are “financial inclusion”, “Inclusive Finance” and “China”.

The third step aimed at finding scientific papers addressing the contribution of Fintech on financial inclusion, which is the focus of this research paper. It was founded that the majority of selected papers dealt with the theme regarding to the impact of Fintech on financial inclusion were conducted in a qualitative way. To be specific, many academics stated that Fintech has a positive promotion to the development of financial inclusion, but they failed to provide a systematical approach answering how Fintech promotes financial inclusion. Therefore, it remains

a research gap for future research and that is the aim of the paper to attempt to make a contribution to fill this research gap.

The fourth and final step was to take a glimpse about the implication of COVID-19 crisis on the Fintech and financial inclusion as the paper is being written in the context of COVID-19 pandemic, thus, it is necessary to collect research papers dealt with the Fintech in the post-COVID-19 era. And many journal papers stated that COVID-19 will accelerate the development of the Fintech and an increasing number of companies or even governments are forced to accept the digital transformation in advance due to the impact of COVID-19 crisis. It is not the main point of this paper; however, it is worthwhile taking a deep research concerning the Fintech or financial inclusion in the era of post-COVID-19. The keywords in this phase are "COVID-19 crisis", and "Fintech and COVID-19".

To sum up, the literature methodology helps the author strengthen the understanding of Fintech and financial inclusion based on effective organization and analysis of collected papers, laying the foundation for the further research.

1.4.2 Descriptive statistic approach

In order to make the analysis results regarding to the status quo of Fintech and financial inclusion more intuitive and comprehensive, the author quotes a great amount of statistic data from different sources, including the Global Findex Database, Statista, People's bank of China, some professional websites for P2P lending, and as well as the official website and annual report for WeBank. And then the author made charts (31 figures and 16 tables) to describe and analyze the statistical data concerning Fintech and financial inclusion, illustrating the change and future trend of the subject under the analysis.

To be specific, the figures primarily consist of flowcharts, line charts, bar charts and pie charts. Among 31 figures, there are 4 flowcharts (figure 1, 19, 22 and 23, respectively), 15 line graphs (figure 8, 9,10, 12,13,14, 16, 20, 25, 26, 27, 28, 29, 30, and 31, respectively), 16 bar graphs (figure 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 16, 17, 21, 24, and 29, respectively), and 3 pie charts (figure 11, 15, and 18). Additionally, 7 figures cover both line graphs and bar graphs (figure 8, 9, 12, 13,

14, 16, and 29, respectively). Flowcharts deal with the structure of the paper, and describes the working process of WeBank; and Pie charts are used to display the percentage of market share of third-party mobile payment providers in China and of ownership of WeBank as well as to show the proportion of different categories of Crowdfunding in China; furthermore, line graphs are used to track and compare changes of the digital payment, P2P lending, Crowdfunding and Robo-advisory in terms of the number of users and the total amount of transaction value over both short and long periods of time; moreover, bar graphs convey relational information of financial inclusion from the perspective of account ownership, saving, borrowing, and visualize and compare the value of digital payment, P2P lending, Crowdfunding and Robo-advisory in certain years.

Tables in the paper are used to organize and summarize the relevant data or information regarding to the key indicators and elements of financial inclusion as well as the contribution of WeBank on financial inclusion, and in the meantime, tables also display the features associated with different categories of Fintech's subsegments in the paper.

1.4.3 Comparative analysis approach

In order to get a relative objective insight regarding to the existing level of financial inclusion in China, the author conducted a comparative analysis approach in the paper through the comparison with other nations, to be specific, G-20 countries are selected as the comparative peers to China. First, G-20 countries are the most powerful countries around the world, and China is one of the G-20 members, therefore, the outcome from the comparison between G-20 nations can represent the real level of financial inclusion in China to some extent. Consequently, the G-20 nations are divided into three groups based on their income levels disclosed by The World Bank Group, in this case, the comparison could be more intuitive as China falls into the upper-middle-income country group, as a result, it enables the author to understand the gap between China and G-20 high-income countries and its positioning within G-20 upper-middle-income countries in terms of financial inclusion. Second, it would be more precise to compare China with the rest of world in terms of financial inclusion, providing a holistic point of view concerning the status quo of financial inclusion in China, but it will require a great deal of time

and efforts to conduct such a comparison. More importantly, the aim of the paper is to the explore the impact of Fintech on financial inclusion in China, thus, the comparison with G-20 countries could be sufficient to support the objective of the paper. To warp up, the comparison between China and other G-20 nations is accepted to deal with the development status of China in light of financial inclusion.

1.4.4 Case study analysis

The case study represents a both qualitative and quantitative assessment of the main findings emerged from this research paper. A real case, WeBank, an Internet Bank, is reported aiming at applying the developed indicators and elements of financial inclusion in practice. There should be more cases from the different streams of Fintech to examine how Fintech companies promote the financial inclusion in China through the developed indicators and elements of financial inclusion. The paper, however, only involves one real case, thereby leading to a significant limitation of the paper.

The objective of this case analysis is to consider the implementation of the finding derived from the concept of financial inclusion, that is a bunch of indicators and elements, and then to provide a clearer understanding of the object this thesis and to emphasize the connection between financial inclusion and the Fintech's associated characteristics. The indicators developed by the paper cannot always follow a quantitative analysis, which is particularly relevant to the quantification of data volume related to Fintech companies. Therefore, the combination of qualitative and quantitative analysis is an approach to analyze how a Fintech company promotes the financial inclusion in China in this paper.

It is worthwhile mentioning how this case was selected: first of all, the company under the analysis should be strongly rooted in the Fintech industry in China as the aim of paper is to analyze the impact of Fintech on financial inclusion in China. Second, the data associated with this Fintech company should be available as the data is critical to conduct some quantitative analysis required by some indicators. Although WeBank is not a public company, annual reports of WeBank can still be collected online and they are audited by PwC, a professional assurance company. Thus, it is reasonable to apply the data from WeBank's annual reports to case analysis

in the paper. It is important to say that they are some missing data and some data are collected from other channels, including websites, blogs, archives, social media and so on. Given that most of Fintech companies in China are private or just in the early stage of development, it is not easy to acquire the relevant data for analysis, partly explaining why there is only one real business cased involved in the paper.

Notes:

1. UNCDF report (2005)
2. Hasan, et al. (2020)
3. Pan (2020)
4. Fungacova & Weill (2015)
5. WBG & PBOC report (2018)
6. International Monetary Fund report (2020)
7. Noelia & Tuesta (2014)
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2. The Overview of Financial Inclusion in China

2.1 Four key elements of Financial Inclusion

Financial services can help drive the economy development in terms of eliminating poverty by facilitating investment in health care, education and business, and in terms of effectively managing financial emergencies, thereby making it a key priority to promote financial inclusion around the world, particularly in emerging economies(Dean, et al., 2016)[1]. There is no consistent definition for financial inclusion yet, and different parties define the financial inclusion in different ways. Center for Financial Inclusion (2011) describes that "full financial inclusion is a state in which all people who can use them have access to a full suite of quality financial services, provided at affordable prices, in a convenient manner, and with dignity for the clients. Financial services are delivered by a range of providers, most of whom are private, and reach everyone who can use them, including disabled, poor, rural, and other excluded populations[2]. Global Partnership for Financial Inclusion (2011) states that "Financial Inclusion is a state in which all working age adults, including those currently excluded by the financial system, have effective access to the following financial services provided by formal institutions: credit, savings, payments, and insurance"[3]. Additionally, it is straightforwardly defined that financial inclusion is "the shares of individuals and firms that use financial services" (Demirgüc-Kunt, et al, 2012)[4]. China's State Council (2015) notes that "Financial inclusion means providing financial services for all social strata and groups with appropriate and valid financial services, at affordable cost, based on the principle of opportunity equality and commercial sustainability. Small and micro business, peasants, urban low-income groups, impoverished groups, the disabled, the aged and other special groups are the focus of the financial inclusion in China"[5]. WBG and PBOC (2018) define the financial inclusion as "the uptake and usage of a range of appropriate financial products and services by individuals and micro- and -small enterprises (MSEs), provided in a manner that is accessible and safe to the consumer and sustainable for the provider"[6]. Although different stakeholders provide different definitions to financial inclusion, they still share some common components such as the expansion of the accessibility to financial services for the vulnerable groups, the affordable cost to receive financial services as well as the safety and sustainability of financial products and services. In order to understand the financial

inclusion in a more holistic way, it is necessary to establish a framework of financial inclusion in terms of four critical elements:

1) Accessibility,
2) Diverse and Appropriate Products,
3) Commercial Viability and Sustainability, and
4) Responsibility and safety.

These four critical elements are citated from the report jointly issued by World Bank Group and People's Bank of China in 2018[7]. The four critical elements will be used to measure the contribution of Fintech on financial inclusion in China in the following Chapter 3 and Chapter 4. Therefore, the table 1 defines and summarizes the aforementioned critical elements in a systematical way from perspectives of their definitions, primary indicators, and significance to financial inclusion, providing a systematic way to check the contribution of Fintech to financial inclusion. Thus, the aim of the table 1 is to develop the key elements and indicators based on the concept of financial inclusion, and then they will be used in the following part to examine the impact of Fintech on financial inclusion.

Table 1: Four key elements of financial inclusion

Key Elements	Perspectives	Details
Accessibility	Definition	A consumer is able to easily select and use a range of financial products and services through physical access points operated by financial service providers and remote devices such as mobile phones and computers.
	Main indicators	# branches of financial service providers # financial agents # Automatic Teller Machines (ATM) # users of a specific financial service or product
	Significance to financial inclusion	-Lack of physical accessibility generates significantly transaction costs for underserved consumers (e.g., direct costs for transportation, indirect costs for loss of time) that can limit the overall value proposition of financial products as tools to meet daily financial needs. -Limited accessibility results in low uptake and use of formal financial products and services. Conversely, improving the accessibility of financial services in enables many follow-on benefits of financial inclusion, including increase in income, productive investments and employment (Sanford,2013)[8].

Diverse and Appropriate products	Definition	A range of financial products and services that are appropriately designed and fit the needs of consumers and that can be selected and used by consumers when necessary.
	Main indicators	-Quality -Convenience -Affordability -The overall range and diversity of available products
	Significance to financial inclusion	The appropriateness of products can drive uptake and usage and increase entry by the unserved and underserved into the formal financial sectors. Conversely, poorly suited products will neither have significant uptake nor long-term usage, or them may actually harm low-income consumers, that's why insufficient attention to product design is cited as a driver of limited uptake and usage of transaction accounts (WBG, 2014)[9].
Commercial Viability and Sustainability	Definition	Financial products, services or business models offered by financial providers have the ability to make profits and survive in markets and encompass continual improvement and innovation that aims to achieve the balance between economic, environmental and social impacts through cost-effective management.
	Main indicators	-Profitability analysis -Sustainability analysis

		-Administrative and operational cost analysis -A robust financial infrastructure
	Significance to financial inclusion	It aims to meet the long-term objectives of financial inclusion if a financial provider is unable to sustain a commercially viable and sustainable business model.
Responsibility and Safety	Definition	The products and services should be responsibly delivered to consumers and the policy of financial inclusion should align with those of financial stability and market integrity.
	Main indicators	-Enhancement on the level of financial capability -Overall safety and soundness of the financial system -Financial risk analysis over a specific financial provider
	Significance to financial inclusion	Financial products and services obtained by consumers should be ensured that they meet consumers' needs and do not harm in their interactions with consumers, particularly in those financially underserved populations who normally lack of necessary financial literacy to identify risks associated with financial products or services.

Source: from WBG and PBOC Report (2018)

Notes to each indicator

- **# branches of financial service providers:** it refers to the number of financial branches that provide financial products and services to the public.
- **# financial agents:** it refers to a number of third-party agents on behalf of traditional or mobile financial service providers, including convenience stores, post offices, large retailers or other outlets[10].
- **# Automatic Teller Machines**: it refers to the number of ATMs serving as the first widespread non-branch access points[11].
- **# users of a specific financial service or product**: It refers to the number of users of a specific financial service or products, including digital payment users, P2P users, Crowdfunding users, etc.
- **Quality**: it includes suitability, dignity of treatment, client protection, transparency and client valued embedded in the financial products and services.
- **Convenience**: it refers to both physical access as well as the timeliness and bureaucratic efficiencies of the financial services or any measures reducing barriers for consumers to approach financial services.
- **Affordability**: it refers to the cost to financial products or services should be reasonable or affordable for low-income consumers.
- **The overall range and diversity of available products**: it refers to the low-income households should access to the same basic financial products and services as all others based on their diverse and complex financial needs rather than just a single product.
- **Profitability analysis**: it refers to the analysis over the operator of financial service or provider of products in terms of financial performance.
- **Sustainability analysis**: it refers to the analysis over the sustainability of business models of operator of financial service or provider of financial products.
- **Administrative and operational cost analysis**: it refers to the administrative and operational costs to deliver financial services or products to low-income consumers.
- **A robust financial infrastructure**: it primarily consists of credit infrastructure and national payment system in order to support efficient transmission of information and transactions among a wider range of market participants.

- **Enhancement on the level of financial capability**: it refers to the improved financial capability of the unserved and underserved population contributes to the increased uptake and usage of financial products and services of financial exclusive groups[12].
- **Overall safety and soundness of the financial system**: it refers to a sufficiently robust regulatory and supervisory framework should be placed in financial market to ensure the development of a long-term financial stability in order to achieve the full financial inclusion.
- **Financial risk analysis over a specific financial provider**: it refers to the financial risk assessment over a specific financial provider in terms of credit risk, market risk, operational risk, etc.

2.2 Benchmarking of China's Financial Inclusion Progress

In order to get an overview insight concerning the current status of financial inclusion in China, the paper draws the data from the World Bank's Global Findex database, which provides a rigorous and multidimensional picture concerning the continued evolution of financial inclusion around the world. China, however, serves as the world's second largest economy, where the process of financial reforms and liberalization is still ongoing. Therefore, the paper examines the level of financial inclusion in China by comparing with other G-20 countries, providing a comprehensive overview of China's financial inclusion progress. The benchmarking group of G-20 countries is divided into the following three groups: 1) G-20 high-income countries (G-20 HIC), 2) G-20 upper-middle-income countries (G-20 UMIC) and 3) G-20 lower-middle-income countries (G-20 LMIC). The table 2 shows the detailed information of these three comparison groups. It is worth noting that China and the European Union are excluded from the G-20 comparison groups.

Table 2: Benchmarking G-20 Comparison Groups

Comparison Groups	Abbreviation	# of countries	Nations
China	-	1	China
G-20 high -income countries	G-20 HIC	10	Australia, Canada, France, Germany, Italy, Japan, Korea, Saudi Arabia, United Kingdom, United states
G-20 upper-middle-income countries	G-20 UMIC	6	Argentina, Brazil, Mexico, Russian Federation, South Africa, Turkey
G-20 lower-middle-income countries	G-20 LMIC	2	Indonesia, India

Source: The Global Findex Database 2017 by World Bank Group

Note: 'high-income', 'upper-middle-income' and 'lower-middle-income' are defined according to the World Bank Group (WBG) income classifications

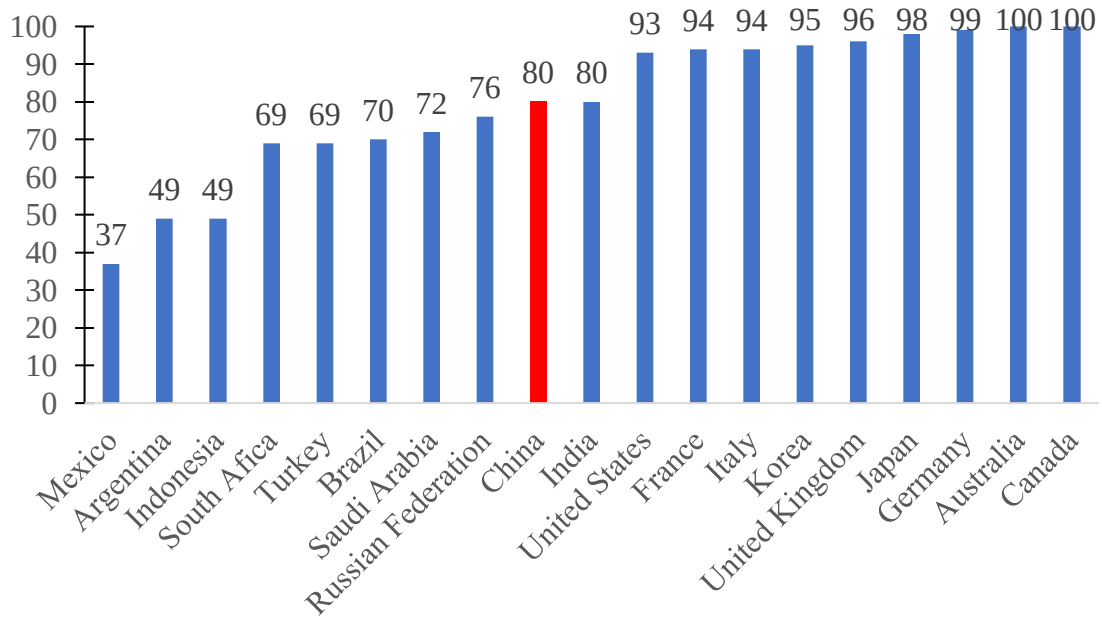
According to the Global Findex Database 2017, there are four main key aspects for financial inclusion in China as well as in other benchmarking groups: account ownership, payments, borrowing and saving (Demirgüç, et al., 2018)[13].Thus, the following subsections are divided into (2.2.1) Account Ownership, (2.2.2) making digital payments, (2.2.3) saving for individuals and (2.2.4) borrowing for individuals; additionally, in the subsection (2.2.5), the barriers to account ownership are reported;

2.2.1 Account Ownership

Accounts provide people a basic financial tool, which can be used to pay bills, access credits, make transactions and send or receive remittances, thus, having an account is an important marker of financial inclusion (Demirgüç, et al., 2018)[14]. The account ownership defined by the 2017 Global Findex database refers to having an individual or jointly owned account either at a financial institution or through a mobile money provider.

Figure 2: Account ownership across G-20 countries

Adults (age 15+) with an account (%)

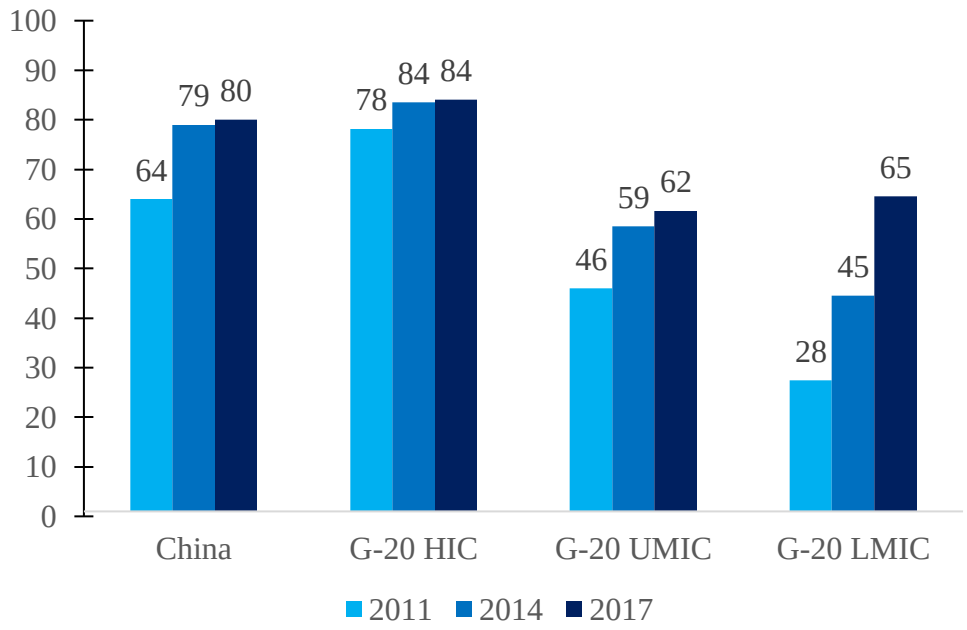


Source: Global Findex Database, 2017

As the figure 2 shows, the average rate of account ownership across G-20 countries in 2017 ranges from 37% in Mexico to 100% in Australia and Canada, while both China and India have 80% of account ownership among adults with ages above 15 years old. It is worth noting that in India the share of adults with an account has more than doubled since 2011, to 80%, which is thanks to the Indian government policy launched in 2014 to boost account ownership among unbanked adults through biometric identification cards (Demirgüç, et al., 2017)[15].

Figure 3: Account ownership among G-20 comparison groups

Adults (age 15+) with an account (%)



Source: Global Findex Database, 2017

From the figure 3, The account ownership in China, however, has remained largely unchanged from 2014 to 2017, increasing just 1 percent within three years, while it shows a significant increase from 2011 to 2014. In addition, both G-20 UMIC and G-20 LMIC indicates a dramatical growth from 2011 to 2017, particularly representing by the G-20 LMIC which states over twice increase from 2011 to 2017. Generally, the account ownership in China is lower than in G-20 HIC group, 84%, but far higher than G-20 UMIC and G-20 LMIC, 62% and 65%, respectively. Thus, China is clearly ahead of its peers (G-20 UMIC) in terms of account ownership, a core metric of financial inclusion.

Table 3: Account ownership among G-20 comparison groups in 2017, by individual features

Adults (age 15+) with an account (%)

Features	Indicators	China	G-20 HIC	G-20 UMIC	G-20 LMIC
Gender gaps	Male	84	96	64	65
	Female	76	92	59	63
Income distribution	Poorest 40%	68	92	53	57
	Richest 60%	88	96	67	70
Education level	Primary or less	71	86	53	55
	Secondary or more	95	95	66	74
Age group	Ages 15-24	87	83	50	62
	Age 25+	79	96	65	66
Employment status	Out of labor force	69	90	51	59
	Employed or seeking work	84	96	69	69
Region	Rural	78	94	60	63

Source: Global Findex Database, 2017

The general level of account ownership in China is significantly higher than other G-20 emerging nations, however, the gap of account ownership in China is far greater than other comparison groups in terms of income distribution and education level as the table 3 shows the individual characteristics of account ownership in 2017 across benchmarking comparison groups. It is worthwhile noting that the proportion of account ownership in terms of richest 60% (it is based on household income quintiles within economies) and secondary or more (it refers to those respondents who have completed secondary school or higher education) in China is 88% and 95%, respectively, which are very close their counterparts in G-20 HIC, 96% and 95%, respectively. Thus, it indicates that account ownership in China subjects to the huge gap between rich and poor and the educational disparity, and it implies that improvement on poor people and people with a primary education or less to access financial accounts will contribute to the progress of financial inclusion in general in China. Furthermore, the account ownership in rural

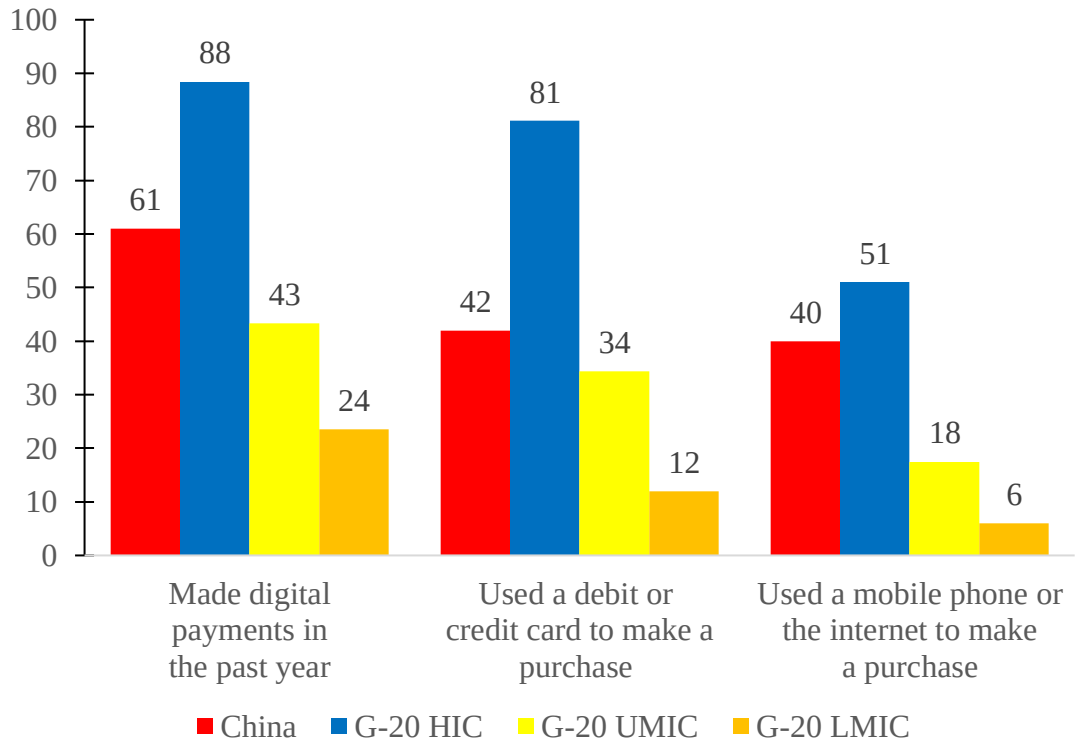
areas in China is far lower than in G20-HIC, and it indicates that the elimination of urban-rural gap will be of great significance to achieve financial inclusion as the above part analyzes.

2.2.2 Making Digital Payments

Apart from the account ownership, making digital payment for transaction is another critical indicator of financial inclusion. According to the Global Findex Database, making digital payments refers to respondents who report using mobile money, a debit or credit card, or a mobile phone to make a payment from an account, or report using the Internet to pay bills or to buy something online in the past 12 months. And it also includes respondents who report paying bills or sending remittances directly from a financial institution account or through a mobile money account in the past 12 months. Generally, 61% of Chinese adults report using a debit or credit card, mobile phone or Internet to make payments in the past 12 months as the figure 4 shows. It is lower than the corresponding rate in G-20 HIC (88%), while is higher than the rate of G-20 UMIC (43%) and far above the rate of G-20 LMIC (24%).

Figure 4: Making Digital Payments among G-20 Comparison Groups in 2017

Adults (age 15+) making payment in the past 12 months (%)



Source: Global Findex Database, 2017

Thanks to the popularity of e-commerce in China in recent years, the penetration of the digital payment based on mobile devices and Internet platforms is getting deeper and deeper in China and increases to 61% in 2017 from 38% in 2014, almost growing by 1.6 times based on the Global Findex database, 2017. As the figure 4 shows, approximately 40% of Chinese adults report having made a payment from their accounts by using a mobile phone or the Internet, and its prevalence rate of mobile phone payments still lags behind that of G-20 HIC (51%), while it far exceeds that of G-20 UMIC and G-20 LMIC groups (18% and 6%, respectively). As regards to using a debit or credit to make payments, the corresponding rate in G-20 HIC is almost twice than that of China, while China still leads to other groups, G-20 UMIC and G-20 LMIC in terms of debit or credit card payments. From the figure 3.3 above, the gap between China and G-20 HIC in terms of debit or credit card payments is far greater than that in terms of mobile phone or Internet payments. Therefore, it can be concluded that China still lags behind G-20 HIC but dominates to G-20 UMIC and G-20 LMIC from the perspective of making digital payments, a critical metric of financial inclusion.

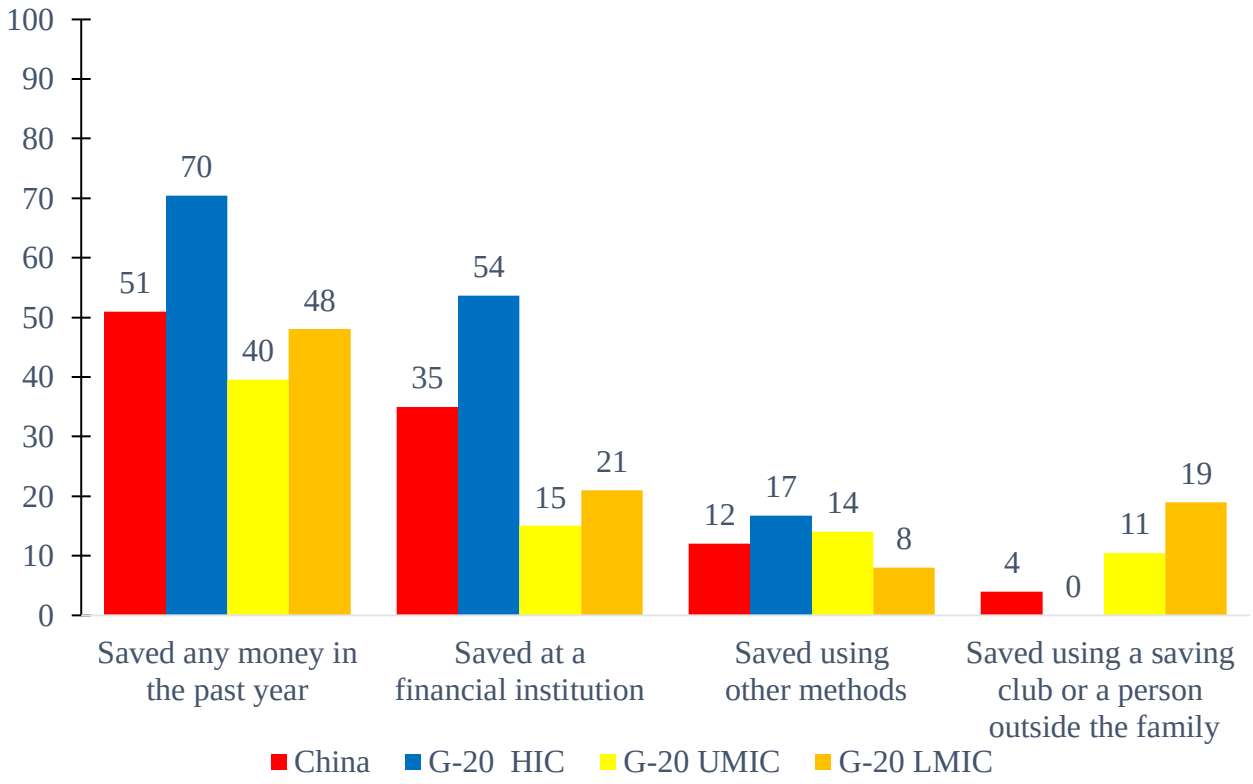
2.2.3 Saving for Individuals

People save money for immediate and future expenses such as for education fees, emergencies, retirement life needs, or even for business. As the figure 5 states, around 51% Chinese adults report saving money in the past years while the saving rate in G-20 HIC groups is much higher, reaching 70%, and the rates of saving in G-20 UMIC and G-20 LMIC arrive at 40% and 48%, respectively. According to the Global Findex Database 2017, people go about saving in different ways and there are three mutually exclusive categories of saving approaches: saved at a financial institution, saved by using a saving club or a person outside the family and saved by using other methods (including saving in cash at home, in the form of livestock, jewelry, or real estates, as well as in the form of using investment products.) Among all adults, the share who reported saving at a financial institution averaged 54% in G-20 HIC economies and reached 35% in China. However, counterparts in G-20 UMIC in G-20 LMIC nations reported 15% and 21%, respectively. Apparently, most of savers in China saved at a financial institute as its corresponding share is far greater than the combination of the other two saving approaches. In G-20 UMIC groups, the proportion of saving methods among these three categories kept at almost

the same level, while the G-20 LMIC groups tend to save at a financial institution or at a saving club or a person outside of the family and are less likely to use other saving methods.

Figure 5: Saving among G-20 Comparison Groups in 2017

Adults (age 15+) saving in the past 12 months (%)



Source: Global Findex Database, 2017

Note: the data with respect to 'saved using a saving club or a person outside the family' is not available for G-20 HIC group from Global Findex Database

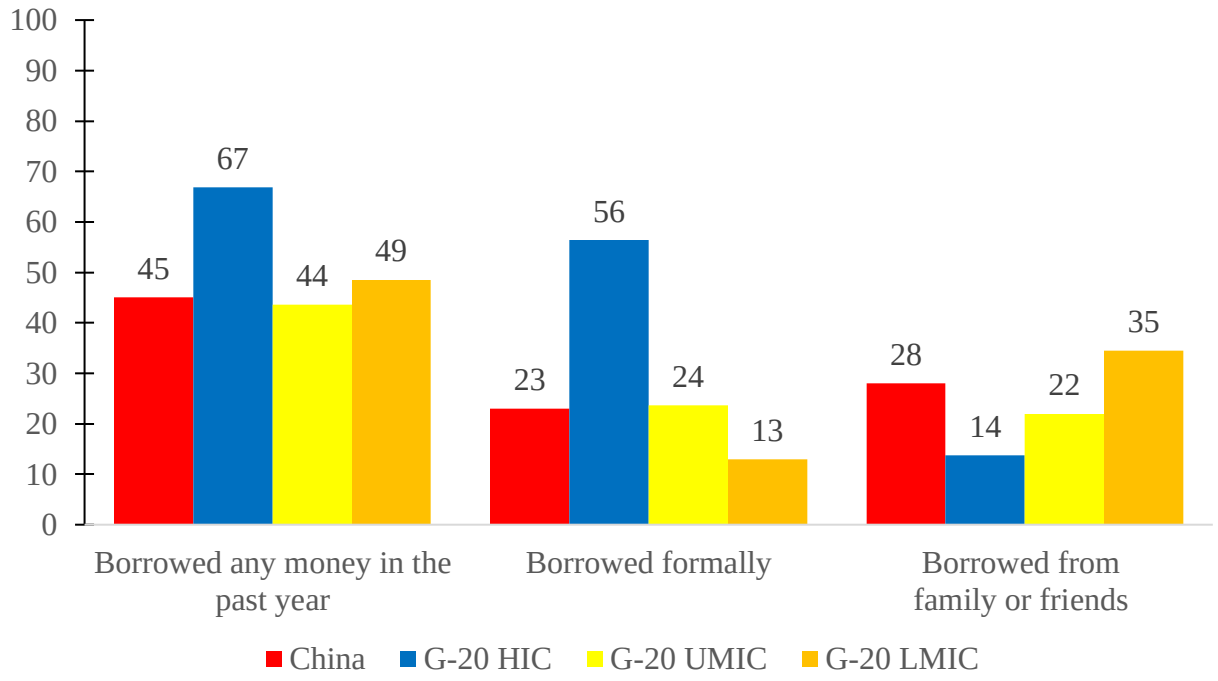
2.2.4 Borrowing for Individuals

Borrowing from financial inclusion (formal credits) is another key indicator of financial inclusion. According to the Global Findex Database 2017, 47% of adults reported having borrowed money in the past 12 months. The share of adults with new credit, formal or non-formal, averaged 67% from G-20 HIC, 49% from G-20 LMIC, and 44% from G-20 UMLC as the figure 6 shows, additionally, among 45% of adults in China reported borrowing money in the

past 12 months. Therefore, Chinese adults are as likely as adults in G-20 UMIC to report having borrowed in the past year but are significantly less likely compared to adults in G-20 HIC. The share of adults who reported having borrowed money in G-20 LMIC are little bit higher than that of China as the figure 6 indicates.

Figure 6: Borrowing among G-20 Comparison Groups in 2017

Adults (age 15+) borrowing in the past 12 months (%)



Source: Global Findex Database, 2017

Note: Borrowed formally refers to 'borrowed from a financial institution or used a credit card'

Approximately half of borrowers in China (23%) reported having borrowed from a financial institution or used a credit cards, which is significantly lower than that of G-20 HIC. In fact, the formal credit was by far the most common source of credit in G-20 HIC economies. The averaged share of formal borrowing in G-20 UMIC economies is one percent higher than that of in China. In terms of informal borrowing, 28% of adults in China reported having borrowed from family or friends in the past 12 months, which takes a significant share of overall borrowing in the past year. And the proportion of informal borrowing in China is a bit higher than the averaged percentage in G-20 UMIC nations. In G-20 LMIC nations, the informal borrowing

seems serve as the most common source of credits. Thus, China's use of formal credit is a bit lower compared to G-20 UMIC nations even though the overall borrowing in China is a bit higher than that of G-20 UMIC economies, which can be explained by the fact that more Chinese people tend to borrow from friends or family compared to G-20 UMIC.

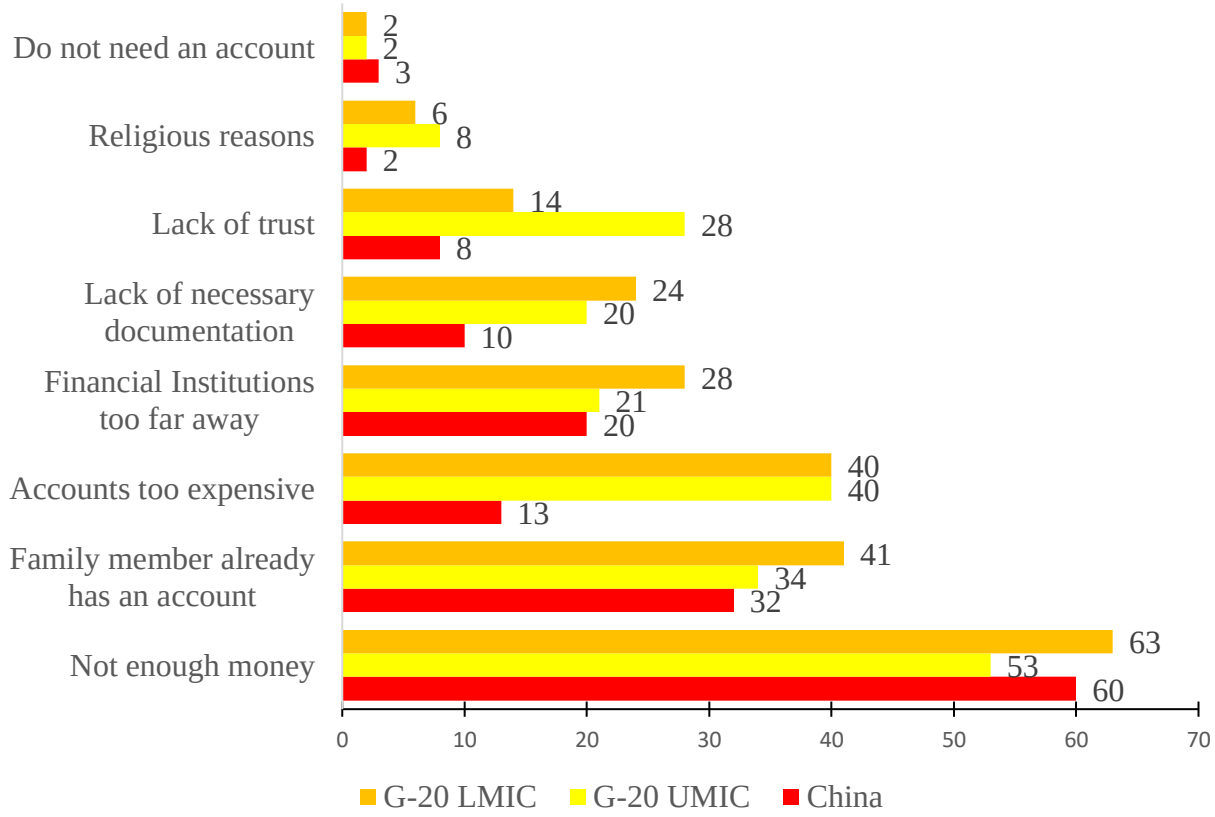
2.2.5 Barriers to Account Ownership

As discussed above, a share of adults in China still lack an account at a financial institution, which functions as a fundamental financial tool to address the needs to make daily transaction as well as to access other financial products and services. Thus, it is of interest to explore the barriers to account ownership in China as well as in other developing economies. In order to shed light on the causes for barriers, the 2017 Global Findex survey asked respondents without an account at a financial institution why they do not have one. As the figure 7 shows, the most commonly cited obstacle was lack of enough money. Nearly 60% of Chinese adults without an account at a financial institute said they have too little money to use one, and it is similarly in G-20 LMIC and G-20 UMIC nations, with percentage of 63% and 53%, respectively. In addition, cost is another important barrier, cited by averaged 40% adults in both G-20 LMIC and G-20 UMIC economies, but the corresponding rate is far below in China where only 13% of respondents without an account at a financial institute marked as an obstacle to access an account. As a matter of fact, the second most common reason cited by Chinese respondents for not having an account is because their family members have already had ones, similarly, it is also a quite common reason cited by G-20 LMIC and G-20 UMIC economies (averaged 41% and 34%, respectively). Furthermore, Distance is another common barrier: 20% of adults without an account in China reported that financial institutions are too far away. In G-20 LMIC economies the share was even higher, with about 28% citing distance as a barrier while in G-20 UMIC economies, the average share is 21%. Distrust in the financial system characterizes as a greater barrier both in G-20 LMIC and G-20 UMIC economies than in China (only 8% respondents cited it as a reason). Documentation requirements also hamper account ownership. 10% of adults without an account at a financial institution in China quoted the lack of the documentation as the obstacle to open an account, while higher shares cited this barrier in G-20 LMIC (24%) and G-20 UMIC (20%) economies. While few adults without an account at a financial institution in China

cited that there is no need to open an account as a reason, which is also similar in G-20 LMIC and G-20 UMIC nations.

Figure 7: Barriers to account ownership in 2017

Adults (age 15+) (%), 2017



Source: Global Findex Database, 2017

Note: World Bank Group has not conducted the survey regarding to barrier to account ownership for high-income countries.

Generally, the level of financial inclusion in China is relatively higher compared to its peer G-20 UMIC group nations but there is still gap between China and G-20 HIC group countries. To be specific, China is pretty close to the G-20 HIC in terms of digital payment based on the Global Findex Database in 2017, and the account ownership in China remains a pretty high level among G-20 UMIC and G-20 LMIC economies, while the borrowing, one of critical aspects of financial inclusion, is relatively lower compared to the average percentage of G-20 UMIC economies in light of formal borrowing (credits granted by formal financial institutions). To

sum up, China has made a significant progress from the perspective of accounts ownership and digital payments, while its borrowing activities still lag behind compared to the former two key aspects of financial inclusion, thus, it can be concluded that the financial inclusion level is imbalanced and heterogenous and the financial credit level is still underserved in China.

Notes:

1.Dean and others (2016)

2. CFI report (2011)

3. GPFI report (2011)

4. Demirgüc & Klapper (2012)

5. China State Council (2015)

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13. Demirgüç-Kunt and others (2018).

14. Demirgüç-Kunt and others (2018)

15. Demirgüç-Kunt and others (2017)

3. An overview of Development Status of Fintech in China

In recent years, Fintech, served as a new financial service provider, has been booming in Chinese market. As a matter of fact, it has deeply penetrated into the daily life of Chinese people. The tremendous proliferation of Fintech is coupled with the advancement of financial technologies, such as the blockchain, Artificial Intelligence, Big Data, Machine Learning and Cloud Computing, which are applied to support the innovation and development of Fintech. The rapid growth of Fintech in China can be partly attributed to the demographic, the increasing GDP, the rising of middle class, the high penetration of smart phone usage as well as the unmet financial needs of consumers and small-and – medium sized enterprises that are usually neglected by traditional financial institutions, represented by banks, which prefer to fund the state-owned enterprises. China has the largest population and its GDP has jumped to the second around the world, and in the meantime, the size of middle class in China has expanded dramatically, reaching approximately 400 million in 2019[1]. Financial service, however, is not advanced enough to cover the increasing financial needs asked by consumers and enterprises in China. All these factors jointly contribute to the development of Fintech in China. Fintech has extended into various aspects of financial industry and generated innovative models, such as the cryptocurrency for investors who have high risk tolerance. Thus, not all the financial products and serviced provided by Fintech are tailored to underserved population due to the different types of fintech models associated with different risks.

The objective of this research is to analyze the role of Fintech in improving the financial inclusion in China. The following sections cover five primary subsegments of Fintech companies in China: (3.1) digital payment, (3.2) peer-to-peer lending, (3.3) Crowdfunding, (3.4) Robo-advisory and (3.5) Internet banks. Finally, the section (3.6) summarizes the contribution of Fintech to financial inclusion in China.

3.1 Digital Payment

In recent years, China has experienced exponential growth of digital payment. Based on data from PBOC, the table 4 mirrors the overall development of electronic payment (or digital payment) transactions in terms of the number of payments and transaction value from 2013 to 2019. Electronic payment consists of online payment, mobile payment and telephone payment and it also includes ATM business, POS terminal business and others from 2015 onwards. From the figure 8, it can be seen that the number of electronic payment (digital payment) has increased to 223,288 million in 2019 from 25,783 million in 2013 while the transaction value kept at around the same level from 2015 onwards.

Table 4: The breakdown of Number(million) and Value (CNY trillion) of Electronic Payment Data from 2013 to 2019

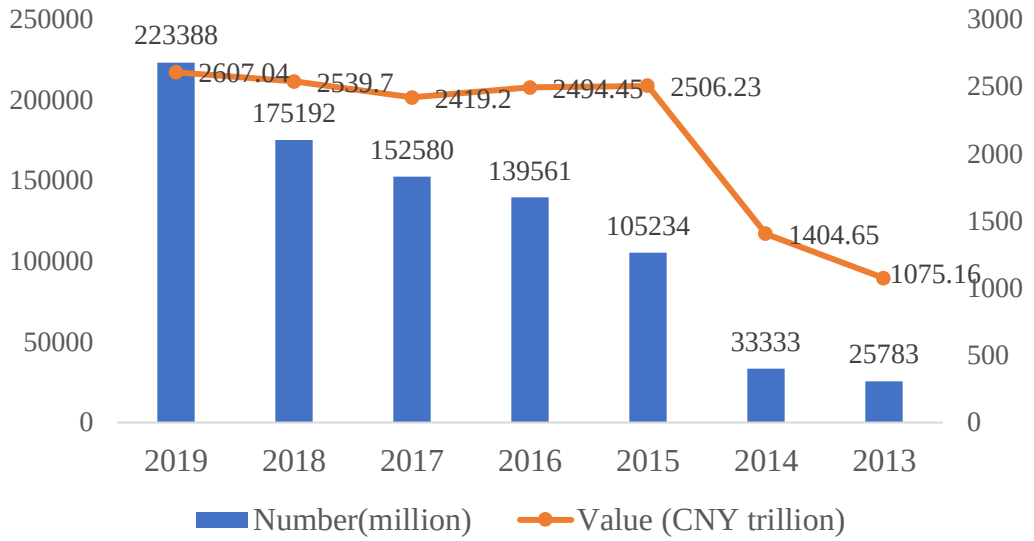
Year	Electronic Payment		Online payment		Mobile Payment		Telephone Payment	
	Number	Value	Number	Value	Number	Value	Number	Value
2019	223388	2607.04	78185	2134.84	101430	347.11	176	9.67
2018	175192	2539.7	57013	2126.33	60530	277.39	158	7.68
2017	152580	2419.2	48578	2075.09	37550	202.93	160	8.78
2016	139561	2494.45	46178	2084.85	25710	157.55	279	17.06
2015	105234	2506.23	36371	2018.2	13840	108.22	298	14.99
2014	33333	1404.65	28574	1376.02	4520	22.59	234	6.04
2013	25783	1075.16	23674	1060.78	1670	9.64	435	4.74

Source: From PBOC

From the figure 9, mobile payment had accounted for the largest part in terms of transaction volume, followed by online payment by the end of 2019. As a matter of fact, the number of mobile payments had reached more than 101 billion, which is around 45% of the total number of electronic payments of 223.4 billion. Mobile payment refers to the process of completing payments through mobile devices and to the conduction of authorization and authentication through mobile devices in exchange for the economic value of services and commodities (Dahlberg, et al., 2008)[2]. The online payment, however, takes the largest portion in terms of transaction value and it reached CNY 2134.84 trillion, which is approximately 82% of the total value of electronic payments of CNY 2607.04 trillion in 2019, while mobile payment takes

around 13%, reflecting such a fact that mobile payments are frequent but in small sum transactions. From the figure 10, it indicates that mobile payment has exceeded the online payment in terms of the transaction volume since from 2018 onwards while the online payment has always dominated to mobile payment in terms of transaction value.

Figure 8: The Number(million) and Value (CNY trillion) of Electronic Payments from 2013 to 2019

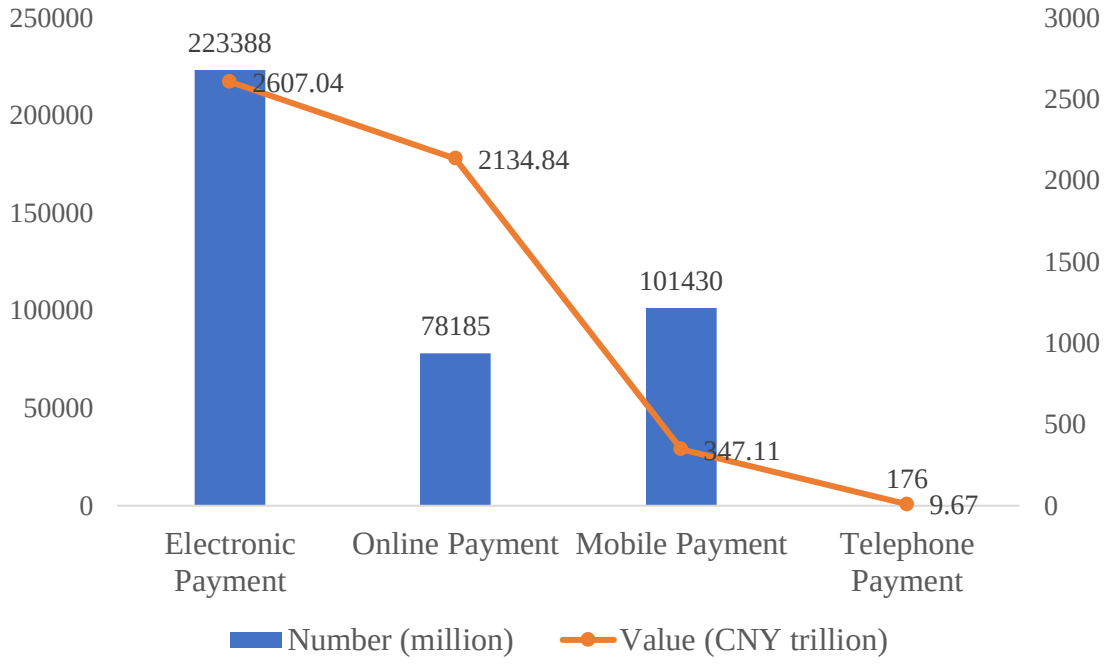


Source: PBOC

Given to the rapid development of mobile payments in China, especially the third-party mobile payment providers, as the figure 11 shows, the market share of third-party mobile payment is dominated by Alipay and Tenpay, taking the shares of 54.4% and 39.4%, respectively, while the joint shares had reached to 93.3% with the remaining shares accounted by UMpay, Union pay and so on by the end of 2019[3]. Alipay, developed by the Alibaba Group's Subsidiary, was launched as an approach to speed up payments on the e-commerce platforms owned by Alibaba. Due to the lack of trust between sellers and buyers between e-commerce transaction in the early days, Alipay introduced a mechanism to serve as a third party where the funds provided by buyers could be stored until the buyers confirmed the receipt of purchased items from sellers. Through this arrangement, it effectively addresses the fundamental issue plagued by e-commerce, and eventually, it significantly boosts the growth of e-commerce business in China. Additionally, Tenpay, developed by Tencent company, enables users sending money and making

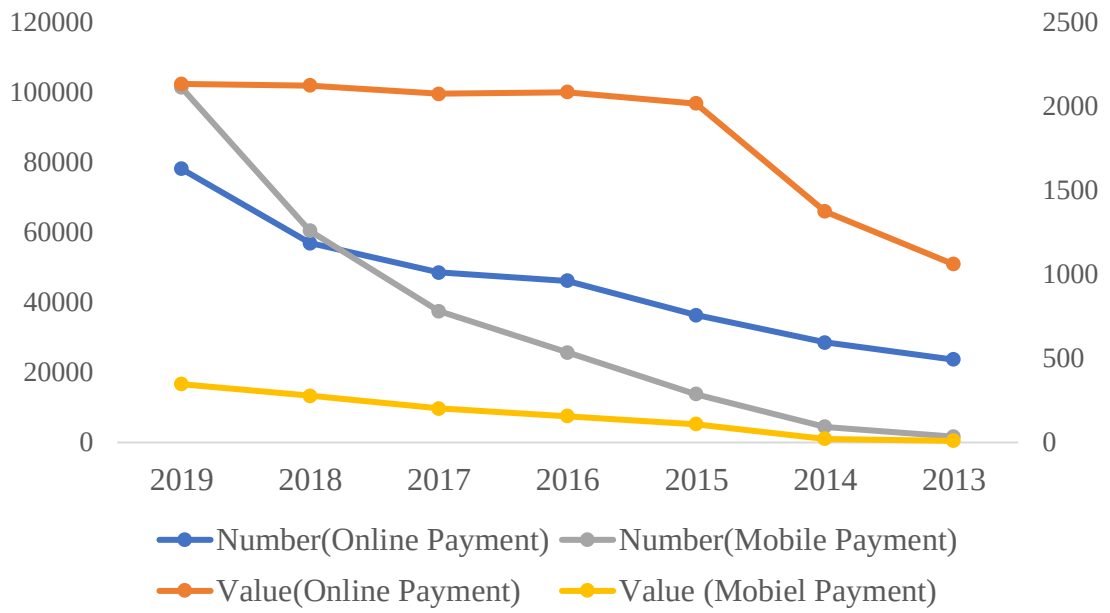
payment on its older social platform QQ originated on PCs, and it has a mobile extension called WeChat Pay, which is rooted in its messaging platform for mobile device, allowing users to perform a variety of transaction including money transfer, making payments, investing in wealth management funds and so on[4]. Based on the data from Statista, the total number of mobile payment users in China had reached around 801.7 million by the end of June 2020, up from about 765 million users by the end of 2019[5].

Figure 9: Breakdown of Number (million) and Value (CNY trillion) of Electronic Payments in 2019



Source: PBOC

Figure 10: The comparison of Online Payment and Mobile Payment in terms of Volume (million) and Transaction Value (CNY trillion) from 2013 to 2019.

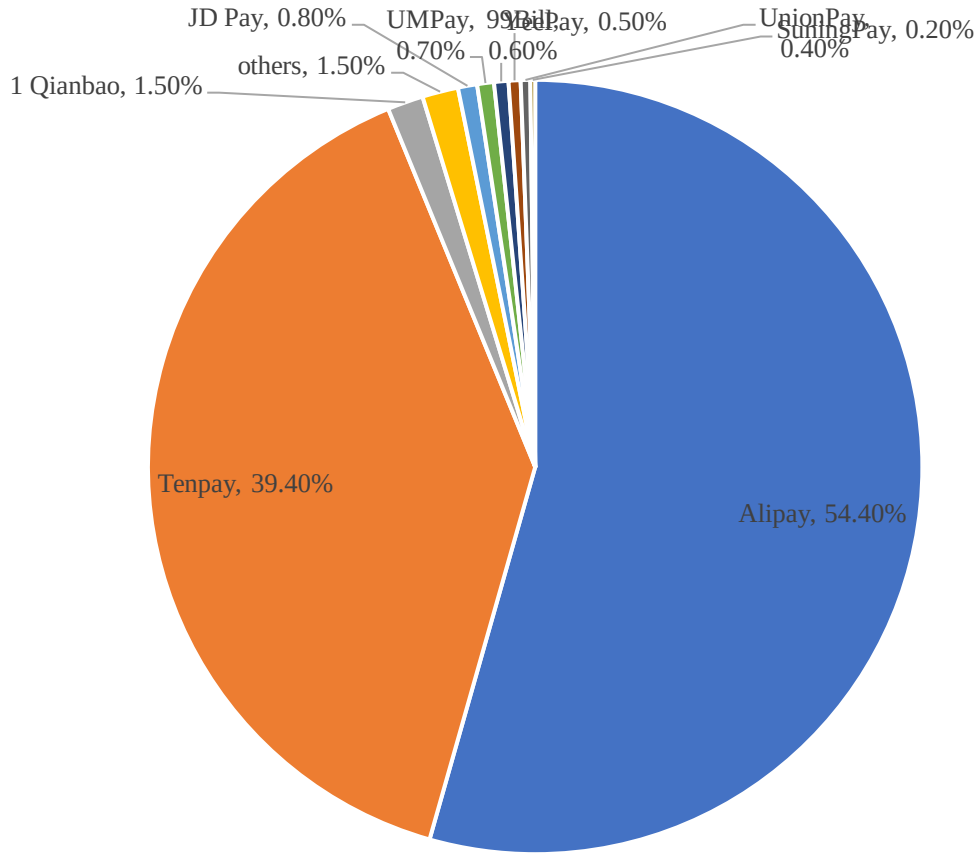


Source: From PBOC

The drivers behind the exponential growth of digital payment in China are various. Klein (2020) states that China's digital payments revolution is related to its unique context, to be specific, the adoption of card-payment is not welcomed by merchants even though China has the largest card network around the world; additionally, the transaction based on cash is cumbersome given that the highest circulating note is 100 yuan (worth roughly $17)[6] ;furthermore, the popularity of QR code in transaction, laying the foundation for the alternative payment approach. Moreover, the rapid growth in use of nonbank digital payment platforms can be attributed to the use of existing platforms(payment functionality embedded in e-commerce and in social media platform by Alipay and Tenpay, respectively), affordability(no cost for transferring money, etc.), convenience and interoperability, and cost saving for retail firms (WBG and PBOC, 2018)[7]. Furthermore, the drivers of mobile payment acceptance in China are due to absorptive capacity(the capacity of individuals to have both prior knowledge and the application of mobile payment), perceived transaction convenience(perceived effort and time spent on a transaction by consumers) and additional value (financial benefits obtained by users by using mobile payment services) as well as other attributes (Chen, et al., 2019)[8]. But there are still potential risks posed by digital payments, for example, the country-level privacy risk faced by digital payments

(Oluwafemi, et al., 2020)[9]. Moreover, the digital payment will also subject to the fraud and money laundering, for example, a user will probably receive a fraudulent payment link, which is akin to the real payment link, when a user is about to make a payment. Thus, in order to address the potential risk coupled with digital payment, the Chinese authorities strengthen the regulation over the digital payment aspect. In July 2015, the People's Bank of China issued the 'Administrative Measures for the Online Payment Business of Non-Banking Payment Institutions (Draft for soliciting Opinions)', introducing a characterized supervisory regime for payment accounts. In the following years, regulatory authorities issued more rounds of policy over the supervisory of digital payment[10].

Figure 11: Market share of leading third-party mobile payment providers in China in 2019

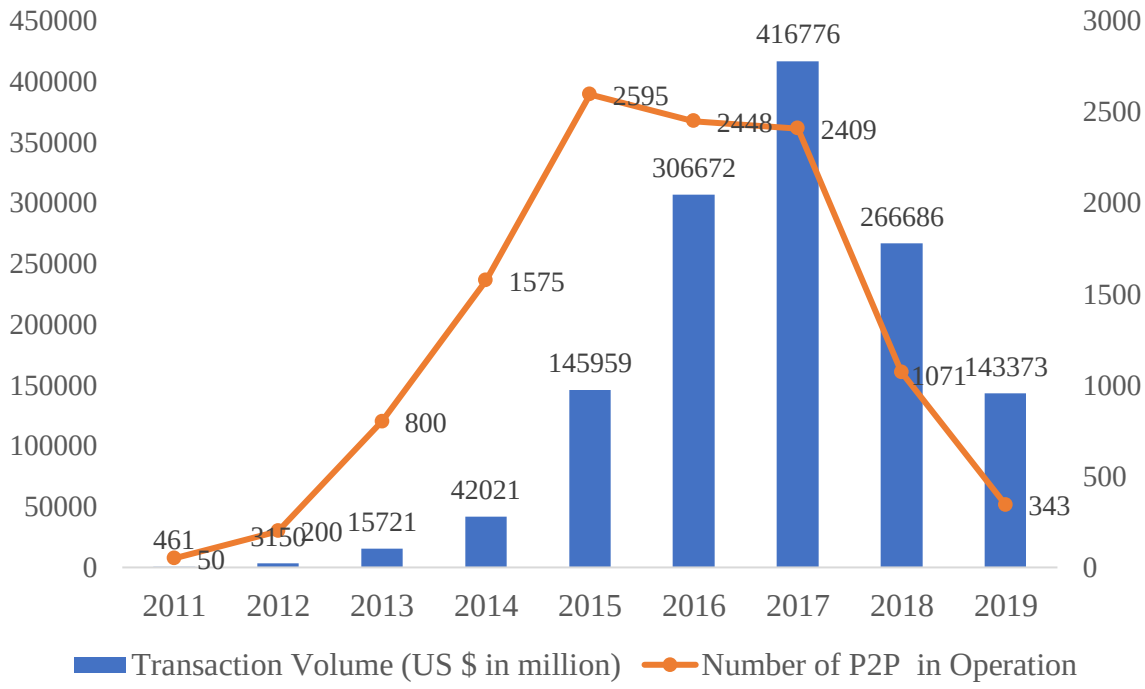


Source: Statista

3.2 Peer-to-Peer Lending

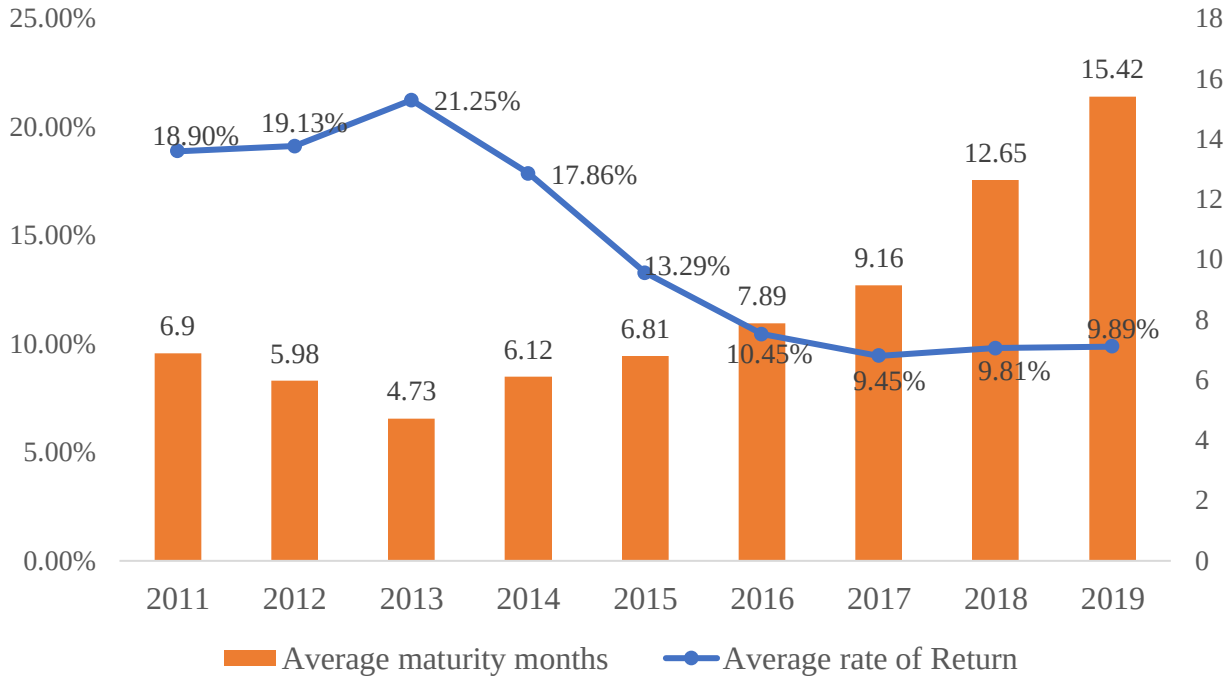
Peer-to-peer (P2P) lending enables individuals obtaining loans directly from other individuals through the online platform, connecting borrowers directly to lenders (Gomber, et al., 2018)[11]. And P2P lending cuts off the traditional financial institutions as the intermediaries and serves as the new brokerage of consumer loans between lenders and borrowers (Hulme & Wright ,2006; Meyer, et al., 2007)[12,13]. Therefore, P2P lending is a special type of credit financing without collateral or intermediation from financial institutions (Lin, et al., 2013)[14], as a result, it provides a new investment channel and improves the utilization efficiency of social funds and simultaneously makes it easy for borrowers to access to loans (Mild et at., 2015)[15]. The world's first P2P lending platform, zopa.com, appeared in UK in 2005, since then, it has witnessed a significant growth around the world. In China, the first established P2P lending platform was PPDAI, which was launched in 2007. From onwards, the P2P lending has experienced an exponential growth. As the figure 12 shows, both the transaction value and the number of P2P lending platforms saw a dramatic rise and fall within a short span from 2011 to 2019.

Figure 12: The transaction value and the number of P2P in operation from 2011 to 2019 in China



Source: From Wangdaizhijia

Figure 13: The average rate of return and maturity months of P2P from 2011 to 2019 in China



Source: from Waidaizhijia

From the figure 13, both the total transaction value per year and the number of P2P platforms in operation has experienced an up -down U shape, the transaction value arrived the summit at around US $417 billion in 2017 and then it started declining dramatically at a stunning rate, and it had realized approximately US $143 billion by the end of 2019, almost three times less compared to its highest amount in 2017. The number of P2P platforms in operation reached a spike at 2,595 in 2015 excluding the problematic P2P lending platforms. As a matter of fact, the total number of P2P lending platforms had reached 6229 by the end of 2017, while there were approximately 3653 problematic platforms in the same year, which subjected to the discontinued operations, failure to meet clients' cash withdrawal demands, or even "run-away(fled)" behavior. And by the end of 2019, there were only 343 P2P lending platforms remained in operation, that is almost 9 times in reduction compared to its climax in 2015. The figure 13 mirrors the trend of P2P lending average rate of return between 2011 to 2019, showing a downward curve in general regardless of the rising trend in the first three years. From 2017 to 2019, the average rate of return of P2P lending kept almost flat and fluctuated at around 9.6%, but it was cut off more than twice compared to the average rate of 21.25% in 2013, which was a turning point for the average

rate of return and began declining from onwards. Conversely, the average maturity months reflected an upward curve from 2011 to 2019 according to the figure 13. In 2019, the average maturity was 15.42 months, which increased by around three months compared to the previous year. From the figure 13, the average maturity was less than one year prior to 2017, while it was over 12 months after 2017, that is to say, the maturity of P2P online lending is gradually dominated by long-term loans to some extent.

Various factors account for the rapid growth and drastic decline of P2P lending in China. It is emphasized that the deep penetration of internet, large supply of funds and unmet financial needs are the three key factors for the aggressive expansion of P2P lending in China (Robin, et al., 2018)[16]. In light of the high penetration of Internet, China has a total of 854 million Internet users by the end of 2019, which increased by 260 million users compared to 2018, and the Internet penetration rate in China reached 61.2% in 2019, increasing by 1.6% compared to the last year, according to the official data released by the China Internet Network Information Center[17]. The total number of online users has exceeded the US and Europe combined, making China become the largest country in terms of the number of Internet users. In addition, the authorities initially adopted a relaxed regulation over the development of P2P lending before 2016, and it created conditions for the rapid increase of P2P platforms due to the less intervention from the government. Furthermore, the advancement in information technology such as AI and big data has contributed to reducing the information asymmetry between debtors and creditors and cost of matching investors and borrowers, thereby significantly lowering P2P transaction costs (WBG and PBOC, 2018)[18].

The drastic fall of P2P lending platform is strongly related to the tighten regulatory environment in China as well as the coupled internal governance structure and business models of P2P companies. Due to the laissez faire policy taken by the Chinese government before 2016, it generated a huge amount of problematic P2P platforms and an outbreak of scandals in the late 2015, therefore, China began to tighten the regulation of the P2P lending market to address the issues regarding the financial stability and social stability. In August 2016 the Chinese authorities jointly issued the “Interim Rules for the Administration of the Business Activities of

Internet-Based Lending Information Intermediary Institutions ("Interim Rules"), with the objective of reforming and standardizing the industry to ensure the healthy development of P2P lending [19]. The promulgation of the 2016 Interim Rules stipulates that the role of P2P lending shifts from financial intermediaries to informational middlemen and that also requires the custodian, information disclosure and registration over P2P lending companies, driving many small and weak platforms with poor internal control mechanism out of the market (Robin et al., 2018)[20]. Additionally, the setback of P2P platforms in China is also related with their inappropriate business models and poor internal management. P2P platforms with weak cashflow management are more likely to be exited from the market due to the risk of rupture of the cash flow, leading to the bankruptcy of the platforms (Yan, et al., 2018; Chen, et al., 2020)[21,22]. 2016 marks a watershed in the history of China' P2P lending industry. The future of P2P lending still remains to be seen.

Based on the relevant regulations, P2P lending platforms are treated as information intermediary by nature rather than credit intermediaries, thus, the business scope of P2P lending primarily covers from collecting and providing information about borrowers, conducting the credit evaluation, and matching borrowers and lenders as well as offering other transaction services for debtors and creditors, and they are prohibited from absorbing deposits from general public or gathering funds or setting up pools of funds[23]. As a result, it leads to several operations models of P2P platforms in China. In China, P2P lending is characterized by two types of features: business channel (online and online-offline) and risk control (with guarantee or without guarantee) (CAFI, 2018)[24].

The first type of P2P transaction is featured by online model without guarantee. It does not provide for any guarantees just in case of default, instead, it just acts as an information intermediary by reviewing borrowers' profiles and then match borrowers and lenders. Since the P2P platform provides no guarantee, the investors have to bear all the risks involved in the transaction, including the late payment or even default risk. Thus, this type of P2P platform bears very low risk, leading to the low transaction fees charged by platform and the improvement of efficiency. A typical example is FinVolution (previously called PPDAI), which was established in 2007, is a pioneer in China's online consumer finance industry and focuses online small loans, and it was reported that the company had over 110.4 million cumulative registered users by the

end of June 30, 2020[25]. Based on the information from FinVolution's website, it serves as an information intermediary and is responsible for reviewing borrowers' information including fraud detection and credit assessment after receiving the loan application from borrowers and then matching borrowers and lenders who subscribe to loans from its platform. It makes partnerships with custodian banks that are in charge of collecting deposit funds for loan subscription from investors and releasing loans to borrowers as well as the loan repayment for both ends of transaction. Through this way, it does not absorb deposits from investors and provides no guarantee.

Another type of P2P operation model is through online-to-offline guarantee. This type of P2P lending company usually collaborates with a third-party guarantee company who bears the full responsibility of guarantee just in case of the default. The online team looks for lenders while the offline team performs assessments of potential borrowers and conduct risk activities due diligence. Once potential borrowers have been verified by offline team and their loan applications will be published on the platform where lenders can subscribe to loans and transaction will take place. Under this model, the platform will take the full risk by making a partnership with third-party companies, thus, the investment yields for investors will not be so high compared to the former type. Lufax is a typical example of the online-to-offline with guarantee model. Lufax, affiliated by Ping An group, was founded in 2011 and now it is a leading Internet-based lending company in China. Its parent company Ping An Group serves a financing guarantee company for Lufax and will compensate the investors once their repayment is overdue, and report borrowers' default status to the Credit Reference Center of the People's Bank of China, and Lufax has accumulated more than 45 million registered users and realized over US $ 14.5 billion profits for its investors[26].

3.3 Crowdfunding

Crowdfunding is the use of collection of small amounts of capital from a large of amount of individuals to fund a new business venture or sponsor projects through the Internet network, bringing the investors and entrepreneurs together and potentially increasing entrepreneurship by expanding the pool of investors beyond the traditional circle of owners, relatives and venture capitalists[27]. Mollick (2014) defines that Crowdfunding is an approach used by individuals or groups of entrepreneurs to raise funds to support their ventures in the form of donation, reward, exchange or voting rights from a large number of crowdfunding sources using the Internet without financial intermediaries[28]. Some scholars, however, state that Crowdfunding is an innovative and disruptive alternative for small-and medium enterprises for fund raising and it also plays a significant role in risk sharing for various investors in China (Zhang, et al., 2014)[29]. There is no consistent definition regarding to the category of crowdfunding around the world. The common types of crowdfunding cover the equity-based, donation-based, reward-based, and the debt-based crowdfund, while there are five different types of crowdfunding in China as the table 5 presents based on the source from Zhongchoujia, a professional website for crowdfunding in China. Hence, the following part about the overview development of Crowdfunding in China is based on the data from Zhouchoujia, and the five types of crowdfunding is shown in the table.

Equity-based Crowdfunding- The investors ask for a stake as a return in exchange for the investment in startups or the early-stage companies, as a result, investors will be shareholders of companies they invest through the crowdfunding. And it is the mainstream model of crowdfunding in China (Hu &Yang, 2014)[30]and it is welcomed by investors especially for the large projects (Wang et al., 2018)[31]. For example, “zhongchouke”, headquartered in Beijing, is an equity-based crowdfunding, launched in July 2015, and has developed affiliations in Shanghai, Shenzhen, Guangzhou and other cities in China. It adopts the operational model characterized by co-investment and online and offline mode, covering the industry from properties, entertainment, restaurants and so on. And there are also other ongoing equity-based crowdfunding platforms such as the “5th Avenue” and so on. As regards to the revenue streams, equity-based crowdfunding platforms will gain profits from the commission fees which are usually 3-5 percent charged on the total amount of funds raised via the platform or from the

value-added fees, such as the management advisory, legal and financial consulting services according to the report released by Yincan Consulting Company (2017)[32]. Although equity-based Crowdfunding has gained the popularity in the Chinese market, the proportion of successful rate is still not high due to the various reasons, including the challenges of making profits, the higher risk and the higher threshold of equity investment and the strict requirements for investors stated by some scholars (Wang et al., 2018)[33].

Table 5: Five common types of Crowdfunding in China

Categories	Features	Representative platforms
Equity-based Crowdfunding	in exchange for shares as return for the money invested to the early-stage company	the 5th avenue; zhongchouke.com; dreammove;
Reward-based Crowdfunding	in exchange for a product or service as return for the money pledged to the project	idianchou.com; hi.taobao.com ; m.modian.com
Royalty-based Crowdfunding	in exchange for a percentage of the revenue accured from the project or venture once it actually starts generating revenue	qiancar.com; Zecaifu.com; etc.
Donation-based Crowdfunding	non-profitable, primarily used for charitable, social, community and medical causes.	shuidichou; qingsongchou, etc
Comprehensive Crowdfunding	it has no specific category of crowdfunding and it contains above types, and also includes items such as films, books, music, etc.	zc.suning.com, etc

Source: from Zhouchoujia

Reward-based Crowdfunding is prevalent in China. Backers are provided the rewards including both tangible and intangible compensation as return for their support in investing in the campaign, especially suitable for small projects. The intangible rewards that funders will get could be in the form of a discounted price of the rewarded products, which are often promoted to the market after their completion (Belleflamme et al. 2014)[34]. The tangible rewards could be in various forms, such as the rewarded products or services, or gifts. “Idianchou.come”, for example, is a reward-based crowdfunding platform, launched in 2014 and headquartered in

Shenzhen, China, and is specialized in the agriculture filed. That is to say, the funders will get the agricultural products as rewards after they pay the money for farmers who use the collected funds to produce agricultural products, and it relies on the operational mode by combining "Internet plus modern agriculture" and it has transformed the agriculture industry to some extent as it contributes to handle both selling and financing difficulties in the agriculture field[35]. The revenues for mostly reward-based crowdfunding come from the commission fees from the successfully funded projects or from the consulting fees. Once a project is successfully funded, a part of funded capital will be transferred to the capital seeker and the remaining part will be transferred after the confirmation from investors who has received the promised outcome from the project.

Royalty-based crowdfunding provides funders a proportion of revenues accrued from the funding project once it begins to generate the profit, thus, this type of crowdfunding model does not enable investors becoming the sharedholders of the funding project, instead, it just entitles them to collect royalties from the project. The royalty-based crowdfund in China primarily covers the industry from the vehicle, properties, agriculture industry. For example, "Zecaifu.com", founded in 2015, primarily focus on the automobile industry, including the used cars, imported cars and new cars from its own network channel. The business model used by "Zecaifu.com" is simply through the bid-ask spread, for instance, investors collectively purchase an used car through its crowdfunding platform and then resell the purchased car at a higher price through its network and finally investors will be able to share the profits from the price difference in proportion to their capital contribution to purchase the used car. There are many similar automobile crowdfunding platforms, and this type of model is considered as one of the most popular Crowdfunding platforms in China (Wang et al., 2018)[36]. And some common features are shared by automobile Crowdfunding: (1) the investors can get the return for a short time; (2) the platforms promise to provide a guarantee of buy-back from investors and sellers; and (3) high-yields of investment (Huang et al., 2018)[37].

Donation-based or charity -based Crowdfunding is featured by non-profitable, and it is primarily used for charitable, social and medical purposes. The initiators who run the Crowdfunding campaigns are not expected to give anything in return and donators who provide

support just simply like their ideas or want to offer help rather than for any material rewards in exchange for their investments (Giudici et al., 2012)[38]. "Shuidichou" and "Qingsongchou" are both main donation-based Crowdfunding platforms which are aimed to cover the medical expenses and other emergencies initiated by public through the Internet or social media such as WeChat. "Shuidichou" was launched in July 2016 and its total amount of fundraising had exceeded CNY 10 billion and it had attracted around 340 million donators to the fundraising platform by the end of September 2018[39]. Similarly, "Qingsongchou" disclosed that it had accumulated approximate 550 million registered users on its website by the end of July, 2018[40]. In a word, the charity-based Crowdfunding has played a critical role in China by encouraging and supporting the development of the charity activities coupled with the innovative business model brought by Internet.

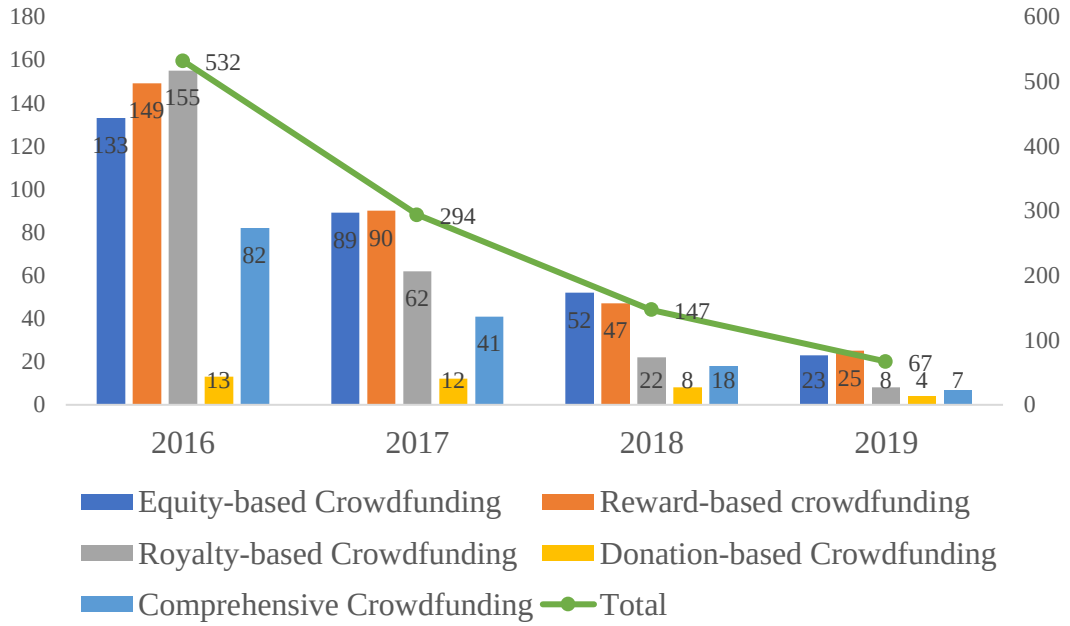
Comprehensive Crowdfunding does not contain any specific type of crowdfunding, as its name suggests, this type of model covers from the equity-based, reward-based and royalty-based crowdfunding, therefore, it is a comprehensive crowdfunding in China. For example, "Zc.suning.com", launched in 2015, is a comprehensive crowdfunding platform owned by Suning Holdings Group, a private company in China. "Zc.suning.com" covers the industry from technology, charity, entertainment and sports, and it promotes the both online and offline crowdfunding, which enables investors more contact opportunities before investing.

Crowdfunding has gained rapid growth around the world. It is characterized by many advantages. First, it can offer an alternative financing option for entrepreneurs or startups who usually fail to get loans from financial institutions such as banks, therefore, it expands the financing channels for small-and-medium enterprises and also allows more small investors participating in investment, which is of great significance to emerging economies to some extent, and simultaneously, it also serves as a fast way to raise funds without upfront fees. Second, it enables new projects or ventures getting more media attention through the online platform, leading to a very effective marketing promotion for those funded projects. Third, it serves as a good channel to get feedbacks from public or even expert guidance on how to improve products or ideas once the crowdfunding projects being launched, and meanwhile, it is also a good way to test the public's reaction toward products or ideas. The more investors fund in projects, the

higher the market recognition of your products will be in the future. Crowdfunding, however, still has shortcomings compared to other ways of fundraising. First of all, it is known to us all that Crowdfunding is the last way to raise funds, therefore, not all the projects on the Crowdfunding platform will get their target funds, that is to say, the successful rate is not very high and there are many projects failing to reach their target funds, which signals the absence of interests from the market and hurts the reputation of the business, making it even harder to raise funds. In addition, initiators have to spend great efforts in building up investors' interests to funded projects, which requires a significant amount of resources such as money, time and so on. Furthermore, if the funded projects or ideas are not protected well, they could be easily stolen or copied by someone once they are public on the crowdfunding platforms.

The crowdfunding emerged just after the global financial crisis and it started to explode in 2009 (Bruton, et al., 2014)[41], while the first crowdfunding, Demohour, appeared in 2011 in China (World Bank, 2013)[42] and it started to surge in 2012 and reached an explosion in 2014 (Xu & Ge, 2017)[43]. The drivers behind the rapid development of crowdfunding platforms in China could be various, but one of the critical factors is that China has the largest online population around the world (FSDC, 2016)[44]. The number of crowdfunding, however, has been declining since 2015. The figure 14 shows that the total number of crowdfunding in China decreased to 67 in 2019 from 532 in 2016, that is nine times of reduction within four years.

Figure 14: The number of Crowdfunding Platfroms in China from 2016 to 2019

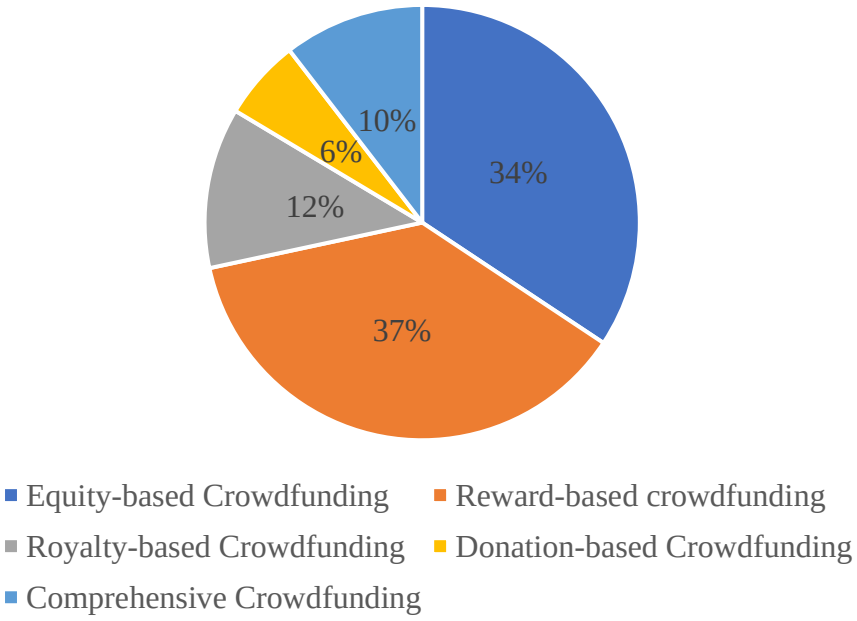


Source: from Zhongchoujia

Figure 15 reflects a closer look concerning the distribution of different types of crowdfunding in 2019. From the figure 15, equity-based and reward-based are two most popular models and collectively account for around 70% of market shares, followed by royalty-based crowdfunding. The factors behind the drastic reduction of the number of crowdfunding could be various. On the one hand, the rapid growth of crowdfunding in the initial stage is also due to the lack of specific regulations for crowdfunding processes, leading to the occurrence of illegal unlicensed fundraising and substantial risks and challenges faced by investors, as a result, those non-compliant crowdfunding platforms were forced to exit by the market (Huang et al., 2018)[45]. On the other hand, the hinderance of the development of crowdfunding in China is also due to the immature legal framework related to the regulation of the Chinese crowdfunding market (Yuan & Chen, 2018)[46] and underdeveloped regulatory system in China (Chirisa, et al., 2018)[47]. Although Chinese authorities have strengthened efforts to address illegal unlicensed fundraising activities by releasing a series of guidelines, for example, in October 2016 a guideline was released by Chinese authorities with aims to regulating the internet -based financing activities and to cracking down illegal financial activities, including illegal offerings of securities and illegal soliciting of funds and so on[48], the legal framework is still underdeveloped compared to

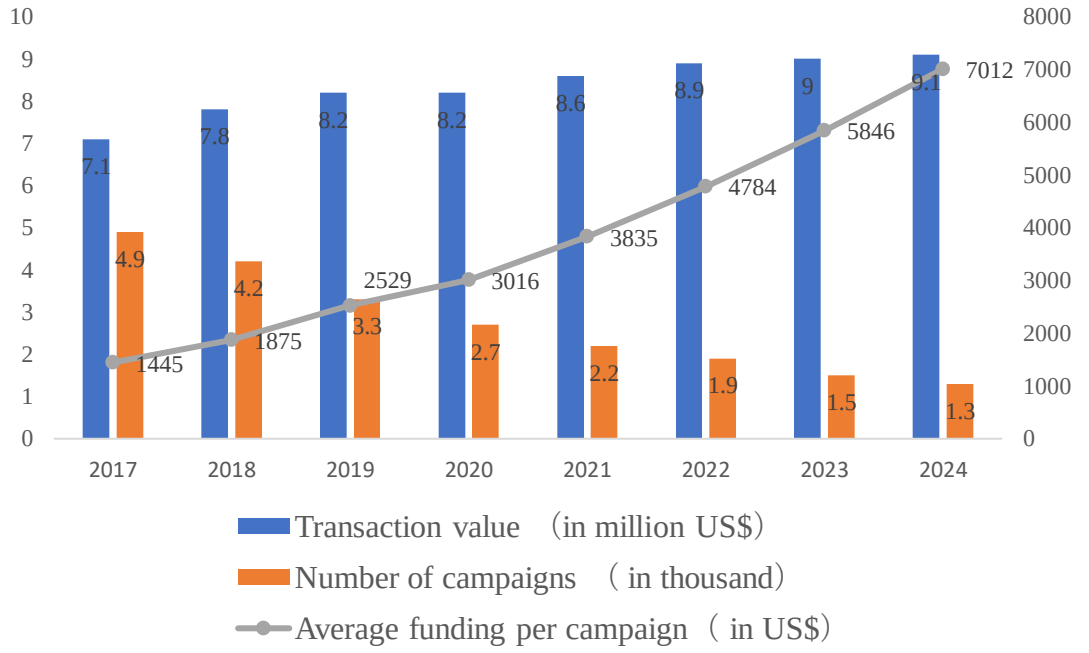
advanced economies. Despite the significant shrinkage of the number of crowdfunding platforms in China due to the compliance management process regulated by government authorities, the transaction value of crowdfunding in China has been steadily increasing since 2017 according to the estimated data by Statista. As the figure 16 shows, the transaction value in the crowdfunding segment is projected to reach US $ 8.2 million in 2020 and the number of successful campaigns is estimated to 2,700, leading to the average funding per campaign amounted to US $3,016. Additionally, transaction value is expected to show an annual growth rate of 2.7%, resulting in a projected total amount of US $9.1million and the average funding per campaign of US $7,012 by 2024 based on the projection from Statista. The future of Crowdfunding in China remains to be seen.

Figure 15: The distribution of different types of Crowdfunding in China in 2019



Source: from Zhongchoujia

Figure 16: The projected transaction value in the crowdfunding in China from 2017 to 2024



Source: from Statista

3.4 Robo-Advisor

Robo-advisors (also spelled as intelligent investment consultants in China) haven been booming around the world with the advancement of information technology, the enrichment of financial data as well as the rising of artificial intelligence. According to the definition of US securities and Exchange Commission, Robo-advisors refer to those registered investment advisors who provide discretionary asset management services to their clients through online algorithm-based program by using innovative technologies such as big data, artificial intelligence, etc. (USSEC, 2017)[49]. Based on the Guiding Opinions on Regulating Asset Management Business of Financial Institutions issued by China Securities and Regulatory Commission, Robo-advisor is deemed as an investment advisor in China[50]. Therefore, a typical Robo-advisor collects information from clients about their financial contexts and future investment goals through an online questionnaire and then uses the data to offer advice and automatically invest clients' assets[51].

As it first appeared in US market, Robo-advisor has been welcomed by investors as a new form of asset investment management service, and it was spread into the rest of world at a staggering rate due to its coupled advantages. First of all, it is featured by a significant lower and transparent cost structure compared to human financial advisors (Fisch, et at., 2018)[52]. With the elimination of human labor, the digital Robo-advisor platform enables offering the same services at a fraction of the cost fees of human asset management companies. In addition, it also lowers the entry barriers for asset management service as it requires less capital to get started. The minimum account ranges from hundreds to thousands of US dollars. One of the most popular Robo-advisor, for example, Betterment, asks for no minimum account at all, allowing more ordinary individuals to enjoy the asset management services. By contrast, the human asset advisors prefer high-net-worth customers who ask for a variety of tailored asset management services and are capable of affording for the relatively high wealth management fees. Furthermore, the Robo-advisor also enhances the clients' accessibility to its online platform. It is normally 24/7 available for clients so they can access to the platform at any time they want, and there is no need for clients to arrange physical meetings with their financial advisors to consult about the wealth management services such as the explanation of their investment needs, filling the paperwork and so on. And what they need to do is just a few clicks on their computers or

their mobile devices in the comfort at their homes. Therefore, it also enhances the efficiency for clients to proceed their financial services compared to the human asset management services. Moreover, it is demonstrated by some studies that the use of Robo-advisors mitigates typical behavioral investment biases, such as herd behavior effect and disposition effect[53]. But there are still some limitations coupled with Robo-advisors. First, investors may have doubts over the Robo-advisor given that their relatively nascent technological capabilities. For instance, the development of AI and big data is insufficient to meet all clients' requirements at the present stage. In addition, investors probably have a sense of distrust due to the lack of human presence. Instead, they prefer the combination of human interaction and the automatic technology, enabling investors to talk human beings if they have doubts with respect to the financial planning generated by Robo-advisor based on the questionaries filled by clients before the commence of investment. Second, it is assumed by Robo-advisor that clients have a clear understanding of their financial situation and their investment goals prior of the beginning of the investment. That is to say, a fundamental knowledge of finance is a prerequisite for the automatic asset management service. As a matter of fact, it is the not the case. As a result, it may lead to a biased expectation of investment planning generated by the Robo-advisor compared to clients' real anticipation of investment objectives. Third, Robo-advisor is insufficient for investors who need more advanced and complex wealth management services; therefore, it could be a god entry-level investment tool for people with limited budget and insufficient investment experience. Hence, the target customer based on Robo-advisor is limited to investors with small accounts at present.

Despite the shortcomings associated with the Robo-advisor, it has been developing actively in Chinese market since it appeared in 2015. More and more Chinese companies from different industries enter this new asset management service industry, including banks, securities, mutual funds as well as Internet companies, launching a bunch of Robo-advisor platforms in China. As the table 6 show, commercial banks founded Robo-advisor platforms as their affiliations and treat open-ended mutual funds as their primary target products. For example, China Merchants Bank is the first bank in China to launch its Robo-advisor platform, "Mojiezhitou", which provides automatic asset management products including open-ended mutual funds and stocks. Apart from banks, Internet companies established their own Robo-advisor platforms too. For

instance, “ToumiRA”, developed by “CreditEase”, is a Robo-advisor mobile application that can create automated asset management service for investors based on their investment goals and risk preferences, and its portfolio includes exchange traded funds and fixed-income investments such as gold, bonds, and even properties from both developed countries and emerging markets, and its minimal account requirement for an investor is $500[54]. In addition, e-commerce giants, Alibaba and Jingdong have also established their own Robo-advisors, respectively.

Table 6: The overview of primary robo-advisors in China

Industry	Parent Company	Robo-advisor	Launch Date	Target Products
Banking	China Merchants Bank	Mojiezhitou	12/2016	open-ended mutual funds, Stocks
	China Guangfa Bank	Guangfazhitou	06/2017	open-ended mutual funds
	Bank of China	Zhongyinhuitou	04/2018	open-ended mutual funds
	Industial and Commercial Bank of China	Aitou	11/2017	open-ended mutual funds
Securities	Gf Securities	Betanew	06/2016	stocks, ETF
Internet	Ant Group	Ant Wealth	08/2015	open-endedmutual funds, stocks.
	Jingdong Finance	Jingdongzhitou	08/2015	stocks, mutuals funds, bonds, negotiable instrument.
	Lanhaicaifu	Lanhaizhitou	10/2015	fixed-income investments stocks, private equities, properties.
	CreditEase	ToumiRA	05/2016	ETF, American stocks, fixed-income investments.

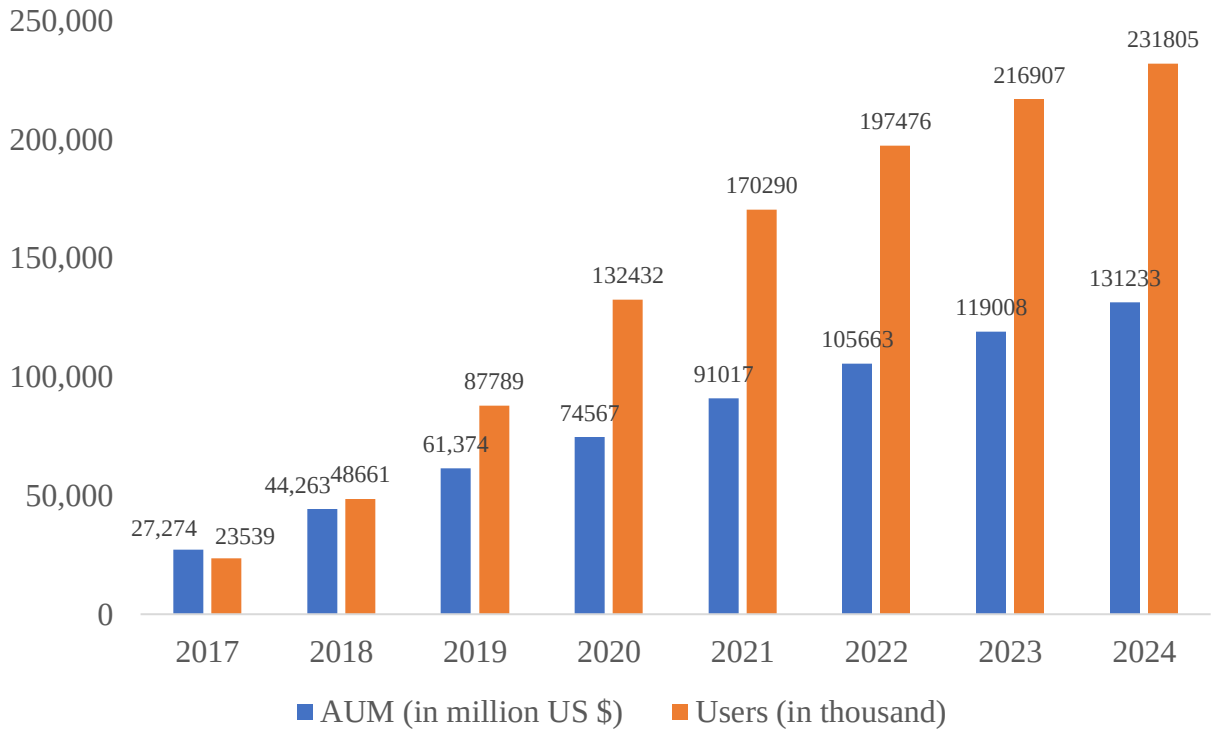
Source: Collection from Internet

In addition, the estimated assets under management of Robo-advisors in China, predicated by Statista, will grow to 74.5 billion US dollars as the second biggest market just after US in 2020

and users will also reach approximate 132 million in 2020 as the figure 17 below shows[55]. Therefore, Robo-advisory has been inevitably attracted by investors, making the asset management service more inclusive for most retail investors and allowing them to access to financial service in a great convenience.

Figure 17: The estimated AUM and users of Robo-advisor in China

(AUM in million US $ and users in thousand)



Source: from Statista

Generally, a typical Robo-advisory in US or European market works as the following stages, it starts from asking clients to fill the online questionnaires in order to get clients' basic financial information and evaluate their risk preference and investment goals. In the first stage, clients will be divided into different categories based on the evaluation of their investment goals and risk tolerance. In the next step, the algorithm-based platform will recommend financial products which consist of a diverse portfolio including equity ETFs and bonds ETFs for clients in light of their previous evaluation results. In the final phase, clients' investment will be automatically managed throughout the whole investment period once clients transfer their capital to Robo-

advisor's account. Meanwhile, clients will be provided the real-time tracking and follow-up portfolio rebalancing service by Robo-advisors as well[56]. The landscape of Robo-advisors in China, however, differs from their counterparties in European and US market due to the unique conditions in China, characterized by the prohibition of granting full power of attorney to Robo-advisors, which means the full delegation is not allowed in China[57]. The main difference exists in the two aspects: (1) whether the Robo-advisor offers automatic account, and (2) the different financial products are recommended (Guo, 2020)[58]. To overcome the prohibitions over the full power of attorney, some Chinese Robo-advisors choose to work in conjunction with oversea companies to provide the auto-account management service and ETF financial products. For example, "ToumiRA" circumvents the regulation to works with an foreign firm, "DriveWealth", to offer automatic account management services and EFTs, and this kind of business model is deemed ideal since it enables the Robo-advisor full autonomy to make the investment decisions and the follow-up rebalancing strategy, while most of Robo-advisors in China fail to provide the automatic account management due to the existing regulatory framework, instead, they usually give recommendations for clients based on the questionaries conducted in the initial stage, that is to say, clients have to either give specific authorization before any transaction is executed or manage the accounts by themselves(Guo, 2019)[59]. In addition, plenty of existing Robo-advisors sell open-ended mutual funds or even individual stocks as their targeted products presented by above table, however, the targeted products of Robo-advisors typically refer to ETFs, which diversifies the portfolio risks. From the table 6 above, only a few Robo-advisors are able to provide ETFs as the targeted portfolio products. Hence, the existing Robo-advisors in China are not generally considered as intelligent. As a matter of fact, the development of real Robo-advisor in China is still in a preliminary stage due to the existing regulatory system.

3.5 Internet Banks

As the development of information technology is getting more and more advanced, the interaction between Internet and other industries become more cooperative and integrated. For instance, a great number of Internet-based companies have stepped into e-commerce and achieved a significant commercial success in China. Meanwhile, these enterprises have developed a large customer base and accumulated a huge amount of transaction data and mastered in online businesses experience. Thanks to the attributes realized by their business operations, these enterprises have recognized their competitive advantages and entered into Internet banking sector. Internet banks, which are also called neo-banks, are Fintech-based banks that operate solely digitally or via a mobile app. These Internet banks have no physical outlets or counter services compared to traditional banks. The absence of physical branches will save Internet banks a significant amount of funds, which can be heavily invested in advanced technology such as AI-powered risk assessment tools, chatbots, user-friendly interfaces and advanced fraud detection system[60].

Internet banks originated in UK after the end of the financial crisis. As a result, it generated a chain rection which led to a wave of emergence of neo-banks around the world. Thanks to their disruptive business models in banking sector, the trend rapidly spread all over the world and at the same time, Internet banks gained the popularity in the market and become a lucrative business model in China. At present, there are 8 established Internet banks which have been granted the commercial banking licenses by China Banking and Insurance Regulatory Commission. As the table 7 shows, 6 out of 8 neo- banks are coupled with the Internet-based enterprises which provide them with the sheer volume of traffic data about online users, contributing to the construction of user profiles for the credit risk assessment. For example, Ant Financial Group, the largest shareholder of Mybank, provides the tremendous amount of transaction data with regards to individual users and small business owners through Alibaba, the biggest e-commerce platform in China, allowing MYbank to leverage big data for credit scoring assessments and loan-granting decisions. Similarly, both Suning Bank and YILLION Bank can exploit the users' data for the evaluation of credit risk from Suning e-commerce platform and Meituan.com, respectively. WeBank, for instance, has a customer base primarily composed of

individual and small business borrowers based on the big data from social networking, WeChat and QQ, the two most popular social media apps owned by Tencent in China.

Table 7: Overview of Internet Banks

Name	Year Launched	Main shareholder	Total assets (CNY billion)	Outstanding loans (CNY billion)	Net profit (CNY billion)
WeBank	2015	Tencent Group	291.2	158.6	4
MYbank	2015	Ant Financial	139.6	70	1.3
XW BANK	2016	Xiaomi Corporation	44.3	33.4	1.1
SUNING BANK	2017	Suning.com Co	63.9	30.6	0.08
YILLION BANK	2017	Meituan.com	31.3	20.2	0.153
Z-BANK	2017	Zhuo'er Holdings	41.9	18.5	0.156
ZGCB	2017	Youyou	17.5	6.3	0.05
OneBank	2017	Yonghui Superstores	10.7	4.5	0.0021

Source: Respective companies' data by the end of 2019.

By the end of 2019, the total outstanding loans managed by MYbank had reached CNY 70 billion, serving over 20 million small businesses among the four-year period after its establishment in June 2015, and it also realized the net profit over CNY 1.3 billion in 2019, approximately twice than that in the previous year, making it one of the most lucrative Internet banks in China. Additionally, the total asset of Mybank had exceeded CNY 139 billion by the end of 2019, becoming the second biggest Internet bank just behind WeBank in terms of the size of total assets. Furthermore, all of these 8 Internet banks had realized the positive net profits in 2019, particular the OneBank, of which the net profit just turned to positive in 2019 from negative in 2018. To sum up, all these banks in the table have realized positive profits within solely a few years. Due to the profitability of online banking sector, it will probably attract an increasing new Internet banks entering this field. For example, "Qihoo 360", a Chinese Internet security company announced on 27 August 2020 that it had received approval from the China Banking and Regulatory Commission to obtain a 30% stake in "Kincheng Bank", a private bank that conducts banking business including deposits, loans, mortgages and other services[61]. It marks an increasing trend of the partnership between Internet enterprises and banks to form the

complementation of both parties' resources, which can be demonstrated by the incumbent players from the table above, even though the business model of Internet banks is still evolving. On the one hand, Internet conglomerates acquire commercial banking licenses through the acquisition of stake in banks which have more rich banking experience; on the other hand, Internet firms are able to provide the wealth of user data and the sophisticated analytical tools. Therefore, the customer resources and revenues from loans disburse through the collaboration between Internet enterprises and traditional banks, gaining more and more popularity in Chinese market.

Various drivers are behind the rapid development of Internet banks in China. First, the financing difficulties of small -and -medium enterprises and underdeveloped consumer loans drive the emergence and development of Internet banks in China. China's market economic system has dominated by Chinese government for a long time and the transformation of market economy has yet completed and the financial system is still in rudimentary stage compared to the advanced economy nations. As a result, financial institutions such as banks prefer to provide loans to large companies, leading to small-and-medium firms inaccessible to financing services. And the financing cost will also be unbearable for those small-and-medium companies even if they are able to get the credit services provided by financial institutions. Thus, the emergence of more Internet banks is due to the imbalance between insufficient financial supply in China and excessive financial demand required by individual consumers and mall-medium enterprises. Additionally, traditional financial institutions may find it hard to provide the corresponding financial products and services for enterprises nowadays due to their diverse and complex financing needs, while Internet banks are capable of matching the unmet needs of enterprises through innovative business model and application of advanced technology.

Second, the advancement of information and communication technology has laid the foundation for the development of Internet banks. Internet banks are able to significantly reduce the operating costs thanks to the lack of physical outlets. Additionally, Internet banks can broaden marketing channels to attract more customers due to their powerful information processing capabilities. Furthermore, the application of big data and cloud computing enables Internet banks

efficiently processing complex information and constructing the accurate user portrait to provide tailored financial products or services and to enhance the customer stickiness.

Third, China's regulatory system over Internet banks has been gradually relaxed and encourages the innovation of Internet banks, thereby allowing more banks to enter into the online banking industry. To warp up, the financing difficulties, the advancement of information and communication technology and the relaxed regulatory system collectively contribute to the rapid development of Internet banks in China.

Some distinctive differences exist between Internet banks and traditional banks as the table 8 shows below.

First, they have different customer bases. Internet banks primarily target at small-and-medium enterprises and entrepreneurs whose financing needs are usually uncovered by traditional banks. They also target individual consumers who are more active in e-commerce and provide them tailored consumer loans. More importantly, some Internet banks, such as WeBank, YILLION bank and Onebank, position themselves to promote the financial inclusion. Their target customer bases, therefore, primarily cover those financially underserved population in order to enhance their accessibility to financial services. As regards to traditional banks, they usually serve customers and enterprises with the credit records. Second, traditional banks still rely on physical counter services while they also have existing online channels which are adapted for the delivery of their affiliated traditional products through the Internet. Third, the approaches to identify and assess creditworthiness are different. Internet banks integrate and leverage resources from their parent companies or from their partners, including user data or information from Internet, and consequently, the big data and advanced Internet technologies enable Internet banks conducting customer identification and credit investigation process in a more efficient way. On top of that, Internet banks can also combine the traditional way such as the telephone credit investigation to take the creditworthiness of customers. Traditional banks, however, primarily rely on their own resources, including the credit risk assessment models, the external resources such as the credit scoring of the targeted companies from credit agency, the financial statements of the enterprises, the face-to-face communication with customers and so on. Lastly but not least, Internet banks

tend to apply the big data, AI and other sophisticated technologies for risk management strategies while traditional banks are more likely to rely on their staff to undertake the risk management activities.

Table 8: The difference of business model between Internet Banks and Traditional Banks

Key Indicators	Internet Banks	Traditional Banks
Customer base	Small-and-medium enterprises, individual consumers, entrepreneurs, financial inclusion	Customers and enterprises usually with traceable credit records
Operating channels	The digital channel only	Both physical counter services and online banking channels
Credit assessment approaches	Internet technologies, big data, telephone credit investigation, etc.	Their own resources, financial statements, face-to-face communications, etc.
Risk management strategies	Big data, AI, etc.	Rely on their staff to undertake risk management activities

3.6 Contributions of Fintech to Financial Inclusion

The impact of Fintech on financial inclusion can be fully explored from the four key elements of financial inclusion presented in the table 2: accessibility, diverse and appropriate products, commercial viability and sustainability and safety and responsibility. The following part will briefly discuss the role of Fintech companies on financial inclusion in terms of critical indicators and element, and not all subsegments of Fintech discussed above will be covered in the following section.

In terms of accessibility, Fintech companies greatly expand consumers to access to financial services ranging from payment, borrowing, funding as well as wealth management services. One of the indicators for accessibility illustrated by table 2 is the number of users of a specific financial service or product. To be specific, the number of mobile payment users in China had reached 801.72 million by the end of June 2020 from around 125.48 million in 2013 based on the data from Statista, increasing over 6 times within a short span of less than 7 years. Additionally, P2P lending not only provides a new investment channel for investors but also a financing alternative for consumers and MSEs to access loans. According to the data source from Wangdaizhijia[62], the number of investors increased to a spike at 17,130 thousand in 2017 from 250 thousand in 2013 and then it declined to 7,260 thousand in 2019, while the number of borrowers experienced a similar trend, initially increasing to 22,430 thousand in 2017 from 150 thousand in 2013 and then decreasing to 11,560 thousand in 2019. Although the number of investors and borrowers of P2P platforms saw an up-down U trend from 2013 to 2019, it still enables more users accessing to both financing and investment activities. Furthermore, Robo-advisor disrupts the traditional asset management services which are only tailored for high net worth investors, allowing more common users to access to wealth management services. Based on the data from Statista, it projects that there will be around 132 million users of Robo-advisor in 2020 in China. Moreover, Internet banks jointly enable more individuals and MSEs connecting to financial services in terms of loan services. To sum up, some Fintech companies discussed above increase the accessibility of users to financial services.

As for diverse and appropriate products, Fintech companies are able to provide a range of financial products and services that are tailored to customers' needs. The contribution of Fintech can be unfolded from three indicators of this key element: convenience, affordability, and the overall range and diversity of available products. First, digital payment, P2P lending, Crowdfunding, Robo-advisor and Internet banks significantly enhance the convenience of users to access relevant financial services as they remove the physical barriers and eliminate the constraint of time limit, making users access financial services anytime and anywhere as long as they can connect to Internet through mobile devices or computers. For example, the 24/7 online available services provided by Robo-advisor and Internet banks enable clients accessing to the platform at any time they want, making users' financial activities more convenient. Second, some Fintech companies also make financial services more affordable for consumers. For instance, the Robo-advisor is characterized by a lower fee structure compared to traditional asset management companies, and it also asks for a lower entry barrier for customers as it requires less capital to start asset management services, to be specific, the minimum account asked by Robo-advisory could range from zero to a couple of hundred dollars. As a result, more consumers find it affordable to enjoy wealth management service, expanding the proliferation of Robo-advisor around the world. Third, Fintech companies enable low-income households or MSEs accessing to diverse and complex financial needs as others do. As it is mentioned above, Fintech companies have fully covered almost all financial services from payment, investment, and loans. As for underserved segments, they can access to digital payment, investment such as purchasing wealth management products and loans from Internet banks just as others do. Therefore, the Fintech companies enrich the scope of financial services or products for financially underserved segment, promoting the progress of the financial inclusion in China to some extent.

In light of commercial viability and sustainability, this critical element requires that Fintech companies should meet the long -term objectives of financial inclusion given that the systematic financial risk will have a tremendous impact on the financial and social stability. Among key indicators of commercial viability and sustainability, profitability analysis and sustainability analysis are more related to quantitative analysis of Fintech companies, while administrative and operational cost analysis can be extended from a qualitative viewpoint. Based on the figure 12 with regarding to the number of P2P platforms in operation in China, it is obvious that most of

P2P lending companies have exited from the market and they fail to sustain their business models due to strict regulation issued by Chinese authorities and their inappropriate business models. China's P2P lending platforms, therefore, are inconsistent to the requirement of financial inclusion from the perspective of sustainability. As for other types of Fintech companies, the section (4.3.3) will analyze the sustainability analysis of a Fintech company in order to measure whether it is in line with the critical element of financial inclusion. As regards to another indicator, administrative and operational cost analysis, both Robo-advisor and Internet Banks are able to significantly reduce the operational cost thanks to the adoption of the advanced technology and the reduction of labor cost. As mentioned above, Robo-advisor will steadily replace the human asset management advisors with AI technology, greatly lowering the operational cost, and that is a part of reason why Robo-advisor charges less service fees on consumers compared to traditional wealth management firms. Additionally, Internet banks have no physical outlets, which save the rental costs compared to other banks, thereby benefiting consumers who spend less money receiving the same financial service. As a result, it helps the achievement of financial inclusion in China. To warp up, not all Fintech companies will exert the same level of impact on the commercial viability and sustainability, therefore, significant challenges still remain for Fintech companies who are supposed to adjust their business models and adapt to the changing regulatory environment.

As regards to safety and responsibility, it is of great significance to achieve the progress toward the financial inclusion in China given the huge potential risk posed by Fintech companies. To be specific, digital finance subjects to various forms of financial risk ranging from loss of funds, violations of data privacy, money laundering as well as the false promotion and outright fraud, leading to a great challenge for regulatory authorities, consumers and Fintech firms. In addition, unserved and underserved segments, the target of financial inclusion, are more vulnerable compared to other groups in terms of finance because they have insufficient capacity to undertake the loss caused by financial risk, therefore, it explains why the safety and responsibility remains one of the critical elements of financial inclusion and requires a higher standard for Fintech companies to achieve the financial inclusion. Based on the corresponding indicators of safety and responsibility, the contribution of Fintech on financial inclusion can be extended from three aspects: enhancement of the level of capability, overall safety and soundness

of the financial system and financial risk associated with a Fintech company. The safety and soundness of the financial system is more relevant to the regulatory context and Chinese authorities have strengthened the regulation over Fintech companies in order to maintain the financial stability and avoid the systematic financial risk. Financial risk analysis will be discussed in detail in the following section (4.3.4). In addition, the improvement of financial literacy among consumers lays the foundation to achieve financial inclusion in China as more and more consumers are capable of comprehending the financial risk, effectively undermining the herding effect in performing financial activities. For example, some Fintech companies are promoting financial literacy to Internet users through their online channels, such as Alibaba and Tencent, who are actively spreading financial literacy among their users to help them intake the financial knowledge. In a word, Fintech companies are supposed to align the financial regulation issued by the authority and adjust their business models to reduce the financial risk and improve the safety of their financial products and services, thereby contributing to the anticipation of financial inclusion.

In general, Chinese Fintech companies have leveraged opportunities created by the advancement of technologies and enriched financial inclusion practices for the underserved population neglected by the traditional financial providers, and significantly expanded the accessibility of financial service channels, developed innovative and low-cost products and services, and diversified the financial ecosystem, thereby playing a significant role in contributing to the progress toward the achievement of financial inclusion in China. Not all Fintech companies, however, exert the same level of impact on the objective of financial inclusion. Meanwhile, challenges still remain for Fintech players and government authorities on the way to achieve financial inclusion.

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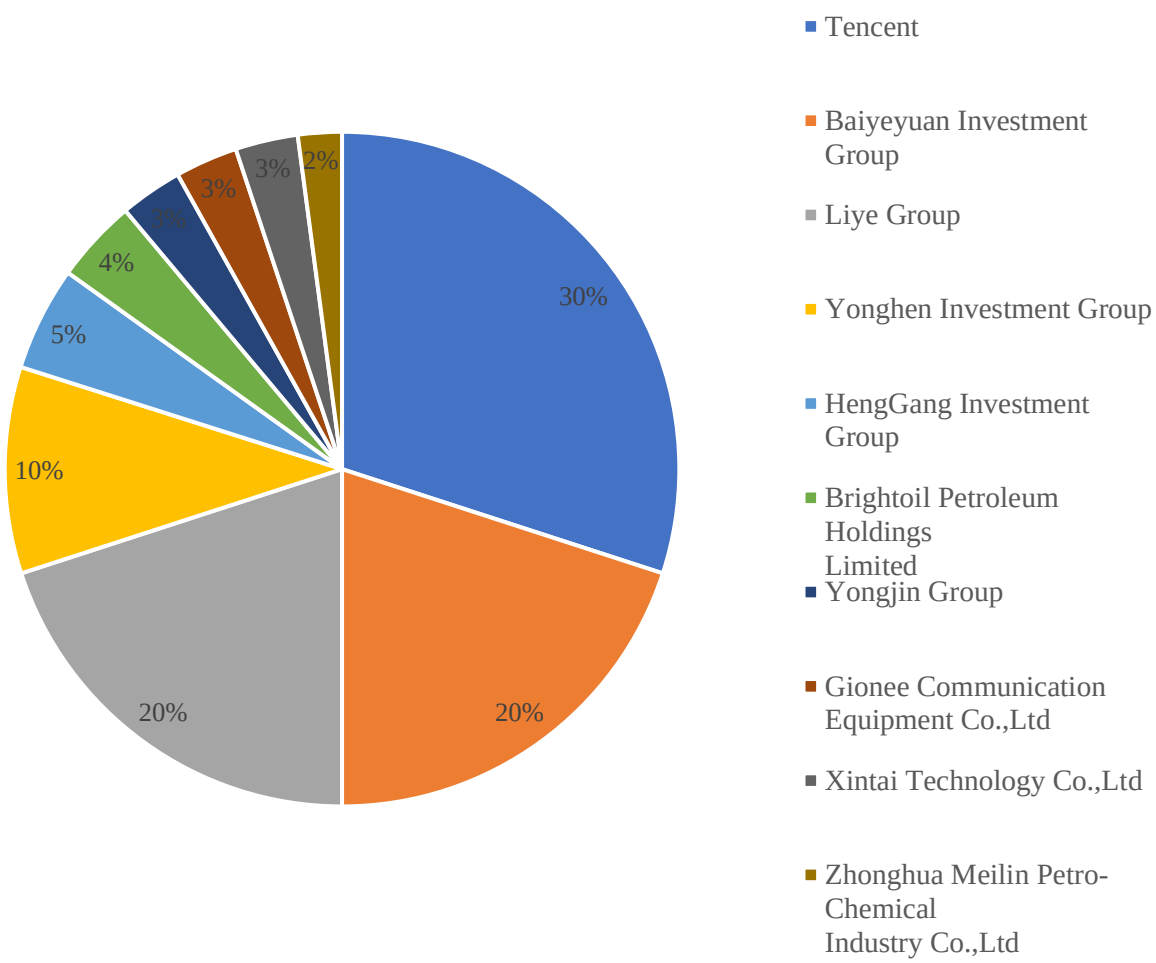
4. Case Study: The role of WeBank on Financial Inclusion

4.1 The introduction of WeBank

Webank is a private Chinese Internet-based bank as well as a Fintech company, and it was approved by China Banking Regulatory Commission on December 16th, 2014, and it started its business in 2015. It is headquartered in Shenzhen, China, and it was founded by Tencent, Baiyeyuan Investment Group, Liye Group, and Yonghen Investment Group as well as other companies. The ownership structure of WeBank is shown as the figure 18 below. Apparently, Tencent is the largest shareholder of WeBank and accounts for 30% ownership shares, followed by Baiyeyuan(20%) , Liye Group (20%), Yonghen Investment Group(9.9%), and other minority shareholders[1]. WeBank aims to providing inclusive financial services to unbanked and underbanked individuals and SMEs by fully exploiting the technology and by collaborating with professional financial institutes. WeBank has been developing at a skyrocketing rate in recent years and its total asset had reached more than CNY 291 billion by the end of 2019 and increased by over 32% compared to the year 2018. Additionally, it has served by nearly 200 million customers by the end of 2019 and the number of served customers grew twice than the previous year according to the annual report disclosed by WeBank[2]. Furthermore, it is rated as "A3" by 'Moody's and "BBB+" by S&P in 2019[3]. Table 9 shows the milestone of WeBank from 2014 to 2019. Hence, WeBank has achieved a tremendous achievement throughout leveraging the technology capabilities of Tencent to develop a digital financial platform to scale up rapidly and sustainably within a short span of period. And it has become one of the leading Internet-based banks in China as well as one of the top Fintech companies in China. Given to its company's objectivity, WeBank has the vision defined as 'Technology', 'Inclusion' and 'Connection' to achieve the goal of financial inclusion in China[4]. The vision of WeBank is presented in the table 10.

Figure 18: The Ownership Structure of WeBank



Source: From Tianyancha Website

Table 9: The milestone of WeBank

Time	Event
16/12/2014	WeBank Founded
04/01/2015	Prime Minister Li Keqiang visits WeBank
15/05/2015	Debut of Weilidai(an unsecured personal loan product)
15/08/2015	WeBank App Launched
09/09/2015	Weichedai (Auto Loan Product Launched)
21/09/2015	Weilidai embedded into WeChat
13/05/2016	Co-founded Blockchain Consortium FISCO(Shenzhen)
22/06/2016	Inter-Bank Negotiable Certificate of Deposit Issuer Acquired
21/07/2016	Certified as Shenzhen High-Tech Enterprise
19/09/2016	Video Conferencing Verification Service Launched for Hearing - Impaired Borrowers
28/02/2017	WeBank Accumulative Revenue Exceeds that of cost
03/11/2017	SME Loan Soft Launch
15/06/2018	Groundbreaking Ceremory of WeBank Tower in Qianhai, Shenzhen
26/06/2018	2018 Domestic Corporate Credit Rating Raised to AAA
27/09/2018	100 Million Effective Customers Reached
16/12/2018	Customer Service Line 95384 Officially Launched
26/07/2019	WeBank Held Inaugural FinTech Day and Released Full Range of Open Source Financial Technologies
05/08/2019	Establishment of Joint Research Lab with Peng Cheng Laboratory
09/09/2019	Debut of WeBank SME Banking App
30/10/2019	Establishment of FinTech School with Shenzhen University
05/11/2019	Rated as “A3” by ‘Moody’s and “BBB+” by S&P

Source: From WeBank’s official website

Table 10: The Vision of WeBank

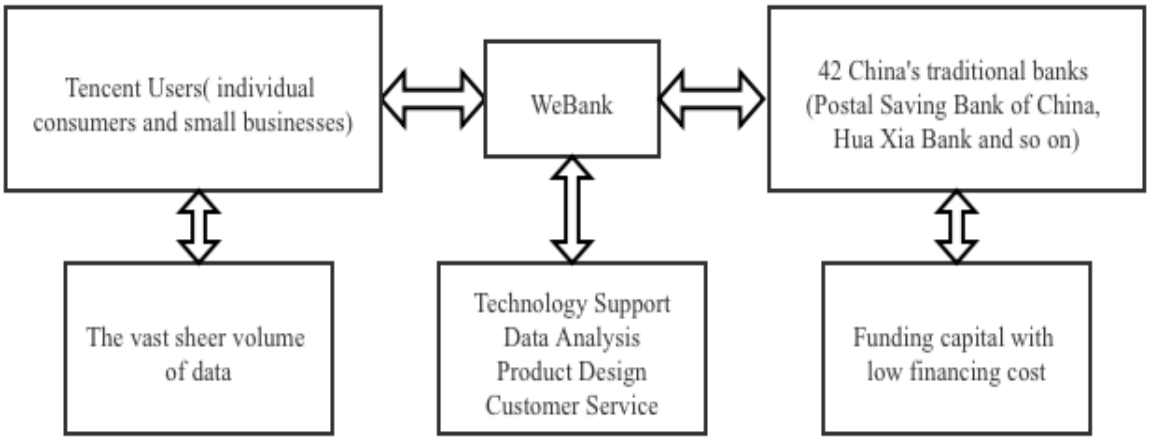
Vision	Performance
Technology	• No physical outlets • Employing "ABCD" model to run business and manage risk
Inclusion	• Providing personal and SME loans • Targeting at consumers and small businesses
Connection	• Serving as a bridge to connect consumers, small business and traditional financial institutes

Source: from WeBank's Five-year Anniversary

Note: 'ABCD' refers to Artificial Intelligence, Blockchain, Cloud Computing and Big Data

The Table 10 shows the Vision of WeBank. In terms of technology, it has no physical outlets compared to traditional commercial bank, reducing the operational cost of WeBank; furthermore, it embraces the "ABCD" model to run business and manage the company, and makes it become a strategic focus of its business model, the further details of "ABCD model" will be explained in the section 4.2.2 (the technology advantage). The inclusion is explained as its credit services for consumers and small businesses who are normally neglected by the traditional financial institutions. In addition, it constructs a platform by connecting consumers, small businesses and financial institutions. The figure 19 shows how 'Connection' of WeBank works. WeBank connects Tencent which is able to provide the vast sheer volume of data to WeBank, while WeBank can acquire the capital with low financing cost through the partnership with 42 China's commercial banks, including Postal saving Bank of China, Hua Xia Bank, Shanghai Bank and so on.

Figure 19: How ‘Connection’ of WeBank works



Source: From WeBank’s official website

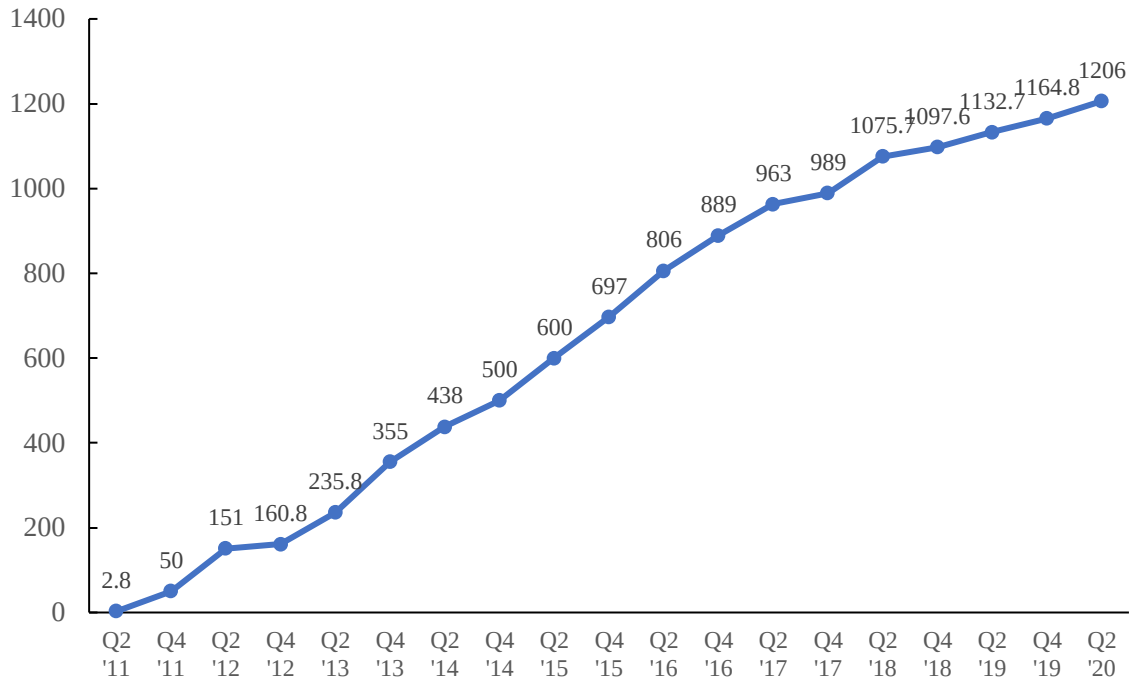
4.2 Business Model of WeBank

The rising of Fintech has brought a disruption in the financial industry, dramatically turning over the financial formalities and shaping a new financial ecosystem. Compared to the traditional banks, Internet bank has the advantage of accessing users through their digital platforms or Internet channels. Thus, Internet banks are trying to embed their business models into their users' daily life. The business model of WeBank can be summarized into the following four aspects: the internal resource, technology advantage, the product mix and risk management strategy.

4.2.1 Internal Source

Tencent, the largest shareholder of WeBank, was founded in November 1998, and it has become one of top multinational technology conglomerates in China, and its services have covered the various Internet-related services and products, including social media, entertainment, news media, technologies, and so on. In terms of social media, WeChat and QQ are the two primary social media apps developed by Tencent. The number of WeChat's active monthly users has been increasing steadily, and it had reached over 1.2 billion monthly active users from a wide range of age groups by the end of the second quarter of 2020 as figure 20 shows below[5]. Additionally, QQ, a social media app, released in 1999, successfully managed to attract about 647 million monthly active users in 2019, more than that of Twitter users according to the figure 21 below[6]. In light of entertainment, Tencent operates the business ranging from the video games, televisions and cinemas, comics music and video streaming. And Tecent video recently reported 114 million paying subscribers at the end of June[7]. And It is the largest video gaming developer in China as well. As for news information, it includes Tencent news and Tencent blog. In addition, it also provides QQ browser, Tencent map and Tencent email service.

Figure 20: Number of monthly active WeChat users from 2nd quarter 2011 to 2nd quarter 2020 (in millions)

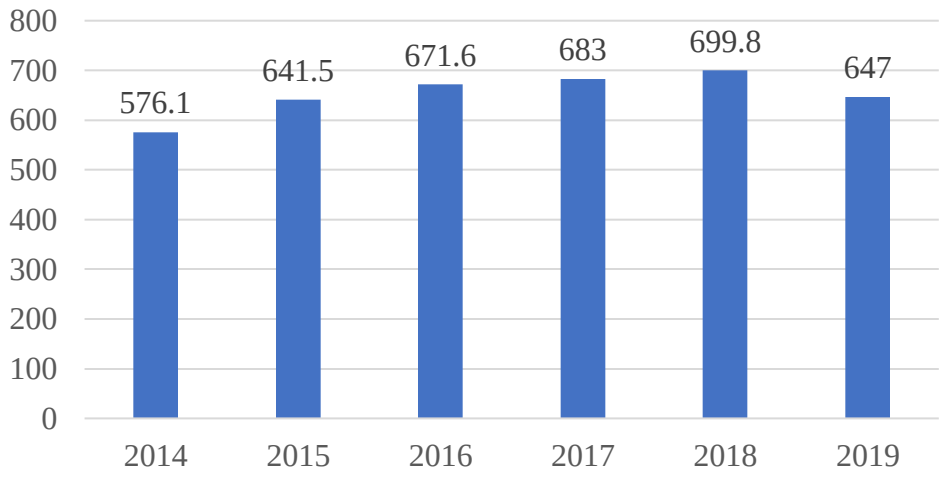


Source: Statista 2020

Through its multiple products and services, Tencent has already penetrated into people's various scenes of life and formed a comprehensive network surrounding residents' daily life. WeBank, therefore, aims at the inclusive financial services through micro-loan business based on over 1 billion user data and transaction data provided by Tencent. For example, Weilidai, an online unsecured consumer loan launched by WeBank, was debuted in May 2015 through QQ wallet and embedded in WeChat in September in the same year and it will be introduced specifically in the section 4.2.3. Thus, WeBank is able to employ these two social media apps, WeChat and QQ, to exploit the pool of consumers as well as take advantage of Internet externalities to connect more users. Moreover, other digital platforms run by Tencent, can also be fully used to expand consumers for WeBank. To sum up, WeBank has the robust internal source to access new users based on the channels provided by Tencent.

Figure 21: Number of monthly active users of Tencent QQ in China from 2014 to2019

(in millions)



Source: Statista 2020

4.2.2 Technology Advantage

WeBank combines a multitude of modern technologies to provide the foundation for a forward-looking Internet-based banking platform architecture, which effectively bridges among consumers, small businesses, coordinated Internet platforms as well as other financial institutions and contributes to the improvement of operational efficiency, the reduction of cost and the expansion of the business.

In particular, WeBank embraces the "ABCD" of Fintech (AI, Blockchain, Cloud computing, Big Data) as its strategic focus and serves as an active leader in their related research and application within the financial filed[8]. In terms of AI, WeBank initiated ‘Intelligence Customer service’ at the foundation of Machine Learning, Deep Learning and Natural Language Processing as well as the Big Data, providing the tailored chatbot service to consumers. As a result, 98% of total inbound customer enquiries are handled by WeBank's chatbot, significantly reducing the human resources cost; furthermore, WeBank's eKYC(know your customer) facial recognition solution has fulfilled over 640 million identity verification requests and achieved a preliminary identification of risk associated with customers prior to the approval credit. In light of

Blockchain, WeBank initiated China's first Financial Blockchain Consortium (FISCO) , which consists of over one hundred consortium members today; furthermore, WeBank has also established the Blockchain- based reconciliation platform to simplify the inter-entity reconciliation process and reduce the operational cost, and it has by far processed over 10 million transaction and operated smoothly without any malfunction. In terms of cloud computing, an IT management framework of distributed architecture named WeCube has been introduced by WeBank into its system, aiming to coordinating tasks and improving collaboration, increasing team efficiency and reducing the manual intervention[9]; furthermore, WeBank has constructed a 100% in-house designed distributed core banking system with self-owned intellectual properties, which is capable of handling high-volume and high-frequency transactions; additionally, it is also the world's first bank to fully deploy its core banking systems on private cloud, and based on its low-cost technology infrastructure, it manages to reduce the average annual IT cost-per account equivalent to USD $0.5 in 2019, nearly 6 to 30 times less than the amount operated by the majority of incumbent banks[10]. As for Big Data, it is used by WeBank for precision marketing to construct the digital channel and expand the businesses, and Big Data can also be exploited to build the user profile to gain a better insight about the credit investigation of borrowers; additionally, the Big Data can be fully deployed to build the Big data-based risk control platform to take a track about borrowers' risk during the loan period; furthermore, WeBank also offers a Big data analytical solution called WeDataSphere, a platform with financial grade computing, data storage and exchange, and machine learning, aims to tackle financial application issues related to security, performance, high availability and traceability[11].

4.2.3 The Product Mix

As a leading digital online bank in China, WeBank has a range of financial services from WeBank App, SME Banking App, Weilidai (an individual lending platform), Weiyedai (SME loan provider) and Weichedai (an Auto Loan provider). The first two applications are designed to serve for personal financial management service, including money withdrawal, transfer and wealth management, and as well as for small business owners to access their financial services through mobile devices, respectively, while the latter three consist of the primary financial product mix of WeBank presented as the following table 11.

Table 11: Primary Financial Products of WeBank

Financial Products	Weilidai (Online Consumer Loan)	Weiyedai (SME Loan)	Weichedai Auto Loan
Launch date	May, 2015	November, 2017	September, 2015
Features	-Easy application -24*7 available online service -Fast Drawdown -Flexibility Turnover	-High Credit Line -Low Interest Rate -Fast Loan Dispersal -Low Barrier to Entry	- Contextual Finance -Seamless Application -24*7 Service
Target consumers	- Individuals with below-average income and less or no borrowing records	- Financially underserved SMEs for business	-individual borrowers with auto financing needs

Source: From WeBank's official website

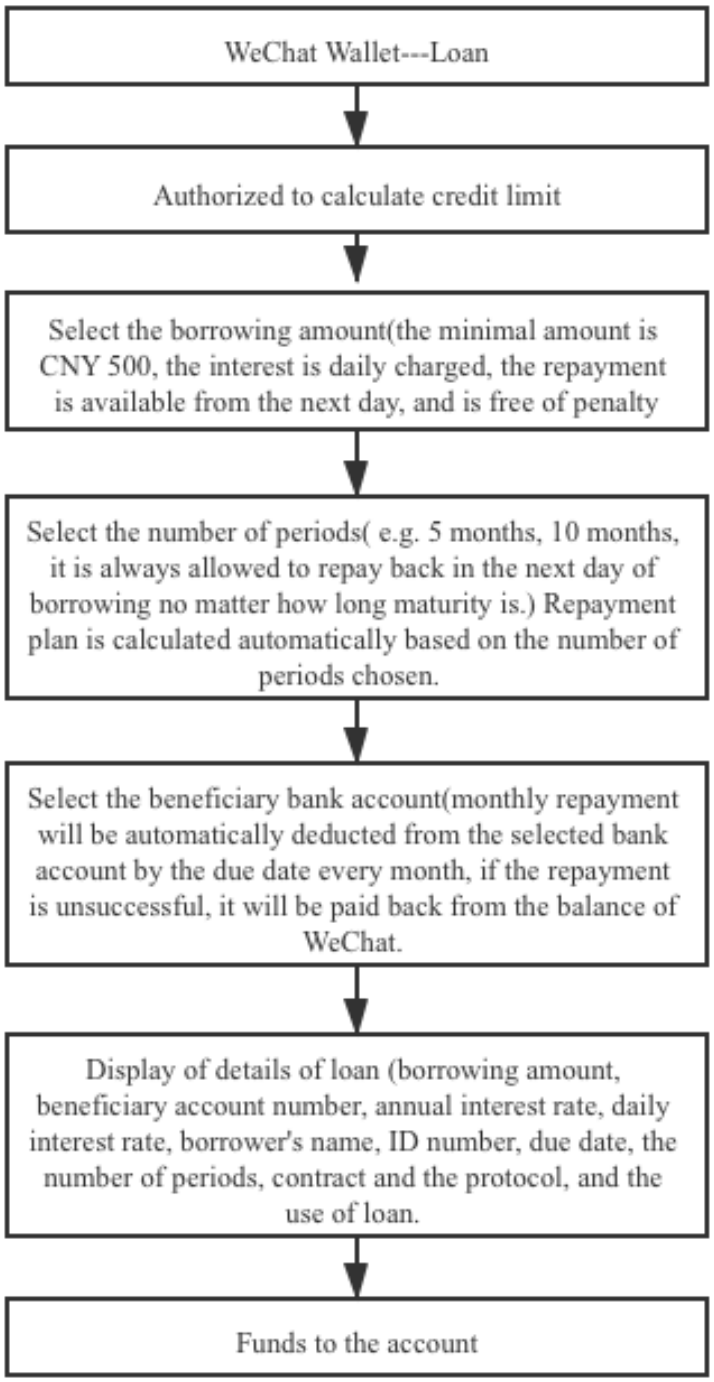
Weilidai, an online unsecured consumption loan platform through WeChat and QQ's wallets, targets at population with below-average incomes or even without borrowing records or living in remote or less-developed areas , and serves to meet their readily available borrowing needs, significantly expanding the pool of consumers and covering more financial underserved population, and it has become one of the most popular accessible forms of financing in China's mass market since its establishment. It is designed with a very simple operation procedure, to be specific, borrowers are free of providing any collaterals or guarantees, and the application can be processed within 15 minutes, greatly enhancing the borrowing efficiency. The operating mode of Weilidai through WeChat is shown as the figure 22. In addition, it has a round-the-clock service through the mobile device, which allows consumers to access their personal financial service at any time they want and overcomes the brick-and-mortar barriers. Apart from the low interest

costs, borrowers are also allowed to repay back their loans ahead of due date without extra commission fees, significantly reducing borrowers' financing burden. Based on the above product characteristics, Welidai has greatly been welcomed by Chinese consumers, particularly by the lower-tier population, making a solid progress toward achieving goal of financial inclusion in China.

Weiyedai, an unsecured business loan provider, targets at SMEs owners whose financial needs are normally unmet by traditional financial institutes. It has accumulated around 800,000 customers since its establishment at the end of 2017[12]. It is featured by a high credit line up to 3 million RMB (equivalent to 450 thousand US dollars) but without requirement for any collaterals, effectively boosting the entrepreneurship in China and greatly lowering the entry barrier for small- and -medium-sized business owners. In addition, the credit application can be processed quickly, making it convenient for loan applicants.

Weichedai, an auto loan product, was launched in 2015. It operates the business with the objective to provide financial solutions for both car buyers and car sales dealers. Technically, it is a combination of Internet and auto finance through the partnership with vehicle dealer. It had accumulated CNY 5.5 billion balance of loans by the end of 2016, nearly 22 times larger than the amount in 2015.

Figure 22: The operating mode of Weilidai through the WeChat channel

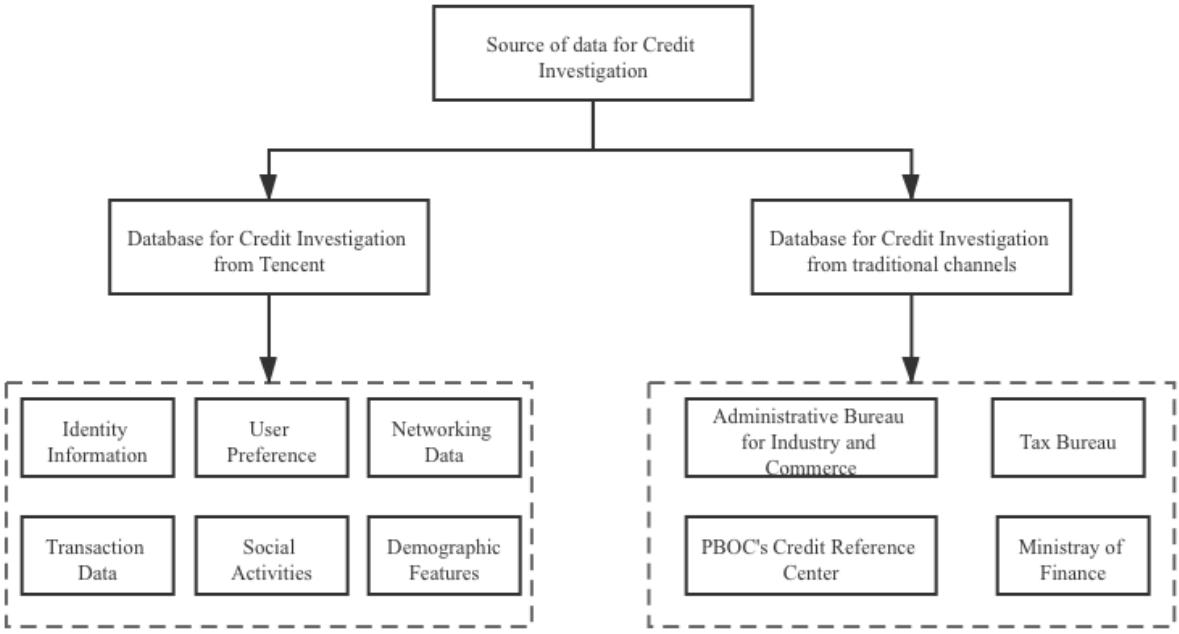


Source: From the practical experience

4.2.4 The Risk Management Strategy

WeBank embraces the Big dada as its core technology to conduct the credit investigation for borrowers just in case of credit risks. The figure 23 mirrors the source of the data of WeBank as its part of risk management strategy. The figure 23 clearly shows that there are two sources of data, either from the database of Tencent or from the database of traditional channels for credit investigation. In terms of the data source from Tencent, it can come from the users' identity information and demographic information such as age, gender, education conditions and so on. And it is possible for Tencent to acquire data related to user preference or their hobbies from WeChat and QQ, the most two popular social medias in China. Furthermore, it can also extract the data or information from their social activities and their networking from WeChat and QQ. Most importantly, the transaction data from WeChat payment and QQ wallet, can effectively provide a more precise insight about the credit investigation of borrowers. As regards to the database from traditional channels for credit investigation, WeBank is able to collaborate with the credit reference center of the People's Bank of China, or with the Ministry of Finance, Tax Bureau or Administrative Bureau for Industry and Commerce to ask for information about individuals and SME owners in order to evaluate the credit scoring of borrowers in a more efficient way, thereby reducing the credit risk. Hence, all of above information can be used as the fundamental data to construct user profiles for borrowers to evaluate their credit scoring. After the acquirement of the data from both channels, WeBank is capable of organizing and analyzing the data in a systematic way, and eventually building the risk -evaluation model. Through this way, WeBank is able to comprehensively assess the credit risk of borrowers and effectively control the risk.

Figure 23: The Data Source of WeBank for Credit Investigation



Source: From WeBank's official website

In addition, WeBank innovates the risk-control model throughout the application of other advanced technologies such as the decision trees, random forest, neural network algorithm and machine learning and constructs seven risk models including the credit investigation, social media, anti-fraud, comprehensive identification of credit service, fraud risk, operational risk and systematic risk. Meanwhile, WeBank deploys a third-party electronic deposit management and data access security to control the potential online operational risk and manages to make the prevention of risk in the end.

4.3 How WeBank promotes financial inclusion

4.3.1 From the perspective of accessibility

The table 12 below encompasses the data with respect to Weilidai and Weiyedai, the financial services provided by WeBank, from year 2016 to 2019. From the table 2 in section 2.2, which has defined both key indicators and elements of financial inclusion, **# users of a specific financial service or product** can be used to measure the accessibility, and a couple of selected indicators of Weilidai and Weiyedai are used to interpret the # users of a specific financial service to prove how Webank promotes the financial inclusion in light of accessibility.

Table 12: Data with respect to Weilidai and Weiyedai from 2016 to 2019

Items	Indicators	2019	2018	2017	2016
Weilidai	Accumulated number of borrowers (in million)	28	-	12	7.1
	Accumulated amount of loans issued (in CNY billion)	3700	-	870	199
	Accumulated number of loans issued (in million)	460	-	100	-
	Average lending amount per loan (in CNY)	8043	-	8700	-
Weiyedai	Number of SME borrowers each year	230,000	68,000	-	-
	Total lending amounts each year (in CNY billion)	180	72	-	-

Source: WeBank's annual report from 2016 to 2019

Note: 2018 annual report does not release the data with respect to Weilidai.

'-' refers to the data unavailable in annual report.

Weichedai was debuted in late 2017, thus, the data before 2018 is not available.

WeBank has never revealed any data about Weichedai Auto loan in annual reports. Thus, data regarding to Weichedai is not available.

Webank's annual report in 2015 is not available.

In case of Welidai, an online consumer loan platform, it has providers credits to around 28 million borrowers by the end of 2019 with the total accumulated borrowing amounts reaching to CNY 3,700 billion and the total accumulated number of loans issued exceeding 460 million from its establishment in 2015, resulting in the average lending amount per loan at CNY 8,043. In addition, it has covered 31 provinces and spread to 600 cities in China (there are 34 provinces and 660 cities in China) by the end of 2019. According to the annual report 2019 published by WeBank, among the clients of Weilidai, around 77 % are working in non-white-collar industry, and about 80% without college degrees and above, and approximate 80% have no bank credit records before, and over70% paid interests less than CNY 100[13]. Hence, it can be concluded that the clients served by WeBank are pretty consistent to the definition of unbanked and underbanked population, which is the exact target of financial inclusion. Statistically, the table 12 reflects an increasing trend of borrowers to Weilidai from 2016 to 2019. Even though the data is not completed, it can still be inferred that the number of borrowers in 2017 is around 5 million and the average number of borrowers is 8 million both in 2018 and 2019. Apart from the number of borrowers, the accumulated amount of loans and the number have also grown to CNY 3,700 billion and 460 million in 2019 from CNY 870 billion and 100 million in 2016, respectively, and the average lending amount is almost same in 2016 and 2019, to be specific, around CNY 8,000.

To wrap up, it clearly illustrates an increasing trend of accessibility of Weilidai to more individuals from the indicators such as the number of borrowers, the amount and the number of loans issued. It can be concluded that, therefore, Weilidai, a financial product launched by WeBank, a Fintech company, has made a positive contribution on improving the level of financial inclusion in China.

Another product of WeBank, Weiyedai, a small business loan provider, had provided credit services for over 230,000 small businesses by the end of 2019, around 3.4 times larger than the year 2018, and it had reached the total lending amount to CNY 180 billion, almost 2.5 times larger than the amount in 2018. Unlike Weilidai, which targets financially underserved

individuals, Weiyedai aims to providing credit business to small business owners who have been subjected to financing difficulties for a long time. Based on the information disclosed by WeBank's annual report 2019, 61% of clients have never borrowed money from banks for their business before and 36% have no individual credit history either. Among the clients, which are all private companies, 45 of them work in manufacturing and high-tech industry, 38% operate retail business and the remaining perform in logistics, construction or scientific research industry. Although the average employees of these small businesses are around 10, they create over 200 million job positions. In addition, WeBank's annual report 2018 disclosed that 66% of Weiyedai's clients are awarded credits by the bank for the first time and 77% of business have revenues less than CNY 10 million[14]. In a word, it is not easy for these small business owners to obtain loans from traditional financial institutions. WeBank, however, grants them an extra financing channel, increasing their probabilities to get credits to operate their ongoing businesses. From this perspective, more and more small businesses can be accessed to loan services. In this sense, Weyedai makes a progress toward the improving financial inclusion level in China for those small businesses who are usually ignored by traditional banks.

4.3.2 From the perspective of diverse and appropriate products

In terms of diverse and appropriate products, a critical component of financial inclusion, indicators including convenience, affordability and the overall range and diversity of available products from the table in section 2.2 can be used to measure the effect of WeBank on promoting financial inclusion in China. Hence, the following part will be unfolded by exploring the three indicators mentioned above.

In terms of **convenience**, the sign language interpreting services embedded in Weilidai has provided a perfect example on interpreting how WeBank improves the convenience for their consumers with hearing impairment when providing them financial services. The sign language interpreting services was launched by WeBank in September 2016 and this service targets at hearing impaired customers, who find it difficult to access financial services especially when involved in telephone communication or voice services, significantly increasing their difficulties of usage and barriers to entry. In order to ensure those hearing -impaired clients to enjoy the

financial services as full and equal citizens, WeBank established the sign language interpreting services group to help this socially vulnerable group in order to bring the practice of financial inclusion to more people. Hence, consumers with hearing impairment can access to the sign language interpreting customer service through videos on their mobile devices, who will help them identify their personal information and confirm their willingness to borrow and assist them completing the loan procedure as well as the consulting services after being granted loans. The sign language interpreting service has been welcomed by public since its establishment and served 1140 consumers in that year. The table 13 shows an increasing trend of clients served by sign language interpreting service, which has served 8168 hearing impaired clients along at 2019, almost 7 times larger than that in 2016. The sign language interpreting service, therefore, clearly interprets how Webank promotes the financial inclusion of hearing-impaired groups by reducing their barriers to access financial services. Apart from the service tailored for clients with hearing impairment, 24*7 available online service, another feature of Weilidai, has also contributed to improving convenience for clients to access financial services. According to the Global Findex database report (2017) by World Bank Group, 20% of respondents without financial accounts cited 'financial institution far away' as a barrier without a financial account. Even though the survey was aimed to exploring the reasons for not having a financial account, it can be inferred that distance will reduce people's willingness to access financial services, including credit services. Weilidai, as a pure online credit platform, has totally addressed the 'distance' issue, thus, customers can access to Weilidai wherever they want as long as they have the mobile device. In addition, Weiyedai has also overcome the time limitation thanks to 24*7 online service, which has greatly enhanced its service efficiency as well as has narrowed the gap between users, particularly for those users who are in urgency for money but are unable to access financial institutes out of their service time. Now, these users have another option through Weilidai, which can be accessed at any time they want, effectively solving their short-term financing difficulties. On top of the 24*7 available online service, Welidai has an advantage of fast drawdown, which refers to the access to a line of credit from a bank. The application for loans can be processed rapidly, in some cases, applicants will be granted credits 40 seconds after application, while it normally takes 3 minutes for applicants to get their loans[15]. Anyway, it won't take too much time for applicants to get their credits as long as they are qualified for asking loans in this digital platform.

To wrap up, the sign language interpreting service embedded in Weilidai helps hearing impaired clients conveniently access to credit, expanding the financial service coverage of unbanked and underbanked group; the 24*7 online service has overcome the limitation of time and space, making more people inclusive to credit service whenever and wherever they want; The fast drawdown has also made the loan application process rapidly, efficiently reducing the waiting time to get credits for consumers. From the perspective of convenience, WeBank has promoted the development of financial inclusion.

Table 13: The number of hearing- impaired clients served by sign language interpreting service

Year	2019	2018	2017	2016
# Clients with hearing impairment	8186	7661	4069	1140

Source: WeBank's annual report

In addition to Weilidai, Weyedai, a small loan provider launched by WeBank, has also brought convenience to small business owners, making a firm progress toward achieving financial inclusion in China. Weiyedai, featured by fast loan dispersal, outpaces the traditional banks in terms of the approval of loan application. The whole process costs small business owners to get a line of credit ranging from 30 minutes to 7 days, which depends on the context of the application, such as the application time, the number of applicants, and the credit investigation of applicants[16]. Meanwhile, Weyedai lowers the entry barrier to credit services for small business owners. Small businesses have suffered the financing difficulties for a long time due to their short-time, small amount, frequent and urgent financing needs, leading to traditional banks unwilling to extend credits to them, because traditional banks will probably face the potential high costs characterized by high credit risk, high operational cost and high service cost when they involve in running small loan businesses. WeBank, however, has advantages in advanced financial technology, as so called "ABCD" (Artificial Intelligence, Blockchain, Cloud Computing and Big Data), effectively tackling the high costs faced by traditional banks through reducing the information asymmetry to rapidly identify applicants' credit status when involving in small loan businesses. Therefore, small business owners can proceed the whole application procedure on their mobile devices, including application, approval, inquiry, borrowing, repayment and repayment in advance, and they are only required to enter a small amount

information without any paper documentation in the whole process[17]. As a result, this purely digital operation has completely overthrown people's old conception about how banks proceed small loans characterized by high barrier to entry, long-term period, and complicated formalities.

To sum up, Weiyedai has leveraged small loan businesses by reducing the operation cost and improving transaction efficiency, making small business owners enjoy the fast loan dispersal and low barrier to entry line of credit. That is to say, Weiyedai has made more small businesses inclusive to financial service.

Thus, the convenience, an indicator of diverse and appropriate products, is analyzed in terms of qualitative way by checking both Weilidai and Weiyedai's role in promoting financial inclusion, respectively.

In terms of affordability, Weilidai aims to target the low-income population to cover their short-term and urgent financial needs. The minimal lending quota is limited to CNY 500 and the daily interest rate is 0.05%, thus, the monthly interest rate and annual interest rate is 1.5% and 18%, respectively, while the annual loan interest rate by Bank of China is 4.35%[18]. At the first glance, the annual interest rate of WeBank is much higher than that of traditional banks, but they are not comparative due to the different targeted customer sectors. Traditional banks rarely serve the unbanked or underbanked customers but target customers who has the good credit recording history. More importantly, Weilidai allows borrowers to repay back in advance even in the next day after the approval of credit. For example, a client borrows CNY 1,000 and makes the repayment in 10 days, the total amount he has to repay back is 1000+1000*0.05%*10= CNY 1,005, and the total interest he was charged for 10 days is just CNY 5. In addition, it is reported that the total interest payment for 74% of borrowers is lower than CNY 100, the average amount of loan is CNY 8,100 and the average loan period is 52 days based on the disclosed information from WeBank's annual report. Based on the above information, it can be concluded that the financing cost of Weilidai is affordable for the majority of low-income population. As for Weiyedai, the minimal annual interest rate is 3.6%, and the interest is charged on the daily basis. The detailed information about the average interest rate charged on micro-loan businesses is not publicly available. Anyway, the interest rate depends on the credit investigation of small business owners based on the algorithm of credit scoring operated by WeBank. Apparently, the

higher the credit score, the lower the interest rate. According to WeBank's annual report 2019, it discloses that the average loan interest rate has decreased by 1.84% in 2019. In WeBank's annual report 2018, it claims that the average loan interest rate has lowered by nearly 1 percent, while the interest rate for small business has reduced by more than 2 percent in 2018. Given that Weiyedai was debuted in 2017, it can be referred that average loan interest for small business rate presents a descending trend from 2018 to 2019 based on a continuous two-year reduction on loan interest rate. Weiyedai is also heading toward the affordability for small businesses in this sense.

In terms of the overall range and diversity of available products, WeBank primarily provides the credit services for individuals and small businesses as shown in the table 4-3. Apart from the credit services, WeBank has also involved in the bank wealth management service and it launched three different categories of wealth management products in 2018, including the current-based wealth management product (without a fixed maturity date), time-based wealth management product(with a fixed maturity date) and open-ended funds(shares can be issued and redeemed at any time)[19]. Thus, there is an increasing variety of financial products and services offered by WeBank for the public.

To sum up, it can be proved that WeBank has boosted the development of Financial inclusion in terms of three indicators, convenience, affordability and the overall range and diversity of available products.

4.3.3 From the perspective of commercial Viability and Sustainability

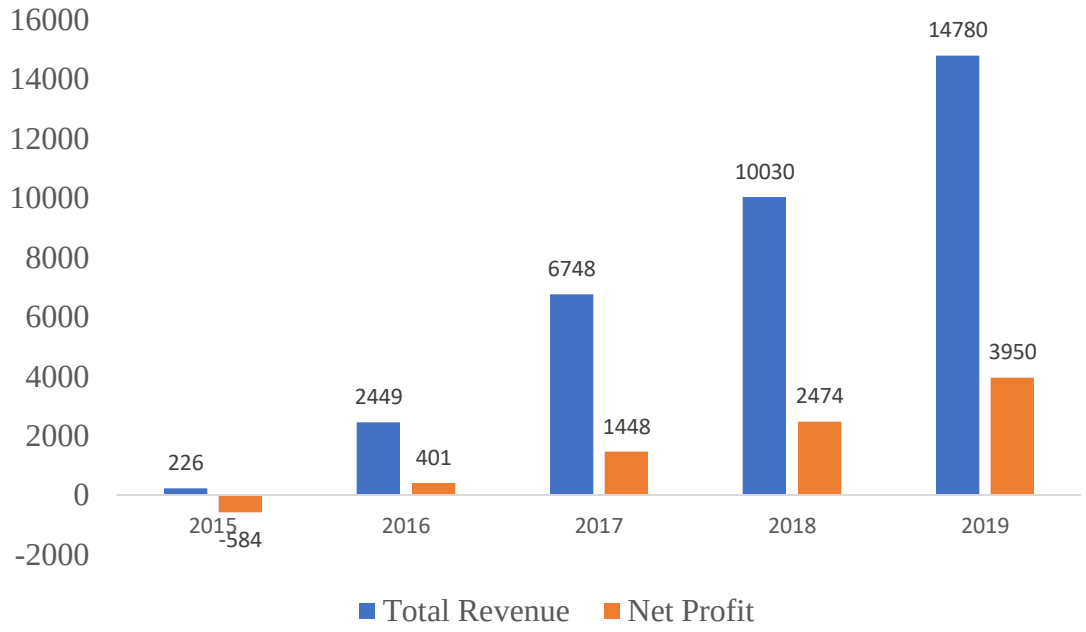
In this part, it will be interpreted about how WeBank impacts the commercial viability and sustainability, another key element of financial inclusion. Commercial viability and sustainability refer that products and services offered by WeBank should be able to make profits and survive in market as well as keep continual innovation. Thus, it will be checked from the following two aspects: profitability analysis and sustainability analysis

From the perspective of profitability analysis, the figure 24 below shows that the net profit starts to turn positive in 2016 and it increases at a staggering rate, and it reaches to CNY 3,950 million in 2019, even though it is negative CNY 584 million in 2015 because of its

commencement at that year. In terms of total revenue, it shows an ongoing rising trend with amount equivalent to CNY 14,1780 million in 2019 from CNY 226 million in 2015.

Figure 24: The total revenue and net profit of WeBank from 2015 to 2019

(in CNY million)



Source: WeBank's annual report

Return on Asset (ROA) is the simplest measure of bank profitability. It reflects the capability of a bank to generate profits from its asset management function. The formula is defined as following:

Equation 1: ROA

$$\text{ROA}=\frac{\text{Net Income}}{\text{Averae Total Asset}}\times 100\%$$

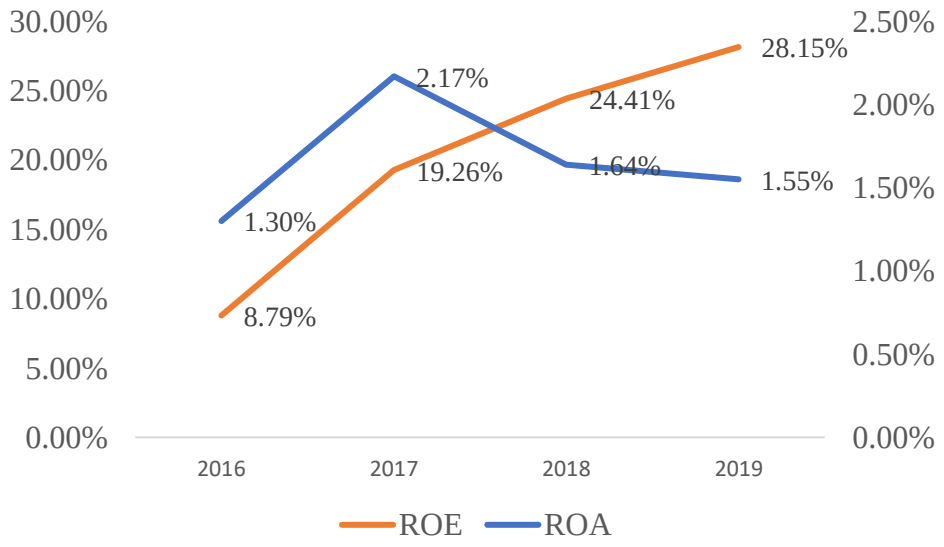
In addition, the Return on Equity (ROE) is another measure of profitability and it measures how effectively management is using equity to create profits, and it is calculated by:

Equation 2: ROE

$$\text{ROE}=\frac{\text{Net Income}}{\text{Averae Shareholders'Equity}}\times 100\%$$

As the figure 25 shows, ROE shows a rising trend from 2016 to 2019 and it arrives at 28.15%, which is much higher than the traditional banks due to its lower operational cost and increasing net interest margin as well as the commission fees. In terms of ROA, it initially increased to 2.17% in 2017 but then it decreased in a consecutive two years and reached to 1.55% at the end of 2019. It is caused by the faster expansion of total asset in recent years, and the total asset grows at a faster speed than the growth of net income, which is present in figure 25.

Figure 25: ROA and ROE of WeBank from 2016 to 2019



Source: WeBank annual report

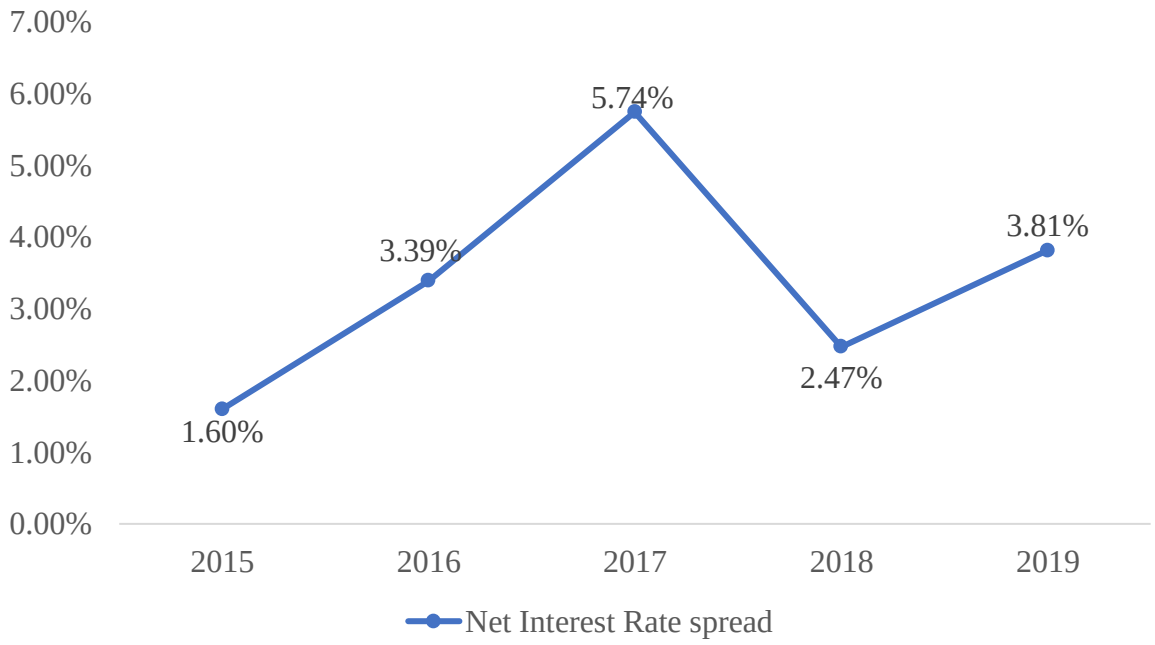
Furthermore, the Net Interest Rate Spread is a key determinant of a financial profitability, and it is the difference between the average return from interest-bearing activities (IBA) and average cost on onerous liabilities, therefore, it is instrumental to a bank's profitability. The formula is defined as the following:

Equation 3: Net Interest Rate Spread

$$\text{Net Interest Rate Spread} = \left(\frac{\text{Interest income}}{\text{Interest bearing activiies}} - \frac{\text{Interest expenses}}{\text{Onerous liabilites}}\right) \times 100\%$$

As the figure 26, the net interest rate spread kept increasing from the first three years and reached the peak 5.74% in 2017 due to the lower operational cost brought by Tencent's huge amount traffic as well the syndicated loan mode through the partnership with other banks. Then it declined to 2.47% in 2018 while increased to 3.81%. The decline of the net interest rate spread is caused by furious competition among Internet-based banks as more and more peers emerge in market; furthermore, the Internet traffic has reached the bottleneck as there is limited space for the growth of micro-loan businesses and personal consumer loans. But WeBank's net interest rate spread is still higher than that of China's commercial banks, ranging from 1.5% to 2.5%[20].

Figure 26: The Net Interest Rate Spread of WeBank from 2015 to 2019



Source: WeBank annual report

In a word, WeBank is profitable in terms of indicators including Net Profit, ROA, ROE and Net Interest Rate Spread, therefore, it is in line with the commercial viability, a key element of financial inclusion.

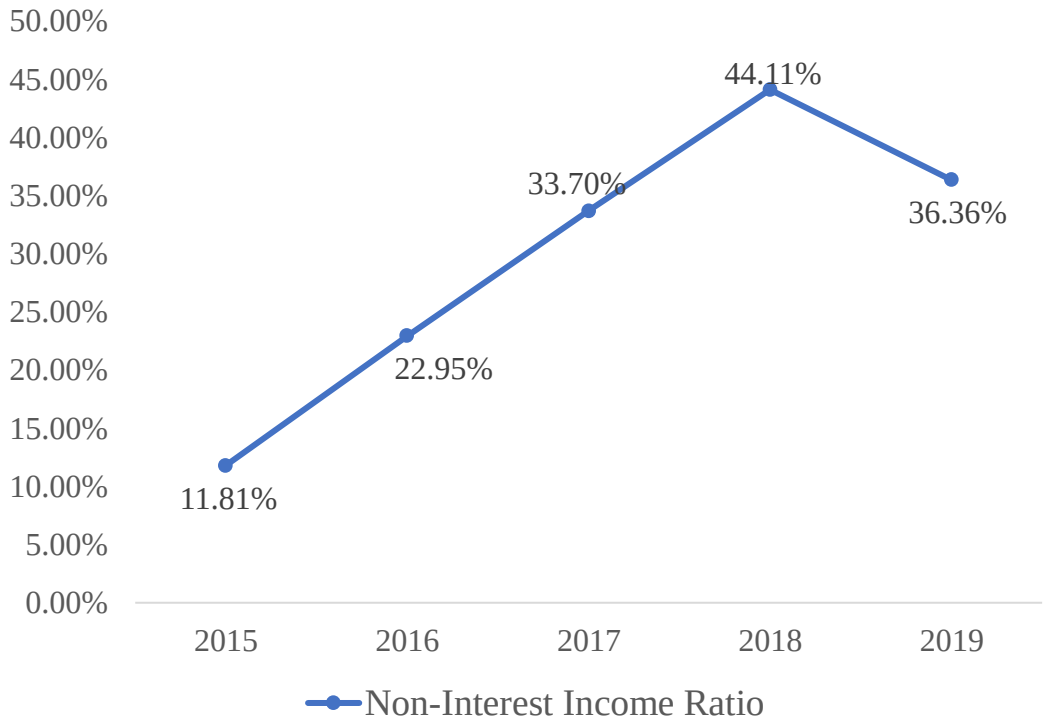
For sustainability analysis, non-interest income and total asset growth rate are selected to represent the level of sustainability for a financial institution.

Non-Interest income of bank primarily derives from commission fees including deposit and transaction fees, annual fees, check and deposit slip fees and son on. It is strategically important for banks especially under the circumstance when the interest rate is pretty low. The low interest rate makes it difficult for banks whose primary income comes from interests charged on loans to make a profit, thereby making non-interest income as a strategic line item on the income statement of banks. The non-interest income reflects the sustainability of the banks particular in the low-interest era to some extent. The non-interest income keeps growing from 2015 and 2019 and it grows to CNY 5,407 million in 2019, almost 200 times than that in 2015. And the non-interest rate income ratio mirrors the proportion of non-interest income in the total income source at the same year. It is defined as below:

Equation 4: Non-Interest Income Ratio

$$\text{Non-Interest Income Ratio} = \frac{Non-Interest\ Income}{Total\ Revenue} \times 100\%$$

Figure 27: The Non- Interest Income Ratio



Source: WeBank annual report

As the figure 27 shows, the Non-Interest income ratio, as a proportion of total income, kept increasing until to 2019 from 2015, and it declined to 36.36 % in 2019 because of the intense competition from the increasing number of new Internet banks.

Another indicator is the total asset growth rate to reflect the change of the asset scale and to predict the growth of asset in the future, and the total asset growth rate of WeBank is showen at the table 14.

Table 14: The Total Asset Growth Rate

Year	2015	2016	2017	2018	2019
Total Asset growth rate	216%	440%	57%	169%	36.36%

Source: WeBank Annual Report

From the table above, the total asset growth rate fluctuates without showing a specific direction. Thus, it would be better to use the annual total asset growth rate to mitigate the impact of the short-term fluctuation of total asset caused by the WeBank's business strategy. The annual interest rate is calculated by the formula as following:

Equation 5: Annual Total Asset Growth Rate

$$\text{Annual Total Asset Growth Rate} = \sqrt[5]{\frac{Total\ Asset\ in\ 2019}{Total\ Asset\ in\ 2015}} - 1$$

After calculation, the annual total asset growth rate is 98% for year from 2015 to 2019. Therefore, it maintains a very high level of total asset growth rate. And it can also mirror the sustainability level for WeBank in the future.

To warp up, the sustainability analysis is conducted from two indicators and both of them have proven that WeBank is able to keep sustainable in the future from the quantitative perspective.

4.3.4 From the perspective of Responsibility and Safety

For this part, the impact of WeBank is clarified in terms of responsibility and safety, another key element of financial inclusion. It emphasizes that the financial products or services should be responsibly delivered to customers and the financial risk associated with products or services should be aligned with customers' needs, particularly for those population with income below average. And indicators such as enhancement on the level of financial capability and financial risk of WeBank are developed to interpret how WeBank's impact on financial inclusion as the following part.

Financial risk analysis over WeBank will cover the analysis from the asset quality, liquidity and safety. In essence, WeBank is a bank regardless of its disruptive business model. Hence, the financial risk analysis will be significant to banks, otherwise, it will bring the potential huge risk for the financial market, leading to the turmoil on the financial market. Given the particularity of targeted customers of WeBank, it is extremely important to analyze the financial risk associated with WeBank. And it is consistent to the responsibility and safety, a critical element of financial inclusion. Financial indicators related with bank's asset quality, liquidity and safety analysis

include the Non-Performing Loan Ratio, Non-Performing Loan Provision Coverage Ratio, Loan Provision Rate, Loan-to- Deposit Ratio as well as Capital Adequacy Ratio.

An important indicator with respect to the financial risk of a bank is Non-Performing Loan Ratio (NPL Ratio), which is a ratio of non-performing loans to the total loans. NPL is a loan in which the borrower is in default due to the fact that they have not made the scheduled payments for a specified period. NPL Ratio is defined as following:

Equation 6: NPL Ratio

$$\text{NPL Ratio} = \frac{\text{Non-Performing Loan}}{\text{The total Loan}} \times 100\%$$

NPL Provision Coverage Ratio is a ratio of loan loss provision to the gross non-performing assets and it indicates the extent of funds that a bank has kept aside to cover loan losses. It reflects the capability of a commercial bank on the compensation for non-performing loan losses and on the prevention of credit risks on loans. And the formula is defined as following:

Equation 7: NPL Provision Coverage Ratio

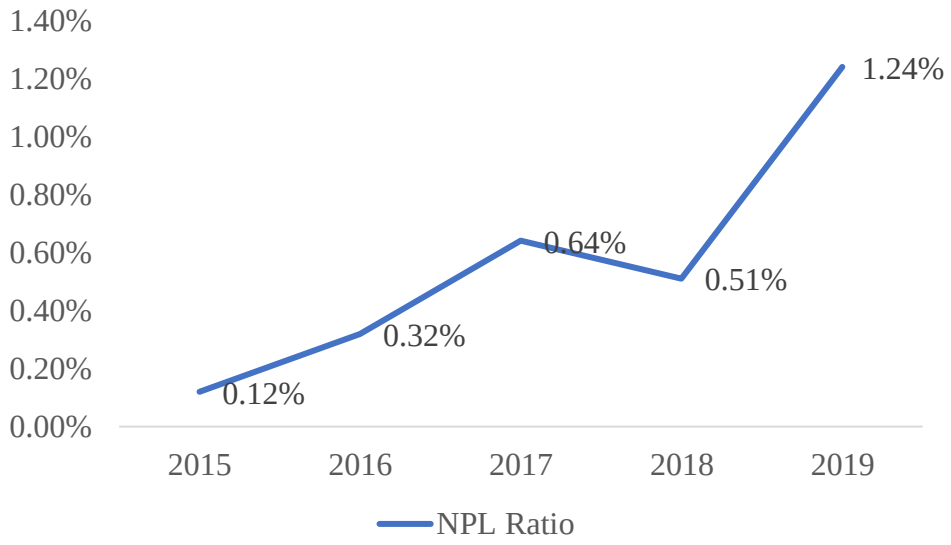
$$\text{NPL Provision Coverage Ratio} = \frac{\text{Loan Loss Provision}}{\text{Non-Performing Outstanding loan}} \times 100\%$$

The Loan Provision Rate is another indicator to reflect the level of financial risk of banks and it is the ratio of loan loss reserves to the total outstanding loans. And the formula for Loan Provision Rate is defined as following:

Equation 8: Loan Provision Rate

$$\text{Loan Provision Rate} = \frac{\text{Loan Loss Reserves}}{\text{The total outstanding loans}} \times 100\%$$

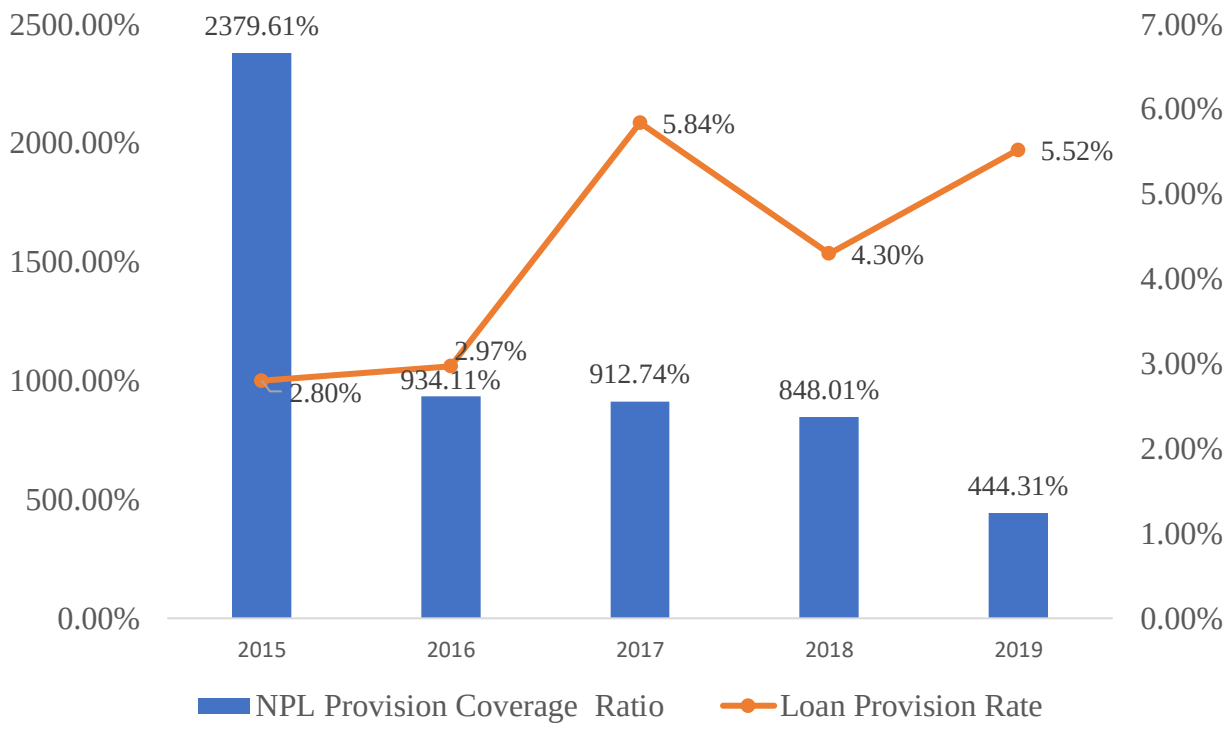
Figure 28: NPL Ratio of WeBank from 2015 to 2019



Source: WeBank annual report

From the figure 28, it is quite obvious that NPL Raito is rising from 2015 to 2019 and it reaches 1.24% in 2019, which indicates there are more non-performing loans in 2019 compared to the previous years' given that the amount of loans keeps increasing every year. NPL Ratio, however, is still lower than its counterparty in commercial banks in China with average NPL Ratio, 1.86% in 2019[21]. But it is worth noting that the NPL of WeBank tends to increase according to the figure 28. Thus, WeBank has to keep the loan loss under control, otherwise, it may face an uprising financial risk in the future.

Figure 29: NPL Provision Coverage Ratio and Loan Provision Rate of WeBank from 2015 to 2019



Source: WeBank annual report

The figure 29 mirrors the trend of NPL Provision Coverage Ratio and Loan Provision Rate from 2015 to 2019. Apparently, NPL Provision Coverage Ratio keeps declining to 444.31% in 2019 from 2379.61% in 2015, but it is still much higher than the average NPL Provision Coverage Ratio of China's commercial banks, that is 186.08% in 2019 based on the report from the China's Banking and Insurance Regulatory Commission. It is due to the WeBank's asset-light business strategy, while on the other hand, the Loan Provision Rate reached to 5.84% in 2017 and it declined a little bit to 4.3% in the next year, but then it increased to 5.52% in 2019 again, which is higher than the average Loan Provision Rate (3.45%) of China's commercial banks in 2019.

Loan-to-Deposit Ratio is used to assess a bank's liquidity by comparing a bank's total loans to its deposits for the same period. It is a ratio of total loans to total deposits in the same period. It shows a bank's ability to cover loan losses and withdrawals by its customers. Thus, it is normally

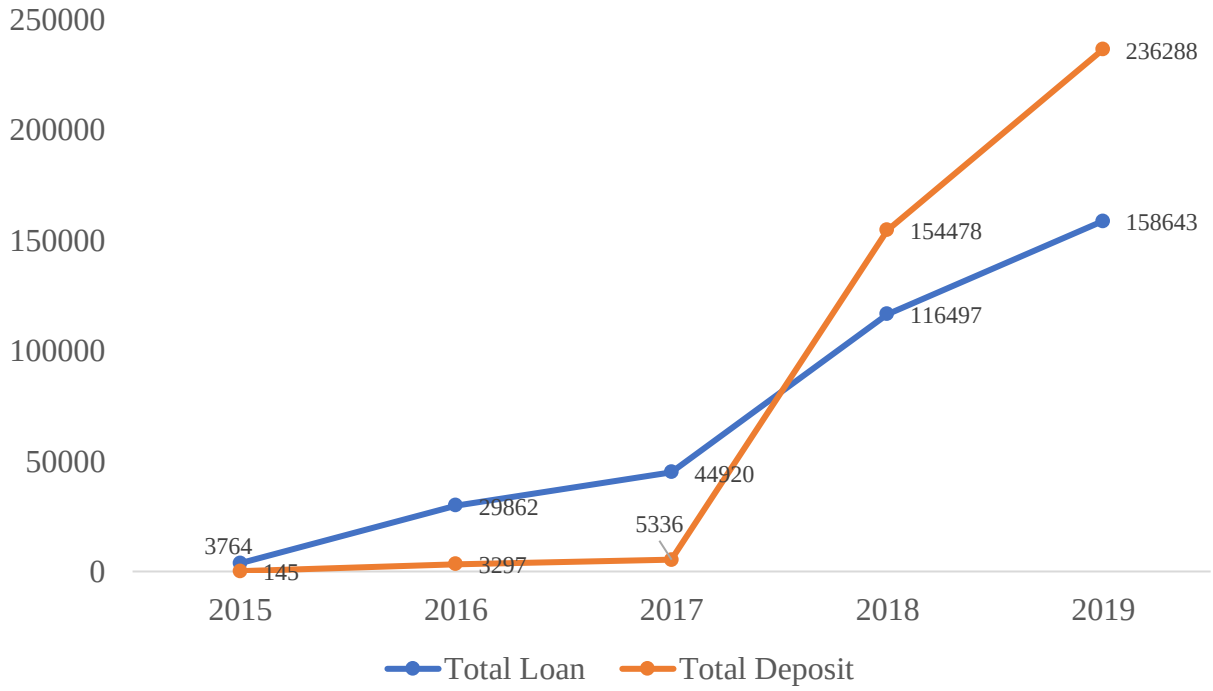
used as an indicator to show whether there is adequate liquidity to cover loans in the event of an economic downturn. At the same time, this ratio can also tell how well a bank is attracting and retaining customers. And the formula of Loan-to-Deposit Ratio is calculated as following:

Equation 9: Loan-to-Deposit Ratio

$$\text{Loan-to-Deposit Ratio} = \frac{\text{Total Loans}}{\text{Total Deposits}} \times 100\%$$

Figure 30: The Total Loans and Deposits of WeBank from 2015 to 2019

(in CNY million)



Source: WeBank's annual report

From the figure 30 above, both total loans and total deposits are increasing rapidly from 2017 to 2019, particularly the increasing rate of deposits. The deposits started to exceed loans from 2018, and it indicates that both deposits and loans are developing synchronously eventually. By the end of 2019, the total deposit has amounted to CNY 236 billion while the total loan has reached to nearly CNY 159 billion. From the loan-to-deposit ratio presented in the table 15, the loan-to-deposit has closed the huge gap from 2015 to 2019 due to the enhancement of deposits at a

skyrocket rate in recent years. The Loan-to-Deposit ratio of commercial banks disclosed by China Banking and Insurance Regulatory Commission is around 75% in 2019, which is a bit higher than WeBank's. Therefore, it can be concluded that WeBank has enough liquidity to cover unforeseen funds requirement compared to commercial banks in China. That is to say, WeBank has a high level of liquidity to handle unexpected funds requirements in future.

Table 15: The Loan-to- Deposit Ratio of WeBank from 2015 to 2019.

Year	2015	2016	2017	2018	2019
Loan-to - Deposit Ratio	2596%	906%	842%	75%	67%

Source: WeBank's annual report

Lastly but not least, Capital Adequacy Ratio is a measurement of a bank's available capital expressed as a percentage of a bank's risk-weighted credit exposures. And it is used to protect depositors and promote the stability and efficiency of financial systems around the world. Hence, it is critical to ensure that banks have enough cushion to absorb a reasonable amount of losses before they become insolvent. To some extent, Capital Adequacy Ratio can reflect the level of safety of a bank. It is calculated as the following formula:

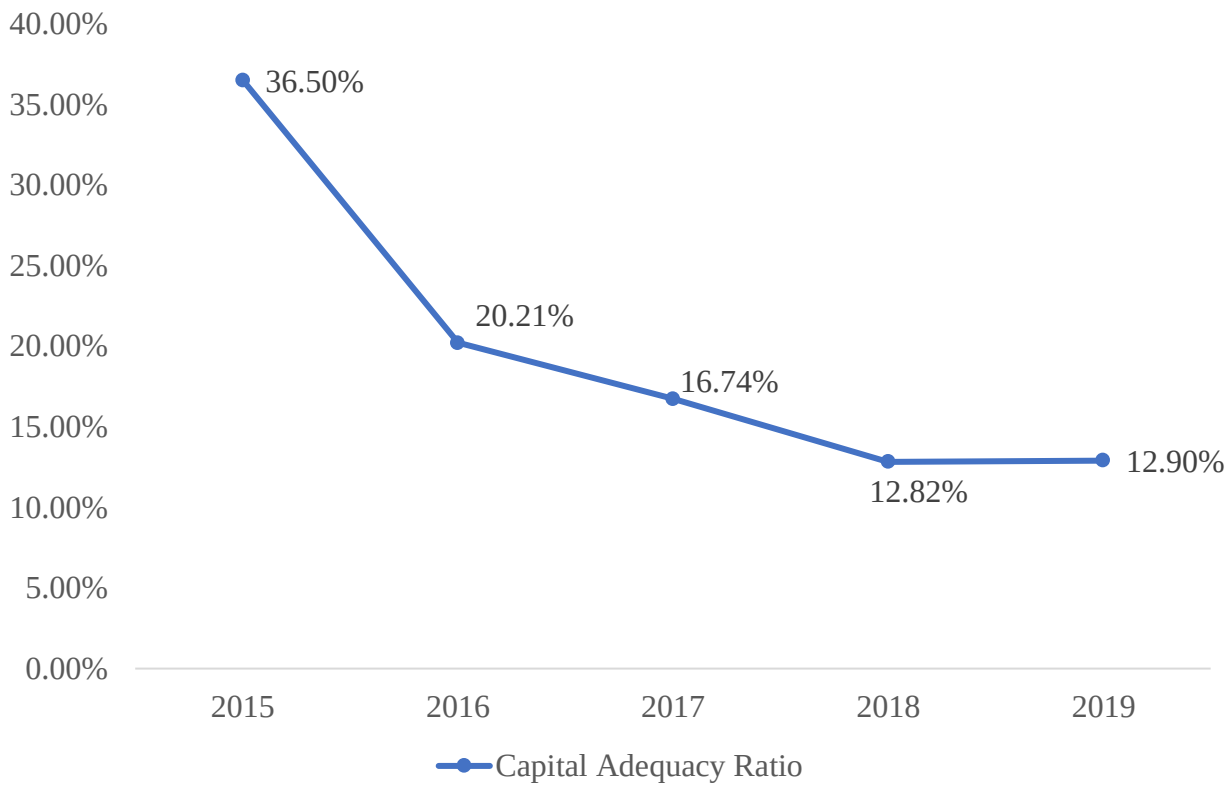
Equation 10: Capital Adequacy Ratio

$$\text{Capital Adequacy Ratio} = \frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{Risk\ Weighted\ Assets}$$

Note: Tier 1 capital, consists of equity capital, ordinary share capital, intangible assets and audited revenue reserves.
Tier 2 capital comprises unaudited retained earnings, unaudited reserves and general loss reserves.

The figure 31 mirrors the declining trend of Capital Adequacy Ratio of WeBank from 36.5% to 12.90% in 2019. Under Basel III, the minimal capital adequacy ratio that banks must maintain is 8%[22]. Thus, the capital adequacy ratio of WeBank is in line with the requirement of Basel Committee. That is to say, WeBank has sufficient capital to buffer the unexpected risk from future.

Figure 31: Capital Adequacy Ratio of WeBank from 2015 to 2019



Source: WeBank's annual report

In terms of enhancement on the level of financial capability, WeBank has made a great contribution on improving the customers' financial literacy in order to help them comprehend the financial products and services better through various channels. By the end of 2016, WeBank had hosted 37 lectures about anti-money laundering, anti-fraud, digital payment security, illegal fundraising as well as protection of consumer rights and interests through Weibo and WeChat channels. These lectures are free for public, and there were nearly 60,000 people participating online lectures held by WeBank according to the statistic from WeBank annual report 2016, and this number has jumped to 100,000 in 2017 disclosed by its annual report. Apart from free online lectures and articles with respect to education on financial literacy, WeBank also organized the physical lectures about financial literacy and held financial quiz in Southern University of Science and Technology and Shenzhen Polytechnic college in 2017, attracting more than 3000 students joining in these activities which aimed to spreading financial literacy and improving risk

awareness among young generation. In 2018, it made a further effort in increasing propaganda on spreading financial literacy among communities through both online and offline channels, covering approximately 7 million people. Meanwhile, it organized multiple lectures in schools to guide teenagers about how to cultivate the financial risk awareness.

On the one hand, this part has analyzed the financial risk associated with WeBank from indicators including Non-Performing Loan Ratio, Non-Performing Loan Provision Coverage Ratio, Loan Provision Rate, Loan-to- Deposit Ratio and Capital Adequacy Ratio. And all these indicators above prove that WeBank is capable of handling financial risk it will face in the future. On the other hand, WeBank is working on spreading the financial literacy among people from different age groups through various channels in order to help more people comprehend the financial products and services, which are exclusive to certain groups.

4.3.5 The summary of how WeBank Promotes Financial Inclusion

Table 16: The summary of how WeBank promotes Financial Inclusion.

Key Elements	Indicators	WeBank	Performance
Accessibility	# branches of financial service providers	NO	/
	# financial agents	NO	/
	# Automatic Teller Machines (ATM)	NO	/
	# users of a specific financial service or product	YES	Number of individual and SME borrowers; The amount of loans
Diverse and Appropriate Products	Quality	NO	/
	Convenience	YES	sign language interpreting services; 24*7 available online service; Fast approval of loan
	Affordability	YES	Daily Interest Rate; Flexibility in repayment in advance;
	The overall range and diversity of available products	YES	Credit services; Bank wealth management products or services.
Commercial Viability and Sustainability	Profitability analysis	YES	Net Profit, ROA, ROE and Net Interest Rate Spread
	Sustainability analysis	YES	Non-interest Income Ratio; Annual total asset growth rate
	Administrative and operational cost analysis	NO	/
	A robust financial infrastructure	NO	/

Responsibility and Safety	Enhancement on the level of financial capability	YES	Organized activities including online propaganda and physical lectures at schools
	Overall safety and soundness of the financial system	NO	/
	Financial risk analysis	YES	NPL Ratio; NPL Provision Coverage Ratio; Loan Provision Rate; Loan-to- Deposit Ratio; Capital Adequacy Ratio

Note: "YES" denotes that this indicator is covered in above analysis with respect to how WeBank promotes the financial inclusion in China.

"Note" denotes that this indicator is not covered in above analysis with respect to how WeBank promotes the financial inclusion in China.

The table 16 summarizes how WeBank promotes financial inclusion in terms of critical elements of financial inclusion. Apparently, WeBank does not cover all the indicators of each element, for example, indicators of accessibility such as the number of branches, agents or ATMs of WeBank are missing from the above analysis, but it is because of the essence of WeBank, a pure Internet-based bank without physical outlets. However, it is still feasible to prove the contribution of WeBank on accessibility through checking the number of users who subscribe to WeBank's services. From the section 4.3.1, it shows that both users of Weilidai and Weiyedai have been increasing since they were available on the market. Given that the target customers of Weilidai and Weiyedai are those people who are normally neglected or excluded by the traditional financial services, and this specific group of customers who involve in WeBank's services are increasing, therefore, it can be concluded that WeBank makes a great contribution on improving accessibility of those unbanked or underbanked population for financial services. In terms of diverse and appropriate products, key indicators such as convenience, affordability and the overall range and diversity of available products are discussed in the previous part. The sign

language interpreting services makes hearing-impaired customers much more convenient for them to accept financial service, enlarging the pool of customers who may find it hard to get financial services before. Besides, the 24*7 available online services overcome the limitation of time and space, making customers accessible to credit services whenever and wherever they want. Additionally, the approval of loan is also fast enough to reduce customers' waiting time, significantly improving the efficiency of services. As for affordability, the daily interest rate of Weilidai is 0.05%, and borrowers are even allowed to make repayment in advance before the due maturity, as a matter of fact, it is even possible to repay back on the next day after being granted of loans. That's why almost 70% of borrowers paid interests less than CNY 100 according to the disclosed information from WeBank's annual report. In light of the overall range and diversity of available products, WeBank also runs the bank wealth management services apart from its core credit services. The bank wealth management products offered by WeBank consist of three categories, current-based, time-based and open-end funds, allowing customers to select wealth management products based on their own needs. Although the quality, an indicator of diverse and appropriate products, is not covered in above analysis for WeBank, three indicators sufficiently demonstrate WeBank's positive impact on boosting the financial inclusion from the perspective of diverse and appropriate products. In addition, two quantitative analysis, profitability and sustainability analysis, are used to demonstrate the commercial viability and sustainability of financial inclusion. If a Fintech company fails to keep business sustainable, it will not meet the long-term objective of financial inclusion, as a result, it will face the bankruptcy risk, leading to the loss for customers, investors, as well as society. Financial indicators such as net profit, ROE, ROA and net interest rate spread are exploited in above profitability analysis. Consequently, WeBank had shown a robust profitability by the end of 2019, but it will face more furious competition as there are more and more internet-based banks stepping into financial inclusive fields on the market as well as the competition from the traditional banks who actively apply to Fintech to adjust its business model and start to enter the financially underserved market including consumer loans and SME credit services. As regards to sustainability analysis, non-interest income ratio and annual total asset growth rate are selected to demonstrate the sustainability of WeBank. Both profitability and sustainability analysis collectively show that WeBank has a robust development and is able to survive on the market, which is consistent of the long-term development objective of financial inclusion. For

responsibility and safety, two key indicators, financial risk analysis and enhancement on the level of capability of people, are conducted in the above analysis to demonstrate that financial products and services provided by WeBank are in line with customers' needs and will not jeopardize their interaction with customers. Responsibility and safety are critical to financial inclusion, especially given the special target customers, who are vulnerable to financial risk exposures. And a bunch of financial indicators are selected to analyze the financial risk associated with WeBank, including NPL Ratio, NPL Provision Coverage Ratio, Loan Provision Rate, Loan-to- Deposit Ratio and Capital Adequacy Ratio, and the result states that the financial risk related to WeBank is still under control; furthermore, WeBank has organized a sheer volume of lectures with respect to anti-money laundering, anti-fraud, security of digital payment and so on through both online and offline channels aiming to enhance the financial literacy of people from various age groups. The level of financial literacy is a prerequisite of financial inclusion to some extent. Once they have more abundant financial knowledge, they are more likely to access financial services as well as raise their financial risk awareness. Hence, it is the duty of financial companies to invest in the overall enhancement of financial literacy to realize the goal of financial inclusion. From this perspective, WeBank does bear the requirement of responsibility and safety, one of key elements of financial inclusion.

In a word, WeBank is on the progress toward achieving the objective of financial inclusion in China by serving more people accessible to financial services.

4.4 The potential risk of WeBank

Although WeBank is thriving in Chinese market at an incredible rate within 6 years, it still faces the financial risk during the course of conducting business, and the risk from banks have a tremendous impact on economy. Thud, all banks around the world will adopt the risk management strategy to reduce the risk exposures. Therefore, it is necessary to discuss the potential risk of WeBank given that WeBank targets at the population with below- average income and small businesses, both of whom are vulnerable to the financial exposure. The following part primarily explores the credit risk.

The credit risk is the biggest risk for banks, and it occurs when borrowers fail to meet contractual obligation. The source of credit risk associated with WeBank could come from the data source used to establish the credit investigation system and from the lack of the monitoring on the usage of funds, and the vulnerability of targeted customers.

In terms of the source of data, the risk management model of WeBank is based on Big data, which is primarily from the database of Tencent and of traditional channels, including the credit reference center of People's Bank of China, Tax Bureau and so on. But there are some drawbacks associated with this model: First, there is still doubt about the reliability of credit investigation platform constructed by Tencent. It is due to the Tencent's source of data, which mainly comes from the social media, WeChat and QQ. And the big data from social medial normally lacks the financial attributes, leading to a very weak correlation with customers' economic activities. Additionally, the big data from WeChat and QQ is very complex and has an extremely broad coverage from almost every aspect in life, and it asks for a huge amount of workload in screening the useful information with respect to borrowers' credit investigation, reducing the operational efficiency. Thus, the reliability and efficiency of big data are challenged when they are used to evaluate the credit risk for customers. As a result, it may cause the large error in the accuracy of customer credit scoring. Second, the credit reference center of People's Bank of China has yet completed, and it will probably lead to error when WeBank applies the data from the credit reference center.

As regards to the monitoring on the usage of credits, WeBank is not able to sufficiently supervise how the credits are used. Welidai is featured by free of collaterals and guarantees, therefore, WeBank lacks the corresponding protection measure to cover its loss when a borrower defaults on the loan payment, leading to the intake of the rising credit risk. Even though borrowers are asked about the usage of funds when applying to loans, they are likely to use credits for other purposes, such as making high-risk investments to pursue the high returns. In this case, not only users will probably face the huge loss but also WeBank will face the risk of failing to recover the principal and interests. Thus, WeBank is unable to track the usage of funds by consumers and small businesses, leading to the uncertainty on the track of funds.

In light of the vulnerability of targeted customers, they are more likely to suffer from the systemic risk. For instance, the outbreak of coronavirus COVID-19 pandemic at the beginning of 2020 and the following lock-down restriction to contain the spread of the virus have caused a huge loss on economic, leading to the unemployment rate in China rising to 6.2 percent in February2020, almost 1 percent higher than the same period last year , according to the monthly surveyed urban unemployment rate in China and it declined to 5.6% in August 2020[23]. Additionally, China's GDP growth experienced a contraction of 6.8 percent in the first quarter of 2020 and now it recovered to 4.9 percent in the third quarter of 2020[24]. Both high unemployment rate and shrinking GDP brought the heavy economic burden on the whole society, especially on those population with middle and below-average income and small businesses, who are exactly the target customers of WeBank. The rising unemployment rate will reduce the demand for personal consumers loans and raise the defaulted risk as well. And the pandemic also brought the shock on small businesses that will probably suffer the capital chain rupture, leading to the layoff of employees or shutdown of business, as a result, the credit risk faced by WeBank will increase a lot especially compared to traditional banks who typically have more high net worth customers, who are more capable of enduring the risk. Thus, the COVID-19 Pandemic has brought a new challenge on WeBank in terms of the risk control.

Note:

1. See the ownership structure of WeBank, access at https://xueqiu.com/1078525202/137476543

2. See WeBank's annual report 2019, access at https://stdd.webankcdn.net/epss/upload/www/pdf/annual_report_2019.pdf

3. See WeBank's official website, access at https://www.webank.com/

4. See WeBank's Five-year Anniversary, access at https://www.yicai.com/news/100437390.html

5. See 'Number of active WeChat messenger accounts Q2 2011-Q2 2020' at Statista, access at https://www.statista.com/statistics/255778/number-of-active-wechat-messenger-accounts/

6. See 'Number of monthly active smart device users of Tencent QQ in China from 2014 to 2019' at Statista, access at https://www.statista.com/statistics/227352/number-of-active-tencent-im-user-accounts-in-china/

7. See 'Tencent video battles iQiyi in China's streaming wars' at The Economist, access at https://www.economist.com/business/2020/08/22/tencent-video-battles-iqiyi-in-chinas-streaming-wars

8. See 'WeBank: the World's Leading Digital Bank Decoded' at CISION PR Newswire, access at https://www.prnewswire.com/in/news-releases/webank-the-world-s-leading-digital-bank-decoded-811666527.html

9. See 'WeCube, simplify IT management for distributed architecture' at WeBank's Website, access at https://fintech.webank.com/en/wecube/

10. See 'Is the WeBank the world's top digital bank?' at Kpronasia, access at https://www.kapronasia.com/china-banking-research-category/webank-the-world-s-top-digital-bank.html

11. See 'WeDataSphere' at Fintech, WeBank, access at https://fintech.webank.com/en/wedatasphere/

12. See Tencent's WeBank turns Five, access at https://chinatechecon.wordpress.com/tag/webank/

13. See WeBank's annual report 2019, access at https://stdd.webankcdn.net/epss/upload/www/pdf/annual_report_2019.pdf

14. See WeBank's annual report 2018, access at https://www.webankcdn.net/s/hjupload/app/pdf/annual_report_2018.pdf
15. See 'Why is Weilidai so popular? Four advantages behind it, access at https://cj.sina.com.cn/articles/view/5675440730/152485a5a02000t4m0?from=finance
16. See "How long will it take Weiyedai approve the loan?", access at https://m.csaimall.com/wenda/3945.html
17. See "WeBank: the micro-loan business has the universal promotion value", access at https://finance.sina.cn/2019-08-23/detail-ihytcern3090063.d.html
18. See ' CNY loan interest rate' , Bank of China, at https://www.bankofchina.com/fimarkets/lilv/fd32/201510/t20151023_5824975.html
19. See 'What about the wealth management products of WeBank?', at fengjr.com, access at https://about.fengjr.com/bank/detail-zx-2619
20. See 'The setback of Net Interest Rate Spread, a Challenge for Banks', at https://finance.sina.cn/2020-04-22/detail-iircuyvh9141239.d.html
21. See 'China Banking and Insurance Regulatory Commission: The average NPL Ratio of China's commercial banks is 1.86% in by the end of 2019.', access at http://www.gov.cn/xinwen/2020-02/17/content_5480190.htm
22. See BIS "Minimum Capital Requirement s for Market Risk.", access at https://www.bis.org/bcbs/publ/d457.pdf
23. See 'Monthly surveyed urban unemployment rate in China from August 2018 to August 2020' at Statista, access at https://www.statista.com/statistics/1109881/surveyed-monthly-unemployment-rate-in-china/
24. See 'China GDP: economy grew by 4.9 per cent in third quarter of 2020' at South China Morning Post, access at https://www.scmp.com/economy/china-economy/article/3106048/china-gdp-economy-grew-49-cent-third-quarter-2020

5. Conclusion

Financial inclusion is crucial toward the economic growth and financial stability; therefore, it is of great significance to countries with relatively low level of financial development. Meanwhile, Fintech is booming rapidly worldwide in recent years, and it has innovated and disrupted the traditional financial industry, and it positively promotes the financial inclusion in emerging economies. The paper provides a new approach to examine the positive impact of Fintech on financial inclusion through developing key indicators and elements based on the definition of financial inclusion. Some findings are presented as following:

At first, it provides an overview concerning the current development status of financial inclusion in China based on the Global Findex Database in 2017 by comparing to other G-20 countries and it reveals that the overall level of financial inclusion in China is relative high in terms of account ownership and digital payment, but the use of formal credit still remains low compared to peer comparative groups.

Then it introduces an overview of development of Fintech in China from digital payment, P2P lending, Crowdfunding, Robo-advisory and Internet banks, and then it studies the promotion of Fintech on financial inclusion in terms of proposed indicators and elements in a qualitative analysis, and it finds that not all the Fintech exerts the same level of impact on the financial inclusion in China.

Lastly, it elaborates how a Fintech firm promotes financial inclusion through a case study, and it states that this Fintech firm has a positive contribution on financial inclusion in China.

Thus, the contribution of the paper is to come up with a qualitative approach by developing a series of indicators from four critical elements of financial inclusion, and then it uses these indicators to interpret how Fintech promotes the financial inclusion in China.

6. Limitations of the Paper and Future Researches

Some of limitations of the paper and future researches should be recognized as following.

First, the data collection concerning the level of financial inclusion in China is from the Global Findex Database 2017. As a matter of fact, the data collected by the World Bank was from 2016, which cannot provide the current development status of financial inclusion in China given that China has been accelerating the financial reform and advancing financial development in recent years. Thus, it fails to provide a comprehensive overview of financial inclusion development status at present. Therefore, an updated database may help reflect the overall level of financial inclusion in China in a more comprehensive perspective.

Second, the research regarding the current development state of Fintech in China is not comprehensive either. The paper just covers several primary Fintech subsegments in China, while there are other Fintech streams undiscussed by the paper, including Insurtech as well as the financial technologies such as AI, big data, blockchain and so on. Hence, future research could explore the impact of these uncovered Fintech segments on financial inclusion.

Third, there is only one real case involved in the paper to examine the role of a Fintech company on financial inclusion in terms of key indicators and elements proposed in this article. Consequently, there a lack of a holistic overview about the impact of Fintech on financial inclusion. Thus, it is suggested that more cases related to Fintech in different segments can be involved in the future research.

Third, the research paper fails to provide an empirical study to examine the impact of Fintech on financial inclusion in China. For example, it could be more straightforward to study the relationship between Fintech and financial inclusion by constructing the Fintech index and Financial inclusion index, and then some mathematical models could be used to explore the relationship between Fintech and financial inclusion.

Lastly but not least, the paper fails to consider the impact of COVID-19 crisis on both Fintech and financial inclusion in China. It is worthwhile studying the development of Fintech and financial inclusion in the post COVID-19 era in future research.

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