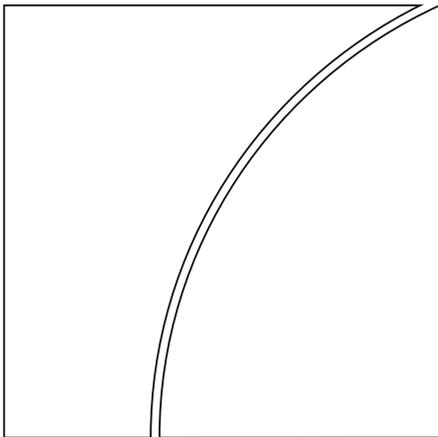




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teach the rest of the world?

by Michael Chui

Monetary and Economic Department

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Keywords: BigTechs, banking and finance.

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Money, technology and banking: what lessons can China teach the rest of the world?¹

By Michael Chui

Abstract

Technology companies entering the financial services industry have become a global phenomenon over the past decade. This trend is most remarkable in China where two large technology firms (BigTechs) have emerged as important market players, especially in payment services. This paper examines the factors driving this development and whether the Chinese experience could be applied elsewhere. Several lessons emerge: first, like any company in a network industry, it is important to build and maintain a large user base and that is the key factor behind BigTechs' expansion into the financial industry. On this basis, these BigTechs can be seen as "accidental financiers" rather than "aggressive invaders". Second, these firms are cautious in offering higher-risk financial services as investment losses could lead to an exodus of customers. Third, Chinese authorities' regulatory tolerance during the early stage has been a key supporting factor and helped fostering innovation benefits. But that was balanced by the implementation of capital and liquidity rules to keep BigTechs from "excessive" growth, mis-selling of financial products and posing systemic risks. Fourth, initial conditions and government support matter. The rapid growth has benefitted from China's large population, the availability of low-cost mobile handsets and heavy investment by the government on mobile communication infrastructure. These may not be easily be replicated elsewhere. Last, BigTechs' overseas expansion may require policy coordination between home and host authorities to keep track of emerging risks.

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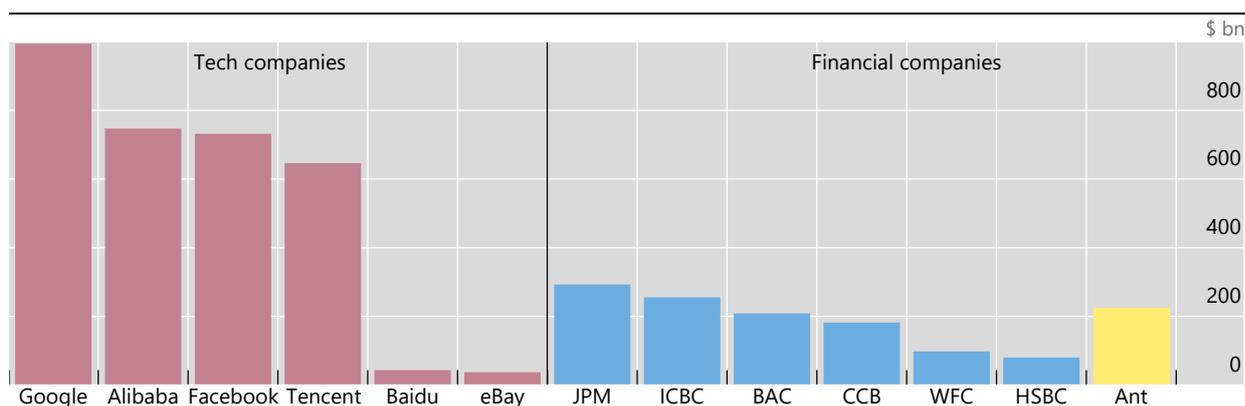
¹ This paper has benefitted from the encouragement and discussions with Benoit Mojon and Luiz Pereira da Silva. I also thank Mathias Drehmann, Christian Upper and other colleagues at the BIS for useful comments. In particular, special thanks are due to Nadine Baudot-Trajtenberg for providing helpful comments and suggestions in shaping the arguments. But all remaining errors are mine.

1. Introduction

Technology companies offering financial services have become a global phenomenon over the past decade. The trend is most remarkable in China. Since the early 2000s, the number of internet users in China has almost tripled to over 900 million in 2020. Supported by this large user base, a few Chinese companies formed in the 1990s are now among the largest technology companies (BigTechs) in the world. Two notable examples are Alibaba Group and Tencent Holdings, which have a market value of around USD 500 billion (Graph 1). Initially, these two companies' core businesses were modelled on ideas first developed in advanced economies with Alibaba running e-commerce platforms and Tencent operating instant messaging services. However, since the early 2000s, they have expanded rapidly into a wide range of other activities including financial services. Ant Group, an affiliate of Alibaba specialises in financial services, filed for a dual listing in Hong Kong SAR and Shanghai in August 2020 to raise around USD 30 billion, putting the company's potential market valuation at over USD 200 billion, on par with the largest global financial groups in the world.²

Market capitalisation of large technology companies and financial groups¹

Graph 1



¹ Market capitalisation as at end-September 2019, except Ant which was a market estimate. JPM = JPMorgan Chase; ICBC = Industrial and Commercial Bank of China; BAC = Bank of America; CCB = China Construction Bank; Ant = Ant Group.

Source: Refinitiv.

The rapid growth of technology firms' financial businesses poses new challenges to central banks and regulators. On the one hand, these new technologies could improve the efficiency of the financial system by lowering the servicing costs. They also improve financial inclusion by providing payment and asset management services to a wide range of recipients and extending credit to micro enterprises and individuals with no credit history. On the other hand, technology companies could bring new risks as they are often not "properly" regulated and their new products could render existing financial regulations obsolete. Therefore, it is important for the authorities to strike a balance between nurturing the benefits of financial innovation and maintaining financial stability.

This paper examines the factors affecting the expansion of Alibaba and Tencent to the financial sector. The rise of these two companies reflected mainly their ability

² In November 2020, the proposed dual listing was postponed, pending the company's response to new regulation changes introduced by financial regulators in China.

to take full advantage of “network externalities”, under which the value of a customer of a firm’s product is positively affected when another user joins. The paper thus begins with a review of the key concepts of network externalities and their importance in shaping the two BigTechs’ journey into the financial services industry. They started with offering payment services before venturing into other areas including asset management, micro lending, banking and insurance.³ Moreover, in running their core and financial businesses, BigTechs collect and analyse huge amount of diverse data. This allows them to monetise data services by offering cloud computing and “credit scoring” information to financial and nonfinancial clients. In documenting this evolution process, the paper also focuses on how economic and social conditions, interacting with regulations have played a role in supporting business growth and/or preventing these activities from becoming financial stability risks. Finally, it concludes with a summary of the Chinese experience that may be relevant for other economies.

2. Some key concepts of network externalities

Alibaba and Tencent started their respective businesses in network industries. While Alibaba began by running an online marketplace, Tencent started off by providing communication services to its members. In both networks, a member’s demand for the network good – a merchandise product or direct link to another – is a function of both its price and the expected size of the network (network externalities). The more sellers/buyers participate in an online marketplace, the higher the chance of getting a deal done. And in a communication network through which a user links directly to others, the wider the available options the better.

Network externalities can also arise indirectly through a system. A well-known example is the computer hardware/software system (see, eg Katz and Shapiro (1994)). A personal computer user will benefit from more people using the same type of hardware units as that will attract a wider variety of software developers to write programmes for these machines. Quite often, a network company will internalise network externalities of a system through vertical integration or joint venture.

Intense competition in network industries means that companies with the largest user base can become a monopoly. The fact that the demand curve is a positive function of both price and the number of users means that a company with the larger “installed” customer base – those customers who are currently using the company’s products – is in a better competitive position, *ceteris paribus*. And users’ expectations of the size of the market can lead to two competitive equilibria: one equilibrium with no subscription if each user supposes that no other user subscribes to the network; and a second equilibrium with many subscriptions if each user believes that a large number of others are going to subscribe to the network. Katz and Shapiro (1985) develop a model to show that there is a “tipping point” of the installed base – a corner equilibrium – in which a single system will dominate and enjoy monopoly profits.⁴

³ Since their presence in the insurance industry remain relatively small, this paper will only touch upon some relevant issues. Of course, it is conceivable that BigTechs may strive for a much bigger share in the insurance sector going forward.

⁴ Any monopolisation or attempted monopolisation can threaten the benefits of unfettered competition and may trigger government interventions. Issues related to antitrust regulations on non-financial businesses are beyond the scope of this paper.

Network companies adopt a range of business strategies to build their installed base, at least before a tipping point is reached. One common strategy is to employ penetration pricing under which a firm charges a price at much lower than market average. In addition, leading firms are likely to maintain product differentiation. As long as a set of users prefers a company's product to those of others in the market, that company can establish an edge over its rivals in building an installed base. On this basis, a network firm often prefers product incompatibility as that allows it to benefit from the positive feedback associated with network externalities. Another common strategy is to build reputation. Hagiu and Rothman (2016) find that in the case of online marketplaces, insufficient trust and safety among both buyers and sellers could bring the downfall to a network provider.

Among all network industries, a payment system is one that may require special attention from a central bank. Weinberg (1996) highlights that a payment system involves two networks. On the one hand, a payment system communicates payment instructions – a communication network. On the other hand, the payment transactions create another network of debt obligations in the form of deposits. A key question to central banks and banking regulators is whether this network of debt obligations can lead to financial stability risks.

In the following sections, the paper will show how network externalities and systems competition can help explain the rise of Alibaba and Tencent and their expansion into the financial services industry.

3. Payment services: a survival kit

Although technology firms may have different core businesses, their crossing-over to the financial industry often started with payment services. There are two views about the expansion. According to "an aggressive invader" view, technology firms identified the inefficiency of payment incumbents (eg high fees and long settlement time) as a weak spot. However, there is "an accidental financier" view, under which technology firms developed their own payments infrastructure as necessity for boosting their core businesses. As discussed in the three cases presented in the rest of the section, Alibaba and Tencent seem to be more aligned with this latter view, at least before diversifying into other financial services. In some sense, the expansion can be seen as a natural way to internalise the network externalities arising from systems competition.

3.1 Supporting e-commerce

In May 2003, Alibaba launched a new customer-to-customer (C2C) e-commerce platform, Taobao. While the platform offered a large number of products, the number of completed transactions was small. A major obstacle was lack of trust between buyers and sellers. In any online C2C transactions, a buyer naturally does not like to pay out before receiving the products, while a seller prefers to be paid before delivering them. In a large country like China, settling the transactions physically is always costly. By the early 2000s, the lack of trust problem had been addressed outside China by third-party payment solutions, which had become increasingly

popular means of online payments (eg, PayPal in the United States).⁵ However, these models often need verification with personal credit card details. That could not work well in China as most local residents did not have credit cards.⁶ In addition, the relatively high fees charged by third-party companies also deterred sellers from using their services.

In October 2003, Alibaba introduced a new function – “secured transaction” – for Taobao customers. Under it, Taobao would withhold a buyer’s payment in an escrow account and transfer the money to the seller only after the delivery of goods was confirmed by the buyer. The function proved to be popular with both buyers and sellers. By early 2004, 70% of products advertised in Taobao supported secured transaction. While it should not be surprising to see buyers welcoming secured transaction as it protected them against fraud, sellers were keen to subscribe to secured transaction too. This was deemed to be a signal of more trustworthy merchants over non-subscribers to this function.

As the volume of Taobao secured transactions grew rapidly, banks serving its customers threatened to stop clearing with Taobao due to the increasing workload (which was done manually at that time). In December 2004, Alibaba decided to set up an independent company, Alipay, to manage the huge cash flows generated between customers’ banks. Alipay eventually was transformed into a new company called Ant Financial, renamed as Ant Group in 2020.

3.2 Monetising instant messaging platform

Tencent was founded in 1999. Initially, the company focused on running an instant messaging service, QQ, modelled on the software ICQ (“I seek you”) developed by an Israeli company. A common problem for instant messaging service providers is the difficulty in generating revenue streams to match the growth in user base. In a winner-takes-all market with plenty of free alternatives, charging customers for the software or running subscription-only services will easily drive users to the competitors. Providers could rely on distributing advertisements to generate revenue but that proved to be difficult for Tencent for two reasons. First, in the pre-smartphone era, advertisements in the form of text messages on a small monochrome screen had rather limited impact. Second, more importantly, QQ’s user base was dominated by the younger generation with limited purchasing power. As a result, only a narrow range of companies would place their advertisements with QQ.

Tencent turned to “personalisation” of users’ digital identities to generate revenue. Specifically, Tencent launched the so-called “QQ show” in 2003, which allowed users to personalise their virtual images by buying small digital items such as virtual clothing and other personal accessories. The popularity of the QQ show exceeded all expectations. During the first six months, 5 million users spent an average of CNY 5 person for these services. These transactions could be paid with “Q coin”, a virtual “currency” created by Tencent for QQ users to purchase these items. Users purchase their Q coins (CNY 1 for 1 Q coin) through their bank cards or mobile phones. From a payment perspective, Tencent effectively started its own payments

⁵ PayPal was launched in the United States in 1999. Users with a PayPal account can make online payments without giving away sensitive personal credit card/bank information to sellers.

⁶ A Gallup survey published in 2005 revealed that 85% of Chinese nationals did not possess any credit/debit cards. In 2016, debit card ownership in China rose to 4.47 per person but credit card ownership remained low at just 0.31 per person.

infrastructure with Q coin, which laid the foundation for the subsequent launch of its first online third-party payment platform, Tenpay, in 2005.

3.3 Smartphone and mobile payments

An important turning point of BigTechs' financial services was the rapid introduction of mobile payments. Soon after the third-generation (3G) mobile communications had been introduced into China in 2009, both Ant and Tencent have launched their first mobile apps to take advantage of the faster data transfers.⁷ The decision proved to be extremely important as mobile internet usage rose quickly in the following years. By June 2020, the number of instant messaging and mobile payment users in China reached 930 million and 800 million respectively. And total value of transactions using mobile third-party payments in 2019 amounted to 230% of GDP.

Several factors have contributed to the remarkable growth in mobile payments in China. First, supported by the central government, China's mobile infrastructure has developed rapidly over the past decade. Since the first fourth-generation (4G) mobile license was granted in China in December 2013, Chinese mobile operators have invested heavily in infrastructure development. By end-2019, China had 5.4 million 4G base stations (the equipment that facilitates wireless communication), representing more than half of the world's total. In addition, Chinese residents have the option to purchase locally-produced smartphones at much lower prices than comparable global brands. These hardware developments have helped China's 4G mobile phone users to reach almost 1.3 billion in 2019.

Second, mobile payments are appealing to merchants, especially small and mobile vendors, because of lower transaction costs. When mobile payments were first introduced in 2011, merchants in China needed to pay around CNY 2,000–3,000 as deposits for a point-of-sale terminal to banks or card companies. Commission charges for each card transaction were as high as 1–3% of the sale amount. And a payment would be received by a merchant at the earliest one day after the transaction took place. Mobile payments changed all of this. Smart phone payment apps allow a buyer to complete a transaction in seconds by scanning a bar-code/QR (Quick-Response) code (Box 1). These codes are distributed by the payment firms and can be printed out by the merchants themselves.⁸ According to the Chinese Academy of Financial Inclusion (2019), mobile payments could raise merchants' operational efficiency by 10% and lower transaction costs by 1%.

The third factor is portability, which gives BigTechs a strong comparative advantage as they can to integrate their other business lines with payments. The main difference between an e-transaction using a personal computer and mobile phone is that only the latter can store information that is portable. For example, in purchasing an event ticket using a mobile phone, the ticket can be stored in the phone and used directly. By contrast, a ticket purchased via a personal computer will have to be printed out first. In many ways, not only does portability improve the accessibility of the payment systems for both buyers and sellers, it also stimulates economic activity.

⁷ The maximum speed of data transfers of 2G, 3G and 4G are 9.6 kilo-bits per second (kbps), 2 mbps and 100 mbps respectively. Speed of 5G is expected to reach 10 gbps.

⁸ The fact that payment companies started off with their respective proprietary QR codes rather than mutually recognised codes probably reflected the product differentiation motivation to establish a large installed base. From a regulator's point of view, having a unified QR code is important for efficiency and consumer protection.

As discussed in the next sections, portability is an important feature that allows Ant and Tencent to diversify into other financial and non-financial services and collect huge amounts of data in the process.

Box 1

Smartphones and QR codes boost cashless payments in China

Payments using a smartphone app to scan QR code has become a part of everyday life in China. Whether it is in the cities or remote areas, app users will not need to use cash to pay for meals, metro tickets, taxi rides, grocery shopping and many other chores. This box examines the factors contributing to the rapid rise in popularity of QR-code payments in China, and the regulatory responses.

QR code was first invented by Denso Wave Corporation (a subsidiary of Toyota) in 1994 as a response to the shortcomings of a barcode – with limited data capacity and slow to scan.^① A QR code, by contrast, can store up to 4,300 alphanumeric characters, which are coded in both across and up/down directions, offering a faster and more secured scanning solution. In Japan where QR codes were first developed, they have been commonly used for item identification and location tracking. In China, BigTech started to introduce QR-code payment system in the early 2010s, which proved to be a game changer in the mobile payment industry.

A number of technological and non-technological factors have contributed to the sharp rise in QR-code payments in China.

Technological factors. The rapid deployment of 3G network due to fierce competition between mobile services providers, and the availability of cheap smart phones manufactured by a large number of producers led to a high smart phone penetration ratio in China. Second, and unlike near field communication (NFC), which is more widely accepted in advanced countries, QR codes do not require merchants to rent POS or consumers to have smart phones with special NFC-enabled chips. Third, QR codes can be used in both directions between customers and vendors, and thus have potential for much wider applications.

Non-technological factors. The large number of users of Alibaba’s e-commerce network and Tencent’s social network, together with their links to off-line businesses (the so-called ecosystem), provide a solid foundation for these two BigTechs to push through their own standards. In addition, BigTechs can use “subsidies” such as cashback to entice users to pay by scanning QR codes to consolidate their user base. By contrast, such strategy would be far more difficult to apply with NFC payment as it would involve many more players, including hardware manufacturers, banks and clearing houses.

Despite the advantages, there are also some issues with QR code payment schemes. Since QR code readers can only decode data using same encoding standards, this often results in multiple QR codes being displayed at a store to support various e-payment schemes.^② More importantly, QR payments are susceptible to fraud. First, criminals can easily replace a legitimate QR code with an illegitimate one as human eyes are not able to decipher the machine codes. Second, criminals could also steal consumers’ QR codes to pay for products, just as they do with stolen credit cards. Third, QR codes and smart phones can be planted with spyware or virus, exposing customers to frauds. In response, in March 2014, the people’s Bank of China (PBoC) issued a ban on QR-code payments due to security concerns. It was only in August 2016 that the PBoC officially authorised the Payment and Clearing Association of China to work with the industry to develop rules for QR payments. An official regulation in relation to QR payments finally came into effect in April 2018. In September 2019, the PBoC issued the “FinTech Development Plan (2019–2021)”, calling for operators to promote interoperability of barcode payment services and achieve mutual recognition of QR codes.

^① A barcode can hold information up to 20 alphanumeric characters, and it is arranged in one direction, making it slower for scanning. ^② Singapore was the first country in the world to combine multiple payment QR codes into a single label.

3.4 Competition between BigTechs

Although Alibaba and Tencent might have been motivated by different reasons to develop their third-party payment services, they now compete against each other to strive for a large installed base, which is important for group-level profitability. Two examples stand out in this evolution process.

Withdrawing penetration pricing too early could threaten market dominance. Three years after its launch in 2006, Taobao had firmly established itself as the market leader in C2C e-commerce in China, with around 60% share in mobile payments. Alibaba then announced a plan that would allow sellers to have their products displayed higher up in the sorting order against a fee. Many sellers reacted negatively to the announcement. To them, the new plan amounted to Taobao reneging on a promise made a year earlier to keep its services free of charge for another three years. About the same time, Tencent's C2C platform PaiPai pledged to offer free services to all sellers for three years as well to give rebates to buyers who completed their transactions with Tenpay (Tencent's payment platform at the time).⁹ Against this backdrop, Taobao decided to withdraw its charging plan.

The fast-evolving nature of digital competition means that an incumbent can lose out to a rival in a short period of time. Ever since its introduction in late 2009, Alipay has been the dominant mobile payment solution in the Chinese market, but this has not been without challengers. WeChat is a mobile social network app that was launched by Tencent in 2011. It allows users to communicate with "friends" via instant messaging, text, audio or video. In 2013, Tencent integrated its Tenpay payment app into WeChat, called WeChat Pay. Initially, WeChat Pay had around 10% to 15% share of the mobile payments market, much smaller than Alipay's 80%. But 2014 marked a significant turning point when WeChat launched a new "red packet" function. It is a tradition of Chinese people to wrap money in red packets and give them to younger generation or friends during festivities. WeChat's red packet function leverages users' social network by allowing them to exchange virtual "red envelopes" with "friends". Importantly, any red envelope recipient who had not "tied up" a bank account with WeChat Pay would have to do so to cash the money they had been gifted. This novel feature, together with embedding apps for popular online-to-offline retail services such as taxi hiring and restaurant booking services, helped WeChat Pay to gain market share over the next two years to around 40%.

But product differentiation remains a useful tool to fence off competition. Ant responded with adding a "friends" function to the Alipay menu in 2015, but that was not well received. Inertia appeared to have played an important role. Most users of Alipay appeared to see the app primarily as an e-wallet rather than a communication tool that they would check regularly. At the same time, users appeared to be more vigilant about exposing their e-wallets to friends, needless to say to any strangers. In 2017, Ant decided to stop pursuing social-networking business.

⁹ PaiPai was sold to JP, another big technology firm in China in 2014.

4. Asset management: market share and reputation

4.1 Money market funds

An important issue facing all payment service providers is how to deal with customers' residual funds (the float) in the accounts. In most countries, the solution is to require providers to keep the float as cash/deposits with banks. Typically, payment providers deposit clients' cash with a bank or money market fund (MMF) and earn the interest. In many cases, this has become a major source of revenue for some providers.¹⁰ However, there are a few exceptions. For example, in the United States, the New York State Banking Department ruled in 2002 that PayPal's practice of retaining money on account for consumers for future use constitutes illegal banking (Kaminski, 2003). In response, PayPal offered to place customer funds in the PayPal Money Market Fund and the interest went to the fund holders.¹¹

Ant's decision to set up a MMF probably reflected the objective to consolidate its installed base, rather than regulatory requirements. Alipay's Yu'eobao, a MMF jointly set up with Tianhong Asset Management, was established in mid-2013.¹² Yu'eobao allows Alipay customers to transfer money between their payment and money market accounts. It soon became clear that, the move involved Ant "voluntarily" transferring the interest income of the float back to the customers, and could be seen as a penetration pricing strategy.

Customers' response to Yu'eobao services exceeded all expectations. Within six months, the number of Yu'eobao subscribers grew to 43 million. In 2017 Q1, Yu'eobao had overtaken JPMorgan's US government money market fund and became the largest MMF in the world with assets of CNY 1.1 trillion or USD 117 billion (Graph 2, left-hand panel). It is however worth noting that Tencent did not adopt a similar strategy. Its asset management function Licaitong was launched in early 2014. It simply provides a platform for MMFs managed by a few selected asset management companies to transact directly with fund subscribers through their bank accounts. Only in late 2017 Tencent set up Lingqiantong, which allows customers invest their float in MMFs. This happened just about the same time when the PBoC announced some major changes to the regulations on payment firms' reserves (see below).

Two factors have contributed to Ant's successful launch of a MMF. The first one was technology. In comparison to most other wealth management products which set a minimum threshold of around CNY 50,000 at the time, Yu'eobao's minimum of CNY 1 was far more accessible to the general public. According to Ant, 70% of Yu'eobao customers' investment was under CNY 1,000. By the end of 2013, average investment per person was CNY 4,300, much lower than the average of CNY 85,000 of the other 9 largest MMFs in China. Accessibility was further enhanced by the fact that customers can withdraw at any point in time and settlement is immediate. All

¹⁰ For example, Hui Fu Payment Limited (2018) reveals that interest income derived from client reserve funds amounted to 32% and 46% of net profits for 2016 and 2017 respectively.

¹¹ See the letter sent by the New York State Banking Department to PayPal dated 3 June 2002 regarding "Opinion regarding PayPal activities" (<https://www.dfs.ny.gov/legal/interpret/lo020603.htm>).

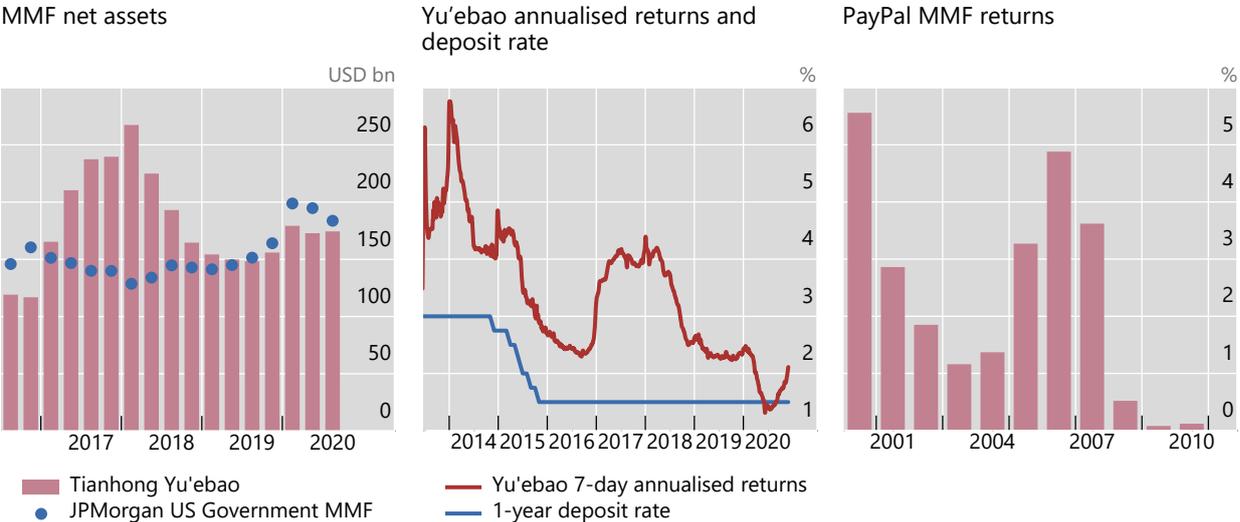
¹² Before the launch of Yu'eobao, Tianhong Asset Management was a relatively small company in the asset management industry in China. But soon after the successful launch of Yu'eobao, Ant Financial bought a controlling stake of Tianhong Asset Management. Since May 2018, Yu'eobao has opened up to a few other MMFs run by different asset management companies.

these were made possible because Ant employs cloud computing to perform the complex data calculations involving hundreds of millions of customers.

The second factor was favourable market conditions. In the second half of 2013, banking system liquidity in China was tight, opening up a large gap between interbank interest rates to deposit rates (Graph 2, centre-left panel). Yu'eobao, which mainly invests in interbank deposits, offered customers much higher returns than deposits. However, as the spreads narrowed in 2016, the growth in Yu'eobao also slowed.¹³ The importance of market conditions was also highlighted by PayPal's decision to close its MMF as US interest rates fell close to zero, depressing total returns (Graph 2, right-hand panel). In this context, one might argue that the persistent low interest rate environment in major advanced economies could be an important deterring factor for tech firms launching a challenge to asset management businesses there.

BigTech's MMFs

Graph 2



Sources: Bloomberg; Wind; company reports.

4.2 Beyond MMFs

Chinese BigTechs' expansion to higher-risk, higher-return funds has proved to be more cautious. For example, Yu'eobao might have propelled Tianhong to become the largest asset management company in China in just a few years, but the firm's product range remains narrowly focused, almost exclusively on MMFs. In early 2018, Tianhong's MMFs reached a peak of almost 25% of total MMF assets in China before falling gradually to just 15%. But throughout this period, Tianhong's market share in funds other than MMFs has been negligible (Graph 3).

Reputational risk can be a major concern for BigTechs offering risky products. Unlike MMFs, which invest mostly in safe and liquid interbank deposits, higher return bond and stock funds could potentially incur large losses for customers. Significant

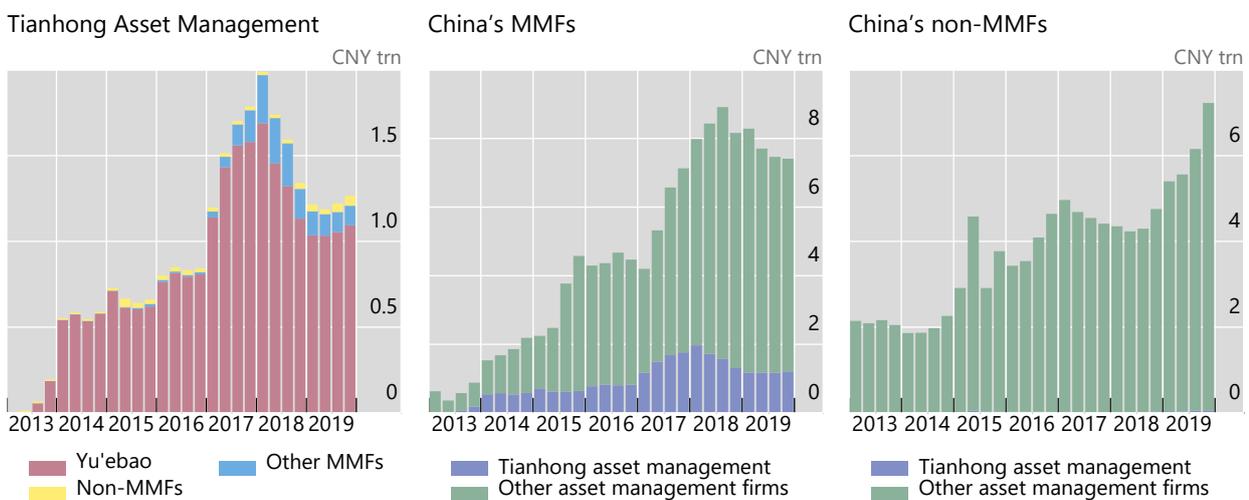
¹³ The decline in Yu'eobao assets over the past two years was also due to some regulatory changes and Ant Financial opening Yu'eobao to asset companies other than Tianhong (see section 7 on regulations).

investment losses could trigger customer exodus, which runs against one of the motivations for offering fund products in the first place.

To protect against potential reputation risks, the Chinese BigTechs thus confine their role to being an intermediary in asset management. As discussed above, Tencent appeared to prefer playing such an intermediary role in providing customers access to invest in MMFs run by established asset managers. In addition, when in 2014 Ant launched for its customers its first fixed-term higher yielding platform, Zhaocaibao, it was effectively a matching agency. Zhaocaibao runs as a customer-to-business (C2B) lending platform, allowing a pool of individual investors to lend to a business project for a fixed period of time at higher returns than MMFs.

Net assets of China's asset management companies

Graph 3



Source: WIND.

Two innovations were introduced to facilitate this matching process. The first was the so-called “**pre-booking**” function. Individual investors could “pre-book” on Zhaocaibao’s platform the amount of money they would like to invest for a specified period at a specified rate of return. Ant would then pool similar registrations for loans to a business project that fitted the specified investment criteria. As a form of risk control, the projects listed on the Zhaocaibao platform are all endorsed by financial institutions. In addition, Ant involved third-party insurance companies to offer capital protection for these fixed-term products. To further encourage customers’ appetite, Ant developed a second innovation – a “**cashing-in**” function. Usually, early liquidation of fixed-term products will incur a loss in terms of interest payments. But cashing-in allows investors to post their shares of investment on a platform and sell them to other interesting parties before maturity so as to recoup part of the interest due. Effectively, Ant created a secondary market for its fixed-term products sold on its platform.

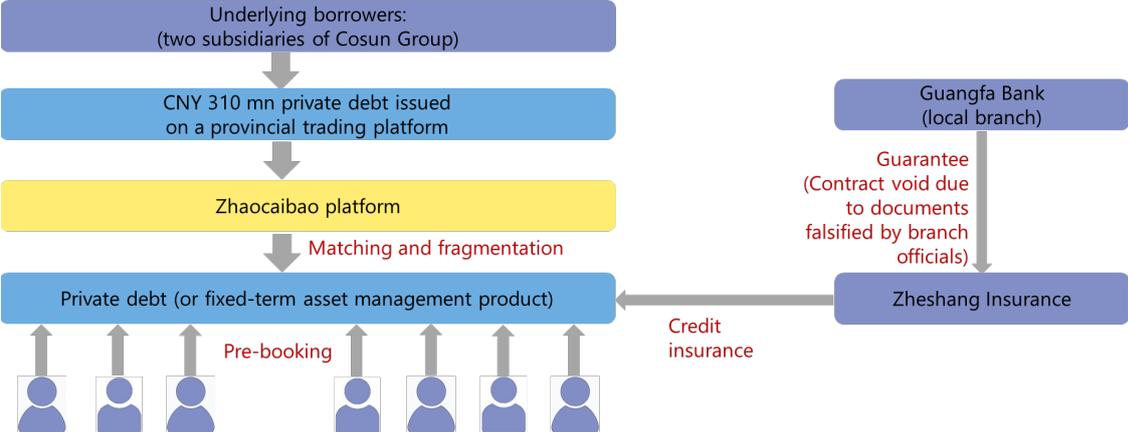
However, this intermediary role cannot fully isolate BigTechs from reputational risks and may violate regulations. For example, when a Zhaocaibao borrower missed payments in late 2016, many investors demanded compensation from Ant even though the court ruled that the company, being just an agency, was not liable. And debt recovery was further complicated by the disputes between the insurance company introduced to offer capital protection and a local bank over falsified

documents (Graph 4, left-hand panel).¹⁴ In addition, from the regulator’s point of view, cashing-in could be seen as a means to bypass regulatory practices on private debt placement, and allowing a large number of less informed investors to participate in a debt placement. Mis-selling is therefore one major risk (Graph 4, right-hand panel).

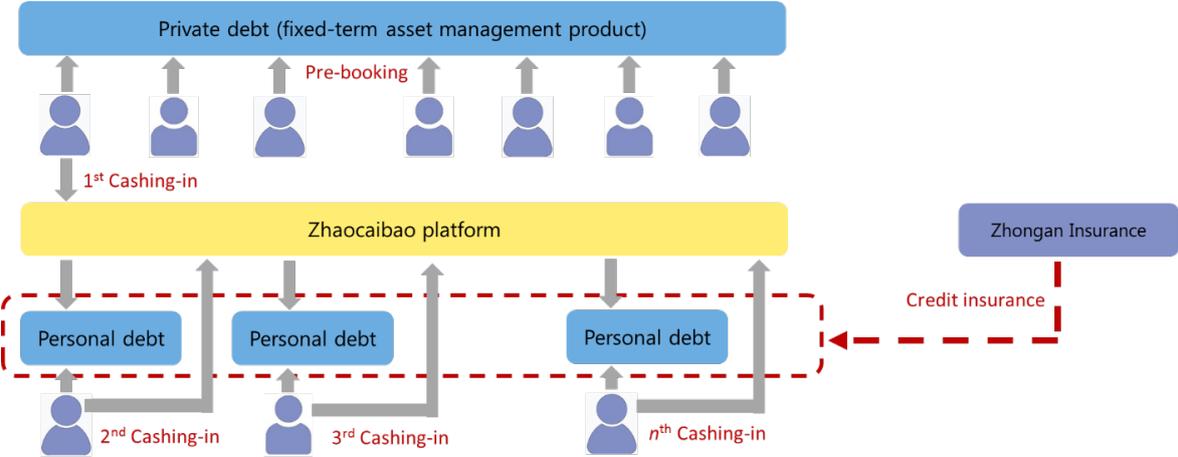
Ant Group’s fixed-term asset management platform: Zhaocaibao

Graph 4

Cosun Telecom: a Zhaocaibao default case



By-passing private debt placement threshold



Sources: Sheng et al (2017); BIS.

5. Credit extension: micro loans and internet banking

5.1 Micro loans

In China, one main obstacle for individuals and small businesses to obtain bank credit is their lack of credit history and/or collateral. Since the early 2000s, Alibaba has

¹⁴ Subsequently in 2016, the authorities issued “Interim measures for the administration of business activities of peer-to-peer lending information intermediaries”, clarifying that intermediaries should bear responsibilities in assessing the risks related to such lending.

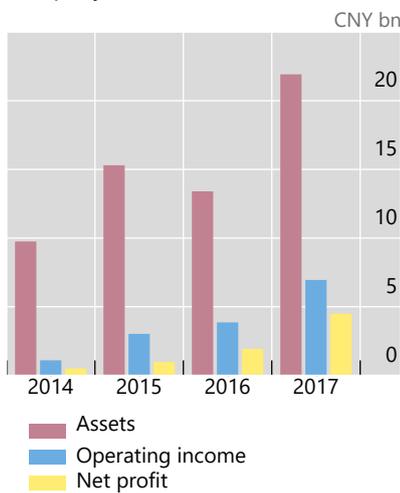
developed “credit” record of merchants based on financial and nonfinancial data collected on their e-commerce platforms to help merchants find trustworthy trading partners. To explore how these data could be used to support lending, Alibaba in 2007 signed agreements with two large Chinese state-owned banks. The goal was to explore extending micro loans to merchants. Under such agreements, Alibaba would recommend potential “credit-worthy” merchants to obtain uncollateralised loans from the banks for up to CNY 10,000. These experiments, however, failed to take off as banks’ risk control turned out to be too high a hurdle for most Alibaba’s recommended merchants. From the banks’ point of view, non-financial transaction data that Alibaba used to rank merchants such as the number of visitors to the company’s webpage or the frequency a merchant builds up its inventory within a certain period could not be used in traditional risk assessment models.

The setback prompted Alibaba to apply for micro-lending company licenses to take full control of micro lending business. Ant built its internal credit scoring system – Zhima credit (see next section) – to enable speedy loan approval. It created the so-called “310 model”: loans take 3 minutes to apply and less than 1 second for approval with zero human intervention. In late 2012, Ant managed to approve a total of CNY 100 million micro loans in just 36 minutes during a special promotion campaign. The micro lending business grew quickly, total assets more than doubled between 2014 and 2017 (Graph 5, left-hand panel). In 2019, digital finance platform (running consumer credit and micro lending businesses) surpassed digital payment for the first time to become the group’s largest revenue centre (centre panel).

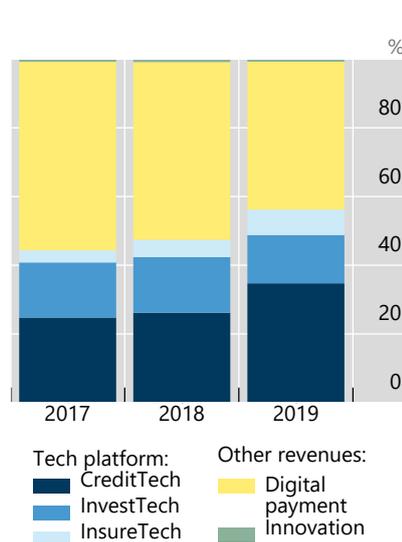
Ant’s micro lending business

Graph 5

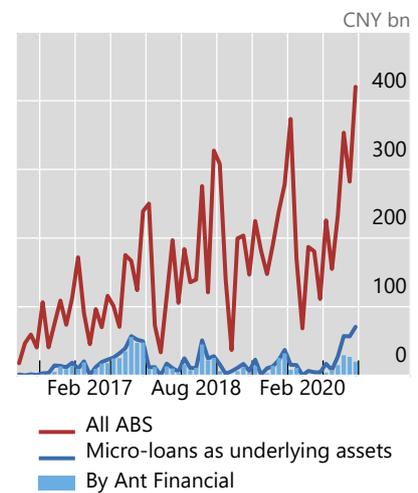
Performance of Ant micro-lending company¹



Ant’s revenue model



Gross issuance of asset-backed securities in China



¹ Data for 2017 are for up to Q3.

Sources: Alibaba small loans ABS prospectus; WIND.

Like for all financial institutions, Ant’s micro lending companies are subject to capital regulations. Prior to 2018, regulation forbid micro lending companies to borrow from more than two banks for funds, and the total outstanding bank funding should not exceed 50% of their net capital. To support the strong expansion of its business, Ant raised funds in the capital markets using securitised products. Gross

issuance of micro-loans backed securities by the two Ant subsidiaries rose sharply between 2016 and 2017.¹⁵ In September 2017, the two companies issued a record CNY 44 billion of asset backed securities (ABS), representing almost 30% of total ABS issuance in China in that month (Graph 5, right-hand panel). That figure was large given the total paid-in capital of the two firms was just CNY 3.8 billion at that time. However, following a sharp rise in peer-to-peer lending defaults in late 2017, Chinese regulators issued new rules, requiring micro loan companies to include off-balance sheet exposures such as asset securitisation in calculating their leverage ratios. Ant announced in December 2017 that it would inject CNY 8.2 billion into its two micro loan subsidiaries. Gross issuance of ABS by the firms has since been relatively subdued. In November 2020, these capital regulations were tightened further.

There is another way for BigTechs to participate in micro-lending without using much of their capital. They can join forces with other financial institutions to provide customers with fast-approved micro loans via digital platform. In doing so, financial institutions provide the capital (up to 98% in some cases) and technology firms charged the borrower a fee to access the platform services.¹⁶ Typically, borrowers would be charged a commission fee equivalent to a third of their total financing costs, and that could rise to two thirds if credit enhancement services were needed.

5.2 Internet banking

Another way for BigTechs to expand the lending business is to obtain a full banking license. Soon after the Chinese authorities announced they would issue new private-owned banking licenses in 2014, both Ant and Tencent created their own internet bank – MyBank and WeBank – respectively. Yet unlike their other financial businesses which recorded exponential growth initially, BigTechs' internet banks remain relatively small. By end-2018, total assets of MyBank and WeBank were around CNY 96 billion and CNY 220 billion respectively, much smaller than the average of CNY 7 trillion for a medium-sized bank.

Two regulatory requirements seem to have hindered the initial growth of these internet banks. First, the authorities set a 30% ownership limit on a private bank for any non-financial entity. This essentially bans any non-financial firms from having a controlling stake, which might have discouraged BigTech firms from devoting the necessary resources to the newly established bank. Second, more importantly, internet banks in China are not allowed to open deposit accounts for customers on a remote basis. Given that these new internet banks do not have a wide-reaching branch network, this is a major obstacle for them to grow their deposit base. The problem is less acute for MyBank, as existing Alibaba merchants appear to be more willing to put some deposits with the banks. That said, the deposit to liability ratio of the two internet banks are much smaller than the national average, at least up to 2017 (Graph 6, left-hand panel).

In 2018, however, internet banks developed high-yielding structured schemes to attract depositors. For example, in September 2018 WeBank introduced a 1-5 year "intelligent deposits+" scheme, with interest rates stepping up from 2.8% within a

¹⁵ The two subsidiaries are specialised in two different types of micro loans. The first is consumer credit for users to spend on products listed in Alibaba's e-commerce platforms, essentially like providing credit card services. The second type is fast-approval micro credit for individuals with interest charging on a daily basis.

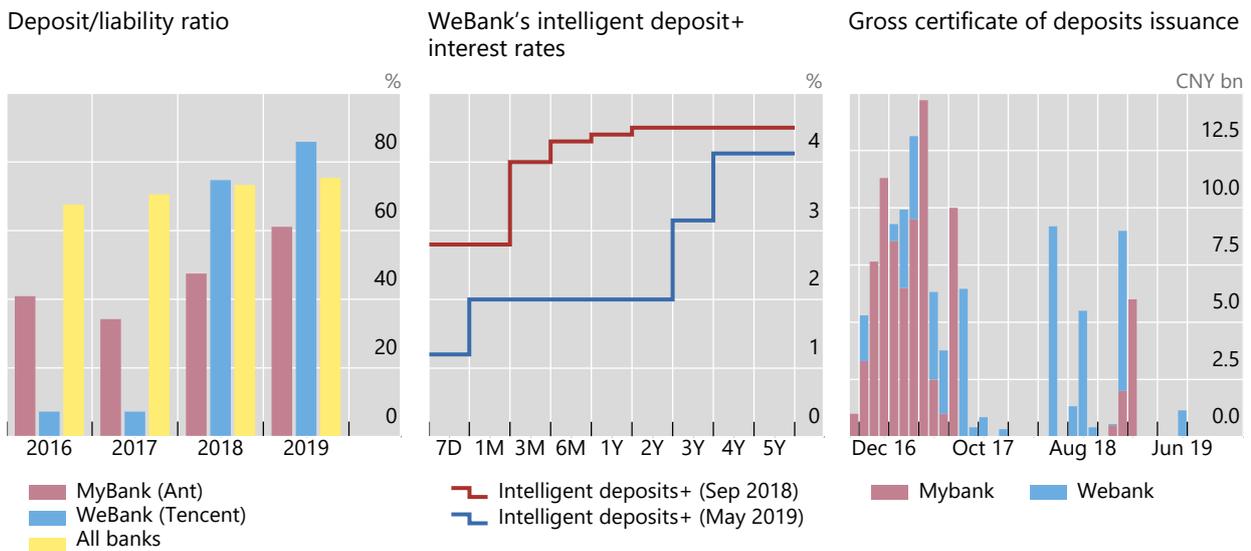
¹⁶ See Guo (2020).

month to 4.5% between 1 to 5 years (Graph 6, centre panel). A main difference of these schemes with fixed-rate deposits is that depositors could withdraw their money at anytime before the 5-year maturity and keep the interest earned up to that point. In turn WeBank would sell the remaining portion of the structured deposits to other financial institutions. This scheme has helped WeBank to boost its deposits by 2800% in 2018. But after discussing with the banking regulators, WeBank briefly suspended the scheme before relaunching the scheme at lower interest rates.

These internet banks have also explored funding sources other than customer deposits. In late 2016 and early 2017, the two banks, especially MyBank, were very active in the interbank certificate of deposit (CD) market, with average monthly gross issuance of around CNY 5 billion. But following the inclusion of CDs in the PBoC's quarterly macro-prudential assessment, CD issuance has slowed somewhat and that by the two internet banks has reduced to negligible levels (Graph 6, right-hand panel). Another way to conserve capital is to form a syndicate with other financial institutions to extend credit. WeBank, for example, develops a network of partner banks to extend micro loans. Through a permissioned blockchain technology, micro loans can be approved within minutes with a 20–80% capital split between WeBank and partner banks. In doing so, WeBank grows its business with the help of other banks' capital, while partner banks benefit from WeBank's superior technology and Tencent's credit scoring system.

Funding of internet banks in China

Graph 6



Sources: Company reports; PBoC; WIND.

6. Monetising data: credit scoring

One key contributing factor to the rapid expansion of BigTechs into the financial services industry is their capacity of handling big data. This allows them to facilitate millions of trade transactions per minute; to provide near real-time information on investment returns; and to grant micro loans with speed and minimum labour input while minimising default risk (at least in their own views). And this last undertaking requires BigTechs to develop credit scoring models using both financial and non-financial data.

Credit scoring has an important role in the financial system in advanced economies. For example, in the United States, around 80% of the population have FICO scores – a three digit number that lenders use to make loan decisions. These FICO scores are based on an individual's financial information, including payment history, amounts owed to banks or credit card companies, how long he or she has held certain bank accounts.

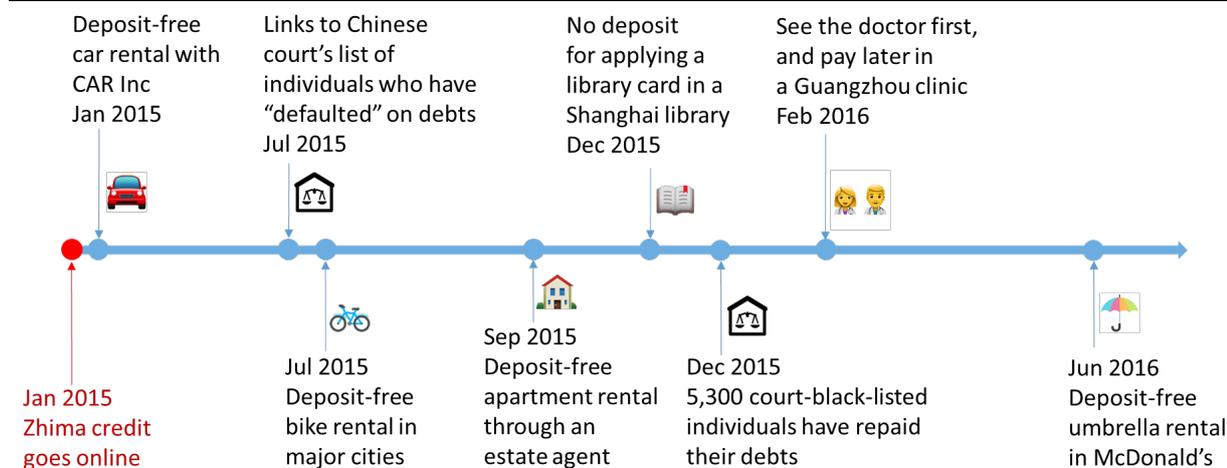
Developing a FICO-style system in China would be difficult as most Chinese residents have no such credit history. Yet BigTechs, through their e-commerce and payments platforms, have collected large volume of non-financial information that could be used to supplement financial data in developing credit scores for individuals.¹⁷ Ant's Zhima credit score, for example, is based on five dimensions: credit history; behaviour pattern; debt servicing capacity; personal characteristics and personal relationships. Data collected through Alibaba's Taobao e-commerce platform such as the basket of products a person purchase within the past year, the total amounts spent, his "reputation" and feedbacks on the platform and so on are used to feed into create credit scores.

Testing with nonfinancial partners shows that Zhima credit scores appear to be useful, especially the rich information backing the scoring can also act as a disciplinary device. Soon after Zhima credit was launched in January 2015, Ant Financial entered a partnership with CAR Inc, one of China's leading car rental companies, to offer people with high Zhima credit scores (> 600) deposit-free rentals. The motivation behind the scheme was to replace the inefficient system of collateralised borrowing. The "try first, and pay later" concept was soon extended to a ranger of other non-financial services such as apartment rental and doctor appointments (Graph 7). For the car rental case, default rates on the deposit-free scheme were initially high. But after a few weeks, defaulting individuals realised they were black-listed from a range of other activities as their names were shared with millions of merchants across China. Five months after the Chinese courts joined forces with Ant Financial to publish the real-time list of "defaulted" individuals, some 5,300 of them voluntarily paid off their debts. Many of them had not done so for over three years prior to the blacklisting by Ant.

¹⁷ The approach is not completely new. For example, in the United States, FICO score XD employs alternative data such as mobile payments, other public records and property data to help those US residents (such as recent graduates) with insufficient credit data history to get loans from lenders, see Clements (2015).

Key partnerships of Zhima credit

Graph 7

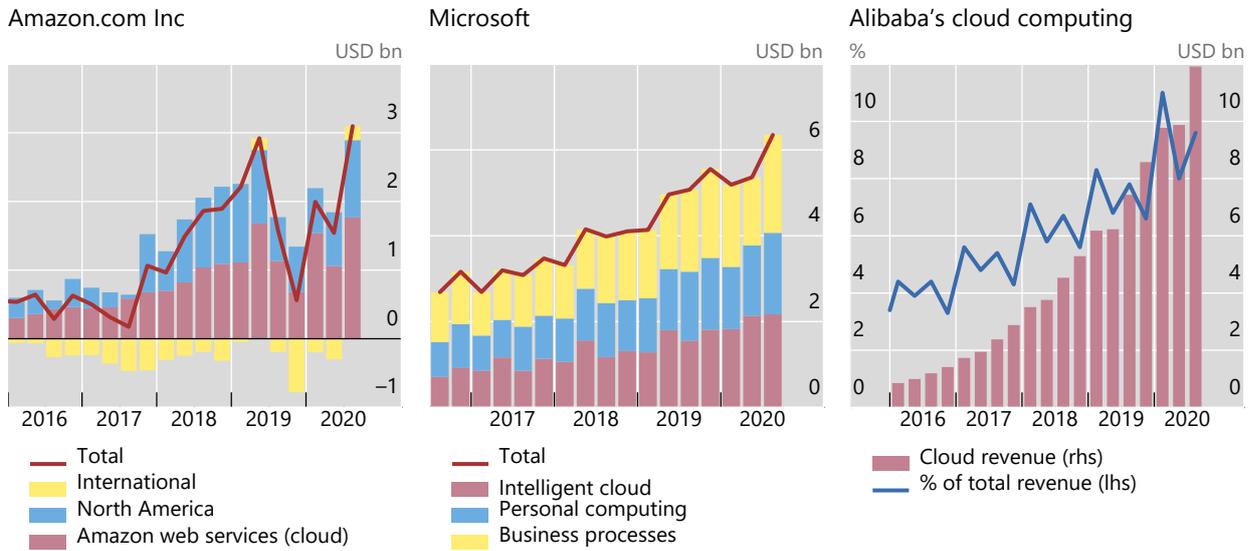


Source: Company website.

Despite the apparent success of BigTech's in credit scoring, the PBoC decided to create a new centralised credit scoring – Baihang Credit Scoring, a joint venture between the State and 8 large technology firms – after a period of public consultation (PBoC, 2018a). There are doubts about the reliability of BigTechs' credit scoring. First, important personal information such as occupation and income included in BigTech's credit scoring are typically self-submitted and very difficult to verify. Second, relying only on online transaction records easily misses out important information about personal wealth such as fixed assets. Third, taking purchasing history online as credit scoring criteria could have overestimated the spending capacity of the generation that is very active in social media (such as students). Fourth, private credit bureaus can run against the principle of data independence and fairness. It is conceivable that in a black-box environment using proprietary data, a company running credit scoring could be biased towards its subsidiaries or other established trading partners.¹⁸

Developing cloud computing infrastructure not only enables BigTechs to engage directly in complex financial applications, it also allows them participate in the financial industry indirectly through providing cloud computing services to other financial institutions. In fact, cloud computing has become a major profit centre for many BigTechs around the world as many non-tech companies have given up on developing their own IT infrastructure on efficiency ground. Globally, the two market leaders are Amazon and Microsoft. Amazon web services (AWS) and Microsoft Azure, the cloud computing segments of the two BigTechs respectively, are now generating around 34% to 57% of their group's income (Graph 8, left-hand and centre panels). Alibaba's cloud segment, which ranked third in public cloud services with 5% of global market share, has also grown rapidly in recent years. But its e-commerce remains Alibaba's core revenue centre (right-hand panel).

¹⁸ One of the main arguments against full transparency about credit scoring models is that users could design ways to boost individual scores, targeting specifically the various weighting schemes.



Sources: Company reports.

The key advantage of cloud computing is that it can deliver on-demand computing power, database, storage, applications, and other IT resources via the internet with pay-as-you-go pricing. In paying for cloud computing services, financial institutions can avoid having to undertake large investments in hardware and its maintenance and can develop and offer more quickly flexible financial products to suit different customer needs. Those institutions that need high-powered computing to run financial calculations (eg MMFs and centralised clearing house) and model simulations (eg, life insurance companies and pension funds) can in this case shorten calculation time from days to hours. Banks can also develop online banking and payment platform using cloud computing which is embedded with security best practices and compliant with regulations.

But the growing reliance of financial institutions on cloud computing also brings data security and privacy risks. Institutions that subscribe to cloud services may not be able to gauge to what extent their data are exposed to foreign institutions or are unlawfully processed by other institutions. Another risk is that the cloud provider might not be able to provide access to information as a result of disruption in their own operations. While decentralised cloud data storage in a large number of small servers provides gains in speed of calculations, it can be less stable than traditional database stored in a centralised server. Unequal "workloads" among the decentralised computers could lead to break down of a particular machine, triggering a chain reaction collapse. One possible solution is to install several machines as backups to each decentralised computer. Yet that solution only brings the stability risks down while still leaving it higher than in a centralised system.

7. International expansion

Domestic success paves the way for Chinese BigTechs to extend their reach globally, spearheaded by third-party payment services. They target two types of businesses: Chinese residents using their e-wallets to pay for expenses when travelling abroad; and local residents in other countries having their own e-wallets. These are pursued through “exporting” the Chinese models or cooperating with a local agency or payment provider. In Ant’s case, the strategy was implemented by buying a strategic or controlling stake in local firms and providing technological support to the operations (Table 1). Alibaba’s business model builds on internalising the network externalities between the online marketplace and the payment network. In the absence of owning a Taobao-equivalent in new markets, Ant Financial chose to cooperate with firms with local knowledge to run third-party payment services. By contrast, Tencent’s overseas expansions have been tied to the popularity of WeChat in the host jurisdictions. WeChat Pay already launched local version in Hong Kong SAR and Malaysia where it has a solid user base.

Outbound Chinese tourism has much room to grow. The number of Chinese tourists travelling abroad has almost tripled over the past decade (Graph 9, left-hand panel). But the number was still small given a population of almost 1.4 billion. Currently, less than 10% of the Chinese population holds a passport. Yet the total amount spent by Chinese tourists overseas has reached almost half of net exports of goods (right-hand panel). Outbound tourism is a key contributing factor to the narrowing of China’s current account surplus over the past few years. Given that the development of outbound Chinese tourism is still at an early stage, and that disposable income is still rising, it would be expected to continue to rise in the near term.

Alibaba and Ant Financial: global investment

Table 1

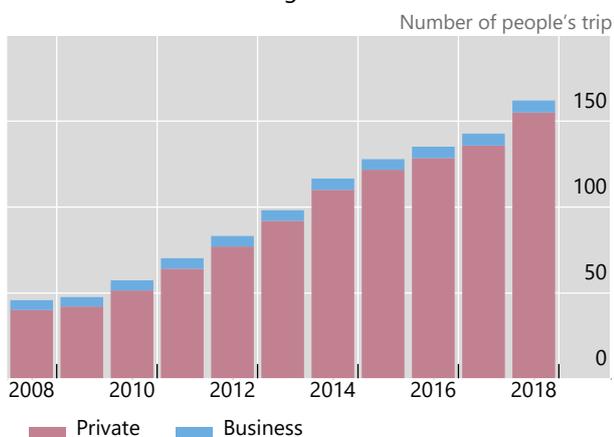
Year	Country	Target company	Key business	Investment strategy
2015	India	Paytm	Payment	Alibaba and Ant Financial together hold a majority stake in Paytm E-Commerce and provides technology support
2015	Korea	K-Bank	Internet banking	Member of the consortium to launch the bank
2015	Singapore	M-Daq	Cross-border securities trading	Invests in a funding round
2016	Singapore	Lazada	E-commerce	Invests USD1 bn to buy a controlling stake of the leading e-commerce platform in Southeast Asia (increases its stake to 83% in 2017)
2016	Thailand	Ascend Money	Payment	Forms a strategic partnership to help Ascend Money develop its payments and financial services business
2017	Korea	Kakao Pay	Instant messaging	Invests USD 200 mn as part of a strategic partnership to help Kakao to run its mobile finance subsidiary
2017	Singapore	HelloPay	Payment	Acquires helloPay and rebrands as Alipay Singapore, Alipay Malaysia, Alipay Indonesia and Alipay Philippines in its respective markets

2017	Indonesia	Emtek	Payment	Sets up a joint venture to launch a new mobile platform for payment and other financial services
2017	Malaysia	CIMB	Payment	Sets up a joint venture (with Ant Financial as a minority shareholder) to develop Touch 'n Go Digital, a mobile payment platform in Malaysia
2017	Philippines	Mynt	Payment and micro credit	Invests in a substantial minority interest in Mynt to accelerate financial inclusion and upgrade payment services in the Philippines
2018	Pakistan	TMB	Payment and micro credit	Invests USD 185 mn for a 45% stake in Telenor Microfinance Bank (TMB) to further develop TMB's mobile payment and digital financial services
2018	Bangladesh	bKash	Mobile financial services	Acquires a minority stake as part of a strategic partnership to promote financial inclusion in Bangladesh
2019	United Kingdom	WorldFirst	Cross-border payments and FX solutions	Acquires WorldFirst for USD 700 mn

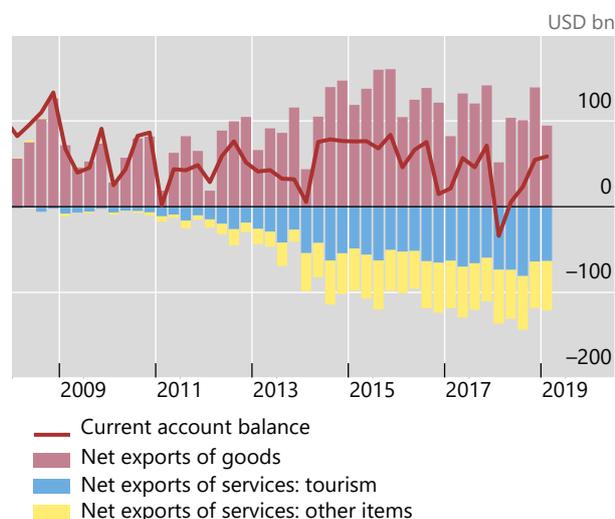
Sources: Company and media reports.

By partnering with local agencies, Chinese customers can use their BigTech mobile wallets to pay for expenses in more than 40 different jurisdictions in Asia, Europe and North America. Effectively, in a typical in-store transaction, the Chinese tourist pays in renminbi and the global merchant receives local currency. There is no publicly available information about the cash flow process. But given the capital account restrictions in China, BigTech must have to first buy foreign exchange from banks onshore before remitting the money across the border. As for the foreign leg of this transaction, there are two options. One is for Chinese BigTechs to sign an agreement with a local payment agent to provide links to local merchants. Alternatively, they can sign a cooperation agreement with a local payment provider to take care of crediting the merchants. One such example is the agreement between Alipay and Finland's ePassi, under which ePassi transfers all payments to the merchants' account with a Finnish bank. In addition, under the new EU directive in place and ePassi's licence from Finland's Financial Supervisory Authority, it allows ePassi to expand its mobile payment service the Nordic region as well as to offer the same ePassi-Alipay service to retailers there.

Chinese residents travelling overseas



China's current account balance

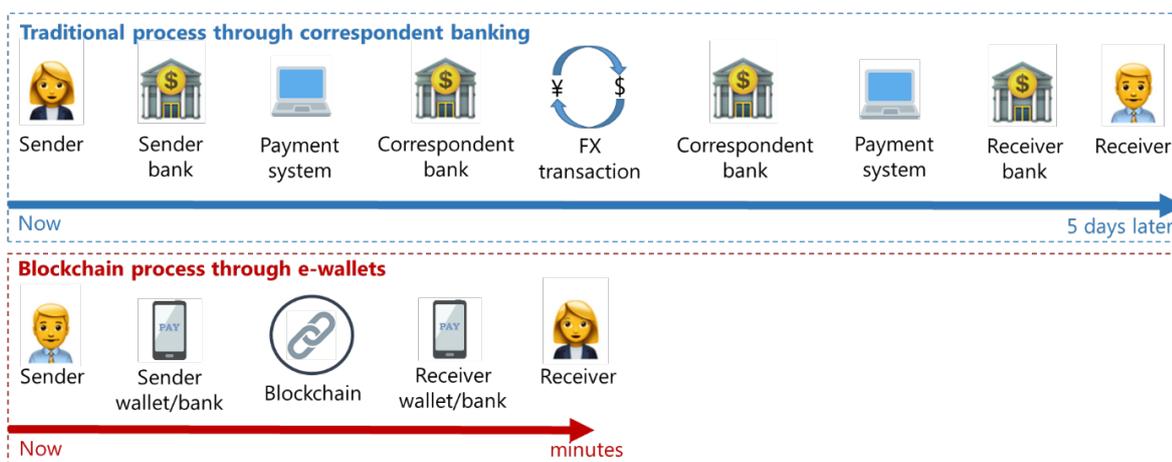


Sources: WIND; SAFE.

BigTechs also play an important role in improving the efficiency of cross-border money transfers, especially remittances. This could benefit most the developing economies as they are the recipients of USD 528 billion of the USD 700 billion global remittances in 2018. Traditionally, remittances through correspondent banking relations required days to complete a transaction, but by using blockchain technology, which cuts the time required for transferring documents and verification, the transfer can take only minutes to do so (Graph 10). In Hong Kong, WeChat collaborates with EMQ, a start up to provide such services to migrant workers. AliPay teamed up with GCash, a mobile wallet in the Philippines, to offer similar services. According to AliPay Hong Kong, remittances passing through the two wallets can be finished within 3 seconds.

Remittances through correspondent banking and blockchain processes

Graph 10



Source: Blockdata.

8. Regulations: balancing benefits and risks

Chinese authorities appear to have adopted a wait-and-see approach to regulate technical innovations in the financial industry. Initially, regulators tended not to react proactively to nonfinancial firms running financial services or introducing new technologies during the nurturing period. But once these activities grew to a certain extent, authorities introduced new or fine-tuned existing financial regulations to rein in emerging risks. In effect, this approach allows live testing of innovations at the edge or even outside of the existing regulatory framework.

An example was the regulatory response to internet payments. Alibaba and others started offering third-party payment services in 2003 and the authorities published a “draft administrative measures on payment organisation for comment” in 2005. It was not until 2010/11 that the first piece of legislation came into effect and licenses were granted to some operators. In the following few years, the sharp increase in mobile phone penetration and introduction of faster 3G and 4G networks supported a strong growth in third-party payments, with total value approaching 100% of GDP in 2015.

Since then, the authorities have become more proactive in monitoring market developments and introducing regulations to mitigate risks (Table 2). For example, in light of the growing number of frauds, the PBoC issued an urgent notice in March 2014, demanding third-party payment providers to stop processing online payments using QR codes. The central bank cited security concerns surrounding identification and potential theft of consumers’ personal information and money as reasons. Instead of suspending QR code payments, BigTechs worked on improving the security of their codes. By July 2016, the Payment and Clearing Association of China (a non-profit industry organisation under the PBoC) issued a draft for comment on QR codes, effectively lifting the ban on the payment method.

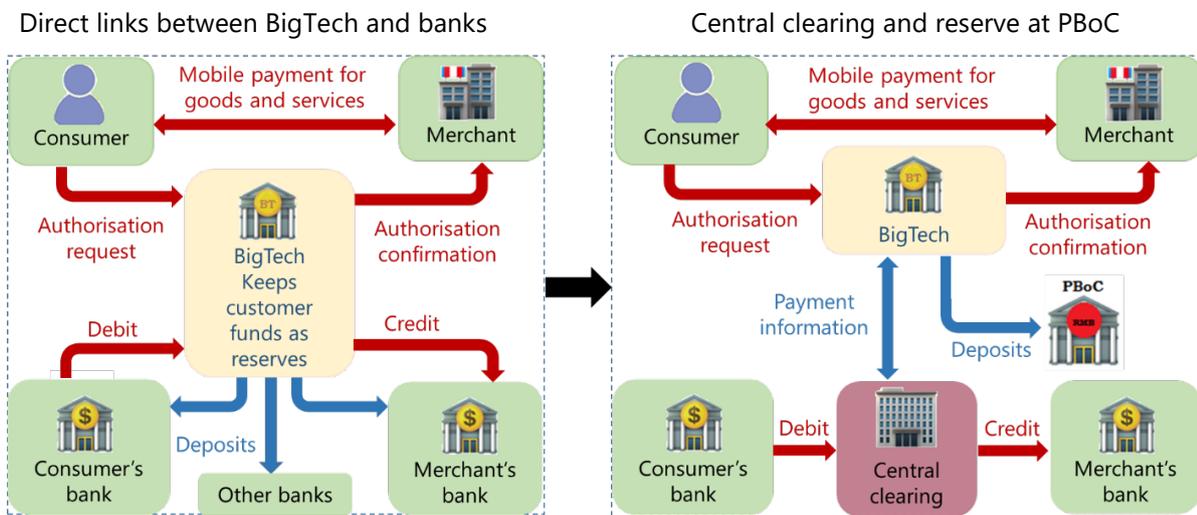
As theory suggests, the dual network nature of privately run payment services – information and debt creation – warrants special attention from the central bank, especially when their memberships grow to cover a significant portion of the entire population. Since January 2017, Chinese authorities have introduced important regulations that target how third-party payment providers process payments with banks for their clients and how they treat customer reserves. These were designed to address several important issues (PBoC, 2018b). First, when payment institutions used reserve accounts maintained at various commercial banks to process cross-bank settlement transactions, they were engaging in cross-bank settlement business outside the oversight of the PBoC (Graph 11, left-hand panel). Second, some payment institutions illegally used customer reserves for purchasing wealth management products or investing in other high-risk products to seek higher returns. In some cases, these reserve funds were even used to launder money for criminal activities. Third, reserve funds held by the BigTechs were large enough to give them market power in demanding higher-than market interest rates from banks. That could be a risk to monetary policy transmission, especially in the context of an accommodative stance by the PBoC. Fourth, the fact that customer reserves were deposited in more than one banks, which is not conducive to unified management of funds by the payment providers, might give rise to liquidity risk.

Against this background, the PBoC introduced two changes to monitor the information and debt obligation flows of payment firms in early 2017. First, all third-party payment providers would not be allowed to process cross-bank settlement

transactions and they would have to migrate them to a new central-clearing platform. Second, they were given a phase-in period to put all customer reserves in a central bank account earning zero interest, effective January 2019 (Graph 11, right-hand panel). During the transition period, reserves of non-financial corporations rose from CNY 80 billion in Jun 2018 to peak at CNY 1.6 trillion at end-2018. However, since the 100% reserve rule came into effect in January 2019, total reserve fell by almost CNY 300 billion (Graph 12, left-hand panel). A possible contributor is that Ant has opened its Yu'eobao platform to an increasing number of investment funds, enticing customers to deposit their residual money in the wallets to purchase MMF shares. Total cumulative increases in the size of those funds that joint the platforms have reached over CNY 1 trillion in a year (Graph 12, right-hand panel).

Regulatory changes on third party payments in China

Graph 11



Source: BIS.

Key regulatory measures of third-party payments since 2015

Table 2

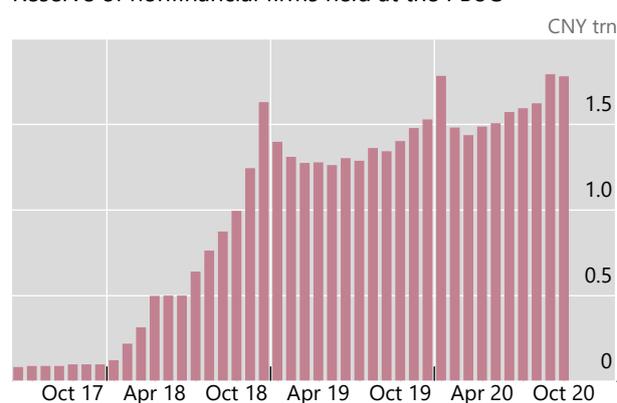
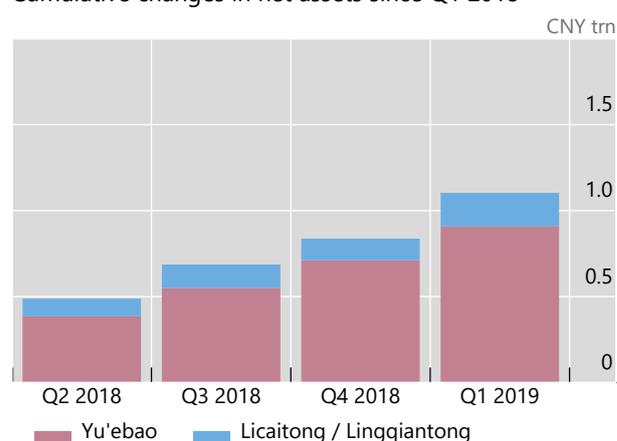
Date	Regulator(s)	Regulations	Key objectives/elements
Jul 2015	PBoC and nine other ministries	Guiding opinions on promoting the healthy development of internet finance	Define internet payment as the service e-commerce and provide efficient small payment services for the society; Designate the PBoC as the supervisor of internet payment.
Dec 2015	PBoC	Administrative measures for internet payment services of non-banking payment institutions	To standardise the internet payment services, mitigate payment risks and protect the legal rights and interests of involved parties.
Apr 2016	State Council	Implementation plan for the special rectification of internet financial risks	Target at eradicating three risks: unlawful use of customers' deposits; illegal cross-border payment services; and unlicensed payment operators.
Apr 2016	PBoC	Measures for the administration of the classification and rating of non-bank payment institutions	To create a self-rating scheme for payment providers
Jul 2016	Payment & Clearing Association of China	QR code payment services specification (Draft for comment)	Officially recognises QR code as a payment means
Jan 2017	PBoC	Notice on implementation of centralised management of customer reserve accounts of payment institutions	Payment providers require to deposit customer reserves in a single bank account.

Sources: Chinese authorities.

Impact of centralised reserve placement requirement

Graph 12

Reserve of nonfinancial firms held at the PBoC

Cumulative changes in net assets since Q1 2018¹

¹ Changes in asset size are calculated based on when the funds were first introduced to the Yue'bao (Ant), Licaitong and Lingqiantong (Tencent) platforms. Data for Yu'e Bao excluded those of Tianhong Asset Management.

Sources: PBoC; WIND; BIS calculations.

In addition, regulators closely monitor traditional market activities to prevent a build-up of systemic risks. For example, the remarkable growth in BigTech MMF raised concerns about systemic risks caused by large-scale redemptions. In the event of a run on large MMF, forced liquidation of large volumes of assets could potentially destabilise the financial system. In August 2017, the China Securities Regulatory Commission announced new regulations introducing higher liquidity requirements for domestic public funds. The new regulations require MMF to set higher reserve capital limits and to boost their holdings of higher-quality, short-term assets.

9. Conclusions

The rapid expansion of Ant and Tencent into the financial services since the 1990s was a remarkable phenomenon in China. This has brought many benefits, including improving the efficiency of payments and other financial services, as well as financial inclusion. A set of initial conditions, some of which are country specific, has played an important role in nurturing this strong growth. First, with a population size of 1.4 billion, China provides a large domestic market for network companies to thrive. Second, the emergence of a large middle income class and micro enterprises following decades of unfettered growth lead to a strong demand for some previously less developed financial services such as consumer finance and wealth management. Third, the Chinese government's long-term plan to develop a modern digital infrastructure and to have mobile signals reaching all corners of the country has facilitated the widespread use of high-speed mobile payments.

During the initial expansion stage, BigTechs can be seen as "accidental financiers". As in all network industries, there is a tendency for a winner to take all once it has secured a large installed user base. In this sense, the initial expansion of Alibaba and Tencent from their core businesses to payment services was driven primarily by a fighting for survival motive. For the same reason, the two companies appeared to be cautious in offering higher-risk financial services as investment losses could lead to an exodus of customers during this fragile stage. Of course, when profits in newly entered financial services are high in comparison to their core businesses, BigTechs may turn into aggressive invaders and stage strong competition with the incumbents. This would pose risks to their customers and the financial system.

Against this backdrop, it is important for regulators to strike a balance between regulatory tolerance during the early stage and tough regulations when there are signs of "excessive" growth. Traditional activity based regulations has served regulators well in many instances. For example, tougher capital and liquidity rules could dampen the growth of a MMF to prevent it posing significant liquidity risk to the entire industry and beyond. Similarly, regulations over leverage limits and balance sheet treatment of assets dampened the strong growth in micro-lending funded by securitisation. But at the same time, regulators also need to closely monitor product innovations. In particular, it is not uncommon to see companies introducing new products to exploit some grey areas of existing regulations or other untested premises in search for higher profits. Some of these activities may require new regulations to keep emerging risks at bay.

Besides competition, the cooperation between BigTechs and incumbent financial institutions poses another challenge to regulators. The cloud computing services offered to other financial institutions is a case in point. Typically, these new services

require strong computing knowhow and IT investment, which are beyond the scope of even the largest financial groups. In subscribing to these services, banks could take advantage of the high-powered calculations and data collection speed to greatly improve their services to the customers. However, the growing reliance of financial institutions on a few cloud computing providers also brings data security and privacy risks.

While BigTechs have brought huge benefits to the Chinese economy by revolutionising the payment services, they also introduced new regulatory challenges. For one, BigTechs, bestowed with the large customers' floats in their e-wallets, can have sufficient market power to distort bank wholesale funding prices. And the huge volume of transactions between BigTechs and many banks without the oversight of the central bank could be seen by criminals as an opportunity to launder money. Introducing a new clearing system and forcing payment operators to deposit customers' floats at the central bank could ease some of these concerns. But this may not be allowed by central bank charter or face strong political oppositions in other jurisdictions.

Finally, the prospect of BigTechs becoming heavily involved in cross-border transfers/payments would require special attention and coordination among central banks. At present, a common practice is for BigTechs in China to find a corresponding agent in the other jurisdictions to process the payments and settlements. In some cases, a fintech firm will be used to deal with the exchanges of currencies. For all these transactions, oversight is an important issue. In case of fraud, who will be responsible for recovery and resolution? Furthermore, when a BigTech has grown to become a dominant player in the payment industries across many countries, will that be a cause for concern for the regulatory community globally? In particular, as data are becoming an increasingly valuable commodity, how to ensure data protection when all transactions are settled through relatively closed payment channels?

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