Volume 8 – Part 1 – 2019 ISSN 2050-9014

LAW AND ECONOMICS YEARLY REVIEW

ISSUES ON FINANCIAL MARKET REGULATION, BUSINESS DEVELOPMENT AND GOVERNMENT'S POLICIES ON GLOBALIZATION

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FONDAZIONE CAPRIGLIONE Onlus

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Queen Mary University of London

LAW AND ECONOMICS YEARLY REVIEW

www.laweconomicsyearlyreview.org.uk

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ISSN 2050- 9014

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CONTENTS

FOCUS ON GLOBAL PERSPECTIVES

ARTIFICIAL INTELLIGENCE AND AUTOMATION IN FINANCIAL SERVICES: THE CASE OF RUSSIAN BANKING SECTOR

Ilya A. Goncharenko [*] - Andrea Miglionico [**]

ABSTRACT: *This article discusses the impact of innovation in the Russian banking sector. This innovation, often referred to as FinTech, comprises cryptoassets, artificial intelligence and RegTech (i.e., applications of digital technology by regulation and compliance actors). The aim of the article is to examine the importance of the new frontiers of technologies in financial services like smart contracts, peer-to-peer lending and crowdfunding platforms. In this context, the article analyses the evolution of artificial intelligence in Russia with emphasis on robotics and automated mechanisms implemented in the financial firms. It also provides an overview of the initiatives of the Central Bank of Russia and their main effects in the payment system. The implications of machine learning and automation are discussed in terms of monetary policy, prudential regulation and investor protection.*

1. Financial technologies (FinTech) aim to support regulation in the finan-

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This article is a result of joint research. Sections 1, 2 and 3 have been written by A. Miglionico; sections 4, 5 and 6 have been written by I. Goncharenko.

cial markets with the use of algorithm and computer systems.[1] FinTech also aims to reduce regulatory and compliance costs by enhancing operational efficiency and product development. This is evident in specific areas of financial services such as prudential regulation, customer protection, disclosure mechanisms, market integrity and competition.[2] A case in point of the application of FinTech is represented by the banking sector. FinTech encompasses risk management and minimises reputational risk, legal risk and operational risk in the financial market: it provides innovative solutions to improve the regulatory framework and the compliant behaviour of financial firms (e.g. natural language processing and cognitive computing).[3] However, the adoption of cloud-based systems and data mining techniques in FinTech underlines the problem of the necessary intervention of supervisors to avoid fraudulent activities and ensure data protection and privacy.

For example, the UK Financial Conduct Authority (FCA) has launched automated practices – i.e., "sandbox" – to develop technologies in performing compliance programmes, particularly in sectors such as anti-money laundering (AML) and 'know your customers' (KYC).[4] This section examines the impact of FinTech – automating regulation and supervision – in the financial market and considers whether the current rules are amenable to algorithmic treatment and what will be the impact on the quality of regulation and the exercise of judgement by the supervisory authority. In this context, the main aspects are international compliance using technology to address the challenge of making single contracts comply with multiple regulatory jurisdictions, and suitability of the current statement of rules and regulations for automation. Automating regulatory compliance does not apply

[1]See DOUGLAS W ARNER, JANOS NATHAN BARBERIS AND ROSS P BUCKLEY, 'The Evolution of Fintech: A New Post-Crisis Paradigm' (2015) 47 *Georgetown Journal of International Law* 4, 1271.
[2]See BUTLER and O'BRIEN, 'Understanding RegTech for Digital Regulatory Compliance' in Theo Lynn, John G. Mooney, Pierangelo Rosati and Mark Cummins (eds), *Disrupting Finance FinTech and Strategy in the 21st Century* (London: Palgrave 2019).
[3]See LEWAN, 'The Role of Trust in Emerging Technologies' in Robin Teigland, Shahryar Siri, Anthony Larsson, Alejandro Moreno Puertas and Claire Ingram Bogusz (eds), *The Rise and Development of FinTech* (London: Routledge 2018) 111-112.
[4]Financial Conduct Authority, 'Regulatory sandbox', available at <https://www.fca.org.uk/firms/regulatory-sandbox> (accessed 27 June 2019).

mechanically, therefore it is relevant to investigate to what extent the UK Prudential Regulation Authority (PRA) can modify the rules. The use of algorithmic regulation to guarantee fairness and appropriateness of insurance, ensuring there is contractual certainty to avoid poor outcomes for customers is a key aspect as well as the use of technology to guarantee quality, suitability and competition in insurance products e.g. at point of sale for consumer durables. Interesting point is whether FinTech affects firms' compliance functions – i.e. if technologies improve or they blindly rely on the algorithm and if the algorithm is not perfectly designed may lead to problems – and whether the use of FinTech automatically excludes certain classes of consumers.

The prudential sourcebook for the UK financial industry offers evidence to discuss the extent to which these aspects can be addressed through principles and to examine which elements of regulation can potentially be most easily automated.[5] Specifically, it is relevant to consider whether the statements of these elements of regulation are 'algorithm ready', i.e. they are presented in a way that would allow automated software-based compliance and reporting compliance.[6] This means to investigate under what circumstances should we entrust 'x', 'y', 'z' tasks to algorithmic decision-making and under what circumstances should we entrust 'a', 'b', 'c' issues to human decision making. A further issue concerns the generation of new risks that derive from the use of FinTech. It is worth considering the role of supervisory judgement and how it will be affected by the introduction of FinTech applied to banking sector and whether automation will reduce or support the role of judgement and the application of principles in banks.[7]

FinTech aims to provide clarity and create a shared understanding around rules and data through virtual platforms: rules are transformed into code, auto-

[5]FCA, 'Prudential sourcebook for Banks, Building Societies and Investment Firms' (June 2019), available at <https://www.handbook.fca.org.uk/handbook/BIPRU.pdf> (accessed 16 June 2019).
[6]See NICOLETTI, *The Future of FinTech: Integrating Finance and Technology in Financial Services* (London: Palgrave 2017) 261-262.
[7]See COLAERT, 'RegTech as a response to regulatory expansion in the financial sector' (16 July 2018) Oxford Business Law Blog, available at <https://www.law.ox.ac.uk/business-law-blog/blog/2018/07/regtech-response-regulatory-expansion-financial-sector> (accessed 26 June 2019).

mating the process can allow regulators to request data and for firms to quickly and simply share it without the need to interpret.[8] While machines can process data far more quickly than humans, they typically rely on more limited types of information. The challenge is how investors ensure that the machine has enough information about the world within which it is operating and how machines make critical decisions.[9] In this context, it is important to explore whether regulation is machine readable into programmes when process data and computer code can ensure adequate consumer protection. Arner et al. argue that the focus of FinTech should be to transform financial regulation as well as achieve efficiency gains.[10] Lastra and Allen observe that FinTech tools are an essential component in the regulatory response to virtual currencies and associated developments, such as 'smart contracts'.[11] Although machines may be more reliable than humans, new risk can be generated into systems.[12] Financial institutions face substantial difficulties to comply with regulation in different jurisdictions, therefore the question arises whether the current statements of regulatory provisions are suitable for automation.

The range of digital technologies used in financial services is very broad, including for example household and small business lending, online and mobile payments, insurance, capital market transactions, wealth management and regulatory reporting and compliance. Likewise, a wide range of digital initiatives seek to promote 'financial inclusion', i.e. widening access to banking and

[8]See DHAR and M STEIN, 'FinTech Platforms and Strategy' (2017) 60 *Communications of the ACM* 10, 32-33, available at <https://cacm.acm.org/magazines/2017/10/221331-fintech-platforms-and-strategy/abstract> (accessed 29 June 2019).
[9]See Marshall W Van Alstyne, Geoffrey G Parker and Sangeet Paul Choudary, 'Pipelines, Platforms, and the New Rules of Strategy' (April 2016) 94 *Harvard Business Review* 4, 54-55.
[10]See Douglas W Arner, Jànos Barberis and Ross P Buckey, 'FinTech, RegTech, and the Reconceptualization of Financial Regulation' (2016) 37 *Northwestern Journal of International Law & Business*, 371.
[11]See LASTRA and GRANT ALLEN, 'Virtual currencies in the Eurosystem: challenges ahead' European Parliament, Monetary Dialogue, July 2018, available at <http://www.europarl.europa.eu/cmsdata/150541/DIW_FINAL%20publication.pdf> (accessed 26 June 2019).
[12]See Ross P. Buckley, Douglas W. Arner, Dirk A. Zetzsche and Rolf H. Weber, 'The road to RegTech: the (astonishing) example of the European Union' (2019) 20 *Journal of Banking Regulation*, 2-3.

insurance services both for vulnerable households and small businesses.[13] Access to technology enacts financial inclusion that "denotes banks' provision of basic financial services at affordable costs to those that need and qualify for them".[14] With the advent of FinTech, it has been said that lenders will have more information to assess the credit quality of borrowers and to make decisions on whether (and how much) to lend more quickly.[15] This raises the following points: (1) impact of FinTech on financial industry structure, organisation and business models; (2) household and business attitudes to financial services and adoption of FinTech; (3) promoting financial inclusion using financial technology in low and middle-income countries (for example the use of mobile phone payments and the promotion of financial inclusion in East Africa)[16]; (4) the consequences of new forms of data and algorithmic processing in financial services; and (5) regulatory applications of FinTech, for example, how it might be used to support regulatory objectives and whether it can be used to manage financial instability.

Stakeholders and policymakers are paying close attention to developments in FinTech, both because of the perception that they should support domestic capacity in what is a nascent and rapidly growing new industry with potential global impact, and because digital technology can address some of the perceived shortcomings of the traditional financial services industry (e.g. lack of consumer protection, weaknesses in governance, gaps in compliance and improved provision to previously underserved regions). As mentioned, issues arising from digital technology and financial inclusion are wide ranging and require regulatory attention, especially in the context of AML, combating the financing of terrorism (CFT) and KYC requirements. These issues underline several economic, regulatory,

[13]See GABOR and BROOKS, 'The Digital Revolution in Financial Inclusion: International Development in the Fintech Era' (2017) 22 *New Political Economy* 4, 423-424.
[14]See LEE, 'Financial Inclusion: A Challenge to the New Paradigm of Financial Technology, Regulatory Technology and Anti-Money Laundering Law' (2017) 6 *Journal of Business Law*, 473-474.
[15]See HODGE, 'The Potential and Perils of Financial Technology: Can the Law adapt to cope?', The First Edinburgh FinTech Law Lecture, University of Edinburgh, 14 March 2019, available at <https://www.supremecourt.uk/docs/speech-190314.pdf> (accessed 28 June 2019).
[16]It is referred to mobile payments technologies in emerging markets, mostly relating to the successful MPesa network in East Africa.

legal and social concerns (cybercrime, data protection, privacy, adequate dispute settlement mechanisms and crisis management procedures).[17] FinTech highlights challenges in the regulatory framework in terms of the interpretation of "smart contracts", attribution of responsibility for the acts and omissions of robots and enforcement of contractual obligations. Further, FinTech raises major data issues that relate closely to the accompanying think piece on data infrastructure.[18] Identity, security, data privacy and their regulation are all central concerns for financial services firms. Enhancing the appropriate public policy on financial data and the availability of 'open data' for use by other financial firms, investors and other 'stakeholders' represent the main challenges for market actors.

2. Regulatory technology (RegTech) can be considered as the new paradigm of supervision and enforcement in the financial sector. The emergence of RegTech – the use of financial technologies to automate regulation and reduce the costs of regulatory compliance – represents a major opportunity for addressing the inefficiencies of financial regulation.[19] RegTech aims to enhance the effective implementation of principles among financial institutions: for example, it facilitates the monitoring of bank capital rules with the use of automated machines.[20] The extent to which compliance with regulation can be automated and carried out by machines raises the question whether manual intervention is still required.[21] The supervisory authorities are exploring RegTech platforms to expedite regulatory and management controls and mechanisms for enforcement of private con-

[17]See ACEMOGLU, OZDAGLAR and TAHBAZ-SALEHI, 'Systemic Risk and Stability in Financial Networks' (2015) 105 *American Economic Review* 2, 564–565.
[18]See ROMĀNOVA and KUDINSKA, 'Banking and Fintech: A Challenge or Opportunity?' in Simon Grima, Frank Bezzina, Inna Romānova and Ramona Rupeika-Apoga (eds), *Contemporary Issues in Finance: Current Challenges from Across Europe*, Contemporary Studies in Economic and Financial Analysis, Volume 98 (Emerald 2016) 21-22.
[19]See SILVERBERG, PORTILLA, FRENCH, VAN LIEBERGEN and VAN DEN BERG, 'Regtech in Financial Services' (2016), available at <https://www.iif.com/system/files/regtech_in_financial_services_solutions_for_compliance_and_reporting.pdf> (accessed 12 June 2019).
[20]See TRELEAVEN, 'Financial Regulation in FinTech' (2015) 3 *University College London Journal of Financial Perspectives* 3, 114-115.
[21]See VAN LIEBERGEN, 'Machine Learning: A Revolution in Risk Management and Compliance?' (2017) 45 *Journal of Financial Transformation*, 60-61.

tracts. However, the application of technological solutions to reduce compliance costs and avoid gaps in supervising financial activities may interfere with the manual intervention of regulators.[22] The adoption of RegTech in automating regulation and supervision, particularly in sectors such as anti-money laundering and 'know your customers', implies a shift from principle based to rules-based regulation.[23] RegTech can promote more substantive compliance processes, ensure information disclosure and contractual certainty and predictability as an incentive to prevent risk-taking and can reduce discretion, particularly in terms of an adequate level of enforcement of principles.[24]

Further, RegTech eliminates the possible risks of compliance failures that consist, on the one hand, of creative compliance (i.e. where although the letter of the norm is adhered to, it is sometimes interpreted over-generously) and, on the other, of over-compliance (i.e. over-regulation or additional burdensome levels of enforcement). RegTech can be well-functioning on the basis of trust and fairness behaviours, which means confidence, transparency and cogent acts and it can strengthen substantive compliance that represents the key objective for fostering responsive regulation. In promoting a new compliance culture RegTech encompasses risk management but it also reduces reputational risk, legal risk and operational risk in banking industry and banking products.[25] Firms and financial institutions have recognised the importance of RegTech particularly as regards internal controls, where the relationship between administrators, managers and investors finds its best expression in a species of self-imposed rules designed to reduce the reputational risks posed by non-compliant behaviours. It has been argued that

[22]See SITARAMAN, 'Regulating Tech Platforms: A Blueprint for Reform' (April 2018), "The Great Democracy Initiative 2018", Vanderbilt University Law School, Legal Studies Research Paper Series 18-64, available at <https://greatdemocracyinitiative.org/wp-content/uploads/2018/03/Regulating-Tech-Platforms-final.pdf> (accessed 14 June 2019).
[23]See GESLEVICH PACKIN, 'RegTech, Compliance and Technology Judgment Rule' (2018) 93 *Chicago-Kent Law Review*, 207-208.
[24]See KAVASSALIS, STIEBER, BREYMANN, SAXTON and JOSEPH GROSS, 'An Innovative RegTech Approach to Financial Risk Monitoring and Supervisory Reporting' (2017) 19 *The Journal of Risk Finance* 1, 39-40.
[25]See KIM, YOUNG-JU PARK and CHOI, 'The Adoption of Mobile Payment Services for Fintech' (2016) 11 *International Journal of Applied Engineering Research* 2, 1058–1061.

'RegTech could make compliance easier: rather than writing rules in legal English the regulator could write rules in machine-readable English or prescribe particular software applications'.[26] Opportunistic behaviours by market participants could be avoided by means of the regulatory technologies – e.g. blockchains and smart contracts – as a measure falling within the category of internal self-controls, which could limit the need to regulate by statutory law and reduce mandatory disclosure costs.[27]

RegTech can be used to prepare regulatory reports (e.g., market conduct annual statements). The FCA launched an initiative for 'Model Driven Machine Executable Reporting' to prove that if parts of their handbook were coded (so they became machine readable) this could streamline regulatory reporting and not only save ambiguity (but not judgement) time and costs associated with this compliance activity but also allow more uniform and accurate reporting and allow both regulatory and industry participants to identify and manage associated risks.[28] In substance, whilst the disclosure regime reduces the costs of capital and information, RegTech enables perfect alignment of manager and investor interests. On this view, the parameters of the regulatory technologies become not only a legal norm, but predominantly, a social norm; on the one hand, it is a legal norm for verifying that the corporate management has complied with the rules, on the other, it is social norm designed to transform risk prevention into benefits for investors and consumers.[29] RegTech not only assumes a normative value but also constitutes a useful measure for enforcing principles. The role of RegTech, as an *ex ante* legal measure to prevent the risks of statutory enforcement loopholes, be-

[26]See MICHELER and WHALEY, 'Regulatory Technology – Replacing Law with Computer Code', LSE Working Papers 14/2018, 8, available at <http://eprints.lse.ac.uk/89550/1/Micheler%20SSRN-id3210962.pdf> (accessed 29 June 2019).
[27]See H Y. CHIU, 'A New Era in Fintech Payment Innovations? A Perspective from the Institutions and Regulation of Payment Systems' (2017) 9 *Law, Innovation and Technology* 2, 190-191.
[28]FCA, 'Model driven machine executable regulatory reporting TechSprint' (20 November 2017), available at <https://www.fca.org.uk/events/techsprints/model-driven-machine-executable-regulatory-reporting-techsprint> (accessed 27 May 2019).
[29]See CARNEY, 'New Economy, New Finance, New Bank', Speech given at the Mansion House, London, 21 June 2018, available at <www.bankofengland.co.uk/speeches> (accessed 25 June 2019).

comes an important link between the rules-based and principles-based regulatory approaches by conveying these types of regulation into the risk-based regime.[30]

3. FinTech holds the promise of addressing fundamental problems of resource misallocation and social and economic inequity in financial services.[31] Supporting the continuing 'information technology revolution' in financial services, especially in addressing barriers such as the constraints of legacy systems and need for co-operation, e.g. on standardisation and on effective digital identity solutions, is the new challenge of regulators.[32] However, there is little consensus amongst practitioners and policymakers on how technological change can shape the industry in the longer term, both in terms of industrial structure and regulation.[33]

For example, processes for KYC compliance are costly and time-consuming with extraordinary fines for non-compliance. By implementing RegTech solutions such as a distributed shared ledger, a business can rapidly verify the identity of its clients and assess potential risks of illegal intentions for the business relationship.[34] RegTech can increase the speed of client on-boarding, reduce risk as a distributed shared ledger acts as an immutable assured audit trail of all KYC processes, enhance the customer experience (as little customer input is needed for on-boarding), and bring efficiency gains as RegTech enables businesses to scale higher

[30]See KRÖNER, 'API Deep Dive: Who Will Thrive in an Open Banking World? Why Meeting Regulatory Requirements Is Not Enough for Banks to Remain Relevant' (2018) 2 *Journal of Digital Banking* 3, 198-199.
[31]See MADER, 'Microfinance and Financial Inclusion' in David Brady and Linda M. Burton (eds), *The Oxford Handbook of the Social Science of Poverty* (Oxford: OUP 2016) 844-45.
[32]See SÁNCHEZ, 'The Information Technology Revolution and the Unsecured Credit Market' (2018) 56 *Economic Inquiry* 2, 914-915.
[33]See POLLARI, 'The Rise of Fintech: Opportunities and Challenges' (2016) *The Australasian Journal of Applied Finance* 3, 15.
[34]Distributed ledgers operate through the maintenance of multiple shared copies of the database which avoids single point attack or failure as with existing large legacy IT systems. Distributed ledger technologies can be used to allow governments to collect taxes, deliver welfare benefits, issue passports and control immigration, maintain land registries as well as manage the supply of goods and services and ensure the integrity of government records and services. For an overview, among others, Kern Alexander, *Principles of Banking Regulation* (Cambridge: CUP 2019) 342.

customer volume more efficiently.[35] In this context, Natural Language Generation (NLG) can be used to automate the generation of regulatory AML reports, e.g., suspicious activity reports (SARs).[36] Large institutions generate thousands of SARs every year, so AML compliance costs can be substantial. NLG enables compliance teams to automatically identify the most interesting and important information trapped in structured data and produce language that provides situational context, explanations and potential next actions. With advanced NLG systems, like 'Narrative Science Quill', the SAR Narrative can be automatically generated, while communicating the key 'who, what, when, and where' aspects of the suspicious activity and can also be tailored to meet the needs of the intended audience.[37]

In terms of fraud insights, artificial intelligence (AI) can be used to reduce occurrences of fraud (internal and external) using Natural Language Processing (NLP) to uncover hidden patterns and anomalies in large quantities of text (outlier and drift detection) to flush out suspicious claims.[38] NLP can be used to extract regulations and identify regulatory and control requirements (i.e. legislation/regulation 'gap' analysis tools). Telephone conversations, face-to-face meetings and written correspondence provide invaluable information for optimising regulatory compliance, risk management, customer care and sales.[39] There are many practical implementations of neural networks and other automated meth-

[35]See LOOTSMA, 'Blockchain as the Newest Regtech Application— the Opportunity to Reduce the Burden of KYC for Financial Institutions' (2017) 36 *Banking & Financial Services Policy Report* 8, 16-17.

[36]A typical SAR has five components; the first four can be auto populated by many case management systems, however the last portion, the SAR Narrative, cannot. See Max Gotthardt, Dan Koivulaakso, Okyanus Paksoy, Cornelius Saramo, Minna Martikainen and Othmar M. Lehner (eds), 'Current State and Challenges in the Implementation of Robotic Process Automation and Artificial Intelligence in Accounting and Auditing' (2019) 8 ACRN *Oxford Journal of Finance and Risk Perspectives*, Special Issue Digital Accounting, 32-33.

[37]See https://narrativescience.com/products/quill/ (accessed 10 July 2019).

[38]For example, IDVision is a RegTech company developing a set of solutions to verify consumer identities to establish identity with greater confidence by verifying against a broad set of personal and digital data and authenticate consumers, securing every point of the customer's journey by validating the claimed identity is who they say they are. In literature, among others, see Mikko Riikkinen, Hannu Saarijärvi, Peter Sarlin, Ilkka Lähteenmäki, 'Using artificial intelligence to create value in insurance' (2018) 36 *International Journal of Bank Marketing* 6, 1145-1146.

[39]Recordsure is a RegTech company currently pioneering tools that automate the assessment of a conversation and identify potential compliance risks: insurers could analyse up to 100 per cent of customer calls rather than the fraction of calls typically analysed by humans.

ods of data analysis for applications in credit, investment and trading decisions, sometimes with substantial industry impact (e.g. the rise of algorithmic and high-frequency trading in equity markets).[40] Using technology-based computation to improve regulation, for example in detecting insider trading, is conducted primarily by private firms. Ensuring that the above-mentioned systems and controls are independently assessed and tested for effectiveness at an appropriate frequency - and ensuring there is a clear allocation of responsibilities in the first and second line for monitoring compliance - are the main challenges regulators may face. In this way, every firm is responsible for interpreting regulation and implementing its requirements. Shifting the responsibility for converting regulation into code to a central body raises questions about the legal basis of the coded regulation and liability questions about who is responsible if there are errors in the conversion.

Regulators are only at the first stages of using technology in financial regulation, a major aspect of their work involving efforts to translate parts of the regulatory rule-book into machine-readable form.[41] While this provides a 'proof of concept', it is relevant to identify what parts of the current range of regulations can be translated into a machine-readable form that can then be enforced algorithmically for rethinking regulatory process to make it more suitable for automated compliance.[42] For example there is widespread industry interest in using a shared third-party for KYC regulations to share identity information; but it appears that these can make limited progress as long as responsibility for compliance remains solely that of the firms that use them with no possibility of regulatory and legal indemnity.[43]

The burden of regulatory compliance may though still be a major barrier to

[40]See CHABOUD, CHIQUOINE, HJALMARSSON and VEGA, 'Rise of the Machines: Algorithmic Trading in the Foreign Exchange Market' (2014) 69 *The Journal of Finance* 5, 2045-2046.
[41]See BENNETT, 'The financial industry business ontology: Best practice for big data' (2013) 14 *Journal of Banking Regulation* 3-4, 256-257.
[42]See BAXTER, 'Adaptive Financial Regulation and RegTech: A Concept Article on Realistic Protection for Victims of Bank Failures' (2016) 66 *Duke Law Journal* 3, 570-571.
[43]See MOYANO and ROSS, 'KYC Optimization Using Distributed Ledger Technology' (2017) 59 *Business & Information Systems Engineering* 6, 411-412.

technology-based entry into financial services. However, RegTech can increase competition in the financial services to the benefit of consumers by lowering barriers to entry in the market for personal current account and payments systems (technological change in bank delivery channels e.g. through ATM, telephone or online banking or on the network economics of card payments).[44] It can be argued that the new generation of financial technologies is an opportunity for rethinking and substantially improving the entire framework of financial regulation. However, the disadvantages of using RegTech are the initial cost, risk of error in the system, risk of over-reliance and increased systemic risk if all firms follow similar artificial intelligence solutions that lead to highly homogeneous market behaviour.

Next section discusses the implications of AI and automation in the Russian banking sector: the analysis shows how commercial banks in Russia are implementing financial technologies in their internal governance to deal with frauds and cyberattacks.

4. Russian legislation gives two specific definitions of artificial intelligence (AI): (1) "artificial intelligence" is simulated (artificially reproducible) intellectual activity of human thinking[45]; (2) "component artificial intelligence" is a simplified version of artificial intelligence implemented in the subject-information form, allowing simulation of individual components of natural intellectual thinking.[46] Even though both definitions backdate to 2009, the issue of AI raised concerns in the Russian banking sector.

President Vladimir Putin pointed in the annual message to the Federal Assembly[47] on February 2019 that "we already have examples of successful innovative companies. We need to have much more of those including in such spheres as

[44]See ANAGNOSTOPOULOS, 'Fintech and regtech: Impact on regulators and banks' (2018) 100 *Journal of Economics and Business*, 7-8.
[45]"GOST P 43.0.5-2009. National standard of the Russian Federation. Information support for equipment and operator activity. Process of information exchange in technical activities. General provisions" (established and enacted by an Order of Rostechregulirovaniye dated 15.12.2009 N959-st), available at <http://www.consultant.ru> (accessed 01 July 2019).
[46]Ibid.
[47]Official name of both chambers of the Russian Parliament.

artificial intelligence".[48] Russian President also suggested to start a full-scale programme in the AI sphere at a national level. Therefore, the issue of AI is becoming one of the mainstreams in Russia for the years to come. This has been a major objective in the council "On development of technology in the AI sphere" where it was pointed by the President on May 2019. The results of this council were approved by the Russian President through several orders[49]:

- Ministry of Digital Development, Communications and Mass Media of the Russian Federation together with Sberbank of Russia PLC and Gazprom oil PLC, public company Management Company for the Russian Foundation of Direct Investment shall provide for the expert society to review a draft National strategy for the development of technology in the AI sphere in the Russian Federation;
- Russian Federation Government shall provide for a draft National strategy for the development of technology in the AI sphere in the Russian Federation, conciliated with the interested state bodies, to be submitted in an established order together with a draft Presidential Decree on approving this strategy;
- Russian Federation Government shall conclude agreements of intent between Russian Federation and interested state corporations and companies with state participation, including Sberbank PLC, State corporation RosAtom, State corporation RosTech, Rostelecom PLC and Russian Railways public company for the purposes of developing specific high-tech directions;
- within the framework of national programme "Digital economy of the Russian Federation" to establish a federal project aimed at fulfilling national strategy to develop technology in the AI sphere in the Russian

[48]Russian Federation President's Message to the Federal Assembly dated 20 February 2019, available at <http://www.consultant.ru> (accessed 25 May 2019).
[49]List of orders as a result of a council "On development of technology in the AI sphere" (approved by the Russian President on 12.06.2019 N Pr-1030), available at <http://www.consultant.ru> (accessed 20 June 2019).

Federation, which would include a three years plan of activities;

- Together with Moscow city Government and Sberbank of Russia PLC to consider creating a territory within Moscow to operate under experimental legal regime and to have conditions necessary to develop and implement technology in the AI sphere.

Most interestingly the Central Bank of Russia is not involved in the mentioned process but Sberbank (the biggest commercial bank in the Russian Federation) deals with financial innovation. In 2017 Chairman of the Bank of Russia Mrs Nabiullina commented at the XV International Banking Forum that digital technology was a third factor of competition, together with an increased financial affordability, decrease of costs to process information and to channel sales, increased clients satisfaction and access to new markets.[50] Nabiullina argued that digitalization was a powerful trend, which would only build up making Russian financial market more and more exterritorial and hence competitive. Thus, only the banks with developed technological platforms and business models focused on the use of AI elements, high level of robotization of business processes, remote client servicing in minimum response time mode would gain market advantages and conversely, the banks – "latecomers" in the digital revolution risk to lose clients and, as a result, income.

Currently the Central Bank of Russia tends to consider AI only from the point of view of threats of cyberattacks, as it is not that important which technology would develop in the future: automation or robotization. It is more important for the Central Bank of Russia to understand which technology and methods can be used by an intruder (for instance to withdraw money). If they see that criminals learns to quickly withdraw money through a particular channel, then the Central

[50]Chairman of the Bank of Russia Mrs Elvira Nabiullina' speech at the XV International Banking Forum on 14.09.2017, available at <http://www.cbr.ru/press/st/press_centre/nabiullina_170914/> (accessed 05 July 2019).

Bank would build up additional security measures in that very direction.[51] Nevertheless, the Central Bank admitted in its Report on development of banking sector and banking supervision in 2018[52] that from the point of view of opportunities and challenges while developing banking technologies financial technology and innovation become an integral part of the banking sector by changing banks' operational processes, services they offer and mechanisms to interact with their clients, that they use. At the same time banking services actively switch for a digital space, which creates several risks for the banks also from the point of view of a growing number and complexity of cyberattacks. In 2018 there were the following trends in the Russian banking sector:

- digital transformation of the banking sector in the part of internal processes and channels to interact with the clients;
- increased competition from new financial market players, including FinTech companies and large technology companies;
- the use of AI technology to collect information about clients, to ameliorate services and render personalized services;
- increased importance of big data analysis, including the use of machine learning technologies;
- increased investment into cybersecurity.[53]

5. As mentioned earlier a pioneer for using AI in the banking sphere in Russia is Sberbank which is at the forefront of deploying digital technology and it is transforming its in-house technological platform and creating a major, industrial-scale IT system. The bank has nine innovative laboratories operating in key areas such as AI and machine learning, virtual and augmented reality, blockchain, robot-

[51]First deputy Head of Department for information security at Central Bank of Russia, Artem Sychev's interview to IA "TASS", 21.06.2019, available at <http://www.cbr.ru/press/int/sychev_tass_2019-06-21/> (accessed 05 July 2019).
[52]Central Bank of Russia's Report on development of banking sector and banking supervision in 2018, available at <http://www.cbr.ru/content/document/file/72560/bsr_2018.pdf> (accessed 03 July 2019).
[53]Ibid.

ic technology, robotization and gamification.[54]

Firstly, Sberbank develops specialized automated systems to work with toxic assets.[55] They carry out R&D projects on their own and exchange experience from other Russian commercial banks on a regular basis. Another sphere of AI development in Sberbank is automation of the insolvency procedures. They have joined efforts with their partner – "Pravo.ru" company – to make an affordable and convenient service in this area. This product is already created and offered to the clients under name Bankro.TECH. Currently it allows to aggregate information about insolvency procedure from all possible public sources, to present it in a structured and easy to analyse form and transmit it to all users, who need it. On a basis of the collected data, the system automatically makes registers of creditors, builds schedules of court sessions, form necessary documents for the insolvency procedure. It also allows participants to the processes to communicate, for example, to hold remote meetings of the creditors committee.

Insolvency procedure is quite formal, it is implemented according to the Bankruptcy Law[56], and most of the steps are confirmed by decisions or rulings of the courts. There are several courts and since there is a register of insolvency information, resources of the Federal Tax Service, the site of arbitration courts where decisions are published, Bankro.TECH allows to work with all the relevant data. Sberbank's system automatically receives information from all sources, determines which document relates to which case, understands the meaning of the documents, extracts data from them and properly sorts it. In addition, attention in Sberbank's service is paid to building the logic of the process itself, it is a work flow system in which one can build work plans (or use the built-in standard plans)[57].

[54]See <https://www.sberbank.com/about> (accessed 7 July 2019).
[55]Interview with Mr Maxim Degtyarjev, Vice-President of Sberbank, Head of the Department for work with toxic assets, "Banking review" N4 [2019].
[56]Federal Law of the Russian Federation dated 26.10.2002 N127-FZ (last amended on 03.07.2019), "On insolvency (bankruptcy)" available at <http://www.consultant.ru> (accessed 07 July 2019).
[57]Interview with Mr Maxim Degtyarjev, Vice-President of Sberbank, Head of the Department for work with toxic assets, "Banking review" N4 [2019].

In terms of automation, Sberbank allows it to free up its employees from performing routine operations and to redirect it to solving more complex interesting tasks where it is necessary to apply the knowledge that robots do not have at this moment. In routine tasks, robots have surpassed a man by quality. There are tasks that a machine fulfills worse than a man. For example, text recognition: the average accuracy of recognition is about 85%. Where the system is not sure, it points it out and the document is passed over to people for further recognition but Sberbank continues to train the system in order to improve accuracy.[58]

Sberbank has already embedded robots into some of its banking processes. For example, Sberbank has a robot-collector - a complex software package that includes several functions. Robot makes calls to customers, talks to them, represents itself, asks who it is talking to, identifies the individual, notifies the person of a debt, asks about the reasons for the debt to occur, requests to repay the debt, registers a consent or refusal. There are several models that work in this complex: speech recognition, when the system translates a set of sounds into a set of characters; understanding the meaning of a message embedded in this text; selecting a desired response and, finally, speech generation. There are standard phrases in a conversation that are prerecorded, and there are phrases that are generated by machine in due course of such conversation.[59] Interesting to note that Sberbank does not warn a customer that he/she is talking to a robot, as some people are not ready to communicate with a machine. Key task of the bank in the process of communication with the client is to recover the debt in a way that is comfortable for both bank and client. After a communication with Sberbank's employee or a robot, the bank conducts a customer satisfaction survey.

Sberbank robot has both male and female voices. They teach models to detect whom a person is more comfortable to talk with: a man or a woman, more rigid or soft tone. In general, there are quite a lot of mathematical models in Sberbank systems on the basis of which AI determines which client should be called

[58]Ibid.
[59]Ibid.

and at what time, and also determines the probability of a successful call depending on the client's profile. An entire pool of overdue loans is screened through a sieve of a whole family of models that determine what needs to be done with this particular client at the current moment. Roughly speaking, a model is launched at night then in the morning the bank gets the result of analysis, which instructs the bank to send SMS to one client today, to call a second client, that a bank employee shall come out to a third client and find out what is going on at spot and that it is time to sue a fourth client.[60]

Sberbank's robot involved in dealing with overdue loans makes around 140,000 calls per day. This is a huge number of calls from which Sberbank has freed its operators. Though they still have a call center, where people handle difficult conversations. At first, they were only entrusted to make first calls notifying of an overdue payment, which were the easiest ones. However, Sberbank already tests repeated calls, conversations about several loans simultaneously. Such a system may further be adapted to suit other market segments like collection agencies, utility services, insurance companies etc. But not everything may be modeled or robotized. There is a relatively big part of work, including the work with papers for court cases, which indeed may be automated, but there is work, which so far cannot be passed over to robots. For example, negotiations on conditions of restructuring, complicated situations, where a bank fails to come to an agreement with a man to repay a debt. Basic Key Performance Indicators (KPI) for Sberbank is a level of repayment. They currently manage to return about 99% of the overdue debt from individuals. In the corporate field the level of return for the default loans, where a delay exceeds 90 days, is more than 60% now, which Sberbank considers to be a very good rate.[61]

In the banking sector AI is also used to evaluate the work of employees and to help them. Sberbank has an intelligent management system that analyses the work of each employee: whether he/she deviates from the process, how does

[60]Ibid.
[61]Ibid.

his/her effectiveness change. What is more important, that after the analysis, the system gives recommendations on what exactly needs to be improved and how to do that based on the best practices. Depending on the type of deviations, different periods and different stages of escalation are set. General principle is the following: if an employee's performance does not change, then the situation is escalated to his/her manager. The manager has recommendations on how to help an employee to work better, what needs to be explained to him/her, maybe the manager shall carry out a transaction together with him/her. If the manager does not react, then the situation is escalated to a next level. In addition, deviations are divided into typical for certain categories of employees and specific. This allows also to analyse the processes: if some similar deviations happen, then perhaps the process itself is initially built inadequately, and the task would be to find these problems in the process and fix them.

Further, robotics for Sberbank is a comprehensive tool that increases the efficiency of all processes, both internal and external, accelerates them, provided that such processes are correctly built from a methodological point of view. But Sberbank is not the only one among Russian commercial banks that implements AI. The lag in the implementation of these technologies may cause a serious damage to competitive positions, but so far it is possible to catch up with the leaders without an exorbitant level of investment.[62] As expected, banks specializing in servicing individuals prevail among the leaders in the field of AI and machine learning but there are also universal credit organizations there. Leading banks have adapted their IT platforms to the needs of AI, have gathered strong teams, organized the work with data, and accumulated experience of using advanced machine learning algorithms. Russian banking sector, because of the efforts of the leaders, does not lag a global trend - banks become more like technology companies, but subject to strict regulation. Among the leading banks in the field of AI one can name the following Russian banks: Tinkoff bank, MTS bank (affiliated with MTS

[62]See VOLKOV, "Banks teach the machines", "Banking review" N12 [2018].

mobile operator), Moscow Credit Bank and others.[63]

Russian banks often use solutions based on AI in the assessment of credit risk and related areas (debt collection, detection of fraudulent transactions), though the leaders are not limited to this. Credit scoring in one form or another is largely practiced by the Russian banks. Another very popular direction, where banks use AI is marketing, including forming individual proposals for the customers. Only one Russian bank had a working solution in the field of automation of call centers, a similar situation is in the field of information security.

Russian banks expect the greatest financial effect from the use of AI technologies in such areas as detection of fraudulent transactions, debt collection and credit scoring. Less promising is automation of call centers using chatbots, monitoring compliance with the Law N115-FZ[64], marketing and algorithmic trading. Russian banks expect significant results from the use of AI in personnel management, tracking the information background in relation to the bank, remote customer identification.[65]

Russian banks consider the following problems to limit the use of AI in Russian banks:

1) noncompliance with security policies;
2) low probability of model validation by the regulator as a basis for IRB-approach;
3) difficulties in interpreting the results when using nonlinear models;
4) data and information systems fragmentation/lack of necessary infrastructure;
5) lack of competencies of the bank's employees;
6) high cost of solutions.[66]

At the same time, the shortage of personnel with required skills often

[63]Ibid.
[64]Federal Law dated 07.08.2001 N115-FZ (as amended on 03.07.2019) "On countering the legalization (laundering) of proceeds from crime and the financing of terrorism", available at <http://www.consultant.ru> (accessed 7 July 2019).
[65]See VOLKOV (note 62).
[66]Ibid.

comes to the fore in public speeches of bankers. Therefore, having overcome the obstacle in a form of data fragmentation, banks would face an acute shortage of personnel capable of processing this information. The growing interest of the Federal authorities and the Bank of Russia in digitalization now exacerbates the problem with personnel, but in the future can create a more favorable regulatory environment, which is very important for the banks that implement AI technologies.

6. Russia stimulates a wide range of AI R&D projects among regular companies for the purposes of economy modernization. From the point of view of state support, R&D projects in the AI sphere are encouraged by granting tax reliefs in Russia. Specifically, all R&D projects fulfilled by taxpayers allow a deduction of 100% of the actual project costs from a Russian income tax on enterprises[67] taxable base, which is not very stimulating bearing in mind a flat rate of this tax - 20%. However, in order to promote research in the AI, Russian Federal Government included some R&D areas related to AI into its Ordinance[68] allowing a deduction of 150% of the actual project costs for the income tax purposes, for instance:

1) development of methods and software for intelligent decision support systems;
2) research and cognitive modeling of intelligence;
3) development of unified flexibly adjustable operating systems for adaptive information and control computing systems with elements of artificial intelligence;
4) development of technologies for monitoring the condition of rocket and space technology products and control of critical objects in real time using artificial intelligence methods and others.

[67]Translation of this tax from Russian is "tax on organizations' income", it is regulated by Chapter 25 of the Tax Code of the Russian Federation.
[68]Russian Governmental Ordinance dated 24.12.2008 N 988 (last amended on 18.05.2019) "On establishing a list of R&D areas the costs of which may be included by taxpayer into other expenses in accordance with item 7, section 262, second part of the Russian Tax Code at the amount of actual costs multiplied by a coefficient of 1.5", available at <http://www.consultant.ru> (accessed 20 June 2019).

The Russian Federal Government offers subsidies from the Federal budget as a form of state support to the leading companies which develop products, services and platform solutions on a basis of "end-to-end" digital technology.[69] For the purposes of determining an amount of a federal subsidy the maximum costs of a leading company to realise a project shall be limited to approximately 3.4 million Euro (250 mln roubles).[70] Similar federal subsidies are granted to the leading research centers to support their programs of activities fulfilled for the purposes of developing and realizing road maps to build promising "end-to-end" digital technologies.[71] Such significant incentives are aimed at increasing a number of entities involved in AI R&D projects thus boosting chances for positive outcome. Currently government aims to introduce AI into various sectors of economy:

- health sector. For instance, creation of centralized digital platforms for the diagnosis of diseases, including the use of AI[72];
- agriculture[73];
- car manufacturing. For example, developing new products and services in the sphere of steering and AI and bringing them to market before 2025 (introduction of an "AI system car" definition into current legislation)[74];

[69]Ordinance of the Russian Federation Government dated 03.05.2009 N 549 "On state support to the companies - leaders in developing products, services and platform solutions on a basis of "end-to-end digital technologies" (together with "Rules for providing subsidies from the Federal budget as a state support to the companies - leaders in development of products, services and platform solutions on a basis of "end-to-end digital technologies", "Regulations on carrying out competitive selection to provide state support to the companies - leaders in the development of products, services and platform solutions based on "end-to-end digital technologies"), available at <http://www.consultant.ru> (accessed 20 June 2019).

[70] Ibid.

[71]Ordinance of the Russian Federation Government dated 03.05.2019 N551, available at <http://www.consultant.ru> (accessed 4 July 2019).

[72]Item 27(19), Chapter IV "Targets, main objectives and priorities for health development in the Russian Federation", Decree of President of the Russian Federation dated 06.06.2009 N 254 "On Strategy for health care development in the Russian Federation for the period until 2025", available at <http://www.consultant.ru> (accessed 4 July 2019).

[73]Ordinance of the Russian Federation Government dated 25.08.2017 N 966 (as last amended on 06.05.2019) "On establishing a Federal scientific and technical program to develop agriculture in 2017-2025", available at <http://www.consultant.ru> (accessed 4 July 2019).

[74]Directive of the Russian Federation Government dated 28.04.2018 N831-R (as amended on 22.02.2019) "On approval of a Strategy to develop automotive industry of the Russian Federation for the period until 2025", available at <http://www.consultant.ru> (accessed 4 July 2019).

- railroads: for instance, creation and implementation of dynamic control systems for transportation process using AI[75];
- higher education: for example, the quality of students' coursework is planned to be evaluated automatically using semantic analysis tools based on AI methods.[76]

In conclusion, it can be argued that a wide implementation of AI technology in the Russian banking sector is a growing trend. Even though currently banks are taking cautious steps to implement financial technologies their competitiveness in the nearest future vastly depend on the results of their progress in the AI sphere.

[75]Directive of the Russian Federation Government dated 19.03.2019 N466-r "On establishing a development program for Russian Railroads PLC until 2025", available at <http://www.consultant.ru> (accessed 4 July 2019).

[76]Letter by the Ministry of Education and Science of the Russian Federation dated 29.04.2019 N MH-737/MB "On providing information on final qualification papers by the graduates of higher educational institutions 2018", available at <http://www.consultant.ru> (accessed 7 July 2019).