FSR

FINANCIAL STABILITY REVIEW

APRIL 2016

FINANCIAL STABILITY IN THE DIGITAL ERA

20

BANQUE DE FRANCE
EUROSYSTÈME

110–020

Contents

Articles

Constructing the possible trinity of innovation, stability and regulation for digital finance

François VILLEROY de GALHAU
Governor
Banque de France

Innovation shapes the evolution of the financial system and plays a crucial role in economic development. Yet innovative technologies may also make more questionable contributions, like during the 2008 financial crisis. Given the potentially systemic impact of these innovations, central banks, supervisors and regulators monitor them carefully. They seek to understand the deep-seated changes and new practices that they bring, while identifying and assessing the benefits and risks to the financial system.

In recent years, digital technologies have made massive inroads in the industrial world, in areas ranging from telecommunications to the automotive business and robotics. These technologies are now spreading rapidly to the financial services sector.[1] More and more practical applications are emerging: mobile, contactless and instant payments; account information and payment initiation services; asset management; investment advice; data management and information storage, etc.

In this new digital era, financial innovation's centre of gravity looks to be shifting to new players, some of which lie outside the financial system. Technological innovations in the financial sphere are no longer solely driven by competitive pressures within the financial system itself, but by the arrival of outside firms with the expertise of new technologies. These new entrants are competing with usual players and challenging the methods used to deliver certain financial services.

The digital wave is also being supported by a new range of services, which is less geared towards the sale of innovative products and more centred on customers, offering instant access from anywhere to a vast array of diverse, affordable, integrated services. This paradigm shift, which has placed customers at the centre of concerns, reflects the influence of multiple factors, including:

- growing appetite for digital solutions, which has drastically altered consumption approaches, through the rise of online banking and the use by Internet service providers of data to obtain detailed intelligence about consumers' preferences and profiles;

- the public's clear mistrust of the banking world in the wake of the financial crisis;

- regulatory changes since 2008 aimed at promoting increased standardisation and transparency in financial transactions, which have also encouraged more electronic trading (by introducing recording or central clearing obligations, for example). Tougher regulations have additionally pushed up intermediation costs, opening the way to new entrants;

- the substantial developments in the field of storage and data management. The spread of "open data",[2] which has made it possible to exploit a wide variety of information collected about customers, played a potentially important role in the development of tools to store and process very large volumes of data (big data). In order to manage large-scale data flows, an adequate processing capacity is necessary. By offering an extensive information system that can be activated worldwide, the cloud allows for gains in responsiveness and speed and thus makes it possible to allocate costs to other business segments.

1 *See* Revue d'économie financière, "Innovation, technologie et finance: menaces et opportunités", *No. 120, December 2015.*
2 *The open data movement was initiated by the Public Sector Information (PSI) Directive of 2003 on the re-use of public sector information (Directive 2003/98/EC).*

As a result, an inventive, multi-faceted offering is emerging and reshaping the banking and financial landscape to create an ecosystem comprising a wide range of participants: traditional players such as financial institutions; operating alongside large international digital companies such as Google, Apple, IBM, Microsoft, Amazon and Facebook; telecommunications operators with a broad base of consumers and major capacity to innovate through mobile telephony; as well as the famous fintechs, which are innovative and often small-sized businesses specialising in financial technology.

This transformation of the financial sector, which is bringing non-financial firms into regulated financial activities, is impacting conventional banking models and changing the way the financial system works. The purpose of this article is to clarify different aspects [3] of this change by looking at: (1) how digital innovations are broadening the offer in banking services; (2) potential risks and new challenges to financial stability; (3) possible responses by central banks and financial system regulators and supervisors. We must therefore, dynamically, construct the possible trinity of innovation, stability and regulation.

1| Digital innovations broaden the offer of all banking services to varying degrees

The centre of gravity of the financial innovation process has shifted from the banking sector to new players previously outside the financial system but using digital technologies.

1|1 Payment services

Retail banking is characterised by highly standardised transactions and substantial fixed costs. These structural aspects offer fertile ground for competition from nimble digital firms that are less burdened by their cost structure. Accordingly, the rise of digital innovation in the retail payments sector paved the way for the emergence of a diverse range of low-cost payment solutions against the backdrop of rapid growth in online commerce. Back in 2007, the first European Payment Services Directive (Directive 2007/64/EC, PSD1) created a new category of payment services providers known as "payment institutions" to regulate the terms of this new competition.[4]

By the end of 2015, France had 24 authorised payment institutions, compared with three at end-2010. Although these new participants rely heavily on existing payment instruments issued or managed by banks (chiefly payment cards and credit transfers, plus direct debits to a lesser extent), they are successfully capturing market share at the expense of banking institutions. Overall payment flows processed by service providers authorised as payment institutions have risen to EUR 25 billion in 2014 but nevertheless continue to be dwarfed by the total flows managed by France's CORE retail payments system,[5] which exceeded EUR 5 trillion in 2014.

The digitisation of payment services is also taking more disruptive forms. For example, new providers not covered by the scope of PSD1 are emerging to connect consumers and merchants (third-party payment services providers) or to enable customers to view information on multiple accounts (account information service providers). Virtual currencies, particularly bitcoin, bring a shadow mechanism of money creation into play, even though their growth is still far exceeded by the commentaries and analyses devoted to them. By seeking to rival legal currencies, virtual currencies appear to introduce a major disruption by their ambition to challenge central banks' monopoly on issuance. Yet usage remains very small: daily amounts exchanged are coming in at less than EUR 100 million with fewer than 200,000 transactions, compared with EUR 70 billion in payments with 250 million transactions every day within the European Union.

1|2 Financing services

In the field of corporate financing too, digitisation is opening up opportunities for innovation, which, in a context of more stringent banking rules and lastingly low interest rates, is contributing to the

3 *The present article focuses on the changes in servicing clients and does not directly address the new features proposed by fintechs to banks, in particular for the credit analysis and debtors' scoring.*
4 *The second Electronic Money Directive (2009/110/EC) created a specific legal regime for electronic money institutions in 2009.*
5 *CORE (FR) is the French retail payment system. It is developed and managed by STET, a company owned by France's five largest banks, namely BNP Paribas, BPCE, Crédit Agricole, Banque Fédérative du Crédit Mutuel and Société Générale.*

diversification of supply outside the banking sector. Meanwhile, companies, particularly very small enterprises, small and medium enterprises, and intermediate-sized enterprises, have shown that they need alternative financing sources that are more closely tailored to their requirements. Against this backdrop, crowdfunding platforms have emerged, meeting the need for small amounts of debt or equity and rounding out existing financing approaches. In France, there were 86 crowdfunding platforms in March 2016, comprising 55 intermediaries providing loan-based crowdfunding, 27 crowdfunding advisers[6] and 4 dual-status platforms.[7] Amounts raised doubled in 2015 compared with the previous year, to EUR 297 million, and comprised EUR 197 million in loans, EUR 50 million in securities purchases and EUR 50 million in donations.[8] However, they are still limited with regard to the overall funding needs of firms.[9]

1|3 Investment services

Technological innovations are having a far more material impact on financial market transactions, and particularly on securities trading practices. High frequency trading (HFT) firms have established themselves as key players on equity markets,[10] accounting for 24% of trading volumes on European equity markets. HFT firms have two characteristics that enable them to carry out very large numbers of small trades with short-term investment horizons (often intraday): (i) ultra-fast access – just a few milliseconds – to trading platforms and market information; and (ii) trading algorithms that operate autonomously without human involvement when markets are open. Even though their economic and social benefits are dubious, the rapid development of HFT firms makes use of low entry barriers. These players tend to be non-banks with small or even negligible amounts of capital compared with traditional market makers, i.e. banks, whose regulatory capital requirements for trading books have increased.

2| The digitisation of financial services nevertheless poses new risks to financial stability

The development of digital instruments and services in the banking and financial sphere is to be welcomed, provided that these instruments and services meet the needs of consumers and investors, support productivity gains and make France's economy more competitive. Yet this development might not only reduce transaction security, or facilitate money laundering and terrorist financing, but also increase two traditional financial system risks (credit and liquidity risk).

2|1 Transaction security

The digitisation of financial services presents a challenge to central banks as they perform their task of ensuring safe financial transactions (payment, delivery and settlement).

In the area of payments, for example, the sources of risks have shifted with the arrival of new participants and payment methods. The growth of online commerce at the start of the 2000s was accompanied by the widespread use of remote payments involving credit cards but also to other innovative instruments: electronic wallets, solutions based on credit transfers from bank accounts and payments integrated within mobile apps that enable purchases to be made swiftly using smartphones.

More broadly, the significant growth of decentralised trading systems, driven for example by the blockchain technology encompassed in bitcoin,[11] could change the conditions in which central banks perform their duties. Such models could replace the traditional operating procedures of clearing houses, which are based on the aggregation and central clearing of flows, thus affecting collateral management frameworks and asset recording procedures. Yet, except for bitcoin, this technology is still very much in the

6 *Crowdfunding platforms that are based on securities purchases.*
7 *According to ORIAS, the entity that keeps the register of insurance intermediaries.*
8 *Source:* Financement participatif France *(association of crowdfunding professionals).*
9 *Crowdfunding has seen much more pronounced growth in the United States than in Europe overall because the market is more mature and because the economy's financing model is structurally more disintermediated.*
10 *See* Assessment of Risks to the French Financial System, *December 2015, on the Banque de France website.*
11 *Blockchain uses a distributed ledger and communication between the payers through a peer-to-peer mechanism. It allows for a safe exchange of information within a given community, without the intervention of a trusted third party.*

experimental stage. Before its development potential can be confirmed, various conditions will have to be satisfied in terms of security, cost, the ability to process large transaction volumes quickly and even the economic benefits of bypassing trusted third parties in certain activities.

2|2 Cyber crime

With its entry into cyberspace, finance finds itself exposed to cyber crime, that is, offences committed using computer or information networks and aimed at violating an institution's data or systems.

These risks have already been taken on-board by traditional financial firms, on which prudential regulations impose a requirement to have in place protection buffers to cope with shocks of any kind. Financial regulators also strive to ensure the proper design of financial institutions' IT security policies: skill-building and awareness-raising among staff, participation in regular crisis exercises, enhanced protection of internal systems through strict access controls, more extensive data encryption, and the introduction of intrusion-detection tools together with the periodic testing of effectiveness.

However, fintechs, with their Internet-based business models, are especially exposed to cyber risks. Given their small size and financial footprint, the occurrence of such a risk presents for them a clear threat to business continuity which is considerably larger than that to more traditional entities and which could affect the latter when they cooperate with fintechs. Fintechs must fully integrate these cyber risks and draw up IT security policies in line with best market practice. Regulating these risks will entail effective cooperation between the competent authorities not only in France, i.e. the Banque de France, the *Autorité de contrôle prudentiel et de résolution* (French prudential supervisory and resolution authority – ACPR) and the *Agence nationale de la sécurité des systèmes d'information* (National information system security agency – ANSSI), but also at the international level.

2|3 Money laundering and terrorist financing

The new players in this digital era must also be fully subject to the anti-money laundering and counter-terrorist financing (AML/CFT) regulations. Accordingly, these firms need to ensure that their AML/CFT systems are suited to their business and customer base but also to the way in which they commence business relationships with their clients – in general through non-face-to-face procedures – in order to protect against improper or fraudulent use of their innovative solutions.

2|4 Credit risk: for an assisted development of crowdfunding

Financial stability issues related to crowdfunding intermediaries appear limited for the time being given the amounts raised. The banking channel will continue to play an essential role as the primary financing source for small and medium enterprises, and intermediate-sized enterprises. However, it is possible that more vibrant growth will spur the development of large platforms that potentially attract much greater amounts. The regulator must therefore take care to ensure that the development of new financing channels does not undermine financial stability or the legitimate protection of individual investors.

For example, crowdfunding may entail risks related not only to assessing the quality of the project and the financed entity but also to the security and the sustainability of the platform through which the funds are transferred. In France, Order 2014-559 of 30 May 2014 on crowdfunding states that platforms must provide Internet users with all the information needed to assess their investment.[12] Above a certain size, or in the case of cross-border activities, a harmonised European standard is necessary that goes beyond the current patchwork legislation.

12 *This information includes notably the eligibility requirements and criteria for selecting projects and project initiators, the risks incurred by lenders and failure rates for projects (already) presented by the platform, and the liability of each party (lenders, project initiator, crowdfunding intermediaries) in the event of the project initiator's failure.*

The Order of 30 May 2014 also enabled crowdfunding intermediaries to enhance their analysis of financial risks by providing them with broad access to financial information. In particular, it authorised them to consult the Banque de France's companies database (FIBEN), which is a key tool for analysing and monitoring credit risk. This initiative is part of efforts to promote the reliability and the sustainable development of this new financing channel, while addressing financial stability issues.

2|5 Liquidity risk: for a tighter regulation of high-frequency trading

HFT's rapid rise is changing the organisation of equity markets and the business model of trading venues. By providing market liquidity without being subject to regulatory requirements in this respect, HFT traders could crowd out traditional market makers. The latter will be forced to close the technology gap if they wish to continue doing business. At present, though, HFT firms are not subject to any obligations towards exchanges or customers. As a result, the liquidity they supply could abruptly dry up in the event of market stress. Some HFT firms employ strategies that could be likened to new forms of market abuse or manipulation: for example, issuing disproportionate volumes of orders that are not intended for execution in a bid to slow the operation of trading venues and thus more easily take advantage of arbitrage opportunities, has the effect of altering market information.

This technology has increased the speed of information flows which amplifies market volatility and contagion across asset classes. High levels of correlation across many HFT strategies tend to magnify the transmission of shocks. Notably, trading algorithms could respond procyclically to a market event, causing prices and volumes to overreact, creating the risk of a self-fulfilling spiral triggered by cascading trades and potentially even unleashing a flash crash, especially during periods of risk aversion. If HFT firms are hit by heavy losses, their lack of adequate capital buffers could lead to failures, especially since these companies often take similar positions. These failures could then quickly affect their market counterparties.

Indeed, regulations governing the way in which HFT firms conduct their business will soon be introduced in the framework of the revision of the Markets in Financial Instruments Directive (MiFID II). MiFID II should come into force in January 2018 and provides notably for the authorisation of HFT firms and a standardised definition of the tick size, depending on the instruments and their liquidity. The Directive also includes pre- and post-trade transparency obligations that should improve knowledge of HFT activity on platforms and the accuracy of liquidity indicators, as well as robustness requirements for algorithms (stress tests and kill functions) that should enhance market resilience. But, more generally, HFT remains a field where regulators, including in the United States, appear to be persistently behind the curve compared with the firms and the technology. Closing this gap must be a priority of international discussions.

3| In order to reconcile innovation and stability, the Banque de France and the ACPR must adhere to two principles of action

Innovation and stability are rarely compatible, which is also the case in finance. The scope of this new financial ecosystem is not yet stabilised, the horizon for deploying new digital technologies is uncertain, and defining the regulatory framework to be applied to a wide variety of corporates is complex. The regulation of financial services created in the wake of the digital wave must be tailored to its specific risks. In the framework established by the regulator, the central bank and the supervisory authority must ensure that new risks stemming from the digital transformation of the financial system do not hinder them from fulfilling their financial stability mandate and that, all things being equal, innovations clearly strengthen the functioning of the financial system for the benefit of the economy. To this end, we must adhere to two principles of action: an absolute guarantee of payment and transaction security, and a commensurate adaptation of regulations to address the development of fintechs.

3|1 An absolute guarantee: the security of payments and transactions

In the framework of its mandate to oversee the security of payment instruments, the Banque de France strives to promote innovative, effective and safe payment solutions. In this respect, it ensures that the emergence of new players and new solutions does not reduce security.

An initial response can be found in the recent or pending amendments to current European legislation on payment services and markets in financial instruments. For instance, with the emergence of new service providers that were not covered by payment services regulations (see above), a review was undertaken that led to the adoption on 25 November 2015 of Directive (EU) 2015/2366 or the Second Payment Services Directive (PSD2). PSD2 does not impose capital requirements on service providers as they do not hold their customers' funds; but these providers must be covered by a professional civil liability insurance or comparable guarantee.

Well before this, the creation of the Observatory for Payment Card Security in 2001, under the aegis of the Banque de France, already fulfilled these objectives with regard to bank cards. The Observatory's promotion since 2008 of strong authentication solutions for online card payments was effective in contributing to a decrease in fraud rates for this channel (0.248% in 2014 compared with 0.269% in 2013). Its mandate should be extended to all cashless payment instruments, as the Ministry of Finance advised during the National Payment Conference (*Assises nationales des paiements*) that took place in June 2015.

We also endeavour to analyse and assess the resilience of financial institutions and market infrastructures. Since it is impossible to fully guarantee their IT security against a cyber attack, it is important to ensure that they can carry on or rapidly return to business as usual in the event of a malfunction of their IT system. At the international level, under the aegis of the Committee on Payments and Market Infrastructures (CPMI),[13] a report recommending measures to promote the resilience of systemic market infrastructures was issued for consultation in November 2015. Such initiatives must be pursued in all relevant bodies in order to cover other systemic entities (banks, insurance companies, investment funds, etc.).

As regards virtual currencies, the Banque de France issued a warning in December 2013 stressing that it could not guarantee their security, convertibility or value, and that their anonymous nature could promote the circumvention of rules relating to anti-money laundering and counter-terrorist financing. In order to better prevent these risks, the conversion of virtual currencies into legal tender via Internet platforms must be considered – given that legal tender is received, recorded and transferred – to be a payment service requiring the relevant authorisation. The ACPR published a position to that end in early 2014.

Moreover, discussions are underway at the Banque de France, and more broadly at the *Haut Conseil de stabilité financière* (the High Council for Financial Stability), as to how to monitor the development of initiatives concerning blockchain technology, both in terms of the possibilities it offers and the issues it raises notably in terms of security.

3|2 A commensurate adaptation of regulations to address the development of fintechs

Adapting regulations to accompany the dissemination of innovations

The fintech industry raises specific challenges for the regulatory authorities. Their rapid development leads regulators to anticipate and consider the most suitable strategies to ensure consumer protection and address financial stability issues. A balance must be found in terms of regulating these new players in order to avoid stifling the innovations that may be directly or indirectly beneficial to consumers (in the form of new services and a reduction in costs due to their competition with traditional players), and more generally to the economy and society (as they offer a new means to finance the economy).

Although the new players largely offer banking services (means of payment, fundraising, savings management, etc.), their often small size and the

13 https://www.bis.org/cpmi/publ/d138.htm

original and fragile nature of their start-up-like business model raise doubts as to whether banking regulations mainly formulated for mature players should be applied to them. Specific regulations, allowing for a gradual adjustment of regulatory intensity, could be better suited to preventing the risks generated by fintech firms. For example, the regime for payment institutions was amended in France to include the possibility of light-touch authorisation[14] for small institutions with low payment transaction turnover.

Lastly, fintech companies, which mainly operate on the Internet, are not bound by borders. This raises questions as to the regulations that are still largely domestic or based on residency criteria (for example, consumer protection rules). The cross-border nature of technological innovation in the area of banking and financial services is a strong incentive for the regulatory authorities to coordinate their policies at the international level. A European statute could be defined for specific companies with a certain development threshold.

Supervising fintech firms with flexibility and vigilance

It is not always easy to legally qualify certain innovations, as illustrated by discussions on rules applicable to virtual currencies and to their trading platforms, with respect to the notions of payment instruments and payment services. The status applied to new activities can vary somewhat, reflecting a degree of regulatory flexibility to adapt to such activities and modulate the intensity of the supervision. In practice this can be relatively complex for project initiators, which are often IT specialists and more rarely finance professionals. In France for example, 62% of the 55 members of the French fintech association are regulated on the basis of ten or so different statuses.[15] According to their activity, entities are either supervised by the ACPR (71% of regulated entities), or by the *Autorité des marchés financiers* (French Financial Market Authority – AMF) (21% of regulated entities), or by both authorities (8% of regulated entities).

In addition to the simplification of regulations discussed above, a specific treatment must be applied to fintech firms in their authorisation request process in order to: clarify the applicable rules, decide under which regulatory framework projects fall, help compile their authorisation application dossier, etc. Lastly, in a certain number of cases, for example when the business model presented falls within different categories (e.g. investment services and lending or payment services), the dialogue between the national banking and market supervisory authorities must be stepped up in order to assist project initiators as much as possible.

The need to adapt supervision to the specific features of fintech companies will require setting up dedicated teams to assist them with obtaining an authorisation and to organise their supervision: this will be the case in France thanks to the creation of a joint unit between the ACPR and the AMF. This initiative will notably allow new players to identify their correspondent, ask questions and access answers to frequently asked questions. Furthermore, an advisory forum allowing for a continuous dialogue between supervisors and fintech companies will be set up to better understand innovations, in particular to identify necessary changes in regulations and foster the exchange of information between stakeholders.

Conclusion

Digitisation has undoubtedly brought benefits to financial services, in particular in terms of information and quality of execution. In this regard, the development of technological financial innovations is positive. Such innovations also foster the emergence of new processes and new players in the financial services industry. Nonetheless, they also entail risks that need to be addressed. Vulnerability analysis must be enhanced, regulations adapted, the security of transactions maintained, and prudential supervision must be both flexible and vigilant. In the long run, once the experimental phase is over, it will be necessary to ensure that the same rules apply to the same activities, irrespective of the players performing them. In order to ensure a level playing field, financial players must be regulated according to what they do and not what they are. Addressing the growing influence of borderless technology on the financial system will also require an international coordination effort. Such are the challenges that the public authorities will have to meet.

14 *This light-touch regime is a possibility provided for in PSD2.*
15 *Payment institution, electronic money institution, payment service agents, electronic money distributors, investment firms, crowdfunding intermediaries, crowdfunding advisors, etc.*

Abstracts/résumés

This 20th edition of the *Financial Stability Review* (FSR) analyses the new situation created by the digital era of the financial system for financial institutions, markets and regulators: development of information systems, incoming of electronic platforms, sharp increase in algorithm-based transactions, creation of virtual currencies, widespread access for online financial services and online banks… The financial world has not been only altered by the financial crisis, it has also profoundly mutated under the influence of digital innovations. The latter have modified the relationship between institutions in the market and have allowed for more transparency, in particular by providing large quantities of data in various fields. They have also contributed to the fall in costs and the increase in speed both for implementing and transmitting operations. Banks can now externalise activities they were compelled to master themselves beforehand (post-market activities mainly). These changes have an impact on financial stability, a positive impact for some aspects (transparency, efficiency…) but also generating new risks (cyber-vulnerability, regulation arbitrage…). Regulators need to take these changes on board and adapt to them. Modifications have already been decided or even implemented in many areas, in particular as regards payment systems and market infrastructures. Fintechs are more challenging though as their market share is too small for them to induce systemic risks but as their very quick development requires regulators to anticipate what may occur.

This new issue of the FSR provides opportunity to gather views on these topics from international institutions, regulators, scholars and market participants involved in analyses and initiatives related to the digital innovations.

Three main chapters are forming the structure of the FSR:

I) New risks for financial stability
II) Regulation and policies to address these new risks
III) The digital transformation on the financial sector: some concrete examples

The following pages provide abstracts of the articles published in this 20th edition.

New risks for financial stability

Digital banking and market disruption: a sense of *déjà vu*?

Jean Dermine
Professor of Banking and Finance, **INSEAD, Singapore**

The article assesses the threat posed by digital banking as seen in the context of a long series of innovations in the banking sector that includes telephone banking, payment cards, the development of capital markets, internet, smartphones, and cloud computing. It focuses on the economics of banking services and banks' two main functions – as providers of liquidity and loans – and analyses whether these could be displaced by peer-to-peer and marketplace lending.

Digital banking is currently one of the main strategic issues faced by banks in terms of threats and opportunities. It raises also public policy issues: its impact on the profitability and solvency of banks, the protection of borrowers and investors, and the systemic importance of the new players, the fintechs starts-up specialised in financial services.

Digital risk: a strategic challenge and a growth opportunity for insurers

Nicolas Schimel
Director General, **Aviva France**

The insurance sector has always based its business model on the collection and exploitation of data – well in advance of many other industries – and now relies heavily on the computerised storage, use and control of data for its liabilities and, with the emergence of sophisticated financial techniques, for its assets. Actuaries, statisticians, financial managers and IT developers have always invested extensively in data processing and in mitigating the associated risks, so that for a long time the insurance industry was at the forefront in these fields. With the rapid unfolding of the digital age, however, data is now used intensively in all segments of the economy.

That said, the transition to a digital world poses specific and major risks for insurers: firstly from a strategic point of view, in that it could lead to profound changes in their traditional business models; secondly, from the point of view of operational security, as Solvency II has placed them under heightened pressure to ensure their long-term business continuity, making insurance one of the most sensitive sectors in terms of cyber risk, alongside banking and defence. Given the scale of the challenges, the insurance industry has equipped itself with both the means and the skills to tackle these operational risks.

The need to control their own exposure to cyber threats will prove an advantage for insurers, allowing them to play a key role in helping society deal with these risks. The digital transition has already raised the question of how to protect against this new danger, leading to the emergence of the very first cyber insurance policies. At the same time, it poses the challenge of how to provide cover for large or strategic organisations, a highly technical area that opens up opportunities for new, dedicated cyber protection ecosystems.

Systemic risk in payments

Georges Pauget
Chairman, **Économie Finance et Stratégie**

Payment platforms in the retail and market segments have continued to operate without major mishaps during the recent financial crises, coping with occasional spikes in transaction volumes. Although gratifying, these performances must not cause the risks associated with payment platforms to be underestimated. However, an analysis of the systemic risk in payments cannot be confined to the risk associated with these platforms, even if they play a key role within the overall system. The question has to be tackled more holistically by applying the risk analysis methods used in banking and finance to the payments sector. The following article applies these methods to retail payments, an area that is undergoing far-reaching structural change and whose role is to ensure the security and traceability of commercial transactions.

Financial institutions and cyber crime – Between vulnerability and security

QUENTIN GAUMER, STÉPHANE MORTIER AND ALI MOUTAIB
Club cybersécurité, **École de Guerre économique, Paris**

In the current world, financial institutions, like other companies, have become increasingly dependent on their information systems. These systems allow them to conduct business transactions (transfers, account management, withdrawals, etc.) and at the same time exercise control over the information exchanged.

More and more, information is becoming the target of cyber attacks from different groups of cyber criminals. They use strategies such as social engineering (human intelligence, manipulation) or more sophisticated techniques (such as advanced persistent threats – see the case of Carbanak). 2015 was a major year for cyber security actors. The cyber crime events of that year were highly instructive for the banking sector, enabling them to adjust their defence tactics and increase their resilience.

Despite the efforts of security companies and the evolution of CISOs' (Chief Information Security Officer) strategies, cyber criminals are constantly updating their fraud methods. Security actors now have to increase their awareness of cyber crime techniques and enhance their monitoring in order to face the new threats to corporates, including those targeted at the banking sector.

As observed last year, hackers have started to shift towards a strategy where they target financial institutions instead of end-users. There were many examples of attacks on point-of-sale systems and ATMs with a significant financial impact for the banks. The trend should be maintained over the coming years, with hackers increasingly trying to find breaches in stock markets and payment systems.

In addition, cyber criminals are already shifting their focus to smartphones due to the growing use of smart mobile devices. On the one hand, alternative payment systems such as Apple Pay or Google Pay will push hackers to monetise fake stolen credit cards. On the other hand, the spread of transactional malwares on mobile devices is likely to increase markedly.

Improving resilience is a major financial stability issue, as it is vital to prevent cyber attacks or IT failures from escalating into systemic crises. However, creating the best possible protection for financial institutions will never reduce to the risk of a cyber attack to zero. Financial institutions also need to have the best possible plans to resume their activities as quickly and efficiently as possible after a breach in their IT systems.

Where are the risks in high frequency trading?

THIERRY FOUCAULT
Professor of Finance, **HEC Paris**

Progress in information and trading technologies have contributed to the development of high frequency traders (HFTs), that is, traders whose trading strategies rely on extremely fast reaction to market events. In this paper, the author describes HFTs' strategies and how they rely on speed. He then discusses how some of these strategies might create risks for financial markets. In particular, he emphasises the fact that extremely fast reaction to information can raise adverse selection costs and undermine incentives to produce information, reducing market participants' ability to share risks efficiently and asset price informativeness for resources allocation. The author also discusses recent extreme short-lived price dislocations in financial markets (e.g. the 2010 Flash crash) and argues that these events are more likely to be due to automation of trading and structural changes in market organisation rather than high frequency trading *per se*. Throughout he argues that regulation of high frequency trading should target specific trading strategies rather than fast trading in general.

REGULATION AND POLICIES TO ADDRESS THESE NEW RISKS

Making Europe's financial market infrastructure a bulwark of financial stability

YVES MERSCH
Member of the Board, **European Central Bank**

Europe's financial market infrastructure has proved to be resilient through bouts of financial market volatility, supporting the liquidity and stability of financial markets in times of stress. The European Central Bank and the Eurosystem, in conjunction with European legislators and market participants, have made Europe's financial market infrastructure into the bulwark of financial stability it is today. Looking ahead, besides a further deepening of integration, the focus in the further development of market infrastructure is on the impact of technological innovation such as distributed ledger technologies. To deal with the technological and strategic challenges, the Eurosystem has developed three key action points it will work on in the run up to 2020: 1) explore synergies between TARGET2 and T2S, 2) support the development of a pan-European instant payment solution, and 3) review the harmonisation of Eurosystem arrangements and procedures for collateralisation.

Beyond technology – adequate regulation and oversight in the age of fintechs

ANDREAS R. DOMBRET
Member of the Executive Board, **Deutsche Bundesbank**

With the number of financial technology firms, or fintechs, increasing steadily in the age of digitalisation, banks as well as regulators must learn to deal with them. Supervisory authorities must ensure that their supervisory approach produces financial stability and establishes a level playing field for banks and technological innovators. In Germany, a risk-based regulatory approach ensures that no relevant risks remain unregulated – neither those stemming from traditional banks nor those created by fintechs. Traditional established banks, meanwhile, must face up to the challenges posed by these new competitors and ensure that their business models remain profitable. The following paper presents the *status quo* in terms of the regulation of fintechs under the German regulatory framework, assesses challenges for regulated institutions and sheds light on potential future risks.

The rise of fintechs and their regulation

SERGE DAROLLES
Professor, **Université Paris-Dauphine**

The 2008 financial crisis led to a loss of confidence and gave rise to a new financial sector landscape. The emergence of the fintech phenomenon is attracting interest from new generations who are turning their backs on traditional players. The digital adjustment of the banking and financial sector at large is based on a move towards greater productivity through the use of new tools that reduce distribution costs. These developments raise questions as to their impact on banks, the reaction of the latter, and the risks incurred with the emergence of new practices. Regulators are facing new challenges that involve ensuring a level playing field for the different players and protecting users.

The migration to online lending and the rise of private regulation of online financial transactions with business customers

G. PHILIP RUTLEDGE
Chairman, **Bybel Rutledge LLP**
Visiting Professor of Securities Law and Regulation, **BPP Law School**

Regulation of online banking services may be viewed in both a public and private context. The public context concerns governmental regulation of the banking sector and focuses primarily on issues relating to safety and soundness of national financial systems and adequate levels of consumer protection. The private context concerns financial institutions individually and focuses on the allocation of liability between the financial institution and its customers through written agreements pursuant to which it provides banking services.

While governments have been focused on increasing prudential measures for regulated financial institutions in light of the recent financial crisis, less attention has been given to the developing "fintechs" that act either as intermediaries in the online provision and distribution of credit or as online non-depository lenders.

Although government consumer protection regulation has imposed requirements on consumer electronic banking, most of these regulations do not apply to business banking where the bulk of transactions occur. Although these transactions may be subject to national commercial law, many of the terms and conditions are set forth in banking agreements. These agreements become the basis for allocation of liability between the customer and the financial institution, particularly when unauthorised transactions occur due to the security of electronic banking systems being compromised.

This article will focus on the rise of private regulation of online banking services enforced through contractual agreements and the various factors giving rise to this development, including, but not limited to, the lack of effective government regulation of "fintech" providers and the wide variance of security procedures utilised by business customers of financial institutions.

THE DIGITAL TRANSFORMATION OF THE FINANCIAL SECTOR: SOME CONCRETE EXAMPLES

Money and payments in the digital age: innovations and challenges

FRANÇOIS VELDE
Senior Economist and Research Advisor, **Federal Reserve Bank of Chicago**

Virtual currencies like bitcoin are protocols that maintain consensus among participants about legitimate ownership of assets; ownership is transferred by modifying the consensus appropriately. In monetary applications the asset is a chain of transactions in scarce supply because the initiation of valid chains is restricted. Similar protocols, using a variety of methods to establish consensus, could facilitate simple or complex transfers of financial assets and reduce transaction and record-keeping costs, but doing so will require costly changes. Distributed ledgers replace trust between counterparties with trust in the protocol. Regulators will need to adapt their frameworks to ensure that the actors in payments and markets abide existing rule and do not create new risks, but also to protect the trust in the new protocols.

Future evolution of electronic trading in European bond markets

Elizabeth Callaghan
Director, Market Practice and Regulatory Policy; Secondary Markets, **International Capital Market Association**

Bond market trading is going through unprecedented change today and will continue to do so over the next years. The traditional bond trading model, mostly reliant on market makers and voice broking, is being eroded. This is partly due to a natural evolution of bond trading, driven by technological progress and the strive for cost efficiencies, resulting in an increasing electronification of markets. The traditional trading model is, however, also being undermined by regulatory pressures which are reducing the capacity for broker-dealers to hold, finance or hedge trading positions, and thus provide liquidity as market makers. The upcoming implementation of Europe's new trading rules under MiFID II will be another key component exacerbating the scale of the transformation. There are signs of the new market structure to come but no one can predict exactly how the secondary bond markets will look in 5, 7 or 10 years. We can only take an educated guess. What is certain is that bond trading must adapt and innovate in order to endure. This will involve all facets of trading including people, technology and a redirection of business strategy. The change will affect the entire market place: sell-sides and buy-sides, but also trading platforms and other trading technology providers. The bond trading ecosystem will see new (and possibly disruptive) entrants, innovative incumbents and adaptive trading protocols and venues. Although often referred to as an equitisation of fixed income, the changes will take a different shape from that of previous developments in equities given the structural differences between equity and fixed income trading. Overall, the transformation will be painful as regulation and technology are disrupting established market structures, presenting serious challenges for many industry participants. However, the transformation will also create opportunities through innovation for market participants.

Emergence of big data: how will it impact the economic model of insurance?

Thierry Derez
Chairman and CEO, **Covéa**

Improved knowledge of one's clients, new pricing models based on greater risk segmentation, the recent wave of connected objects which paves the way for new personalised services, etc.; the exact contours of the "big data" phenomenon and its potential consequences may appear fuzzy and definitions differ from one person to another. However, there is a unanimously shared feeling that this technological revolution will not spare the insurance sector, and that in a few years business models will probably be widely different to what they have been in the past.

This perception is often associated with the prospect of a demutualisation, resulting from the differentiation to an extreme degree of insurance offers and prices from one person to another. While the development of new technologies and the exacerbation of competitive pressures could actually result in much finer segmentations than what is now the case, this fear must however be put into perspective. Besides the regulatory constraints that are present and do not appear to be on the decline, an extreme segmentation would go against the very interests of insurers, creating excess risk and profit volatility.

Structural changes will also arise from the new types of relationships between insurers and their policyholders (when taking out a policy and, even more so, throughout the life of the insurance contract). In the longer term, the changes in the actual underlying risks could constitute structural breaking points of economic insurance models. The announced development of the driverless car is a perfect example.

In this context, access to data will be of decisive importance and may eventually have an impact on financial stability. It therefore seems essential to define clear rules for accessing these data, based on self-determination and individual freedom of choice.

Big data challenges and opportunities in financial stability monitoring

MARK D. FLOOD
Research Principal, **Office of Financial Research, US Department of the Treasury**
H. V. JAGADISH
Bernard A. Galler Collegiate Professor of Electrical Engineering and Computer Science, **University of Michigan**
LOUIQA RASCHID
Professor of Information Systems, **University of Maryland**

The exponential growth of machine-readable data to record and communicate activities throughout the financial system has significant implications for macroprudential monitoring. The central challenge is the scalability of institutions and processes in the face of the variety, volume, and rate of the "big data" deluge. This deluge also provides opportunities in the form of new, rapidly available, valuable streams of information with finer levels of detail and granularity. A difference in scale can become a difference in kind, as legacy processes are overwhelmed and innovative responses emerge.

Despite the importance and ubiquity of data in financial markets, processes to manage this crucial resource must adapt. This need applies especially to financial stability or macroprudential analysis, where information must be assembled, cleaned, and integrated from regulators around the world to build a coherent view of the financial system to support policy decisions. We consider the key challenges for systemic risk supervision from the expanding volume and diversity of financial data. The discussion is organised around five broad supervisory tasks in the typical life cycle of supervisory data.

Implementation of real-time settlement for banks using decentralised ledger technology: policy and legal implications

KAREN GIFFORD
Special Advisor for Global Regulatory Affairs, **Ripple**
JESSIE CHENG
Deputy General Counsel, **Ripple**
Vice Chair, **Payments Subcommittee of the American Bar Association Business Law Section's Uniform Commercial Code Committee**

A wave of innovation is occurring in financial technology, affecting products and services offered to consumers and businesses as well as financial market infrastructures such as payment and settlement systems. These innovations taken together have the potential to vastly lower the cost of financial transactions, resulting in a qualitative shift analogous to the advent of the internet in the 1990s, supporting international financial inclusion and enhancing global systemic stability. We refer to both the current set of innovations bringing about the shift we describe, as well as future innovations built on these new technologies, as the *Internet of Value* (IoV).

Just as the internet ushered in an era of rapid innovation, economic growth and productivity gains, the potential promise of the IoV includes greater prosperity, financial access, stability and further innovation; however, appropriate industry, regulatory and policy support will be needed in order to achieve this promise.

This paper examines one recent financial innovation, decentralised ledger or *blockchain* technology, and considers the legal and policy ramifications of one of its most widely-discussed use-cases: real-time settlement in bank-to-bank payments. Our analysis focuses on two elements, trust and coordination, both of which are fundamental to current payments laws and rules. Decentralised ledger technology replaces certain operational and even legal elements of the current payment system; yet trust and coordination continue to be relevant considerations. Creation and adoption of appropriate policy and legal frameworks are key to optimising the potential benefits of this technology.

High-frequency trading, geographical concerns and the curvature of the Earth

Fany Declerck
Professor of Finance, **Toulouse School of Economics**

For high-frequency traders, fragmentation, information, speed and proximity to markets matter. On today's financial markets each nanosecond may count; therefore, an arms race is more likely as traders, venues or investors compete to see who can be fastest. The theoretical literature also demonstrates that fast traders can cause more adverse selection against slower traders and can impair long-run asset price informativeness. In this set-up, regulators and empiricists are now facing major challenges. Most evidence suggests that high-speed trading has led to improvements in liquidity and price discovery. Trading on advance information is nonetheless significant. Finally, the "slice and dice" trading strategy implemented by institutional investors does not seem fully appropriate to avoid the risk of detection by fast traders. Indeed, if, during the first hour following the order submission, high-speed traders act as market makers, they then increase trading costs for the institutional trader.