Digitalization of RegTech - Critical Review in China

Zixuan Li

Discipline of Finance, The University of Sydney, NSW 2006 Australia
zililzx@163.com

Abstract: With the advancement of technology and the digital development of China's economy, Fintech has steadily integrated into various financial sectors, giving rise to the application of regulatory technology. The article was drawn from an academic perspective combined with practice-oriented research. Begin by tracing the developmental history of regtech, correlating its evolution with various societal development stages, and summarize the digitization process of regtech. The article offers a modular review of regtech applications within China's economic development context, categorizing them into regulatory and compliance technology. Regulatory technology employs emerging technologies such as big data, AI, and cloud computing for real-time surveillance of anomalous market financial data, transitioning from ex-post regulation to ex-ante prediction. Compliance technology encompasses Customer Identity Management, Transaction Monitoring, Financial Risk Alerts, Automated Regulatory Reporting, and Financial Decision-making. This article posits that regtech is no longer exclusively for financial markets but could be applied as a risk-monitoring tool across various industries, proposing novel risk-compliance tools for regulators and compliance officials. In conclusion, the article sets forth the digital transformation requirements for regtech, advocating for digital standardization, enhancement of digital sharing capabilities, algorithmic development and application, and improved digital security. This provides forecasts and tangible suggestions for the digital transformation of regtech.

Keywords: RegTech, digitalization, data standardization

1. Introduction

The paper is in the middle of a new wave of technological transformation. In recent years, the rapid advancement of financial technology (FinTech) has progressively reshaped the financial industry's landscape, introducing innovative products and services [9]. While these developments have enhanced the financial inclusion rate, they also pose potential new financial risks. The emerging concerns led to the gradual adoption of regulatory technology (RegTech) in the financial sector. Financial regulators in countries such as the United States, the United Kingdom, Australia, and Singapore have actively implemented relevant policies and regulations in alignment with their nation's unique FinTech and RegTech development characteristics.

China, the world's largest FinTech market and the second-largest financial market, holds immense potential for the evolution of RegTech. In January 2022, the People's Bank of China promulgated the "Financial Technology (Fintech) Development Plan (2022-2025)," suggesting the

enhancement of foundational Fintech regulatory frameworks and the establishment of inclusive, prudent Fintech regulatory instruments. It signals that financial supervision and regulatory compliance will be foundational pillars for the financial sector's development in the digital era. As industry regulation constantly evolving, RegTech is undergoing a series of changes in regulatory explanations, digitalization, and technological innovations means produced by regulators to cope with the challenges emerging from FinTech development.

The evolution and application of regulatory technology (RegTech) have emerged as focal points in research. Combined with the development process of the financial industry, the paper will elaborate on the digital development phases of Regtech, including the IT, automation, and digital stages. Building on this foundation, the paper will further analyze the strategic application of data across various regulation scenarios, aiming to offer a clear and practical direction for data utilization. By the end of the article, the paper will highlight the existing shortcomings and challenges in data utilization, hoping to provide valuable insights and recommendations for the industry.

2. Definition of RegTech

After the Financial crisis of 2008, The UK government restructured its financial regulatory department to establish the FCA (Financial et al.). It began to explore the use of technology for financial system supervision, strengthening the regulation of financial risks associated with innovations (FCA, 2015). Internationally, the UK's Financial Conduct Authority (FCA) defined Regtech as a subset of financial technology. Specifically, it refers to adopting innovative technological methods to assist financial institutions in effectively and efficiently meeting diverse regulatory compliance requirements. However, researchers pointed out that Regtech does not only act as a subset approach to monitor Fintech development but also dives into the direction of future regulation focuses [14]. Standing in Chinese views, Sun Guofeng, the director of the Financial Research Institute of the People's Bank of China, defined that Regtech is represented by emerging technologies primarily used to maintain the safety and stability of the financial system [16]. "Regulatory Technology" generally refers to adopting advanced scientific and technological methods to achieve regulatory and compliance management objectives. Based on application agents, Regtech can be defined in two main branches: one applied to the regulatory side, known as SupTech (Supervision Technology), and the other applied to the compliance side of financial institutions, known as Compliance Technology or CompTech for short [15].

2.1 Era of Data

With the advancement of technology, human society has entered the era of the digital economy. The concept of "data elements" has emerged in China in recent years, with data integrating as a latent force within traditional factors of production, driving transformative changes in production methods. Data are generated from each stage, the generation, acquisition, storage, and analysis, to the application. This makes data a new factor of production in this era, hence termed "data elements". With the rapid digital expansion and application of wired bandwidth and wireless networks, emerging technologies like cloud computing and storage are gradually being realized. Data is moving from local specific terminal devices to the cloud, stored in data centres built by data companies, internet enterprises, and governments [8].

Data has increasingly become valuable in regulation, assisting regulators and financial institutions to transition from ex-post regulation to ex-ante prevention. Granular data streams embedded in modern technology allow financial institutions to collect and analyze data in real-time [5]. Such as predictive analysis, through analyzing vast historical data, AI and machine learning

models can forecast potential risks and violations, enabling regulators to take preventive measures before risks materialize [9]. Automation processes, where data can automatically trigger specific regulatory processes, such as auto-reporting anomalous transactions or auto-freezing suspicious accounts, greatly enhance regulatory efficiency and accuracy. Transparency and traceability technologies like blockchain ensure data integrity and immutability, ensuring data authenticity and reliability and providing regulators with a reliable data source for ex-ante regulation. Data is pivotal in regulatory technology, enabling regulatory authorities to transition from passive ex-post regulation to a more proactive and preventive ex-ante regulatory model.

3. Digitalization of Regtech

3.2.1 IT technology

The evolution of Regtech reflects the complexity and dynamism of the financial markets. In its early stages, Regtech primarily developed technologically, integrating financial engineering and quantitative risk models into risk supervision and compliance requirements. This phase coincided with financial institutions' rapid global expansion and the financial industry's gradual digitization. Regulators relied on manual and rudimentary computer technologies to collect, process, and analyze data. They primarily depended on periodic reports from financial institutions, supplemented by on-site inspections and audits, to ensure compliance [12]. During this period, the influence of technology was predominantly seen in applying regulatory tools. The actual integration of regulation and technology could have been improved. The financial industry relied on quantitative risk management and information technology to detect internal financial risks but needed help to effectively detect and alert systemic financial risks [2]. This limitation was evident in events such as the 1987 stock market crash and the 2001 internet bubble.

4.1. Automation

Following the subprime mortgage crisis outbreak, financial regulatory authorities worldwide intensified their regulatory policies, imposing stricter penalties for non-compliance. Financial institutions faced escalating costs associated with risk monitoring and compliance. With advancements in computer technology, regulatory compliance began to merge with information technology, achieving automation in regulatory data submission. Open, standardized systems for financial data collection and sharing platform established, catering to diverse market requirements and enhancing regulatory compliance capabilities. During this phase, financial institutions leveraged innovative technologies to transition towards regulatory technology (RegTech), promoting the automation of regulatory data submissions and aiding institutions in dynamically adapting to the changing regulatory landscape.

4.2. Digitalization

In the data-centric regulatory phase, cloud computing and artificial intelligence technologies will be deeply integrated into RegTech scenarios. Advanced technology offering efficient and cost-effective regulation also heralded a transformation in financial regulatory approaches. At this juncture, Regtech transcended mere automation to become data-driven. The RegTech industry evolved from automating regulatory data submissions to centring regulation around data. The objective of this phase was to establish data-driven and algorithmic regulation through regulatory data sharing and integration, ultimately aiming for prudential supervision and financial risk prevention (CSRC, 2018). This implies that regulatory decisions are now based on extensive data

analysis and advanced algorithms, enabling regulators to predict better and manage systemic risks while more effectively monitoring financial institutions' behaviour.

3.2.2 Role of data element in regtech

3.2.1 Supervise technology.

The core of "Supervise technology" is constructing an efficient regulatory big data platform. By comprehensively utilizing data analysis techniques such as electronic alerts, statistical analysis, and data mining, it focuses on the capital market's primary production and business activities. This allows for real-time monitoring and historical analysis investigations, assisting regulatory personnel in conducting panoramic analyses of market entities. It also enables real-time monitoring of the overall market situation, promptly identifying suspected insider trading, market manipulation, and other illegal and non-compliant behaviours, fulfilling regulatory responsibilities, and maintaining market trading orders—the Practical Application of the Platform. Regulatory technology (RegTech) employs comprehensive data collection and analysis across various platforms, utilizing anomaly detection models for real-time risk alerts. This is primarily aimed at auditing financial enterprises within the jurisdiction to prevent financial risks in the market. A financial risk database is established by integrating data from four primary sources: public complaint departments, administrative departments, publicly available online information, and enterprise-bank-linked account data.

Within the public complaint data, the general public can report to government financial institutions through various means, such as emails and letters. Regulatory bodies employ artificial intelligence techniques to extract and interpret keywords from these reports, enabling efficient responses to the reporting public and imposing rigorous scrutiny on implicated enterprises. Through an in-depth analysis of publicly available information and records of illicit activities, regulatory authorities can swiftly identify enterprises potentially involved in illegal or non-compliant activities. With data growing from each related agency, the combination report expands, and the model and AI machines could increase their effectiveness and accuracy in abnormal data spotting [11]. This early warning mechanism allows regulators to take necessary interventions before issues arise, thereby preventing or minimizing potential losses in the financial market.

Moreover, data integration with administrative departments such as public security, commerce, and taxation gives regulators a holistic view, enabling them to assess enterprise compliance from multiple perspectives. For instance, by analyzing a company's tax records, regulators can determine if there are instances of tax evasion or fraud. Data from public security departments can further assist regulators in identifying enterprises or individuals potentially involved in financial crimes. As core participants in the financial market, banks offer invaluable data for regulatory bodies. By analyzing bank data, regulators can promptly identify high-risk enterprises or individuals. For example, a company frequently making large cross-border transfers might be at risk of money laundering. Additionally, bank data aids regulators in assessing the credit risk of enterprises, thereby bolstering the stability of the financial market. The transition from post-event regulation to proactive prevention in financial market operational risk detection is realized by consolidating data from multiple platforms and establishing early warning models for real-time monitoring。

3.2.2 Compliance technology

Compliance technology helps financial enterprises to achieve regulatory compliance, enhance risk management, and reduce compliance costs. The innovation in Regulatory Technology (RegTech) is transitioning from "Know Your Customer" (KYC) to "Know Your Data" (KYD). Data is poised to

become the cornerstone asset for financial institutions, fintech companies, and RegTech firms. Financial entities must invest significant efforts in constructing a compliance system driven by data. This system offers guidance for corporate compliance, business expansion, strategic transformation, and other necessities. These institutions can carve out a distinctive competitive edge by leveraging unique data sources, data processing and analytical techniques, data security technologies, and data monetization strategies. In the subsequent research, the evolution of RegTech will be elaborated upon from five distinct perspectives.

3.2.2.1 Customer Identity Management

Identity verification is one of the pivotal applications of RegTech. Through customer identity management, financial institutions gain insights into a client's risk appetite, investment intentions, and financial status, which could aid in identifying and mitigating financial risks in the market. Moreover, identity verification is crucial for anti-fraud and anti-money laundering monitoring and prevention.

3.2.2.2 Transaction Monitoring

Transaction monitoring involves collecting and analyzing data generated during the transaction processes of financial institutions. By adhering to rules that detect anomalous transaction behaviours, comprehensive transaction reports are generated, and alerts are issued. With the advancement of technology, a significant portion of transactions are conducted online, producing real-time, unstructured, and high-dimensional data. The volume of this data is burgeoning, making manual transaction monitoring inadequate for daily compliance needs. The introduction of RegTech allows for the collection of vast amounts of data and the construction of databases using big data technologies or various data collection tools prior to transactions. During transactions, real-time data processing is achieved, following the papers by efficient and accurate analysis using data analysis models. Post-transaction, precise data visualization tools enable swift problem identification and feedback. RegTech provides comprehensive coverage of the transaction process, enhancing the efficiency and accuracy of transaction monitoring.

3.2.2.3 Financial Risk Alerts

Financial institutions face various risks during their operations, such as market, credit, liquidity, operational, and compliance risks. A robust risk management mechanism can assist financial institutions in effectively monitoring, analyzing, and preventing risk events, which is vital for their stable operation. The application of RegTech, through artificial intelligence and big data technologies, allows for detailed modelling and analysis of financial data, identifying anomalies and taking timely countermeasures to reduce the likelihood of significant risk events.

3.2.2.4 Automated Regulatory Reporting

Financial institutions are required to submit compliance reports to regulatory bodies periodically. With increasingly stringent regulatory requirements and regional regulatory variations, the pressure of data submission on financial institutions is escalating [4]. Regulatory bodies demand data of varying quantities, dimensions, structures, and frequencies. Financial institutions must invest considerable time and labour in collecting, organizing, and filling out compliance data. RegTech facilitates a digital connection between financial institutions and regulatory bodies. This digital application encompasses digital regulatory protocols and digital regulatory materials. The former involves a digital interpretation of regulatory rules embedded in institutions and various businesses

and updated based on regulatory changes. The latter involves digitizing all regulatory-related materials stored in digital formats, including data, documents, images, audio, and video. RegTech enables financial institutions to enhance the efficiency of data collection and processing, quickly identify inherent risk vulnerabilities, and automate the generation of compliance reports, thereby reducing compliance costs and increasing accuracy.

3.2.2.5 Financial Decision-making

RegTech aims to assist financial enterprises in automating the decision-making process, encompassing pre-decision forecasting, mid-decision control, and post-decision feedback. By collecting internal and external data of the enterprise and pairing it with the required decision analysis model, automation technology enhances the efficiency of decision analysis implementation. This ensures that the decision-making process adheres to regulations and reduces unnecessary labour costs. For instance, in the decision-making regarding the cash demand amount for various bank ATM branches, big data is used to collect internal and external data of commercial banks. Based on this data, artificial intelligence technology trains and constructs a cash demand model. Once the automated robot determines the results, the cash amount is entered into the ATM management system, realizing the automation and intelligence of routine bank decisions.

3.2.3 Redefinition of Regtech in digital era

After reviewing the RegTech, the paper posits that understanding should be extended to converge on the following consensuses: 1. The stakeholders involved in RegTech have extended beyond regulatory and regulated entities. RegTech companies, research institutions, standardization bodies, certification agencies, and financial consumers are also integral to the financial ecosystem. 2. Beyond addressing the compliance costs and efficiency for financial regulation, RegTech could also serve as a pivotal opportunity for corporations to refine corporate governance and promote its core competencies. 3. RegTech is not only the subset of Fintech but is driving the evolution of regulatory concepts and mechanisms in the face of rapid technological and financial business advancements. 4. Regtech is not exclusively applicable to the financial sector but will also be broadly relevant to governmental administration and societal governance.

Given these considerations, the paper states that RegTech emphasizes data collaboration, construction, and sharing to empower companies with a better regulatory and compliance approach. Regtech innovations align with Fintech to promote a robust financial system, and its inherent nature and practical characteristics will be widely applicable to other industries.

4. Requirements of future Data

After reviewing the Regtech, data will be the foundation of each technology applied in the regulation system. In this article, the author will demonstrate 4 points of future data potential risks and suggested policies.

4.1. Data standardize

Data standardization encompasses the definition, presentation, and submission format of data. As previously illustrated, data standardization lays the groundwork for data analysis and sharing. Enhanced data quality, achieved through standardization, amplifies the value derived from data analysis and fortifies the foundation for constructing a data-sharing platform.

Firstly, the need for a unified standard means that various financial institutions often submit disparate data inputs, even when aiming for the same reporting objective. Such inconsistent data

inputs complicate the data processing task and diminish data reliability. Secondly, inadequate data standardization restricts the scope of data that AI algorithms can process, slowing down analysis. Raw data often needs manual standardization, leading to increased labour costs. On a broader scale, an effective data-sharing platform across regions with distinct financial policies can enhance regulatory efficiency [6]. Given the varying degrees of digitalization across countries, allowing regulatory authorities to extract necessary data from a standardized platform could mitigate these disparities and foster greater RegTech integration across borders.

In order to improve data standardization, this paper proposes the following solutions. The paper advocates for establishing a top-down data policy [1] encompassing unified data formats, definitions, application interfaces (APIs), and transport protocols. A more holistic information perspective can be achieved by integrating unstructured data with structured data through regulated procedures. For example, an Italian bank amalgamated its KYC report (structured data) with related news reports (unstructured data) to probe potential money laundering incidents.

4.2. Scope of Data Sharing

The scale of data sharing encompasses regulatory authorities collaborating with financial institutions, inter-district regulatory bodies, and financial institutions interfacing with their peers. Enhanced data sharing improves information transparency, enabling authorities to monitor financial transactions in real-time, thereby pre-emptively mitigating potential disorder conduct. Additionally, this transparency facilitates firms in understanding and adhering to regulatory mandates, minimizing undue compliance risks.

However, the landscape has challenges. Diverse financial policies and corporate monopolies have created "data silos," hindering seamless data sharing. Given that RegTech is still in its nascent stages, regulatory frameworks have yet to evolve in tandem with its rapid technological advancements. Consequently, fluctuating data requisites and inconsistent regulatory policies across regions and over time have resulted in a lack of uniform data input standards. Furthermore, as FinTech continues to burgeon, dominant players in the sector have established proprietary databases, often reluctant to share crucial data, citing intellectual property rights. These data silos compromise the efficiency and relevance of RegTech solutions.

Addressing these challenges, the paper proposes two salient strategies. The first is to create flexible regulatory mechanisms to enhance the digitalization of regulatory protocols, equipping computers with the capability to monitor financial markets autonomously. The second strategy advocated for FinTech firms is to introduce data acquisition services and monetize their data assets. This involves recognizing data as a tangible asset, incorporating it into financial statements, and transforming it into a lucrative asset. This approach incentivizes firms to profit from their valuable data and fosters a conducive environment for data liquidity in the financial marketplace.

4.3. Data algorithm development and application

Using algorithms in data analysis enhances the value of data and allows stakeholders to make informed decisions. The efficacy and precision of an algorithm are pivotal in determining the quality of the resultant data processing. Concurrently, financial institutions and regulatory bodies rely heavily on these results to make consequential decisions. Even a minor discrepancy in the results can trigger significant financial risks. Therefore, the development and implementation of algorithms warrant oversight by regulators to ensure their reliability and impartiality.

Financial institutions and emerging FinTech entities sometimes obey the minimum legal requirements, leveraging algorithms that skirt regulatory boundaries to maximize profits. Finance companies might leverage their technology and data advantage to deploy algorithms to counteract

regulatory objectives, cloaking their pursuit of potentially illicit gains under the guise of legality. Also, the often-opaque nature of algorithmic poses challenges for regulators attempting to decipher the underlying mechanics. The paper emphasizes the need for regulators to pay attention to the anti-regulation algorithms and scrutinize and advocate for the established models to counteract these tactics.

Furthermore, it is essential to recognize that algorithms are not inherently neutral. The data processing procedures often reflect the biases and perspectives of their creators [3]. Technology will show bias impacted by human tendency, and there will be potential for created algorithms to stand for specific groups' interests [13]. While technology can mitigate specific risks, it can also inadvertently introduce new conflicts, especially when diverse interest groups are involved. To address these concerns, the paper proposes establishing third-party reviews for algorithms before implementation. To ensure the neutrality of the regulatory process and aid in identifying and rectifying any inherent biases.

4.4. Data security

In today's digital landscape, data originating from individual activities is pivotal in shaping societal outcomes. The ramifications of data security breaches, such as extensive data leaks, can undermine public trust and jeopardize financial stability. The inherent vulnerability of data to breaches has intensified the call for robust data security and privacy measures. Data security concerns can broadly be categorized into two facets: inadvertent data loss or damage and unauthorized data manipulation by malicious actors. The integrity of databases, data continuity, and the safeguarding of personal privacy are all intertwined with data security.

During the data storage phase, unforeseen events, such as abrupt power outages, can result in the loss of unsaved data. Similarly, natural disasters can compromise physical storage infrastructure. To mitigate such risks, many organizations have transitioned to cloud storage solutions. However, these are not immune to threats, notably from cyberattacks. Moreover, the ongoing costs associated with maintaining and securing cloud storage can be substantial. While there is not a one-size-fits-all solution to data security, adopting regular data backups, enhancing firewall technologies, and imposing stricter penalties for data breaches can offer some respite.

Data breaches might suffer from external threats like hackers or from within due to authorized users' misuse or careless data handling [10]. Unlike traditional assets, data ownership can be multifaceted. For instance, while personal data at its inception belongs to the individual, the results derived from processing and analyzing this data might be attributed to either the individual or the analyzing entity. Establishing clear data ownership is intricate yet crucial. Clarifying ownership can delineate protective responsibilities at various stages, streamline the identification of liable parties in breach incidents, and bolster user data protection awareness, thereby diminishing data privacy concerns.

For regulators, as data is transferred and shared with financial entities, the emphasis should be on ascertaining data ownership. By clearly defining data ownership, regulatory bodies can ensure the legitimacy of data transfer and sharing practices, thereby minimizing potential data breach risks.

References

[1] *Andrew, G., Stacey, S., Stacey, S., & Meihui, Z. (2020). RegTech innovation and cooperation - Australia Andrew, G., Stacey, S., Stacey, S., & Meihui, Z. (2020). RegTech innovation and cooperation - Australia and China compared. AUSTRALIAN JOURNAL OF ASIAN LAW, 21(1), 39–55.*

[2] *Arner, D. W., Zetzsche, D. A., Buckley, R. P., & Barberis, J. N. (2017). FinTech and RegTech: Enabling Innovation While Preserving Financial Stability. Georgetown journal of international affairs, 18(3), 47–58. https://doi.org/10.1353/gia.2017.0036*

[3] *Bolton, M., & Mintrom, M. (2023). RegTech and creating public value: opportunities and challenges. Policy design and practice, ahead-of-print(ahead-of-print), pp. 1–17. https://doi.org/10.1080/25741292.2023.2213059*
[4] *Butler, T., & Brooks, R. (2018). On the role of ontology-based RegTech for managing risk and compliance reporting in the age of regulation. Journal of risk management in financial institutions, 11(1), 19–33.*
[5] *D.W. Arner, J. Barberis, R.P. Buckey .2016 FinTech, RegTech, and the reconceptualization of financial regulation, Nw. J. Int'l L. & Bus. 37 371.*
[6] *E. Aktas, K. Roland. (2021). Fintech revolution, regulatory and supervisory challenges, and opportunities for improvement by utilizing regtech and suptech, International Journal of Business Research and Information Technology 8 (1) 82–92.*
[7] *Ivanoski, J., & Bailey. D, & Walters. M, & Vazirani, J. 2017, The transformative power of regtech. Frontiers in Finance: For decision-makers in financial services 57 14–17.*
[8] *K. Yeung. (2018). Algorithmic regulation: a critical interrogation, Regulation & Governance 12 (4) 505–523.*
[9] *Mengfei, L., Jie, F., & Xiaowei, L. (2022). RegTech: Theory and Practice in Technology-Driven Financial Regulation. Frontiers of economics in China, 17(1), 164. https://doi.org/10.3868/s060-015-022-0007-3*
[10] *O.C. Elimelech, S. 2022 Ferrante, N. Josman, S. Meyer, F. Lunardini, J. Gomez-Raja, ´S. Rosenblum, technology use characteristics among older adults during the COVID-19 pandemic: a cross-cultural survey, Technol. Soc. 71 102080.*
[11] *Patani, B. (2019). "RegTech: 'A Safe Bet for Tackling AML and Fraud in the Gambling Sector'."In The RegTech Book: The Financial Technology Handbook for Investors, Entrepreneurs andVisionaries in regulation, edited by J. Barberis, D. Arner, and R. Buckley, pp. 292–295. NewYork: Millennial Ltd.*
[12] *S. Narang. (2021). Accelerating Financial Innovation through RegTech: A New Wave of FinTech. In Fostering Innovation and Competitiveness with FinTech, RegTech, and SupTech (Pp. 61–79, IGI Global.*
[13] *Zou, J., and L. Schiebinger. 2018. "AI Can Be Sexist and Racist—It is Time to Make It Fair."Nature 559 (7714): 324–326. doi:10.1038/d41586-018-05707-8.*
[14] *程雪军, & 尹振涛. (2022). 监管科技的发展挑战与中国选择：基于金融科技监管视角. 经济体制改革(01), 135-142.*
[15] *何海锋, 银丹妮, & 刘元兴. (2018). 监管科技(Suptech):内涵、运用与发展趋势研究. 金融监管研究(10), 65-79. https://doi.org/10.13490/j.cnki.frr.2018.10.005*
[16] *孙国峰. (2018). 发展监管科技构筑金融新生态. 清华金融评论(03), 16-19. https://doi.org/10.19409/j.cnki.thf-review.2018.03.003*