



BANK OF ENGLAND

Speech

The Promise of FinTech – Something New Under the Sun?

Speech given by

Mark Carney

Governor of the Bank of England

Chair of the Financial Stability Board

Deutsche Bundesbank G20 conference on “Digitising finance, financial inclusion and financial literacy”, Wiesbaden

25 January 2017

I am grateful to Alice Carr, Iain de Weymarn, Charlotte Hogg, Claire Sunderland-Hay, Nicola Anderson, Tom Mutton and Sinead O’Leary Barrett for their assistance in preparing these remarks, and to Sharmista Appaya, Rosey Jeffrey, Jack Roe and Anna Orlovskaya for background analysis and research.

Ecclesiastes 1:9 What has been will be again, what has been done will be done again; there is nothing new under the sun.

1. FinTech's Shining Future

It is a pleasure to be at *Schloss Biebrich* as part of this Bundesbank conference on "Digitising finance, financial inclusion and financial literacy."

Just a few hours ago, I was in the world's leading FinTech centre. One which generated £6.5 billion in revenue, attracted just over £500 million in investment and employed around 61,000 people in 2015.¹

From start-ups in London's Silicon Roundabout to established players in The Valley, entrepreneurs are applying their creativity and technical ingenuity along the financial services value chain.

To its advocates, this wave of innovation promises a FinTech revolution that will democratise financial services.

Consumers will get more choice, better-targeted services and keener pricing.

Small and medium sized businesses will get access to new credit.

Banks will become more productive, with lower transaction costs, greater capital efficiency and stronger operational resilience.

The financial system itself will become more resilient with greater diversity, redundancy and depth.

And most fundamentally, financial services will be more inclusive; with people better connected, more informed and increasingly empowered.

With hundreds of millions now entering the digital financial system every year, could higher economic growth and a quantum leap in social equity be on the horizon? Or will the range of new financial technologies primarily make existing institutions and markets more efficient and effective? No small prize but hardly a transformation.

¹ See Ernst and Young, (2016), "FinTech on the Cutting Edge": <http://www.ey.com/uk/en/industries/financial-services/banking--capital-markets/ey-uk-fintech-on-the-cutting-edge>

Of course, technological innovation has long been twinned with finance. Today's system is the product of past advances, beginning with the simple ledger in the fifteenth century. Building on this foundation, a range of innovations – from the telegraph in the 1860s to the digitalisation of the ledger a century later – have created the plumbing of modern payments, clearing and settlement infrastructure necessary for global financial institutions and cross-border, wholesale markets.

More recently, customer access has been opened up with the introduction of the first automated teller machines of the 1960s, the arrival of online banking and brokerage in the 1980s, and the rapid rise of mobile banking since the millennium.

Despite these advances, finance continues to be arranged around a series of hubs like brokers, clearing houses and exchanges; whereas in other domains, people are increasingly forming connections directly, instantaneously and openly, revolutionising how they communicate, work, and live.

The extent to which finance could be redrawn depends on superficially arcane, but fundamentally vital, enabling technologies. The emergence of mobile telephony, the ubiquity of the internet, availability of high-speed computing, advances in cryptography, and innovations in machine learning could all combine to enable rapid changes in finance – just as they are in other areas of the economy.

FinTech's true promise springs from its potential to unbundle banking into its core functions of: settling payments, performing maturity transformation, sharing risk and allocating capital. This possibility is being driven by new entrants – payment service providers, aggregators and robo advisors, peer-to-peer lenders, and innovative trading platforms. And it is being influenced by incumbents who are adopting new technologies in an effort to reinforce the economies of scale and scope of their business models.

In this process, systemic risks will evolve. Changes to customer loyalties could influence the stability of bank funding. New underwriting models could impact credit quality and even macroeconomic dynamics. New investing and risk management paradigms could affect market functioning. A host of applications and new infrastructure could reduce costs, probably improve capital efficiency and possibly create new critical economic functions.

The challenge for policymakers is to ensure that FinTech develops in a way that maximises the opportunities and minimises the risks for society. After all, the history of financial innovation is littered with examples that led to early booms, growing unintended consequences, and eventual busts.

At the request of the German presidency, the Financial Stability Board (FSB) is considering the most important financial stability issues associated with new financial technologies and, drawing on a stocktake of national approaches, it is assessing the extent to which these risks are addressed by existing regulatory frameworks.²

The FSB will report its findings to the G20 summit in July to promote the G20's broader objectives for financial inclusion and strong, sustainable and balanced growth.

In that spirit, this evening I would like to highlight some of the potential financial stability issues raised by the FinTech revolution.

2. The Financial Services Value Chain

But first I should make a confession: I was a banker once.

To earn money for university tuition, I worked as a teller in my native Canada. To be more precise I was a Customer Service Representative.

My core responsibility was simple: stand at a wicket and accept customer deposits, mainly from small businesses, and pay out withdrawals, mainly to their employees. Over time, I got to know the regulars ranging from the baker who would come in every afternoon to deposit a bundle of bank notes smelling of bread (literally dough) to the executives of a failing construction company who would cash their weekly pay cheques with alacrity and trepidation.

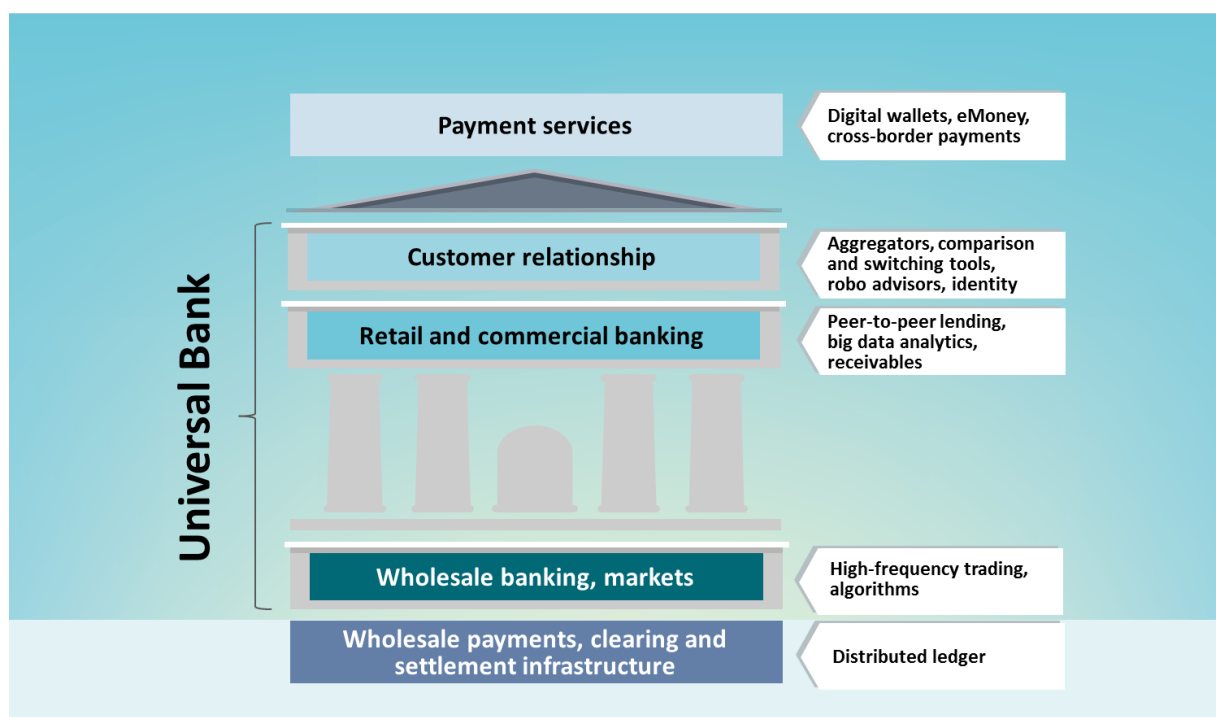
I learned that there were two types of client: those who engaged with me and those who didn't. And I learned with time that the former got more from the bank because I and it knew more about them and what they needed – whether a savings product or a loan. The bank got more from them in terms of revenue and reliability (helpful given that two small banks had recently failed). Indeed, as my province was in a deep recession at the time, loyalty and understanding mattered. It could mean the difference between a restructured loan that could be repaid and a foreclosure that would bring liquidation.

In short, I was at the front line of a banking value chain – one that is now being impacted across its components by FinTech.

Traditional universal banks combine the customer relationship, retail and commercial deposits and lending, and a wide range of activities in wholesale money and capital markets.

² The FSB defines FinTech as technologically-enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services.

Diagram A: Financial Services Value Chain



Payment services traditionally relied on cash, debit and credit cards, and wire transfers. Now FinTech companies are providing domestic and cross-border **payment services** on significant scale through “digital wallets” or pre-funded “eMoney”. Tech firms take a slice of payment revenues and, in many cases, the totality of customer transaction data. In the process, they are systematically capturing the type of knowledge I used to gain from my daily interactions with customers in the bank branch.

Some providers are leveraging this data to sell their customers non-bank products and services. This – and the desire to avoid regulation – reduces their incentive to integrate upstream to conventional banking.

Traditional universal banking begins with the **customer relationship** – or what I used to have as a teller. This historic preserve of established financial institutions is now being opened up. Aggregators, making use of banks’ Application Programme Interfaces (APIs), are providing customers with ready access to price comparison and switching services. New pro-competition policies are reinforcing this competition.³ Meanwhile so-called “robo advisors” are deploying algorithms to deliver affordable investment advice to retail customers.

³ The second Payment Services Directive (PSD2) will allow, conditional on FCA authorisation and customer authority, non-banks to access customers’ bank account data. In the UK, the Competition and Markets Authority has required that the UK’s nine largest banks adopt an open banking standard for APIs by early 2018.

As customers become more willing to delegate decision-making to machines, their funds and loans are being better matched with the best rates from around the system. These flows could become seamless if public policy initiatives and new technologies combine to create digital credentials that are universal, durable and reliable.⁴

Other FinTech players are increasing competition in **retail and commercial banking** by providing new lending and borrowing platforms for retail and corporate customers.

In a number of G20 countries, new business models draw on big data and advanced analytics to tailor products and services to customers and discipline credit underwriting. For example, peer-to-peer (“P2P”) lending has grown rapidly in recent years from a small base.⁵ In the UK, P2P lending now represents about 14% of equivalent gross bank lending to small businesses.⁶ Estimates suggest that more than half of all P2P business lending is unlikely to have been provided by existing banks.⁷ Other platforms are allowing firms to borrow against invoice receivables, drawing on data gathered directly from software their customers use to manage their accounts payable.

Some of the more radical innovations underway are in emerging economies. E-commerce platforms in China, for example, are using algorithms to analyse transaction and search data to improve credit scoring. The result has been a significant expansion of credit availability with low default rates (albeit ones not yet tested by an economic downturn).⁸

In **wholesale banking and markets**, the direction of travel over the past few years has been from intermediated trading (involving ‘dealers’, either via voice or electronically) to non-intermediated, more fully electronic order-driven trading.⁹ Where securities, such as equities and futures, are traded electronically, including via exchanges, algorithmic trading has grown rapidly. Technological improvements, and the growth of multilateral trading venues, led to the emergence of high-frequency trading firms. From a small base in the early 2000s estimates now suggest they (High Frequency Traders) account for up to three-quarters of equity trading volumes and around 40% of FX.¹⁰

⁴ For now, however, every regulated financial institution must separately meet legal and regulatory requirements to establish customer identities. This adds cost and reduces choice, but safeguards privacy.

⁵ In 2015, total loans originated by peer-to-peer lenders were \$117 billion in China, \$40 billion in the US, £4.5 billion in the UK and €1.1 billion across Europe. At least in the UK, there are signs that the rate of growth for new lending has slowed recently; down from 100% to 30%.

⁶ Cambridge Centre for Alternative Finance and NESTA. See: <http://www.nesta.org.uk/publications/pushing-boundaries-2015-uk-alternative-finance-industry-report>

⁷ Cambridge Centre for Alternative Finance and NESTA survey evidence suggests that around 55-60% of peer-to-peer business borrowers were refused bank credit while other SME firms have assumed they would not be offered bank credit. See: <http://www.nesta.org.uk/publications/understanding-alternative-finance-uk-alternative-finance-industry-report-2014>

⁸ In 2014, only around 10% of Chinese adults accessed credit from a financial institution and less than one third have a credit score. A number of organisations have been authorised by the government to provide alternative credit scores, including Ant Financial, which since it launched in 2015 has amassed 190 million users and made more than 400 billion yuan of microloans. Although they require no guarantee or collateral, default rates are currently reported to be less than 2%.

⁹ This shift has not been uniform, however. For example, while just over a third of US Treasuries are traded electronically, this figure is much smaller for UK and German government bonds. And US corporate bonds are almost fully intermediated.

¹⁰ This was aided too when the NYSE, in 2001, reduced the minimum increment for trading in listed US equities to 1 cent from one sixteenth of a US dollar.

Finally, technology promises changes to **wholesale payment, clearing and settlement infrastructure**. Emerging technologies, such as distributed ledger, could in future offer significant gains in the accuracy, efficiency and security of processes across payments, clearing and settlement as well as better regulatory compliance. In the process, tens of billions of dollars of capital may be saved and resilience could be significantly improved.¹¹

Securities settlement in particular seems ripe for innovation; a typical settlement chain can involve many intermediaries, making securities settlement comparatively slow, operational risks and costs high.

3. Broader Public Policy Issues

Before turning to some specific financial stability issues created by these developments, let me acknowledge a few of the other important public policy considerations that G20 authorities must bear in mind – not least because how they are addressed will influence the extent to which certain financial technologies are adopted and the system is transformed.

First, a host of conduct issues with these new products and services, must be addressed including client suitability, Anti-Money Laundering (“AML”) and Combating the Financing of Terrorism (“CFT”). Conduct regulators – such as the UK’s Financial Conduct Authority (“FCA”) – have taken an early lead in seeking to ensure that standards for financial advice and services offered are upheld, and that the integrity of the financial system is protected.

Second, the twin imperatives of greater inclusion and more competition point to the value of digital identities. Billions of people are still under-or unbanked across advanced and emerging economies.¹² And as the FSB and others have highlighted, some countries are at risk of being cut off from the global financial system as major correspondent banks withdraw.¹³

New technologies are providing solutions. Already, biometrics and cryptography are being used to validate customer identities in consistent and reliable ways, facilitating access to the financial system and reducing AML and CFT due diligence costs. For example, since 2010, the Indian government has issued more than 800 million such identities, such that at least four out of five citizens can now use them to make use of governmental and financial services.

¹¹ Oliver Wyman and Santander estimated that distributed ledger technology could reduce banks’ infrastructure costs attributable to cross-border payments, securities trading and regulatory compliance by \$15-20bn per annum by 2022. See: <https://santanderinnoventures.com/fintech2/>

¹² Some 2 billion adults lack a bank account worldwide. 10 million US households and 1.5 million UK adults are also unbanked.

¹³ In recognition of the serious implications of a withdrawal in correspondent banking services for growth, financial inclusion, and the stability and integrity of the financial system, the FSB is working to advance a four-point Action Plan to address the recent decline. For an update on this work see: <http://www.fsb.org/2016/12/fsb-publishes-progress-report-and-2017-workplan-to-assess-and-address-the-decline-in-correspondent-banking/>

Seizing this opportunity means considering fundamental rights such as privacy, and practical constraints such as the costs of storage and handling. Ultimately it is for governments and citizens to decide whether – and how – to ensure the benefits outweigh the costs.

Third, and relatedly, there are fundamental issues around data protection to consider. Traditionally, financial institutions have sought to protect and use their own customers' data under well-established legal and regulatory frameworks. In contrast, social media firms regularly collect and sometimes share extensive data from their users (with their consent).¹⁴ The FinTech future envisages the gathering of a broad range of financial and non-financial data from, and sharing across, a wider set of parties. A more intense debate can be expected about whether there are appropriate frameworks for the gathering, storing and sharing data both domestically and cross-border.

Now turning to the most important financial stability risks.

4. The Potential Impact of FinTech on Financial Stability

As I mentioned earlier, the FSB is assessing how FinTech developments are affecting the resilience of the system; by identifying the risks associated with new and existing financial institutions and activities, and the supporting financial market infrastructure.

In so doing, the FSB is making use of its existing risk assessment frameworks for evaluating the systemic risks around banks, insurers and financial market infrastructure, as well as activities beyond the regulated sector.¹⁵

Our starting point is that there is nothing new under the sun. We need to be disciplined about consistent approaches to similar activities undertaken by different institutions that give rise to the same financial stability risks. Just because something is new doesn't necessarily mean it should be treated differently. Similarly, just because it is outside the regulatory perimeter doesn't necessarily mean it needs to be brought inside.

¹⁴ In today's interconnected world, many citizens have authorised the use and onward sharing of their data without realising it. In considering digital identities, there may be opportunity for citizens and their elected representatives to agree what arrangements should be put in place to safeguard data, including who it could be shared with.

¹⁵ These frameworks provide methodologies for assessing the systemic importance of: financial institutions, markets and instruments and of non-banks, non-insurers (NBNI); risks from shadow banking; and principles for Financial Market Infrastructure.

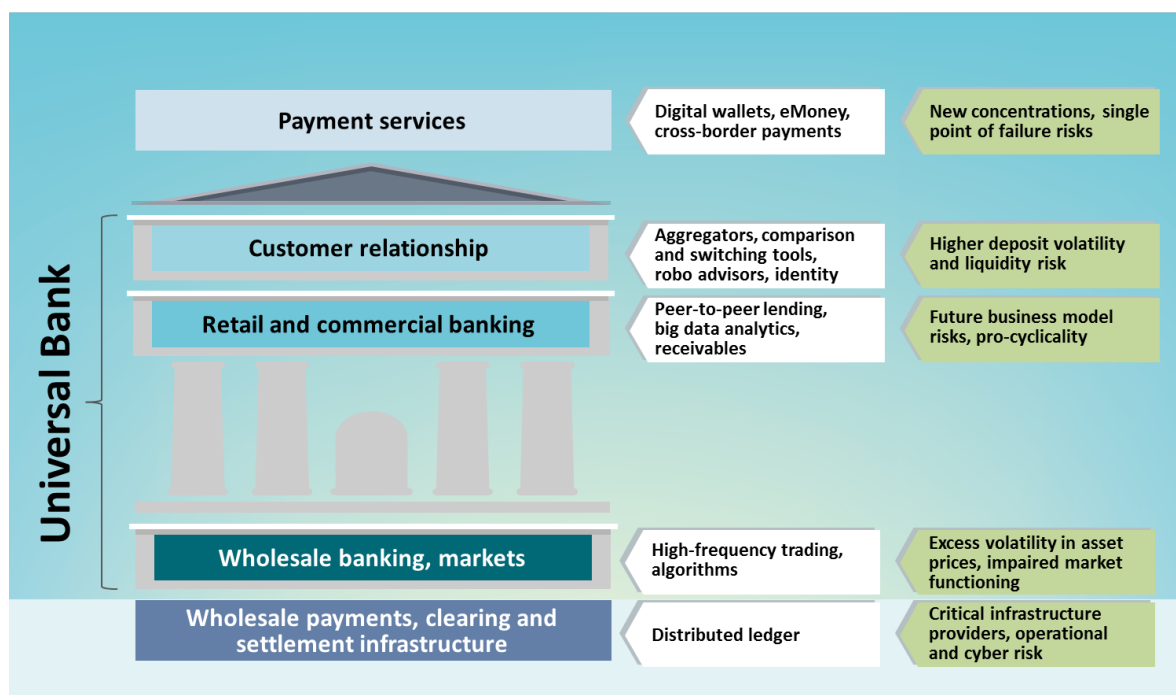
Some of the most important questions we are considering include:

- Which FinTech activities constitute traditional banking activities by another name and should be regulated as such? Those systemic risks associated with credit intermediation including maturity transformation, leverage and liquidity mismatch should be regulated consistently regardless of the delivery mechanism or credit algorithm (a general principle of the FSB's shadow banking roadmap).¹⁶
- How could developments change the safety and soundness of existing regulated firms, particularly those judged to be systemic, and what supervisory responses for *those firms* should be put into place?
- How could developments change potential macroeconomic and macrofinancial dynamics including disruptions to systemically important markets?
- What are the implications for the aggregate level of cyber and operational risk in the financial system? And which FinTech activities could become systemic because they provide new critical economic functions or market infrastructure (for example if certain digital wallets become dominant) and potentially merit higher standards of operational risk oversight?

To illustrate some of the issues, let's return to the financial services value chain to consider some of the ways in which FinTech developments could affect financial stability.

¹⁶ See FSB, (2013), "Strengthening Oversight and Regulation of Shadow Banking, FSB, (2013). Available at: http://www.fsb.org/wp-content/uploads/r_130829c.pdf

Diagram B: Financial Services Value Chain with Potential Issues for Financial Stability



Conduct regulators are in the lead in addressing regulatory issues posed by **payment services** innovations.¹⁷ This is both because, at least in advanced economies, FinTech payment service providers have not chosen to undertake banking activities and individual providers have not yet reached the scale that might be considered systemic.

Looking ahead, it is possible that virtual currencies and FinTech-based providers, particularly where they gain direct membership to central bank payment systems, could begin to displace traditional bank-based payment services and systems. Such diversification could be positive for stability; after all the existing tiered and highly concentrated system has created single point of failure risks. At the same time, regulators would need to monitor such changes for any new concentrations.

In this regard, with a view to such future proofing, the Digital Economy Bill in the UK proposes to extend the definition of a payment system beyond those that are inter-bank, to include any that become systemically important. If these are so designated by HMT, they would be supervised by the Bank.¹⁸ This would be akin to the recent recognition by HMT of Visa Europe and Link.¹⁹

¹⁷ In the UK under eMoney regulations, providers must hold customer funds separately.

¹⁸ The legislative changes also include adding non-bank payment providers to the list of regulated entities to whom the Settlement Finality Regulations apply and modifying the Payment Services and Electronic Money Regulations to enable safeguarded funds held by E-Money Institutions and Payment Institutions to be posted with the Bank.

¹⁹ These systems were brought within the Bank's supervision, under Banking Act 2009 powers, because of the potential they have to threaten the stability of, or confidence in, the UK's financial system or to have serious consequences for business or other interests throughout the UK in the event of their disruption.

Changes to **payments and customer relationships** may have more fundamental implications for financial stability.

Specifically, while FinTech may make conventional banking more contestable, improving efficiency and customer choice, the opening up of the customer interface and payment services business, could, in time, signal the end of universal banking as we know it. If today's universal banks lose the loyalty I saw on the Canadian prairie and instead have less stable funding and weaker, more arms-length client relationships, the volatility of their deposits and liquidity risk could increase. In addition, with weaker customer ties, cross-selling (my old preserve as a teller) could be less prevalent, hitting profitability. The system as a whole wouldn't necessarily be riskier, but prudential standards and resolution regimes for banks may need to be adjusted.

The diversity in funding brought by market-based finance, as an alternative to **retail banking**, means that peer-to-peer lending has potential to provide some consumers and small businesses with affordable credit, when retail banks cannot. At the same time, this implies that borrowers in some segments may be placing increased reliance on this source of funding. How stable this funding will prove through-the-cycle is not yet clear, as the sector's underwriting standards, and lenders' tolerance to losses, have not been tested by a downturn.

Due to its small scale and business models, the P2P lending sector does not, for now, appear to pose material systemic risks. That said, as a general rule, it always pays to monitor closely fast-growing sources of credit for slippages in underwriting standards and the promotion of excessive borrowing. Moreover, it is not clear the extent to which P2P lending can grow without business models evolving in ways that introduce conventional risks, including maturity transformation, leverage and liquidity mismatch, or through the use of originate and distribute models such as those seen in securitisation in the 2000s. Were these changes to occur, regulators would be expected to address such emerging vulnerabilities.

In **wholesale banking and markets**, robo-advice and risk management algorithms may lead to excess volatility or increase pro-cyclicality as a result of herding, particularly if the underlying algorithms are overly sensitive to price movements or highly correlated. Similarly, although algorithmic traders have become a more important source of market liquidity in many important financial markets, they tend to be more active during periods of low volatility giving an illusion of plentiful liquidity that may subsequently be withdrawn during periods of market disruption when it is needed most.

FinTech innovations, such as distributed ledgers, are being trialled for use within, or as a substitute to, existing **wholesale payment, clearing and settlement infrastructure**, will need to meet the highest standards of resilience, reliability, privacy and scalability.

For all financial firms, the advent of FinTech materially changes **operational and cyber risks**. Regulators need to be alert to new single point of failure risks such as if banks come to rely on common hosts of online banking or providers of cloud computing services.

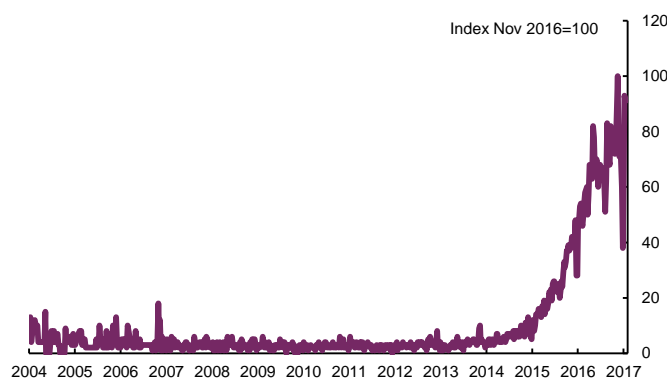
In recent years, the cyber threat to the system has grown as financial institutions have become more reliant on interconnected IT systems. As the FinTech future envisages the sharing of data across a wider set of parties, coupled with greater speed and automaticity in executing transactions, the challenges around protecting data and the integrity of the system are likely to increase. One sign of this is a growing preoccupation in the insurance industry with how best to underwrite such risks.

Recognising the vital importance of learning from international experience, in late 2016 the G20 called upon the FSB to stock-take existing cyber security regulation, as a basis for developing best practices in the medium-term.²⁰

5. Conclusion

In conclusion, FinTech appears to be everywhere. Media citations – and conferences – are through the roof. But where are we along the cycle from the technology trigger to the “peak of inflated expectations” and the trough of disillusionment? Will FinTech change the world as we know it? Is there something new under the sun?

The “FinTech” Phenomenon



Source: Google Analytics, Chart shows an index of the number of google searches for the term 'FinTech'

The “Hype Cycle”



Source: Hype Cycle research methodology © Gartner, Inc.

The achievements thus far are impressive, with enormous increases in financial inclusion due to the advent of digital finance. Moreover, there are clear prospects for new financial technologies to make the financial system more efficient, effective and resilient.

²⁰ In 2015, the G7 published a set of cyber principles. See: <https://www.gov.uk/government/publications/g7-fundamental-elements-for-cyber-security>

But the biggest prize arises from FinTech's potential to combine seamless, real-time payments, distributed commerce, more sophisticated client targeting and more accurate credit scoring. The more this can be realised the more the new financial system will support the new creative jobs people will need – and enjoy – in the coming Machine Age.²¹

While only private sector ingenuity will make these gains possible, authorities have essential, supporting roles in reinforcing them and managing the associated risks to financial stability. To help realise FinTech's promise, we should refresh our supervisory approaches in a few ways.

First, **regulatory sandboxes** can allow businesses to test innovative products, services, business models and delivery mechanisms in a live environment and with proportionate regulatory requirements. This supports innovation and learning by developers and regulators. The FCA was an early mover launching Project Innovate in 2014.²² The G20 might consider the extent to which such approaches should be adopted more widely.

Second, **existing authorisation processes can also be adapted** to ensure they do not unnecessarily block new business models and approaches. This is why in the UK, the PRA and FCA now work closely with all firms seeking new authorisation as banks.²³

Third, the Bank of England is **expanding access to central bank money to non-bank payments service providers (“PSPs”)**. Allowing access to the Bank's Real Time Gross Settlement System allows PSPs to compete directly with banks, and so supports innovation, competition and financial stability.²⁴

Fourth, a number of authorities, including the Bank of England with its FinTech accelerator, are developing **Proofs of Concepts with new enabling technologies** from machine learning to distributed ledgers. And, to explore what **could be genuinely new under the sun**, we are researching the policy and technical issues posed by Central Bank Digital Currencies. On some levels this is appealing; people would have direct access to the ultimate risk-free asset. In the extreme, however, it could fundamentally reshape banking including by sharply increasing liquidity risk for traditional banks.²⁵

²¹ Carney, M 'The Spectre of Monetarism' speech given at the Roscoe Lecture, Liverpool John Morres University, 5 December 2016

²² Followed by its regulatory sandbox in 2015. See: <https://www.fca.org.uk/firms/project-innovate-innovation-hub/regulatory-sandbox>

²³ The PRA and FCA launched a New Bank Start-Up Unit in January 2016 to more effectively manage interactions with potential new entrants with innovative business models. To date, some four digital banks have been authorised.

²⁴ Given RTGS is critical infrastructure supporting real economic activity, such access should come with proportionate responsibilities. New non-bank entrants would be required to meet liquidity and operational resilience requirements. A fuller account of the market dynamics can be found in Carney (2016).

²⁵ Carney, M 'Enabling the Fintech transformation: Revolution, Restoration, or Reformation' speech given at Mansion House 16 June 2016.

This last point underscores that, in order for FinTech's potential to be realised, authorities must manage its impact on financial stability. On the positive side, FinTech could reduce systemic risks by delivering a more diverse and resilient system where incumbents and new entrants compete along the value chain. At the same time, some innovations could generate systemic risks through increased interconnectedness and complexity, greater herding and liquidity risks, more intense operational risk and opportunities for regulatory arbitrage.

As those risks emerge, authorities can be expected to pursue a more intense focus on the regulatory perimeter, more dynamic settings of prudential requirements, a broader commitment to resolution regimes, and a more disciplined management of operational and cyber risks. And we will be alert to potential impacts on the existing core of the system, including through business model analysis and market impact assessments.

By enabling technologies and managing risks, we can help create a new financial system for a new age... under the same sun.