Big tech in finance: opportunities and risks

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This year's Annual Economic Report has a special chapter on the entry into financial services of large technology companies, the so-called "big techs" that already have established platforms in their respective businesses, such as in e-commerce or social networking.

It is still early days for big techs in financial services, but given their size and customer reach, they have the potential to spark rapid change in the financial system. The special chapter provides an initial assessment of the benefits and costs, and lays out a number of questions that deserve more attention.

I can summarise the broad findings as follows. First, big techs' access to customer data expands the scope for financial inclusion by reducing the need for documentation and for collateral – both of which have traditionally excluded users from banking services. At the same time, big techs' entry into finance introduces new elements into the risk-benefit equation. Some are old issues of financial stability and consumer protection in new settings, which can be addressed by adapting or expanding existing regulation. But there are also important new elements. Public policy towards big techs in finance needs to build on a more comprehensive approach that draws on financial regulation, competition policy and data privacy regulation. Before we get there, let me provide a few highlights from the chapter.

The "DNA" of big techs' business model

The business model of big techs rests on enabling direct interactions among a large number of users. An essential by-product of their business is the stock of user data. The data are then utilised as input to offer a range of services that exploit natural network effects, generating further user activity. Increased user activity then completes the circle, as it generates yet more data. We dub this the "**d**ata-**n**etwork-**a**ctivities" loop – or the "DNA" loop.

The DNA loop is self-reinforcing. More data generates stronger network effects, which elicit more activity, leading to yet more data. This means that big tech firms with an established platform have a running start when they venture into financial services.

The source of their competitive advantage depends on the nature of their existing platform. Big techs with e-commerce platforms collect data from the activity of sellers and buyers, and can combine them with financial and consumer habit information. These can be a valuable input into credit scoring models, especially for loans to small and medium-sized enterprises (SMEs) and consumer loans. Big techs with large social media platforms have data on individuals and their preferences, as well as their network of connections. Big techs with search engines do not observe connections directly, but typically have a

broad base of users and can infer their preferences from their online searches. Both in the case of social media and in internet search, the big tech can use the information on users' preferences for marketing financial products, or to serve as a supermarket for third-party financial services, such as in insurance.

Big data and financial inclusion

All of these advantages can expand financial services to users who were previously excluded. Take the example of lending. Screening borrowers for creditworthiness is a costly activity for lenders. Many SMEs in developing economies often do not have audited financial statements. Borrowers who lack basic documentation or are in regions without bank branches get left out of the formal financial sector. Big techs are in their element in this kind of setting. They can tap relevant information from their existing platforms and overcome the informational problems.

Let me take you through an example from the chapter, which illustrates the credit scoring algorithm used by Mercado Libre, which is a well known e-commerce firm that operates in Latin America.[1] Imagine that you use a black box to screen good borrowers from bad. The black box has a green light and a red light. You feed in the name of the borrower, and either the green light comes on (and you say yes) or the red (and you say no). To evaluate the accuracy of the black box, you want to compare the signals with the final outcomes. The vertical axis in the left-hand panel of Graph 1 measures the proportion of good borrowers that were given a green light. The horizontal axis measures the proportion of bad borrowers that nonetheless received the green light.

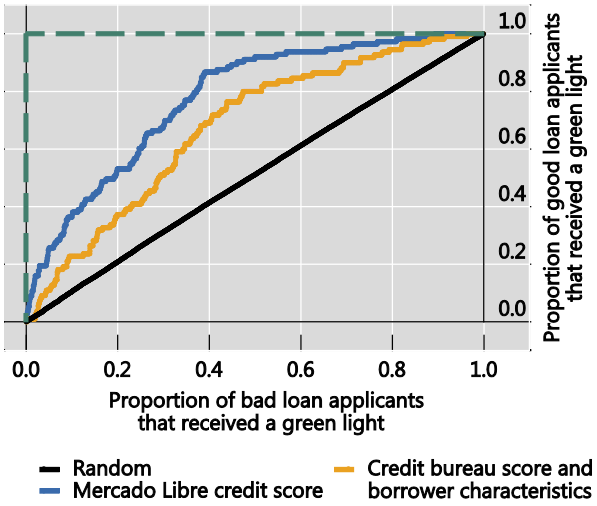
Suppose you can dial up or down the frequency of the green light. If the black box is uninformative, then both good and bad borrowers receive the green light with the same frequency. This is the 45° line, where good and bad borrowers are treated equally. Ideally, there should only be green lights for good borrowers and red lights for bad borrowers. This is represented by the dashed green line. The better the credit scoring model is at signalling credit risk, the higher the curve is above the 45° line. The yellow line uses standard credit bureau ratings and borrower characteristics. This is above the 45° line, and so is better than the purely random black box at separating good from bad borrowers. But compare this with the blue line. The blue line uses the Mercado Libre machine learning model based on all the data from the e-commerce platform. You see that the blue line is higher. This is suggestive evidence that big data from the e-commerce platform allows more effective screening of bad risks than standard credit assessment methods. This is perhaps not so surprising, as the data from the e-commerce platform tell us not only about the borrower, but also about how the borrower interacts with the rest of the online community on the e-commerce platform. You know the borrower's activities, but also the activities of all the business counterparties. This is like judging someone's character by being able to see the character of all their friends.

[1] See J Frost, L Gambacorta, Y Huang, H S Shin and P Zbinden, "BigTech and the changing structure of financial intermediation", *BIS Working Papers*, no 779, April 2019.

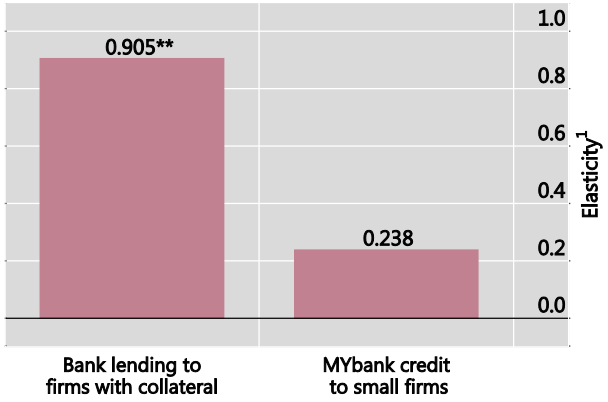
Opportunities: big data and financial inclusion

Graph 1

Accuracy of credit scoring models for "unbanked" borrowers



Breaking the link between credit and house prices in China



** indicates significance at the 5% level.

[1] Percentage change of credit in response to a 1% change in house prices.

Sources: J Frost, L Gambacorta, Y Huang, H S Shin and P Zbinden, "BigTech and the changing structure of financial intermediation", *BIS Working Papers*, no 779, April 2019; L Gambacorta, Y Huang, H Qiu and J Wang, "How do machine learning and non-traditional data affect credit scoring? Evidence from a Chinese fintech firm", mimeo, 2019.

As well as the cost of screening borrowers, another impediment to credit is the cost of monitoring and enforcement of loans. Banks usually require borrowers to pledge collateral to deal with the risk of default. Big techs can address issues of monitoring and enforcement in a different way. For example, it may be relatively easy for a big tech to deduct the (monthly) payments on sales revenues that flow through its payment account. Also, if the big tech is dominant, the simple threat of a downgrade or an exclusion from its ecosystem will be a powerful sanction against the borrower.

This could explain why, unlike banks', big techs' supply of corporate loans does not correlate with asset prices much. The right-hand panel of Graph 1 shows the results of some empirical work currently under way at the BIS[2] using detailed data from a big tech lender in China. It shows the estimated elasticity of credit with respect to house prices in China. If credit is dependent on collateral, we would expect credit to be sensitive to house prices. Indeed, for bank credit, this is what we see. The elasticity of credit with respect to house prices is large and significant for bank credit. The estimated elasticity is close to 1. This is the left-hand bar. In contrast, when we conduct the same exercise for the credit by the big tech lender, the coefficient drops to around 0.24, and is no longer statistically significant. This is the right-hand bar.

In other words, the supply of credit from the big tech lender seems far less sensitive to the housing market than the credit decisions of banks.

[2] L Gambacorta, Y Huang, H Qiu and J Wang, "How do machine learning and non-traditional data affect credit scoring? Evidence from a Chinese fintech firm", mimeo, 2019.

Issues for financial regulation

So far, I have talked about the many benefits of big techs. But there are also costs. Let me turn to those now, and say how policy should respond.

Part of the costs are old issues in financial regulation in new settings. In this case, the response calls for the regulations to be adapted to the new setting. If such adaptation rapidly outruns the existing letter of the regulations, then a revamp of those regulations will be necessary. The general guide is to follow the risk-based principle and adapt the regulatory toolkit in a proportionate way.

A good example is the payment system, where big techs may already have become systemically relevant institutions. In China, big techs' role as payment firms is mirrored by their role in money market fund (MMF) products, where users maintain their payment balances in money market funds. In turn, these MMFs mainly invest in unsecured bank deposits. Around half of the assets are bank deposits and interbank loans with a maturity of less than 30 days, which introduces potentially systemically important linkages between big techs and the banking system. A large redemption shock could transmit to the banking system through deposit withdrawals. To address these risks, the authorities in China have introduced a number of new rules, including rules requiring clearing on a common, public platform for all payment firms, as well as a cap on instant redemptions.

Market power and competition

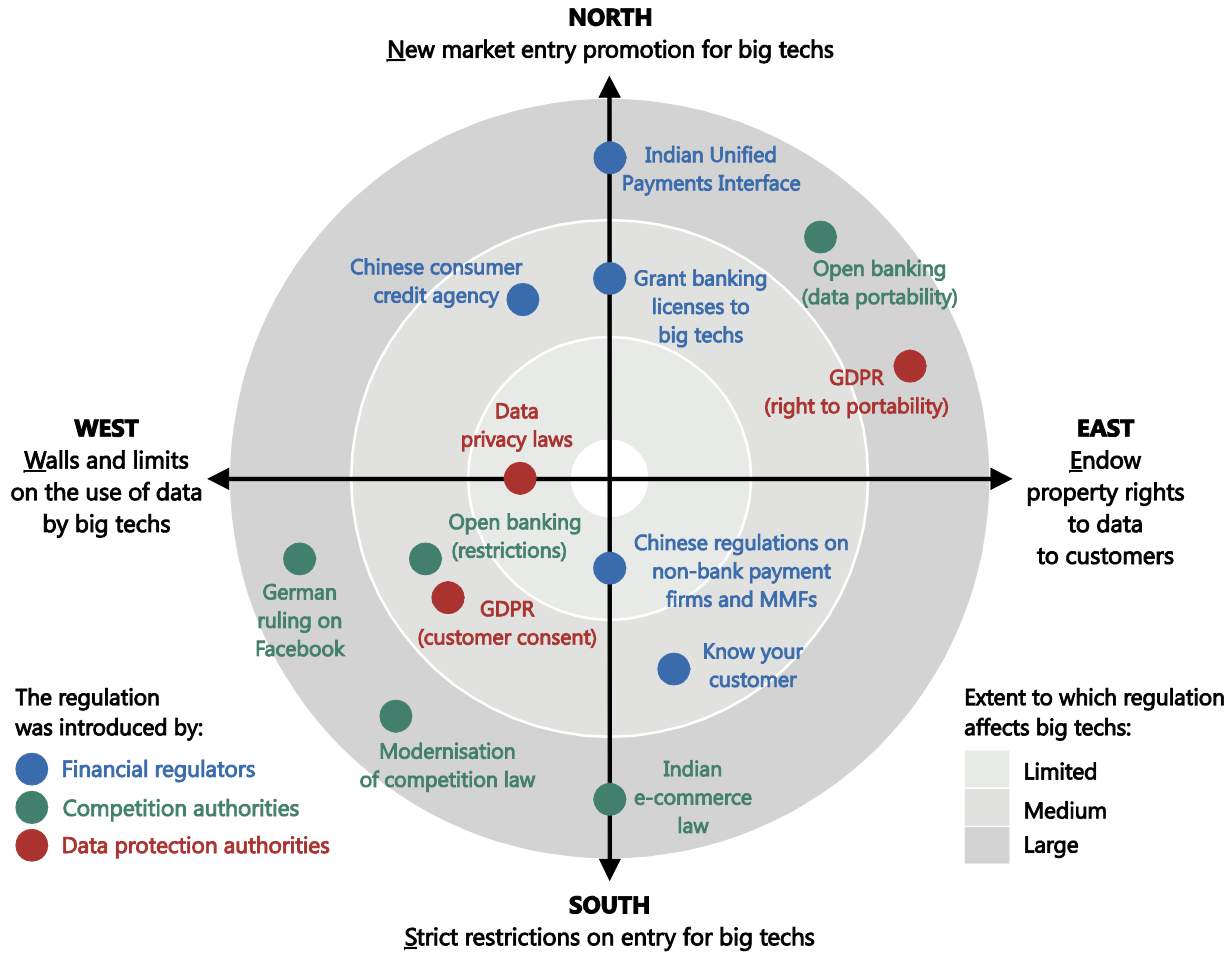
Big techs introduce new elements that go beyond traditional financial regulation. The DNA loop, which lies behind the benefits of big techs, is also the very feature that brings costs associated with market power and data privacy. Once a captive ecosystem is established, potential competitors have little scope to build rival platforms that can mount an effective challenge to the incumbents. Dominant platforms can consolidate their position by raising entry barriers or by positioning their platforms as "bottlenecks" for a host of services, which could favour their own products at the disadvantage of other providers. Other practices such as product bundling or cross-subsidisation could further reduce competition. These are issues that are more familiar to competition authorities and economists working on industrial organisation, rather than financial regulators.

A new regulatory compass

To navigate the new, uncharted waters, the special chapter outlines a new "regulatory compass" which organises policy tools along two dimensions (Graph 2). One dimension of the compass spans the range of choices over how much new entry of big techs into finance is encouraged or permitted, ranging from an approach that promotes new entry to one that restricts new entry. The second dimension in the compass spans choices over how data are treated in the regulatory approach. It ranges from a decentralised approach that "endows property rights over data to customers", to a restrictive approach that places "walls and limits on use of such data".

The regulatory compass reflects the menu of policy choices, not the outcomes as measured against the ultimate goals. The evaluation of the policy choices according to their effectiveness in achieving the ultimate objectives will need to take account of the interactions between objectives of financial stability, competition and data privacy.

A regulatory compass for big techs in finance — Graph 2



Source: BIS.

Revisiting the competition–financial stability nexus

Take the example of the interplay between competition objectives and financial stability objectives. Traditionally, policy towards entry into the banking industry has been influenced by two divergent schools of thought. One view is that the entry of new firms in the banking sector is a good thing as it fosters competition. The other view is that a concentrated banking sector is better for financial stability as incumbents are more profitable, and thus more able to accumulate a strong equity base, and also have a higher franchise value, and are thus more likely to act prudently.

However, the relationship between entry and effective competition is far from obvious when the DNA feedback loop is taken into account. Unrestricted entry may not increase effective competition if big techs manage to entrench their market power through control of key digital platforms, or when such control may generate the kind of bottlenecks described above. For these reasons, the rule of thumb that encouraging new entry is conducive to greater competition can be turned on its head.

The new competition-data nexus

A second, important dimension has to do with data. One way to approach the problem is the decentralised (or Coasian) approach that assigns property rights over data to the customers. Customers could then decide which providers they choose to share data with and which to sell data to.

However, the DNA feedback loop challenges a smooth application of the decentralised Coasian approach. Big techs can obtain additional data from their own ecosystems in social networking, search engines and e-commerce that are outside the financial services they operate. Since data have increasing returns to scope and scale, big techs will be able to make far more effective use of any incremental data.

For these reasons, the competitive playing field may be levelled out more effectively by placing well designed limits on the use of data. Introducing some additional rules regarding privacy – while at the same time allowing selectively for the sharing of some types of data – could enhance effective competition by curbing the DNA loop.

One example is the various forms of open banking regulations that have been adopted around the world, and the second is the European Union's General Data Protection Regulation (GDPR). Open banking gives authorised third-party financial service providers direct access to bank customer data. They also set common technical standards for application programming interfaces (APIs). To the extent that they entail the transfer of data ownership from big techs to customers, both regulations can be seen as measures intended to facilitate greater effective market contestability. For this reason, they are positioned in the northeast quadrant in the regulatory compass.

At the same time, some of the new regulations limit the scope of data-sharing. Regulations that limit the use of data are positioned in the western half of the compass. Open banking regulations selectively restrict the range of data that can be transmitted (for instance, to financial transaction data). There are also restrictions on who can access the data (for instance, limited to accredited deposit-taking institutions). Similarly, the GDPR requires customers' active consent before a firm can use their personal data. Both types of restrictions can be seen as barriers to big techs' entry into finance. For this reason, they are positioned in the southwest quadrant of the compass.

At first sight, having elements of the same rules that appear in opposite quadrants may seem perverse, but given the special nature of the big tech DNA loop, this apparently contradictory approach may, in fact, have the effect of fostering more effective competition. We could compare these regulations to sprinkling grains of sand in the excessively lubricated wheels of the DNA loop.

There are a whole host of other rules that can be positioned on the compass. In the special chapter, we describe what they are, and how they address the issues in the entry–data nexus. The regulatory compass is a useful device for classifying the range of policy initiatives. However, it remains to be seen how far these policy initiatives will lead to the desired outcomes in terms of effective competition, efficiency and soundness of the financial system. A broadening of perspectives will be essential to make considered policy choices in this area.

Policy coordination and a need for learning

Given the many new challenges, the public policy approach will need to be joined up.

First, there is a need for closer cooperation between national authorities, namely competition authorities, financial regulators and data protection authorities. Currently, their mandates and approaches are not always compatible.

Second, as the digital economy expands across borders, there is a need for international cooperation on rules and standards. The recent proposal by Facebook to launch a digital currency, Libra, has underscored the importance of cross-border cooperation.

Innovation is here to stay, and much of it will bring great benefits. With those benefits clearly in sight, some degree of disruption and structural change of the financial system should not only be tolerated but be welcomed. However, disruption for disruption's sake is something that we should greet with greater caution. More than ever, clear thinking is essential to reap the benefits of financial inclusion and efficiency while mitigating the risks.