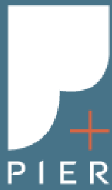

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Regulating big tech and non-bank financial services in the digital era

by

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Regulating big tech and non-bank financial services in the digital era[*]

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In the digital era, new forms of non-bank entities have emerged and gained increasingly prominent roles in providing financial services. These non-bank entities, particularly those associated with non-financial conglomerates and large technology companies (BigTech) pose new challenges for financial regulators whether in terms of financial stability, level-playing field competition, or customer protection.

This article discusses emerging trends in the rise of non-bank entities in the digital era, the challenges they pose, and what financial regulatory approaches can help to address those challenges. This article proposes that a holding company structure could be applied to regulate non-financial conglomerates or BigTech firms providing financial services through subsidiaries. This proposal is expected to help address regulatory concerns where existing regulatory approaches cannot adequately cope with.

Current approaches of financial regulations: entity-based, activity-based, and proportionality principle

In the past, financial regulators could address most of their concerns on financial service providers directly through licensing schemes and regulations governing different categories of licenses. For financial service providers that engage in intermediation of funds, such as banks, insurance companies, and securities firms, their licenses are often based on entity and regulations typically involve capital and liquidity requirements and scope of business to ensure stability[1], as well as market conduct regulations for customer protection.

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For other non-bank niche players that did not engage in intermediation of funds, such as e-money providers, or money changers, regulators often issue licenses to these entities with different sets of regulations. The regulations typically focus on customer protection, since they do not necessarily pose financial stability threats, and are often too small to abuse their market positions.

Such a regulatory approach whereby each financial service entity is regulated based on conditions prescribed on its type of license, whether in terms of capital requirements, liquidity requirements, minimum governance standards, or customer protection is known as an **entity-based approach** to regulation.

By the early 2010s, with FinTech firms starting to emerge as mono-line financial service providers in different domains of financial services, particularly in payment, consumer credit, and wealth management, an **activity-based approach** to regulation started to emerge as a complementary regulatory approach. For example, in the payment domain, mono-line FinTech firms providing payment services and e-money started to compete with banks and gained prominent market shares. As a result, it would be more appropriate to regulate entities providing similar services with similar set of regulations, *regardless* of the types of licenses these entities hold. For instance, they should be regulated with similar cyber/IT regulatory frameworks to avoid the "weakest-link" problem that could pose risks to the payment and settlement system. Regulating different entities providing similar financial services with similar set of regulations would also ensure level-playing field competition and minimize regulatory loopholes, (Monetary Authority of Singapore, 2016; Restoy, 2021).

The focus on activity-based approach for FinTech firms was in line with the rethinking among regulators on entity-based regulations in the aftermath of the 2008-2009 global financial crisis. The crisis had by then shown that non-bank entities such as American International Group (AIG), the insurer, or Bear Stearns and Lehman Brothers, the securities firms, were engaging in activities that threatened financial stability such as

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[1] Scope of business and business-group regulations could also be applied to ensure level-playing field competition as fund raising through deposits could typically be done at lower costs than other means.

credit default swap, and securitization and trading of subprime mortgages, and thus warranted closer scrutiny and broader supervision by the regulators than the traditional conditions attached with their licenses. Despite their intermediation of funds activities, non-bank entities such as insurance and securities firms generally face lower degrees of supervision compared to banks because they do not take deposits. But since the activities that they engage in could have material implications on systemic risk, regulations governing these non-banks should also be based on the activities they engage in, not simply on just the types of traditional licenses they hold[2].

In practice, applying similar regulations on banks and FinTech firms competing in the same domains of financial services is not a straightforward matter, and the **principle of proportionality** might be required. FinTech firms that do not engage in intermediation of funds, e.g. those that provide only payment or credit services, pose relatively little financial stability threats. Applying capital and liquidity regulations on these FinTech firms to the same degree with banks would place unnecessary regulatory burden on them and stifle innovation, given the high compliance cost.

To ensure payment system stability, level-playing field competition, and innovation promotion, financial regulators need to apply a combination of entity-based and activity-based approaches to regulation, along with the proportionality principle on these mono-line FinTech firms. IT/cyber security requirements on large FinTech firms involving a large number of users or connected to the nation-wide payment or settlement systems need to be set to the same level as those on banks, or otherwise the ability of these FinTech firms to directly connect to the main payment and settlement systems should be denied.

Main aspects of consumer protection regulations, such as those on market conduct and data privacy, also need to be set proportionately to the risks they pose. This is to ensure not only adequate customer protection, but also level-playing field competition among different types of entities, whether in the domain of payment, credit, or wealth management.

[2] See, for example, (Kress, McCoy, & Schwarcz, 2018) for detailed discussions.

Challenges from non-financial conglomerates and BigTech firms providing financial services

By the late 2010s, a new trend started to emerge. Digitization of data, widespread use of smart phones, as well as advance in cloud computing and data analytics have resulted in new business models where non-financial conglomerates and BigTech firms increasingly engage in multiple domains of financial services. Their business models could start by setting up subsidiaries providing different types of financial services under different types of licenses, (Frost, Gambacorta, Huang, Shin, & Zbiden, 2019). After a while, these subsidiaries could be integrated into a multi-line financial service platform comparable to a bank.

A typical example is where a non-financial conglomerate or a BigTech firm establishes an e-Wallet subsidiary and obtains an e-Wallet license to offer payment services, first to their existing customers. The same BigTech firm could establish another subsidiary providing consumer credit with a personal loan license, and another wealth management subsidiary to offer investment products under a fund management license.

Unlike mono-line small FinTech firms that focus on one particular domain of financial services, the subsidiaries of a non-financial conglomerate or a BigTech firm could work together in an integrated business model and compete with banks in multiple domains, from payment to credit to wealth management. In such cases, it is arguable that the current regulatory approaches might be inadequate, (Carsten, 2021; Restoy, 2019; Restoy, 2021). Given their size and complexity, recent emerging business models of BigTech firms and non-financial conglomerates could pose risks to systemic financial stability, level-playing field competition, and customer protection. Financial regulators need to explore a new regulatory approach to meet these challenges.

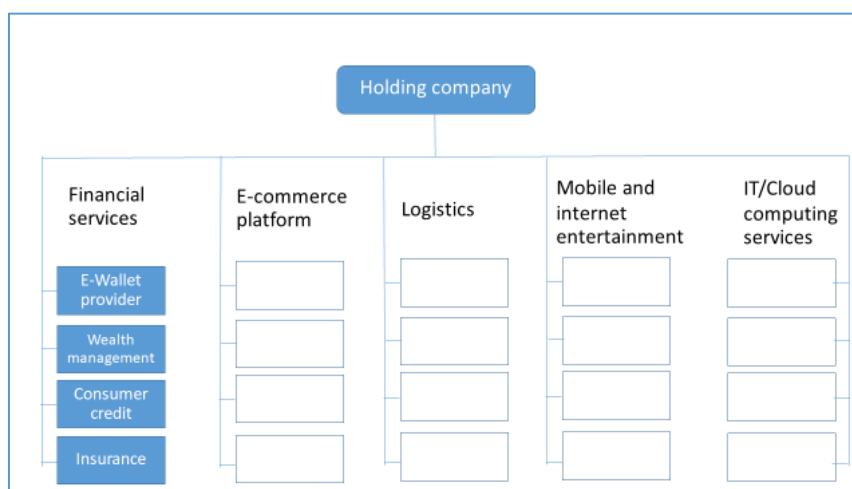
Unlike the case of mono-line FinTech firms, there are three characteristics of an integrated business model of non-financial conglomerates or BigTech firms that could raise concerns for regulators: (1) complex governance structure, which could inhibit the ability of both the services providers and the regulators to correctly assess arising risks and mitigate them in a timely manner; (2) risks associated to transformation of funds across subsidiaries, and shadow banking activities; and (3) cross-subsidization, both in

terms of cost and data sharing within an integrated business model, especially on the platform they serve clients.

Complex governance structure

By nature, a conglomerate often has a complex corporate structure, possibly with a holding company as well as cross-holdings among its subsidiaries. Non-financial conglomerates or BigTech firms that expand into financial services often do so through their subsidiaries operating under different licenses for different services such as payment, consumer loan, wealth management, and insurance. This parent company or holding company could be outside the purview of financial (or any specific domain) regulators. Figure 1 shows a possible governance structure of a BigTech firm.

Figure 1: A possible governance structure of a BigTech firm



Such a complex governance structure raises a potential concern in terms of transparency, accountability, and risk transformation across the financial services subsidiaries. In an integrated business model, a non-financial conglomerate or a BigTech firm as a group can offer a range of financial services nearly comparable to a bank, with the key exception being deposit taking. Unlike the case of a bank where the bank's board and the management are fully accountable to the financial service activities undertaken by the banks' different business units, the board and the management of the non-financial conglomerate or the BigTech firm are outside the purview of financial regulators, and could be far removed from financial services activities of the subsidiaries.

In this case, traditional entity-based approach to regulation is inadequate, as financial regulators can only deal with the legally separate subsidiaries, based on the licenses issued to them, and do not have the authority to supervise the non-financial holding company. As will be discussed later, augmenting traditional entity-based approach to regulation with activity-based regulations will also be inadequate to ensure stability, level-playing field competition, and customer protection in the case where a non-financial conglomerate or a BigTech firm in practice provides financial services across their subsidiaries in an integrated manner. Specifically, augmenting the traditional entity-based approach with activity-base regulations will not suffice where risk transformation, shadow banking activities, and cross-subsidization of cost and data could be done across financial services subsidiaries in an integrated business model.

Risk transformation and shadow banking activities

Two of the best known examples in recent years of how complex governance structure of a non-financial conglomerate or a BigTech firm could lead to risk transformation were in China, the place where non-financial conglomerates, particular those associated with BigTech platforms seem to have advanced the furthest in serving financial needs of their otherwise underserved customers.

First was the case of risk transformation that occurred between Alipay, an e-Wallet provider, and Yu'e Bao, a money market fund, both under Alibaba, a Chinese BigTech group. In 2013, Alipay started to offer its e-Wallet customers the option to automatically sweep "left-over" money from Alipay e-Wallet account to Yu'e Bao at the end of the day in order to earn interests. Because of this arrangement, Yu'e Bao grew exponentially to become the largest money market fund in the world in 2017, (Lucas, 2017). The ability of Alipay customers to have the money in their e-Wallet accounts invested into the money market fund, and seamlessly redeem the money from the money market fund through their e-Wallet apps constitute risk transformation of funds that has the potential to threaten financial stability. Alibaba as a group became a systemically important financial institution through their fund management and payment licenses.

Money market funds typically allow investors to redeem money at a short notice, while the funds themselves invest in money market securities that need to be liquidated

if the redemption exceeds the funds' cash at hand. In the US prior to the 2008-2009 financial crisis, investors often treated their money market funds as an alternative to traditional bank deposit accounts. Money market funds offered higher returns than traditional bank deposits, but offered similar level of convenience in access. During the height of 2008-2009 financial crisis, as liquidity tightened, the values of securities invested by money market funds started to drop, resulting in waves of panic redemption on US money market funds.

One could argue that many of Alipay customers treated their Alipay e-Wallet accounts in a way they would do with a mobile banking account, i.e. they would put in money, expected to earn interests, and accessed the funds whenever they wanted to make payment, (Mooney, 2016; Lucas, 2017).

The case of Alipay and Yu'e Bao working together also raised concerns on shadow banking activities. First, Alibaba Group used money market fund license of its wealth management subsidiary, Yu'e Bao, to provide a service that enabled its Alipay e-Wallet customers to treat their e-Wallet accounts in similar ways to a bank deposit account, while bypassing a banking license and associated prudential regulations. Second, Alipay, through the money market fund license of its associated wealth management firm, managed to bypass e-Wallet license requirements that mandate e-Wallet providers to keep customers' money (floats) in escrow bank accounts for safe keeping. Ultimately, Chinese financial regulators had to step in, and imposed regulations to make sure that customers do not perceive and treat their Alipay e-Wallet accounts as a bank deposit account, (Wildau, 2017; Wildau & Jia, 2019).

The second case of risk transformation by financial services subsidiaries of BigTech firms involved the securitization and selling of microloans by lenders associated with Chinese BigTech platforms. With their ecosystem covering e-commerce and social network, in addition to financial services, Chinese BigTech platforms have vast troves of customer data that traditional banks do not. By using advanced analytics, subsidiaries of these BigTech platforms are able to offer customized microloans to individual customer risk profiles, and afterwards securitize and package the loans, for selling off to investors including traditional banks, who do not have direct access to platform customers, the amount of data, nor the analytics capability needed to create such loans.

Through the practice of originating, packaging, and selling microloans to the banks, Chinese BigTech platforms engage in risk transformation of funds, as banks used depositors' money to buy up the packaged loans from the BigTech firms. At first, such partnerships looked beneficial to all the parties involved, with customers getting better financial access, traditional banks getting the loan portfolios they might not have otherwise obtained, and BigTech platforms getting the fees from their customer reach, data analytics, and loan packaging and securitization. As the business grew, however, at least two financial stability concerns started to arise from this business model.

First, subsidiaries of the BigTech firms increased their focus on packaging and selling the loan portfolios to generate fees and minimizing credit risks, while keeping a very small percentage of the original loans on their books, creating a moral hazard problem. This kind of business model is a catalyst for excessive loan growth. Similar to subprime lenders in the US prior to the 2008-2009 financial crisis, the BigTech subsidiaries have the incentives to lend, securitize, and sell the loans off as much and as fast as possible. Their objectives started to revolve around growing the business and earning the securitization fees, without much regards to underlying credit risk, since the packaged loans would not be kept on their book.

Second, the packaged loans were based on risk models of BigTech subsidiaries that were built with little visibility and based on data from an incomplete business cycle. The buyers of these loans would also have to trust the black box risk models of BigTech's platforms. This raised concerns for the regulators since microloan borrowers on the BigTech platforms typically have higher credit risk than those that traditional banks might lend to.

Ultimately, Chinese regulators again had to step in, and put on regulations requiring that, among others, the credit screening and packaging firms would need to keep at least 30 percent of the loans on their own book, i.e. requiring these BigTech subsidiaries to have large skin in the game, and that the loans to individuals be capped at one-third of a borrower's annual pay or RMB 300,000, whichever is lower, (Financial Times, 2020).

Cross-subsidization of cost and data

In an integrated business model, subsidiaries of a non-financial conglomerate or those of a BigTech firm could cross-subsidize among themselves on at least two fronts: operating cost, and data. On the cost front, cross-subsidization of costs could arise from: (1) customer acquisition, where existing customers of one service could be introduced to another service at a low cost; (2) investment and operations, e.g. through the sharing of IT infrastructures, platform, and other assets; and (3) product bundling, where low margin products are bundled and sold together with high margin products. On the data front, data from various services (financial and non-financial) could be harnessed at low costs, integrated, and analyzed for customer insights. As demonstrated by the case of microloan securitization in China, BigTech firms have distinct advantages over traditional banks and mono-line FinTech firms on this front.

A key example of cost cross-subsidization occurs where a BigTech platform cross-subsidizes the loss incurred from payment services provided by its e-Wallet app with the cross-selling fees generated from matching third party financial services providers, including banks, with the users of its e-Wallet app. The e-Wallet app providers could match its e-Wallet users with lenders, wealth management firms, and insurers and earn fees from matchmaking services.[3]

Whereas a BigTech e-Wallet provider acts as a service aggregator / matchmaker, third-party financial services providers can lose direct relationships with customers. In the case of Ant Group, 100 partner banks vie for borrowers from Ant Group's e-Wallet users, while others buy securitized loans from Ant's lending subsidiary, (McMorrow, Liu, & Ju, 2020). Lending decision, risk analysis, and product designed are made largely by Ant Group, not the banks. Going forward, with BigTech platforms' increasingly dominant position in the economy, their business models as aggregators of financial services raise

[3] In the case of Ant Group, an Alibaba's offshoot, fees earned from matching their e-Wallet users with loans, wealth management, and insurance offerings contributed to more than 60 percent of revenue in the first half of 2019, (McMorrow, Liu, & Ju, 2020).

a concern on level-playing field competition with other financial services providers, including banks.

On data, for activities that occur on a BigTech platform, there is typically no practical mechanism that will enable customers to utilize their own activity data for their own benefits outside the platform. For example, there is no mechanism for customers to allow credit screening firms outside the BigTech platform to access the data on the activities that they performed on the platform, and produce credit scores that the customers can use to apply for credit outside the platform. This raises a concern on level-playing field competition, especially in jurisdictions where open banking initiatives have paved ways for individuals to give consent and allow third-party credit screening firms to access transactional data from their banks, and create credit scores that could be used elsewhere.

Furthermore, on customer protection, while consent-based data sharing is becoming a dominant model, there are still risks that customers do not read the entire lengthy consent declaration, and that oftentimes customers give consent beyond necessary because otherwise they would not be able to access the services they need.

Regulating non-financial conglomerates and BigTech firms providing financial services: two approaches

Unlike the case of mono-line FinTech firms, the entry of non-financial conglomerates and BigTech firms into financial services raise potential concerns for financial regulators on at least three fronts: financial stability, level-playing field competition, and customer protection, such that the combination of existing entity-based and activity-based approaches with the proportionality principle do not suffice.

Table 1 Regulatory issues posed by non-banks in the digital era

Entities	Stability	Competition	Customer Protection
Mono-line FinTech firms	• Mono-line FinTech firms are not a significant threat to financial stability, if they do	• Possibility of un-level playing field competition between tightly regulated banks	• Possibility of un-level playing field competition between tightly regulated banks

Entities	Stability	Competition	Customer Protection
	not engage in transformation of funds. • Entity-based approach to regulations can be used by attaching conditions on the licenses to ensure that the mono-line FinTech firms do not engage in transformation of funds. • Activity-based approach to regulations could be used to ensure that the FinTech firms do not become the weakest-link in terms of cyber/IT security when connected to main payment hubs.	and lightly regulated non-banks. • Concerns addressable by activity-based regulations with proportionality principle.	and lightly regulated non-banks. • Concerns addressable by activity-based regulations with proportionality principle.
Integrated financial services models offered by non-financial conglomerates or BigTech firms	• Possible threats to financial stability, owing to risk transformation across the subsidiaries of a non-financial conglomerate or a BigTech firm. • Traditional entity-based approach to regulations does not suffice, given that the parent company or	• Possibility of un-level playing field, given that subsidiaries of a non-financial conglomerate or a BigTech firm can work together in an integrated business model, resemble a bank, and can cross-subsidize on cost and data.	• Currently customer protection framework is inadequate to effectively protect benefits of customers in the case of data sharing across subsidiaries of a non-financial conglomerate or a BigTech firm. • Data privacy framework imposed

Entities	Stability	Competition	Customer Protection
	holding company of a financial conglomerate or that of a BigTech firm is outside the purview of financial regulators.	• Existing activity-based approach to regulations does not recognize synergy that occurs when subsidiaries of a non-financial conglomerate or a BigTech firm work together in an integrated business model, resemble a bank, but do not face the same regulatory burdens (including open banking initiatives) that banks do.	on banks or financial services providers might not apply to non-financial subsidiaries of a non-financial conglomerate or those of a BigTech firm.

To address the concerns where existing regulatory approaches do not suffice, this article explores the possibility of (1) issuing a digital banking license to govern a non-financial conglomerate or a BigTech firm, and (2) applying a holding company structure to govern financial service subsidiaries of a non-financial conglomerate or those of a BigTech firm.

Issuing a digital banking license to a non-financial conglomerate or a BigTech firm

In the case where the holding company of a non-financial conglomerate or that of a BigTech firm is outside the purview of the financial regulator, the issuance of a digital bank license to a non-financial conglomerate or a BigTech firm could be a policy option worth consideration. Such an issuance will consolidate legally separated subsidiaries of a non-financial conglomerate or those of a BigTech firm offering different financial services under different licenses, into a single entity, a digital bank, which will then be subject to digital banking regulations.

Since the early 2020s, digital banking licenses have been introduced in a few countries with various variations. Common characteristics of a digital bank are: (1)

reliance on digital channels (particularly mobile apps), for which customers could be served 24/7, with no reliance on a traditional physical branch network, (2) extensive use of advanced analytics on customer behavioral and transactional data (from various sources) to offer mass customization of services, and (3) lean organizational structure and flexible IT infrastructure based on cloud computing, which allow for rapid developments of products and services that better meet customers' demand.

With these characteristics, non-traditional players including non-financial conglomerates and BigTech firms could enter into the banking realm quite readily, without the need to build up a costly physical branch network[4]. With the abundance of customer data from their various existing businesses, and flexible organizational structure and IT infrastructure, a non-financial conglomerate or a BigTech firm with a digital banking license has the potential to offer a greater range of financial services that rival traditional banks, while also be subjected to necessary banking regulations.

In China, Tencent, the dominant social media platform, entered into non-payment domains of financial services via its digital bank, WeBank. Given that WeBank operates under a digital banking license, it is subject to digital banking regulations, which have the same capital and liquidity rules as traditional banks[5]. While WeBank also packages and sells loans to other traditional banks, its digital banking license helps ensure that it limits the size of these loans, and properly manages the risk as a bank, unlike subsidiaries of other Chinese BigTech platforms that do not operate with a banking license, (Sender, 2020).

One common practice to supervise digital banks in various jurisdictions is that the digital banks are subject to the similar stability regulations, including those on ownership, capital, liquidity, and IT / cyber security, and similar customer protection rules as those of

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[4] Digital banks have been set up in various jurisdictions by various types of entities including startups, FinTech, BigTech, non-bank conglomerates, traditional banks, as well as joint-venture companies.

[5] Digital banks in China are not allowed to have physical branches; are subject to maximum shareholding limit at 30 percent; and can manage only certain types of bank accounts which restrict account holder services, and have limits on transaction and deposits, (The Asian Banker, 2020)The Asian Banker (2020).

traditional banks, thereby lowering concerns on non-level playing field competition. The design of a digital banking license depends largely on the regulator's licensing objectives. This could range from the objectives of enhancing competition and efficiency in the banking industry (e.g. Australia, China, and UK), promoting FinTech and innovation, and enhancing customer banking experience (e.g. Hong Kong, Korea, Singapore, and UK), to providing access to capital and financial services to SMEs (e.g China).

Given the relatively streamlined governance structure of a digital bank, the issuance of a digital banking license is a good option that financial regulators could use to address concerns with regards to non-financial conglomerates or BigTech firms offering financial services in several product domains. In practice, once a set of criteria on the size and the ownership structure is met, a non-financial conglomerate or a BigTech firm might be required to consolidate its various financial services subsidiaries into one single entity, and for that entity to operate under a digital banking license.

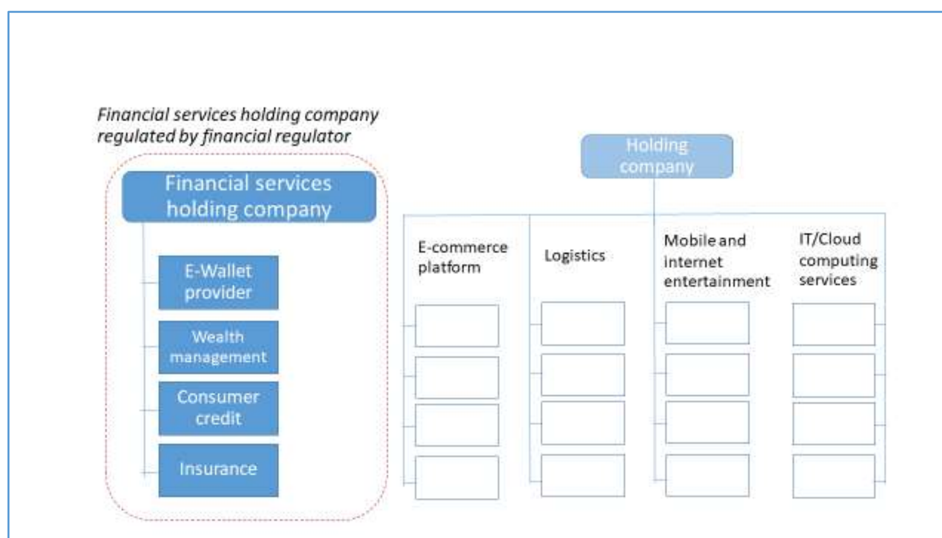
Imposing a holding company structure on financial service subsidiaries of a non-financial conglomerate or those of a BigTech firm

Another possible option to regulate subsidiaries of a non-financial conglomerate or those of a BigTech firm engaging in different domains of financial services, is to impose a holding company structure on these subsidiaries, and subject that holding company to financial regulations. By structuring the subsidiaries into a holding company structure, the governance structure could be simplified, and financial regulators could assess risk and address various concerns in a holistic manner similar to the holding company regulatory framework that regulators have imposed on financial groups.

In China, financial regulators are also exploring the possibility of applying a holding company structure on subsidiaries of a BigTech firm, (Yu, McMorrow, Lockett, & Ruehl, 2021). Lessons from China demonstrate that when financial regulators could deal with BigTech firms as a single entity, regulators could address pressing regulatory concerns in a timely manner. For example, Chinese financial regulators have not only introduced regulations that make an e-Wallet account more distinguishable from a bank deposit account and required that the lending subsidiary put more skin in the game when they securitize and sell loans to other investors, but could also require that the whole integrated

business model be overhauled, and launched anti-trust investigation into the (non-financial) parent company.

Figure 2: Hypothetical set up of a holding company for financial service subsidiaries



The lessons from China are quite important going forward, since non-financial conglomerates and BigTech firms in many countries appear to emulate the Chinese platform models. Furthermore, as some BigTech firms venture out of their home country to provide financial services in other (host) countries, the concept of regulating a holding company structure on financial service subsidiaries of a non-financial conglomerate or those of a BigTech firm could be accordingly applied. Often, BigTech firms offer financial services in the host country through their locally incorporated financial services subsidiaries. Host country financial regulators can thus require that a holding company structure be set up for these locally incorporated financial subsidiaries, and financial regulations be applied on the holding company. To lessen the possibility that such holding company requirement might stifle innovations, there might be thresholds that allow non-financial conglomerates or BigTech firms to operate multiple domain of financial services before the setting up of a holding company for their financial services subsidiaries is required.

Conclusion

This article discusses why the traditional entity-based regulations, as well as activity-based regulations and the proportionality principle that were used to address

emerging issues associated with FinTech firms in the early to mid-2010s might be inadequate to deal with the integrated business models of non-financial conglomerates and BigTech firms that entered into financial services and quickly gained market shares in multiple domains.

Specifically, non-financial conglomerates and BigTech firms providing financial services have at least three features that could be of financial regulators' concerns: complex governance structure; risks related to transformation of funds and shadow banking activities; and cross-subsidization of cost and data. These characteristics pose risks not only on financial stability, but also on level-field competition and customer protection, which existing approaches to regulation might be inadequate to address these new challenges.

To address these concerns, the article proposes two possibilities. First, a digital bank license could be issued to the non-financial conglomerate or a BigTech firm that is offering financial services via subsidiaries in an integrated business model, ensuring a level-playing field competition with traditional banks, and addressing financial stability and customer protection concerns. Second, a holding company structure could be required over financial services subsidiaries of a non-financial conglomerate or those of a BigTech firm, and financial regulations imposed on the holding company. Exact calibrations on both approaches will need to be further explored and tailored to country specific conditions to ensure that regulators' concerns be addressed without stifling financial innovations.

References

Carsten, A. (2021). Public policy for big techs in finance. *Asia School of Business Conversations on Central Banking Webinar, "Finance as information" with Robert Merton and Agustin Carstens*. Basel: Bank for International Settlements. Retrieved from https://www.bis.org/speeches/sp210121.pdf

Financial Times. (2020, November 4). Ant IPO: The Regulators Strike Bank; Due Diligence, Merger and Aquisition. *Financial Times*. Retrieved from https://www.ft.com/content/ff5cbd9f-dbc3-485d-a965-a4c39aa2e47f

Frost, J., Gambacorta, L., Huang, Y., Shin, H., & Zbiden, P. (2019). *BigTech and the changing structure of financial intermediation*. Bank for International Settlements. Retrieved from https://www.bis.org/publ/work779.pdf

Kress, J., McCoy, P. A., & Schwarcz, D. (2018). Regulating entities and activities: Complementary Approaches to Nonbank Systemic Risk. *Southern California Law Review*, 1455-1530. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3238059

Lucas, L. (2017, April 27). Chinese money market fund becomes world's biggest. *Financial Times*. Retrieved from https://www.ft.com/content/28d4e100-2a6d-11e7-bc4b-5528796fe35c

McMorrow, R., Liu, N., & Ju, S. (2020, August 26). The transformation of Ant Financial. *Financial Times*. Retrieved from https://www.ft.com/content/c636a22e-dd3f-403e-a72d-c3ffb375459c

Monetary Authority of Singapore. (2016). *Proposed Activity-based Payments Framework and Establishment of a National Payments Council*. Singapore. Retrieved from https://www.mas.gov.sg/-/media/MAS/resource/publications/consult_papers/2016/Proposed-Activity-Based-Payments-Framework-and-Establishment-of-a-National-Payments-Council.pdf

Mooney, A. (2016, April 17). Turning China's digital dash into stable savings,. *Financial Times*. Retrieved from https://www.ft.com/content/3e9fa230-0224-11e6-99cb-83242733f755

Restoy, F. (2019). Regulating fintech: what is going on, and where are the challenges? *ASBA-BID-FELABAN XVI Banking public-private sector regional policy dialogue "Challenges and opportunities in the new financial ecosystem"*. Washington D.C.: Bank for International Settlements. Retrieved from https://www.bis.org/speeches/sp191017a.htm

Restoy, F. (2021). *Fintech regulation: how to achieve a level playing field.* Financail Stability Institute. Bank for International Settlement. Retrieved from https://www.bis.org/fsi/fsipapers17.pdf

Sender, H. (2020, November 24). Lessons from China's decision to halt Ant Group's giant IPO. *Financial Times*. Retrieved from https://www.ft.com/content/bf4ff599-419b-47f9-ae92-131702700b79

The Asian Banker. (2020). *Are central banks issuing digital banking licences to counter the threat of fintechs and big techs?* The Asian Banker. Retrieved from

https://www.theasianbanker.com/uploads/TAB_Rise_of_Digital_Banking_Licences_SpecialReport_2020.pdf

Wildau, G. (2017, September 4). China regulators target 'systemic risk' from money-market funds. *Financial Times*. Retrieved from https://www.ft.com/content/c145a75a-9136-11e7-a9e6-11d2f0ebb7f0

Wildau, G., & Jia, Y. (2019, January 29). Ant Financial's money market fund shrinks to 2-year low. *Financial Times*. Retrieved from https://www.ft.com/content/35bbbef6-20a8-11e9-b126-46fc3ad87c65

Yu, S., McMorrow, R., Lockett, H., & Ruehl, M. (2021, February 3). Ant Group strikes deal with Chinese regulators over restructuring. *Financial Times*. Retrieved from https://www.ft.com/content/25e311e0-a489-4a2e-9533-76c8f2ba60ab