FINANCIAL TECHNOLOGY, REGULATION, AND THE TRANSFORMATION OF BANKING

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ABSTRACT

The combination of technology, regulation, and changes in consumer behaviour has the potential to transform banking. Various aspects of the retail financial services industry are being transformed by varied types of technology. A central theme is that regulation (PSD2 and Open Banking) and developments in technology (FinTech, digitalisation, Big Data, Artificial Intelligence algorithms) have come together in a way that has the potential to transform the banking industry. Although technology is certainly not new to banking, a distinction is made between what might be termed "efficiency technology" (technology that enhances the efficiency of financial firms whilst keeping basic business models the same), and what might be termed "transformative technology" (technology that has the potential to transform the industry and generate fundamentally different business models, new ways of conducting business, different forms of consumer interface with financial services firms, and the offer of new products and services).

There is a two-way link between FinTech and the introduction of PSD2 and Open Banking: financial technology makes the objectives of PSD2 and Open Banking feasible while at the same time PSD2 and Open Banking enhance the potential of new financial technology. The two trends have the potential to transform the industry in many respects: nature and form of competition, who supplies what services, new business models, the possibility of partnerships between established incumbents and new entrants, the structure of the industry, and how consumers interface with financial services firms. Transformation is also likely to occur through challenges to traditional integrated value chains and the way that consumers interface with financial services firms.

Traditionally, incumbent banks have a set of comparative advantages (e.g. information advantages) which enable them to dominate many aspects of finance and most especially financial intermediation business and payments. These hitherto entrenched advantages are under challenge through a combination of regulation and technology. The combination of the two developments potentially undermines some of the traditional comparative advantages of banks. The combination of the two developments potentially undermines some of the traditional comparative advantages of banks. In this context the view is sometimes expressed that society needs banking but not necessarily banks. This view is too apocalyptic as while emphasis has been given to the potential threats to incumbent firms there are also opportunities to be derived from the same pressures though legacy costs need to be addressed. Conflicting forces

are operating. On the one hand while some aspects of technology enhance finance and increase its potential (and thereby create opportunities for all players in the market – the expansion effect) at the same time they potentially threaten the entrenched position of incumbent banks (substitution effect)

Emphasis is given in the paper to the “potential” for transformation in three respects: (1) just because something is technically possible does not mean that it will happen, (2) a lot depends on the behaviour of consumers to new technology and the new regulatory regime and opportunities offered by them, and (3) there is a tendency to over-state the short-run implications of technology while understating the nature and extent of the long-term implications.

1. OVERVIEW OF KEY ISSUES

The combination of technology, regulation, and changes in consumer behaviour has the potential to transform any industry and there have been many examples in history in a range of industries where this has happened. There have been profound changes under the influence of new technology in industries such as music, publishing, and retailing because of the way that consumers have responded to new opportunities created by technology. A key issue is the extent to which a similar pattern may emerge in banking and financial services.

The focus of this paper is on how these combined pressures have the potential to transform the banking industry in terms of eroding some of its traditional and entrenched comparative advantages, its business models, how consumers interface with banks and financial service providers, and banks' traditional integrated value chain. In the process, the issue arises about what type of institutions will come to provide banking services and products, what the emerging industry structure will become, and how the heterogeneous array of different business models will compete with each other. The particular dimension of regulation in the paper relates to the introduction of Open Banking induced by the requirements of the Second Payments Services Directive (PSD2) issued by the EU Commission.

The paper begins in section 1 with a consideration of the powerful pressures of technology (particularly digitalisation and artificial intelligence), regulation (Open Banking and PSD2), and changes in consumer behaviour in banking and retail financial services. Section 2 reiterates the historical core competences that have given incumbent barks a dominant competitive advantage. This is followed in section 3 by a review of the key elements of new technology and particularly the role of digitalisation and artificial intelligence. Section 4 reviews the key elements and role of Open Baking and PSD2. Section 5 considers how these combined pressures have the potential to erode some of the core competencies of banks though also creating new opportunities for incumbent banks. This is followed in section 6 by a summary review of the nature of the potential transformation of banks and the baking industry. A sense of perspective (particularly with respect to the Hype Cycle and possible limits to the extent

that consumer behaviour will respond to new opportunities) is outlined in section 7. Section 8 offers an overall assessment.

Consumer behaviour (most especially with respect to their access to financial services) has changed substantially over the past few decades: a steady rise in the use of apps, internet, and telephone access. Various aspects of the retail financial services industry are being transformed by different and varied types of technology. As put by the IMF:

> "A new wave of technological innovations, often called "FinTech", is accelerating change in the financial sector…. it is hard to judge whether this will be more evolutionary or revolutionary", (IMF, 2017).

In recent years, the financial industry has witnessed a fast-growing adoption of financial technology. Of course, technology is not new to banking and financial services and different phases in the evolution of technology have had significant impacts on the industry and the way that financial services are created and delivered. Technology has changed many aspects of banking and retail financial services: the increased variety of payments mechanisms (electronic, internet, telephonic, etc.), greater range of consumer access channels, the entry of specialised FinTech companies, the emergence of P2P lending and Equity Crowd Funding to mention just a few trends driven largely by technology. In the process it has challenged the role of, and need for, a branch network.

A central theme is that Open Banking needs to be seen in the context of other pressures which, when combined, have the potential to transform banking and the retail financial services industry. The focus in particular is on the related pressures of: *Digitalisation*, *Big Data*, (with a lot of bank data storage in the Cloud) *FinTech*, the development of *Artificial Intelligence* (AI) in finance, and *Open Banking*.

A symbiotic link exists between FinTech (especially digitalisation and the adoption of AI algorithms) and the introduction of PSD2 and Open Banking: financial technology makes the objectives of PSD2 and Open Banking feasible while at the same time PSD2 and Open banking enhance the potential of new financial technology. The two must be considered together

The combined pressures are transforming the way that retail financial services are searched, chosen, accessed, purchased and consumed. As put by Jackson (2017): “the whole process has the potential to create a tectonic shift in the landscape”. While the theoretical potential for transformation is clear, the speed and extent to which transformation occurs will be driven as much by consumer attitudes as by the potential of technology. Thus, technology might operate on the supply-side of the equation (making new things possible) whilst the all-important consumer response will operate on the demand-side. As in other areas, just because something is technologically possible does not guarantee that it will happen.

2. TRADITIONAL BANKING MODEL

Five main universal functions of the financial system can be identified: the provision of financial intermediation services for savers and borrowers; managing the payments and settlements system, offering markets and instruments for the management and shifting of risk; the provision of insurance services, and instruments enabling financial decisions by different players in the system to be optimised. FinTech and Open Banking have a potential impact on all of these functions which is why they are potentially transformational.

The traditional view of a bank is that its core function is to provide financial intermediation services to savers and borrowers, it has a set of competitive advantages in this function, its liabilities are money and therefore banks have a dominant position and role in the payments system, and it has an integrated value chain by itself conducting the various ancillary services that are needed in its core business.

In many ways the banking industry, and finance generally, are being transformed and the traditional model of banking is giving way to new approaches to conducting banking business. Traditionally, incumbent banks have a set of comparative advantages which enable them to dominate many aspects of finance and most especially financial intermediation business and payments, (Llewellyn, 1999). These hitherto entrenched advantages include, *inter alia:*

- Information advantages *vis a vis* their customers. Managing a customer's current account through which income and payments flow gives the bank valuable information about the customer's profile. This advantage can be used in many different ways, not the least in risk assessment and selling a range of financial products and services. Historically, this information has been "locked" within the bank. Later sections discuss how digitalisation and other technology are having the effect of "unlocking" this data and making it available to others including FinTech firms and other non-bank competitors.

- Information gives banks *ex ante* screening advantages with respect to their borrowing customers, and the on-going transactions in the current account gives them *ex post* monitoring advantages after a loan has been made.

- Banks have risk analysis advantages partly associated with their information advantage.

- Banks' dominant position in the payments system has given them an intrinsic advantage partly because it is the ultimate basis of customers' transactions. Though a wide range of payments media have been available, banks retain a commanding position.

- Banks have traditionally offered a wide range of services. In some cases, such as SME banking, services have been bundled which effectively locks the customer into the bank. This has also meant that banks have been able to adopt a cross-subsidising pricing policy in some markets and in some parts of the value chain.

- Customers have tended to value this relationship-banking rather than using several different financial firms for different services even though it might sometimes be more economic to unbundle services when this is possible. The costs of searching the market for relevant information have traditionally been a constraint on "shopping around".

- With respect to switching personal current accounts, this has historically been low with customers on average changing their spouses more frequently than their basic current account. Notwithstanding the Current Account Switching Guarantee in the UK, the perception has been that switching bank accounts is costly and inconvenient and to little advantage as the perception has been that "they are all the same". Furthermore, bounded rationality (an inability of customers to analyse more than a limited number of factors when considering moving a bank account) has reinforced the basic inertia of customers.

- Incumbent banks have had a virtual monopoly in delivering banking services and maintaining the customer interface and relationship, and the dominance of the branch network as a medium of delivery has also been a traditional advantage of incumbent banks and has acted as an entry barrier to potential new entrants.

- All of this has created strong brand values for incumbent banks.

Within the link between the customer and a financial service provider, there are several ancillary services. Thus a customer seeks a mortgage from a bank (or building society in the UK) which requires certain services to be performed such as initiating the loan, risk analysis, administration, holding of the asset on the balance sheet, funding the loan, etc. The key issue is who supplies and undertakes these ancillary services: the extent to which they are provided internally through an integrated value chain process, or via various forms of outsourcing of some ancillary services.

The traditional business model of retail banks has been based on an integrated value chain with the lending institution doing everything: accepting deposits, utilising their intrinsic information advantages, conducting risk analysis, making loans, monitoring borrowers, and holding the asset on the balance sheet against which capital is required. In particular, it has owned the customer interface through which is offered their own products and services.

All of this is currently in a state of flux under the combined and related pressures of technology, and potentially Open Banking. In particular, the

traditional integrated value chain has been challenged by a process of "deconstruction" involving the breaking down of the integrated value chain into its component parts which can be provided either internally or through external agencies.

Although it is difficult to predict exactly in what way or how quickly Open Banking and technological changes will impact on this traditional business model, the direction of movement is clear. Many of these ancillary services, previously core parts of the business model, are becoming standardised and automated. Those that rely on collection and processing of information from other sources, for example to comply with Know Your Customer or Asset and Liability Management regulations, could end up being provided virtually without cost through agreements on the sharing of data through distributed ledger technology. Even where data remain proprietary, third party providers may be able to offer services such as verification of information or servicing of loan repayments at much lower cost than can be undertaken internally. Such automation and standardisation will likely displace these ancillary processes from the value chain, making it easier for competitors to provide loan, deposit and savings products on a stand-alone basis.

Furthermore, just as incumbent banks are losing some of their traditional information advantages, consumer behaviour is changing and becoming less loyal. Customers have become more mobile with access to, for instance, comparison websites. At the same time, digitalisation has facilitated risk analysis capabilities for a wide range of alternative companies, and the potential application of artificial intelligence models is eroding the bounded rationality problem. The costs of unbundling and switching accounts has become lower partly under the dictates of regulation. In addition, banks have witnessed a steady erosion of their dominant position in the payments system.

3. IS CURRENT TECHNOLOGY DIFFERENT?

A dominant theme of the paper is that PSD2 and Open Banking need to be seen in the context of other pressures which, when combined, have the

potential to transform the banking industry. It is technology in general, and digitalisation in particular, that makes Open Banking feasible.

Although technology is not new to banking, a distinction is made here between what might be termed “efficiency technology” (technology that enhances the efficiency of financial firms whilst keeping basic structures and business models the same), and what might be termed “transformative technology”. In the latter case, technology has the potential to transform the industry and generate fundamentally different business models, new ways of conducting business, different forms of consumer interface with financial services firms, and the offer of new products and services.

The Bank for International Settlements, for instance, has argued that banks will find it difficult to sustain their current operating models. It has further argued that

> “Financial technology has the potential to change traditional banking business models, structures and operations including the delivery of financial services,” (Basel Committee, 2018)

3.1 FinTech

Technology in general and digital technology in particular, is certainly not new to banking. Most consumers are totally familiar with some aspects of digital finance: contactless cash payments, online access to account information, automated telephone banking, etc. However, past technology innovations in finance have been related mainly to enhancing the efficiency of existing processes and existing business models. They have not changed the fundamentals of banking. The more recent wave of technological innovation (FinTech) could prove to be transformational because it is more than enhancing efficiency of existing processes. In particular, new business models are emerging. The International Monetary Fund emphasis the significance of FinTech as follows:

> “From artificial intelligence to cryptography, rapid advances in technology are transforming the financial services landscape, creating opportunities and challenges for consumers, service providers, and regulators alike.” (IMF, June 2017)

Ultimately, FinTech is based on the digitalisation of finance and the financial sector and the provision of financial services by making use of computer software, algorithms and modern technology. Specialist FinTech

companies have emerged though to date they have tended to be niche players with different and specialist business models. To date, FinTech companies have tended to focus on a narrow range of business: consumer lending, wealth management, payments facilities, and delivery of products and services.

3.2 Digitalisation

Digitalisation in its various forms is impacting on many dimensions of people's lives. It can be argued that the digital revolution in particular is one of the most important trends of our time which amongst other impacts has spawned the emergence of what has come to be known as FinTech and the emergence of specialist financial services firms operating exclusively on the basis of digitalised data.

Digitalisation is the conversion of diverse forms of information (text, sound, imaging, voice, data, etc.) into a single binary code and the storing of these images in a form capable of transmission and computer processing and analysis.

This in turn implies increasing computer power and, through artificial intelligence models, the use of algorithms to analyse data relationships and consumer behaviour. This is sometimes referred to as Robotic Finance. The use of Big Data is a powerful tool for discovering new correlations predicting consumer behaviour and constructing optimal portfolio structures for consumers.

A fundamental feature of digitalisation is that vast amounts of data can be aggregated, analysed and transferred to potential users. The related concept of Big Data refers to the storage of massive volumes of data generated by the use of digital tools and information systems. Digitalisation and Big Data have the potential for customer profiles to be generated in digital form. Algorithms also have the capability of cross-filtering customers' transactional data with other sources of information especially with respect to on-line activity and digital data which may have been released by customers to a wide range of financial and non-financial firms.

The enhanced exchangeability of data implies that data (most especially with respect to customers' bank accounts) that have hitherto been locked inside customers' banks have become unlocked. The enhanced access to customer data has the effect of lowering entry barriers for some new financial firms (including FinTech companies) and potentially undermining one of the banks traditional core competences – exclusive access to customers' bank data.

There are several ways in which digitalisation in particular can be transformational in the banking industry:

- Wider access and transferability of data implying increased availability and lower costs of access to information. In particular, it enhances the access and lowers the costs of information for both incumbent firms and new entrants. In the process, it enhances consumer choice.

- In some areas, and in parts of the value chain, entry barriers are lowered with the result that competition is enhanced.

- In the process, it challenges one of the core competencies of incumbent banks. A recent and widely-publicised report by the McKinsey consultancy suggests that around 30 percent of banks' profits are at threat from digitalisation.

- Digitalisation can fundamentally change the way consumers search for and access information and make financial decisions. Digitalised data, and the creation of search and transactional apps, lower search costs and potentially reduce consumer inertia with respect to changing bank and other accounts. In the process, it enhances consumer choice.

- Enhanced potential for complex data analysis through increased computer power and the application of algorithms to analyse data relationships. This both widens the range of financial products provided to consumers and also the number and type of firms capable of supplying financial services and products. The use of

such algorithms, and the potential of artificial intelligence, change the nature of the decision-making process for consumers.

- It changes both the relationship between financial services firms and their customers and the consumer interface with the financial services provider.

6.3 Artificial Intelligence

Coupled with digitalisation and Big Data, recent developments in the application of artificial intelligence techniques have the potential to change the way that data is analysed and some financial services selected by, and delivered to, consumers. A recent issue of the Harvard Business Review has suggested that artificial intelligence is likely to be the most important general technology of the current era. Many banks are on record as saying that, in some business areas, significant numbers of staff could come to be replaced by robots.

Artificial Intelligence (and Machine Learning – the ability of computers to learn from data) relates to computer systems and algorithms that are capable of performing some tasks that have traditionally required human intelligence. This implies computer systems that imitate human intelligence. Artificial intelligence computers and apps are designed to perform human functions including learning, decision-making, identifying relationships between different data sources, and speech recognition. The potential of AI lies in the capacity to analyse quickly in real time a wide range and volume of data from disparate sources beyond the normal capability of human beings because of their enormity and complexity.

AI has the potential to use vast amounts of unstructured data to profile customers and, for instance, to predict the needs of consumers and search for suitable products and services thereby avoiding search costs for the consumer. In the process it increases the speed and efficiency of processing large and complex information sets. In particular, and of immediate relevance to retail finance, such apps and computer models are capable of identifying relationships between different data sources and identifying patterns in consumers' behaviour to a greater extent than can humans.

Machine Learning is a process of designing a sequence of actions (algorithms) to solve problems that optimise automatically through experience with only limited or no human intervention. It implies using algorithms that learn from data and past behaviour of consumers together with relationships between different data sets. Machine Learning computers that can learn from data can be used to analyse behaviour patterns together with algorithms to automate increasing numbers of decisions in a wide range of areas.

Robo investment apps apply algorithms to calibrate portfolios to a consumer's goals and risk tolerance levels. This is based partly on identifying patterns in a consumer's past investment behaviour. In essence, Robo advisers are digital platforms that provide automated financial services with minimal human supervision or intervention. The platforms use algorithms to analyse data, identify patterns, monitor market developments, and make recommendations to customers or automatically initiate investment transactions.

Artificial intelligence is used in many areas of retail finance including insurance, credit quality assessment, financial advice, financial and portfolio modelling, stress testing, the analysis and identification of market trends, portfolio management, market impact analysis, risk management and trading.

Chatbots are computerised virtual assistants that assist customers' transactions and solve some problems. These automated programmes interact with customers in natural language in both text and voice. Chatbots are being introduced by a range of financial services firms and often in their mobile apps or social media both of which are often attractive to younger customers. To date, chatbots are in their infancy and available for only a limited number of uses. The extent to which they will be used for giving financial advice has yet to be seen. However there is a recent example of a mortgage sourcing system linking up to Amazon Alexa.

In the context of Open Banking, and with easier access to customer data, artificial intelligence has the potential to analyse consumers' bank account

data and other financial accounts, to identify patterns in behaviour, and to make recommendations.

A word of caution is given by the Chairman and Chief Executive of Afiniti: “The fact is that the latest incarnations of AI are not much better at solving real world complex problems than their ancestors were three decades ago. What is AI good for? What it has always been good for: the identification of patterns in complex data.” (Chishiti, 2018)

4. PSD2 AND OPEN BANKING

Open Banking in the UK can be viewed in the context of the European Commission’s Second Payments Services Directive (PSD2) both of which formally came into force early in 2018 though full PSD2 implementation will not be required until September 2019. In one sense, Open Banking can be regarded as the UK’s response and implementation of PSD2. In both cases there are two central planks:

(1) To create arrangements that enable Authorised Third Parties (ATPs) to gain access to data on a customer’s bank accounts providing the customer has given permission. Banks are required to enable ATPs to have access to customers’ data. While comparison websites have to choose and instigate a switch of accounts, under the Open Banking regime the switch can be made automatic: all that is needed is the consumer’s permission.

(2) To enable third parties (including merchants) to initiate payments direct from a customer’s bank account again providing permission has been given.

These are to be facilitated by Application Programme Interfaces (APIs): software that allows one piece of software to communicate directly with another in real time application. They are protocols that enable data to be transferred automatically over the internet from one piece of software to another. In the UK, all applicable financial institutions are required to establish a common API format.

Open Banking, most especially when combined with latest technology,has the *potential* to dramatically change the landscape of retail banking services and open up the sector to much greater competition. The extent and the speed with which this will happen remains very uncertain. In particular, Application Programme Interfaces (APIs) may be used by comparison websites and others to ensure up-to-date and accurate information about the products and services they offer. This makes it easier for consumers to make comparisons. Open Banking and the PSD2 directive require all providers of current accounts to offer APIs. However, unlike Open Banking in the UK, PSD2 has not established a standard setting process to ensure these APIs all work in the same way.

In essence, the requirement is that the largest retail banks in the UK develop and adopt a common API banking standard so as to enable the sharing of customer information. Further, it is to be an open standard so that it can be widely accessible.

The key features of the Open Banking regime in the UK may be summarised as follows. Nine institutions of the largest payments institutions are required to adopt APIs which comply with agreed open standards. Other payment providers can adopt them voluntarily. To facilitate this, payment services providers are required to adapt their IT systems to a single common Application Programme Interface which facilitates compatibility with all payment service providers. In the process, companies making access to a customer's payments account are able to view the patterns and history of the customer's transactions and advise the customer of changes that might be beneficial.

If a customer has more than one account, an authorised third party will be able to aggregate the accounts and again make recommendations regarding payments patterns, etc. This will involve the third party creating apps so that a customer can view all accounts together rather than separately.

5. EROSION OF TRADITIONAL BANK ADVANTAGES

Many of the traditional comparative advantages that banks have had and which, to some extent, account for their entrenched position are being eroded through the pressures of technology and regulation. Entry barriers in some areas and parts of the value chain are being eroded with the effect of new entrants coming into the market and challenging the entrenched position of incumbent banks. In the process, the degree of contestability is being increased. Many of these new entrants have different business models compared with incumbent banks. This may also erode the cross subsidy potential that incumbent banks have in some business areas and also make bundling of different products and services less attractive for consumers.

In particular, banks are losing their traditional consumer information advantages they have as a by-product of managing customers' basic current accounts This has increased access to data and information both for consumers and alternative suppliers of a wide range of financial products and services. Another way of looking at this is that what has hitherto been "locked" customer data within banks is becoming "unlocked" and, with customers' permission, made available to a wide range of alternative financial service companies and other authorised third parties.

Search costs for consumers are being lowered (which is partly the objective of PSD2 and Open Banking) with the corollary that banks may become less able to rely on customer inertia with respect to switching of accounts and services. The current account is often a route to selling other financial products and services to customers. As part of this, banks could lose some of the advantages they have by virtue of a near-monopoly of the interface with their customers with a potential consequent erosion of relationship banking.

Banks have risk analysis advantages not the least because of their traditional information advantages which again is secured through managing customers' basic bank accounts. Some aspects of new technology focus on risk analysis and the ability of a wider range of

institutions to conduct risk assessment of consumers because of their greater access to customer data.

As a result of the greater feasibility of deconstruction of the value chain, parts of this can now be challenged by new entrants. This also has the effect of lowering entry barriers as new entrants are able to focus on specialist parts rather than having to offer the traditional integrated value chain. In other words, deconstruction enables new entrants to focus on their comparative advantages.

The wider range of access/delivery channels also erodes a particular market advantage traditionally enjoyed by incumbent banks as it is no longer necessary to have a branch network to deliver all banking products and services. In this respect, what has traditionally been an advantage to incumbent banks (the need for a branch network acting as an entry barrier) has now become one of the banks' biggest problems through the legacy cost associated with the network.

A key product and service of incumbent banks has historically been their dominant position in the payments system. One of the central features of Open Banking is the ability of Authorised Third Parties who have the customer's consent to make payments direct from their bank account. The development of APIs allows for the possibility of a range of new third-party services through a new breed of Payment Initiation Service Providers and Account Information Service Providers.

The ultimate rationale and purpose of Open Banking is for the consumer to benefit from increased competition, efficiency and innovation. This is meant to derive from more open access to customers' information (with customers' explicit consent): customers have greater ownership of their financial information which is no longer locked into the bank. This in turn enables competitors to offer their own products and services and to offer advice. The advantage is that consumer search costs are lowered when seeking particular services and products.

5.1 Enhanced opportunities for incumbents

The view is often expressed that society needs banking but not necessarily banks and that some aspects of technology threaten the dominant position of banks. This view is too apocalyptic as while emphasis has been given to the potential threats to incumbent firms there are also opportunities to be derived from the same pressures.

Conflicting forces are operating. On the one hand while some aspects of technology enhance finance and increase its potential (and thereby create opportunities for all players in the market) at the same time they potentially threaten the entrenched position of incumbent banks

As consumers will have greater access to information about the range of alternative suppliers of particular financial products and services, there is a potential for incumbents to gain business (e.g. savings and mortgage accounts) if they are amongst the more efficient, trusted and low-cost providers of a particular service. Put another way, this could imply lower search costs for incumbents to gain customers.

At the same time, there will be greater opportunities for incumbents to offer a wider range of financial products and services and enhanced potential to lower costs through outsourcing of different parts of the value change though this has attendant risks and complexities.

Incumbents will also have the advantage of experimenting with different business models possibly involving partnership arrangements with other firms. There could also be lower costs to be derived through the use of robotics, AI and Machine Learning. New technologies could improve mortgage underwriting as a greater volume of an individual's transaction data can be analysed, making assessments of creditworthiness more accurate. Lower-cost delivery routes could also be available via the use of platforms.

On the other hand, legacy costs will need to be addressed and Jackson (2017) wonders whether large incumbent banks will be able to move fast enough compared with some of their more nimble new competitors.

6. NATURE OF POTENTIAL TRANSFORMATION

This section considers, in summary form only, some of the dimensions to the potential transformation of the banking and financial services industries through the combination of technology, regulation, and changes in consumer behavior:

- Enhanced competition in the retail finance sector due to lower entry barriers, and ease of comparisons to be made by consumers. The Competition and Markets Authority (CMA) in the UK emphasises the importance of consumers being able to make reliable comparisons between competing providers of services. This will be facilitated by common standards in open standard Application Programme Interfaces. In its latest review of banking in the UK the CMA states unequivocally:

  > "Of all the measures we have considered as part of this investigation, the timely development and implementation of an open API banking standard has the greatest potential to transform competition in retail banking markets. We believe that it will significantly increase competition between banks, by making it much easier for both personal customers and SMEs to compare what is offered by different banks and by paving the way to the development of new business models offering innovative services to customers," (Competition and Markets Authority, 2016).

- Greater *contestability* (low entry and exit barriers to an industry) of some retail financial services markets means that change may occur because of the anticipation of change and the potential threat of new entrants. This means that significant change can occur in the way business is conducted without FinTech and other new entrants gaining substantial market share.

- Industry and competitive structures in the financial sector are likely to evolve in different ways than in the past.

- Although entry barriers might rise in some areas, the lowering of entry barriers in other areas is likely to induce new firms to enter parts of the industry, de-construct the value chain, and offer challenges to incumbents in various parts of their business. New

business models will emerge by both incumbents and new entrants, with elements of the traditional business model value chain becoming contested and others being displaced entirely as they become standardised and automated.

- *Deconstruction* of the value chain is likely to develop further as different firms come to focus on different parts of the traditional value chain most especially involving a distinction between manufacture and delivery. This would imply an erosion of the traditional integrated value chain as new entrants undertake some (but not all) of the functions traditionally performed by manufacturers, and others are standardised, automated and displaced from the value chain entirely. A feature of the recent evolution of the retail financial services industry is the emergence of a wide range of specialist FinTech companies which concentrate on relatively narrow parts of the value chain. Increasingly, financial services products/services and their delivery are capable of being "deconstructed" with different firms supplying component parts of the value chain. Ancillary activities, such as customer onboarding, loan servicing or verification of application data could be displaced entirely from the value chain and automatically fulfilled by third party suppliers or through industry co-operation. Overall, the pressures identified represent a potential existential threat to traditional bank business models and the way of doing business most especially with respect to the value chain.

- Greater access to, and transferability of, information about alternative products and services (for the consumer), and about consumers (for financial services providers).

- If bundling of financial products and services becomes less prevalent because of greater competition in sub markets, the ability for incumbents to cross-subsidise some products and services becomes less feasible as new entrants target subsidising parts of incumbents' business.

- More enhanced data aggregation facilities allowing consumers to have a holistic overview of their finances.

- In the process, consumers could be offered a wider range of products, services and suppliers, and a variety of ways to interface with suppliers.

- Links, including ownership, between incumbent firms and new entrants who provide specific specialist services are likely to become a feature of the strategy positioning of some banks and financial services firms. Sone incumbent banks are creating their own FinTech subsidiaries or links with external FinTech companies.

- Consumer behaviour (especially with regard to the interface with financial services firms) is likely to change. This is likely to involve differences between generations, income levels and different types of products and services. There may also be a tendency for less consumer inertia as more information becomes available and the costs and ease of transfer move favourably for the consumer.

- Almost certainly there will be more use of platforms in the delivery of financial products (see section 6.2 below).

- New business models are likely to emerge both for incumbents and new entrants and most especially FinTech companies specialising in particular parts of the value chain of financial services. Some elements, such as the Know-Your-Customer requirements and other on-boarding requirements (e.g. ensuring systems are working correctly, ensuring financial arrangements are in place, etc.) or verification of income in loan applications might become routine automated processes with no opportunity for creation of value.

- The way that consumers interface with financial services providers is likely to change yet further: new delivery channels (including a further erosion of the branch networks) and changes in the way that consumers interface with different types of financial firm. Between 2010 and 2017, the number of bank (and building society) branches in the UK declined by 35 per cent.

- Increased use of artificial intelligence and the use of AI algorithms have the potential to change the decision-making process of both suppliers and consumers of retail financial services and products.

- Further challenge to the historic near-monopoly of banks in the payments system.

Taken together, these pressures and trends are transforming the way that retail financial services are searched, chosen, accessed, purchased and consumed.

6.1 financial system structure

Overall, the impact of Open Banking and the evolution of technology will induce structural changes in the retail financial services industry including who supplies financial services to retail consumers, how customers interface with service providers, challenges to the value chain in the provision of services and products, the range of products and services offered by different financial services firms, and the extent to which traditional financial services firms may forge strategic links with FinTech firms.

As a wider range of different types of service providers is likely to emerge and different suppliers of financial services will adopt different business models, the retail financial services industry is likely to become populated by a wider range of business models. This means that incumbent financial firms will be forced to compete with new competitors which have fundamentally different business models.

As an example of how technology might impact on the retail financial services industry, a recent Deloitte report suggests that large incumbent firms have four alternative general business models to choose from: Full Service Providers (more or less the *status quo* with proprietary products and services supplied through proprietary distribution channels); Utility Service (providing only the infrastructure for third party products); Product/Service Supplier (offering own products and services but relinquishing distribution to an external partner), and Interface (distribution for others).

In contrast, the Bank for International Settlements has proposed five general scenarios within which different business models would play differing roles (table 1):

1. Better banks: Large incumbent banks digitise, leveraging technology to change their current business models but remain Full Service Providers and retain the customer relationship and core banking services.

2. New banks: New entrants or challengers (including Big-Tech companies such as Amazon) with full-service, built-for-digital platforms replacing incumbents as Full Service Providers. Under this scenario, some banks may struggle to compete long-term except in some niche markets.

3. Disrupted banks: In this model, financial services are broken up, with incumbents able to carve out niches. Provision of services comes via a network of modular providers, a mix of Product/Service Suppliers and their own Interfaces.

4. Relegated banks: Banking services are commoditised, and incumbents become product suppliers or merely Utilities, ceding the customer relationship to FinTech or Big Data companies whose front-end platforms provide the interface.

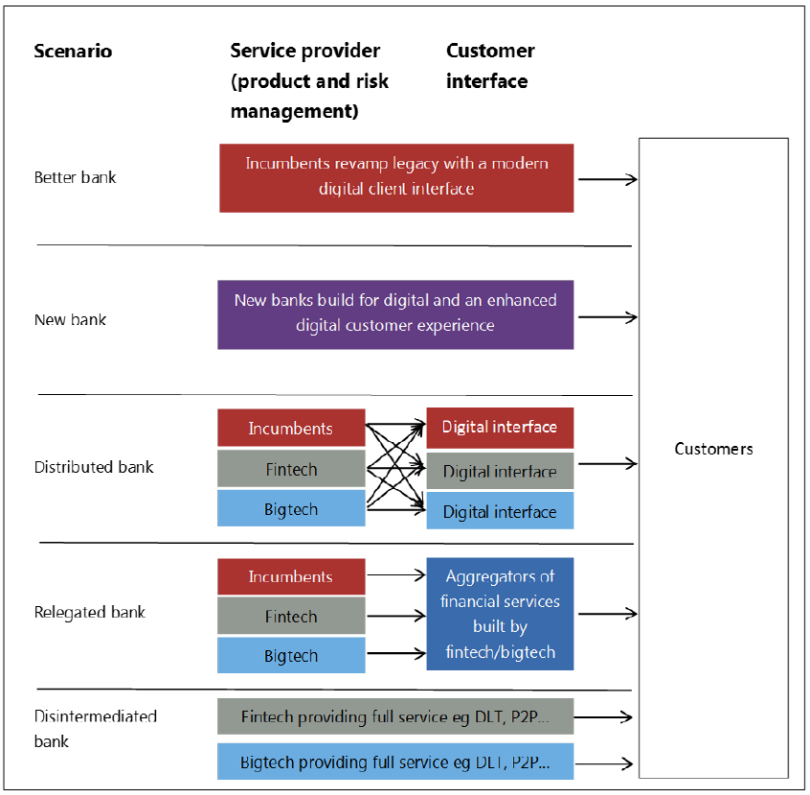
5. Disintermediated banks: FinTechs using more agile platforms and technologies to provide services without balance sheet intermediation; incumbents are squeezed out. This is deemed unlikely in the short- to medium-term.

Conflicting pressures are likely to emerge. On the one hand, as argued in the McKinsey 2016 *Global Banking Review*, some incumbent financial firms are likely to lose business and revenues on a large scale. On the other hand, many of the pressures that have been identified create enhanced opportunities and the potential to raise efficiency even if this might necessitate the adoption of different business models and structures.

In reality some combination of different scenarios may apply across different market segments, and these changes may take place at varying rates. For example, the savings market may (eventually) become commoditised so that providers are relegated to utilities. On the other hand, incumbents may be able to adopt technological improvements in the mortgage market more quickly, so that lenders maintain a direct interface with some borrowers, as well as distributing through others.

FIGURE 1

Graph 5: Overview of the five scenarios and the role players



Colour code: red indicates incumbent banks; purple new players; grey specialised fintech companies; and blue bigtech companies.

6.2 Platforms

A key aspect of the changing structure of the market place is the increased potential for platforms as the main distribution channel (see Jackson, (2017) who argues that: “it is likely that successful operators will be platforms offering products manufactured by a variety of players rather

than just offering their own". Platforms link two sides of the market, enabling a customer to deal with multiple financial service providers through a single interface. For example, platforms would provide the customer interface and aggregation services in the Distributed and Relegated bank scenarios above.

Online platforms could offer a supermarket-type access to various products offered by a wide range of suppliers, and in the process come to significantly disrupt existing financial firms. In particular, online platforms could in some cases become the preferred customer interface with financial service/product providers.

Platforms are not a new market structure. Free newspapers are a common example of a platform that sits between readers and advertisers, but the likes of Uber, Airbnb and Facebook are recent adaptations of it, using new technologies. A platform cares about the customer's interests, so may welcome or be indifferent to competition between suppliers, and can play a quasi-regulatory function (think of Uber policing driver ratings).

On a platform, the relative pricing depends on how sensitive each side is to changes in the platform's prices and also how much value each side gets from using the platform due to the presence of the other group (Tirole 2017). Platforms often grow large by offering very low prices on one side of the market, depressing margins on the other side whose reliance on the platform is greater.

Platforms need scale for two reasons. First, to spread costs across many users and, secondly, because of network effects. That is, if the bulk of potential customers are on one platform, the more suppliers, providers and apps will want to use that platform.

There is therefore a risk of a platform becoming too-big-to-fail and having excessive market power. In the extreme, there may be a single winner-takes-all platform, and not limited to one country. However, competition is also possible between platforms, especially if they are all based on Open Banking APIs. Platforms also need not be limited to financial services - a lifestyle offering could combine financial and non-financial services.

7. RESERVATIONS

We have emphasised the “potential” for technology and the introduction of PSD2 and Open Banking to transform parts of the banking and retail financial services industry. Emphasis is given to “potential” as it is difficult to be precise and certain for several reasons and in particular because it is difficult to know how consumers and incumbent firms will respond (and to what extent) to the opportunities open to them.

A sense of proportion is warranted. Firstly, it is necessary to consider how consumers are likely to respond to the new ease through which their personal data can be transferred: there could be resistance. Secondly, the time-frame is relevant in that the short-run impact may be different from the long-run impact. The more general point is that just because something is technically possible does not mean that it will be adopted.

10.1 Consumer reactions

There have been profound changes in consumer behaviour under the influence of new technology in industries such as music, publishing, and retailing because of the way that consumers have responded to new opportunities created by technology. A key issue is the extent to which a similar pattern will emerge in financial services.

Consumers may have concerns about the security of data transfers and may be concerned at the possibility of unauthorised access to data. They may be troubled that, as in the past, information is sold-on to other firms. A lot of data sharing is already driven by on-line algorithms and automated technology. There is a more general security issue to consider: the real or imagined fear of cyber-attacks. The incidence of fraud and on-line scams is not unknown. There have been many past examples of scammers using bogus emails. Furthermore, consumers need to have assurance that they can invest trust in new technology and digital processes.

In some ways, the transfer and sharing of information runs counter to what consumers have always been advised: to be careful about the security of personal data. Perhaps a different mind-set needs to evolve. It may also

be the case that the inertia bank customers have shown in the past to switching of accounts may persist. This is a particularly relevant consideration if, as is sometimes (usually?) the case for many financial products offered in a competitive market, the marginal advantage of switching may be relatively small.

On the other hand, the recently introduced General Data Protection Regulation (EU2016/679) will offer some degree of protection with respect to third-party use of consumers' data.

Three basic conditions need to be met if account switching is to become less lethargic. Firstly, consumers need to have sufficient information in easily accessible form about the full range of alternatives open to them. Secondly, there needs to be significant differences between the alternatives to make the switch worthwhile. Thirdly, the perceived costs of switching need to be low enough to make the switch worthwhile: for a further discussion see the Capability–Motivation–Opportunity model (Michie *et al* 2011). Open Banking is designed to address the first and third conditions.

10.2 Constraints

Just because something is technologically possible does not mean that it will happen: this is because of constraints on the demand- and/or supply-side of the equation. As already noted, there may be consumer resistance on the demand side. On the supply side, all incumbents and potential new entrants face a varying mix of Strengths, Weaknesses, Opportunities and Threats. It all depends on the underlying economics of the firms in question and this will vary between different firms and different types of firm. Nevertheless, the economics associated with evolving technology and Open Banking are opening up opportunities for new entrants in three dimensions in particular: the provision of products and services, their potential role in the value chain, and with respect to consumer interface in financial services.

10.3 Short- v. long-term potential reactions

The implications and impact are likely to be different in the short- and long-run because it takes time for consumers to react, and the necessary investment by financial firms may be delayed. There is a general tendency to over-state the impact of technological change in the short term though underestimate its longer-term and enduring impact. The Basel Committee on Banking Supervision has put it this way:

> "FinTech in general may well be hyped…but this does not necessarily mean that FinTech will have no lasting effect on the banking sector (in the longer term)." (Basel Committee, 2018)

A useful representation of this has been offered by Gartner (2018) in figure 2 where six different phases of the "hype cycle" are identified. An innovation **trigger** creates new expectations which reach a **peak** to be followed by a **more realistic interpretation** after which a **trough of disillusionment** emerges (interest wanes as implementations fail to deliver anticipated results and early entrants either fail or exit). There then follows a **moderate pace of acceptance** until it reaches a **sustainable plateau.** This seems to be a pattern that has emerged with various examples of technology-based innovations in many sectors of the economy and not just finance.

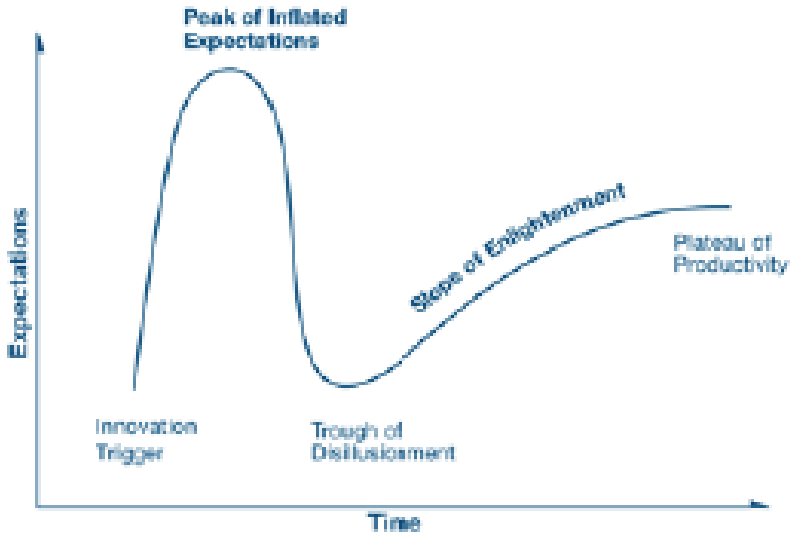


FIGURE 2

This Gartner hype cycle characterises a number of recent innovations in information and communications technologies, such as the applications of personal computers in business and the emergence of the internet (with the peak of the dot com boom in March 2000 corresponding to the peak of inflated expectations). It suggests a cautious response to some of the more exaggerated claims about the immediate impact of technology on banking and financial services. Cryptocurrencies and blockchain are not going to displace regulated financial institutions any time soon.

There is a further reason for thinking that the short-run impact of Open Banking and other technologies on financial services may be modest, even if the longer-run impact turns out to be quite profound. Many financial services required shared infrastructure, e.g. for clearing and settlement of payments or the information and ratings used in credit assessment. There are more obstacles to innovation when infrastructure is shared than when competing firms can implement individually and gain competitive advantage. It may be some years before current technological innovations are fully employed in financial services infrastructures, further delaying the time until Gartner's 'plateau of productivity' is achieved for FinTech.

8. ASSESSMENT

The paper has argued that Open Banking needs to be set in the context of a broader set of pressures operating on the retail financial services industry. It is these pressures of FinTech, Digitalisation, Big Data, and Artificial Intelligence that makes Open Banking feasible. Combined they have the potential to transform the retail financial services industry and the markets in which they operate. The pressures identified have the potential to have a significant impact on some of the core functions of the financial system: making payments, saving, borrowing, risk management, and financial advice.

The impact may include structural changes in the retail financial services industry including who supplies financial services to retail consumers, how customers interface with service providers, challenges to the value chain in the provision of services and products, the range of products and services

offered by different financial services firms, and the extent to which traditional financial services firms may forge strategic links with FinTech firms.

The analysis highlights that while Open Banking and technological changes can be expected to substantially alter many aspects of financial services, this will be a process of evolution and adaption rather than a rapid disruption like that of analogue film processing by digital photography. Both because of the likely consumer resistance to unfamiliar products and the slow process of co-ordination of regulations and standards, Open Banking will only gradually alter the markets for current accounts and payments services. play out.

The paper argues that the impact will depend crucially upon how consumers react and their willingness or otherwise to allow the sharing of data. These reactions may be different for different generations of consumers. Open banking also raises important issues of consumer protection for which regulatory responses may be necessary.

The evolution of technology does not suddenly come to a halt and today's technology in banking is not the end-state. The next phase could be quantum technology and the development of quantum computers and their application to banking. Waters and Thornhill (2018) suggest that: "the results could far exceed even the most high-powered AI systems of today".

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