Approach to SupTech Development

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After financial technology (fintech), supervisory technology (SupTech) has become the new hot topic in the financial sector. As the financial system reform in China continues to deepen, the Chinese financial market is transforming at an increasingly rapid pace. At the same time, a new round of technological and industrial revolution is booming. Exemplified by Big Data, cloud computing, and artificial intelligence (AI), modern information technology has become deeply integrated with economic society. New technologies not only drive progress in industry and the market, but also take root in the regulatory space. As well as issuing new standards and regulations, regulators must also deal with new risks and challenges in completely novel ways. This requires regulators to stay at the forefront of developments, and to make use of smart technologies to continuously improve their monitoring capabilities. SupTech originates in response to this demand.

Note that SupTech is a different concept to compliance technology (CompTech, also widely referred to as regulatory

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technology or RegTech). CompTech refers to applications of innovative technologies that support compliance with regulatory and reporting requirements by regulated financial institutions. SupTech refers to the use of emerging technology, typically Big Data and AI, by regulators themselves to integrate information systems and data sources, achieve monitoring requirements, optimize monitoring and supervision models, and increase regulator efficiency and oversight capabilities. However, while SupTech and CompTech are conceptually distinct, they share many of the same underlying technologies and have end solutions with very similar functions.

SupTech can assist regulators in the timely identification and prosecution of illegal activities, the prevention of systemic financial risks, and the protection of investors' lawful rights and interests. Born from the disruptive innovation of emerging technology in the regulatory space, SupTech is, at its core, the integration of financial regulation with modern technology. It is the use of technology to build a bridge which corresponds to regulatory standards and meets regulatory requirements between regulators and regulated entities.

A significant role in financial regulation

Driving changes in both regulatory standards and regulatory system
From manual forms and handwritten reports to the automated data collection that is the norm today, from next-day reporting to real-time data collection, SupTech has not only resulted in improved quality and efficiency, but has also driven changes in both regulatory standards and the regulatory system. As finance and technology become ever more closely in-

tegrated, regulators must ensure that new regulatory system and knowledge structures are established and updated respectively, to manage the great changes that technology brings to financial markets. Likewise, the scope and targets of regulations will also need to be continuously adapted to ensure their suitability to this technological age. New technologies will continue to be applied to the market, and they will continue to bring potential financial risks. Therefore, in accordance with the principle of system antecedence, regulators will need to re-evaluate whether current standards and regulations are sufficient future proof. SupTech will ultimately transform the landscape of financial regulation and catalyse a reform of the current regulatory model.

A key instrument for the regulation on new industries in the financial sector

The trend towards digitalization in China's financial sector is becoming increasingly apparent—peer-to-peer lending, robo-advisors, quantitative trading, and high-frequency trading are now a burgeoning part of the industry. Providers of conventional financial services face a growing risk of being cut out as the intermediary, while at the same time technical risks are also becoming more prominent. Security risk now overlaps with data risk, and as a consequence, financial risks spread more quickly, more widely, and are also less easy to detect, increasing the potential for systematic financial risks. The emergence of SupTech has allowed technology risks to be addressed through the use of technology. SupTech helps regulators to understand the patterns and trends of new industries in the financial market, undertake timely reviews

of regulatory policy, and implement more effective and targeted compliance monitoring. In addition, SupTech has cut monitoring costs while drastically improving accuracy, precision, and efficiency, thereby inhibiting the cross-contamination of risks from fintech innovation and ensuring the safe and stable operation of the financial system.

Current state of SupTech (or RegTech) utilization

Promoting the development of SupTech worldwide

Since 2015, UK regulators, led by the Financial Conduct Authority (FCA), have taken a proactive approach in encouraging the establishment of a SupTech ecosystem. Through the FCA's regulatory sandbox, innovative fintech products and services can be tested in a controlled environment. Through its Innovation Hub, the FCA provides support and guidance for financial institutions to assist them in understanding the regulatory framework and identifying the regulatory, policy, and legal issues relevant to SupTech innovation. In early 2016, the U.S. Consumer Financial Protection Bureau and the Office of the Comptroller of the Currency issued joint guidelines on evaluating and responding to fintech and SupTech products. The guidelines serve the dual purposes of both encouraging fintech innovation and pushing fintech enterprises to make use of technology to proactively adapt themselves to the regulatory system. In the same year, the Monetary Authority of Singapore (MAS) released its Fintech Regulatory Sandbox Guidelines, establishing a safe and favourable environment for fintech innovation through the creation of a regulatory sandbox. The sandbox period also allows the MAS to observe

the results of practice, which then form the basis for policy updates and adjustments.

Financing and investment in the global SupTech sector continue to hit new records

According to the State of RegTech Briefing from CB Insights (a leading market research company), since 2013, the global RegTech sector has attracted nearly USD5 billion in equity funding across 585 deals. The US continued to lead in the RegTech space, accounting for 74% of deals completed between 2013 and the end of the third quarter of 2017, the UK came in second with 10%, while Canada and India tied for third with 3%, respectively. Investors, which include banks, large corporates, and venture capitalists such as Santander, Barclays, and Goldman Sachs, have been actively investing in RegTech and in personal identification, transaction monitoring, and blockchain technology.

A standard component of financial regulation in China

In 2017, the People's Bank of China (PBC) established its Fintech Committee, with the aim of strengthening research planning and overall coordination of its fintech work, as well as enhancing the application of SupTech. In 2018, the China Securities Regulatory Commission (CSRC) established its SupTech Expert Advisory Committee and issued the CSRC Overall Construction Plan of Regulatory Technology (hereinafter referred to as the "Plan"). The Plan groups Sup-Tech into three categories, namely level 1.0, 2.0 and 3.0, providing a top-down plan for the all-round deployment of SupTech in the CSRC.

At the macro level, SupTech are predominantly used

for statistical monitoring, which is primarily carried out by regulatory authorities. Business rules behind the monitoring technology have been generated based on regulatory experience, and are mature and well-defined. Thus far, statistical monitoring has returned good results, due in a large part to the high speed and high-volume computing power of information technology. However, the boom of new industries and the fast-changing landscape of the financial market that has been catalysed by the latest technologies have made it difficult for statistical monitoring to keep pace, and in many instances this solution is no longer adequate.

Meanwhile, fintech can be used for indicator monitoring, which is principally carried out by research institutions. Indi-cator monitoring generally involves the modelling of a particular sub-sector or industry, extracting specific indicators and conducting real-time monitoring. This type of monitoring returns very up-to-date data, however, because of the limitations in parameter and complexity imposed in most models, the data can only be used for the analysis of specific domains over specific time periods, and cannot be further generalized. Thus indicator monitoring cannot be used by regulators as the primary basis for making decision.

In addition, fintech can be used for hotspot analysis, which is mainly conducted by commercial organizations. This is generally geared towards the modelling of typical issues or case studies, and is usually used in ex-post analysis to explain risks or specific aspects of risk. As such, hotspot analysis does not provide sufficient reliability in the prediction of subsequent developments.

At the micro level, data analysis tools such as entity portrait creation, (transaction) anomaly detection, relevant account analysis, and financial risk analysis have all been applied, to some extent, by regulatory agencies. However, at present, these technologies can only be relied on to point out "crash sites," in other words, analysis are based on simple underlying models and can only identify conspicuous risks and issues. Current data analysis tools have not been built with a thorough understanding of the regulators' role behind them, and the capacity for conducting in-depth modelling of target entity operations is inadequate. Development of the underlying technology has also been disjointed, with developers each going their own way. As such, there are not as yet any tools or solutions that can be suitably applied to a regulatory agency's day to day tasks.

In summary, SupTech has now reached a phase of accelerated development. Top-down support, actual project deployment, and investment in the sector are all at an all-time high. However, there is still a long road ahead for the development of SupTech, given its diversity and complexity, as well as the large number of fields and entities that it covers.

Approach to promote SupTech utilization by CSRC

The development of SupTech is a multi-stage project. From the earliest digital and electronic monitoring to the later network and 3D monitoring technologies, then to the automated and smart monitoring now in place, each new step has been firmly built on the foundations of earlier progress. This is the

approach that the CSRC has taken to SupTech development. The Plan, released in August 2018, sets out three major stages for SupTech development, five basic support capabilities, and 32 regulatory application scenarios across seven broad categories. Under the Plan, the establishment of a SupTech environment for regulation will be achieved through Big Data platforms, multiple analytic centers, and specialized services, and will be managed and operated through 12 key mechanisms.

Three stages for the progressive development of SupTech

The construction of SupTech conducted by the CSRC covers a broad spectrum of contents, from the most basic underlying infrastructure of SupTech development, to software and application systems, all the way to top-level data analysis services. In accordance with the specific requirements being targeted, SupTech development has been divided into three stages: SupTech 1.0 of digital monitoring, SupTech 2.0 of 3D monitoring, and SupTech 3.0 of smart monitoring. These three stages form a synergistic, interactive, and indivisible whole.

SupTech 1.0 is primarily targeted at fulfilling the basic operational needs and specific job requirements of CSRC organs and branches, through the procurement and development of mature and highly effective software, hardware, and other equipment.

SupTech 2.0 aims to achieve end-to-end operability of cross-department monitoring and the establishment of a data integration mechanism. This will be accomplished through expanding and improving the central regulatory information

platform and optimizing business system.

SupTech 3.0 will focus on establishing the five basic SupTech analytic capabilities, namely entity portrait creation, financial analysis, public opinion analysis, relavant account analysis, and transaction anomaly detection. On top of these analytical capabilities, SupTech 3.0 also seeks to establish targeted solutions that can be applied in regulatory scenarios, assist with the timely detection of potential risks in regulated entities, improve monitoring and control of anomalous market movements, and enhance the depth and breadth of regulatory auditing and enforcement.

Measures put in place for the all-round implementation of SupTech

In 2018, the CSRC bolstered coordination of internal and external resources and adopted multiple measures to prioritize the development and deployment of SupTech 3.0, whilst ensuring that continued progress was made in SupTech 1.0 and 2.0 and related areas.

SupTech 1.0 achievements include revamping the CSRC's data centre and e-government Internet; upgrading network bandwidth; optimization of the CSRC's OA system; increasing the number of audit evidence collection and case-related data analysis tools; as well as the establishment of smart hearing rooms, inquiry rooms, and emergency command center.

SupTech 2.0 activities were centered around the central regulatory information platform. Construction of the main part of the central regulatory information platform was completed, creating a highly efficient overarching operation and maintenance system with seamless front-, mid- and

back-end connectivity. The platform also provides further facilitation for business process collaboration and expands the scope of data sharing.

SupTech 3.0 is currently the top priority in CSRC's SupTech development activities. The core mandate of SupTech 3.0 is to methodically introduce Big Data concept into the CSRC's day-to-day monitoring and supervision activities. Using the objective patterns presented in Big Data as a starting point for the identification of illegal activities in the capital market, early warnings of anomalous market movements can be provided, enhancing the market's risk prevention capabilities. Specific measures initiated by the CSRC are set out below.

First, an effective system through sound top-down planning has been built. A comprehensive regime for the execution of SupTech 3.0 is developed based on the Plan. This includes: (1) establishing the CSRC SupTech Development and Coordination Working Group for the overall management of SupTech development and implementation; (2) establishing a SupTech Development Policy Committee, which issued the CSRC SupTech 3.0 Development Policies; (3) establishing a collaborative working model for joint construction of a shared regulatory system, creating a favourable environment for the uniform management of SupTech 3.0 activities and the widespread application of Big Data in capital markets; and (4) establishing the CSRC SupTech Expert Advisory Committee as an external think tank to provide advice on the development and implementation of major policy measures relating to the use of technology in capital market regulation, thereby increasing the level of public participation and the

objectiveness of policy making in this field.

Second, in-depth research has been carried out to provide technical support for the development of SupTech. A plan is established for the design and build of the CSRC's Big Data platform, and Technical Guidelines for the Construction of the CSRC's Big Data Platform were developed and issued to guide the work of subordinate entities, ensuring that the basic infrastructure for Big Data analysis would be in place. At the same time, in-depth research on Big Data engineering methods for SupTech 3.0 is initiated to provide technical support for the comprehensive launch of SupTech 3.0 development activities. A basic capability analysis and technical collaboration group is set up to study the data requirements, analytical methods, result evaluation criteria, service specifications, and other parameters which need to be established for various scenarios.

Third, review on initial public offering, supervision on listed companies, and supervision on private equity funds have been taken as the three priority areas for SupTech deployment. New technologies such as entity portrait creation, public opinion analysis, and financial document identification will be used in combination with industrial, commercial, and financial data as well as administrative penalty, judicial proceeding, and credit records to conduct multi-dimensional analyses of regulated capital market entities. These analyses will be used to identify risks and risk factors such as non-compliance with disclosure requirements, financial fraud, related party transactions, bond defaults, deteriorated operating performance, and negative public opinion. Preliminary

completion of a systemic entity portrait portfolio which covers companies applying for listing, listed companies, and private equity funds will allow comprehensive and in-depth analysis of these three types of entities, greatly reducing the difficulty and time cost of manual processing and improving regulatory efficiency.

Fourth, efforts have been made in SupTech data coordinated management and training talents. It can be achieved through: (1) proactively undertaking the work required for SupTech data management, completing the construction of a data resources catalogue for the securities and futures regulatory system, and establishing a clear ledger of data resources; (2) actively importing external capital market data, through channels such as commercial purchases and inter-departmental collaboration, to establish a data pool in preparation for carrying out SupTech; (3) establishing a skilled SupTech personnel team, launching SupTech specific training programs, and inviting experts from research institutions to train subordinate entity personnel in SupTech theory, practice and application. Those efforts can increase technical personnels' knowledge and understanding of the basic theory underlying key SupTech technology and their capability in the application of SupTech.

More extensive and in-depth research and collaboration is required

At present, SupTech development in China still falls short of the progress made in developed countries in areas such as policy and regulation, governance, key algorithm development,

and technical standards. There are also gaps in areas such as data management, data security, and data protection which need to be addressed. Extensive and in-depth cooperation at the national, grassroots and market player level is therefore required for the successful implementation of SupTech in China.

First, top-down design and organizational management needs to be strengthened. To this end, it is recommended that either the National Financial Stability Board or the PBC takes the lead in establishing research institutions or research projects that are cross-sector, cross-industry, and cross-agency. Close collaboration between all participants through these projects and institutions will drive further the application of SupTech for the prevention and resolution of major financial risks. Collaborative projects involving researchers from all sectors, including economics, finance, and industry, should be organized to carry out modelling and analysis of financial industries. These analyses will cover the underlying causes and potential trajectory of major financial risks, and through repeated Big Data calculations, facilitate the projection of optimal solutions for risk resolution.

Second, in-depth financial engineering research should be carried out in relation to the various modes of regulation, including institutional regulation, functional regulation and behavioural regulation. Analyses should be conducted on the nature and characteristics of all kinds of market entities, as well as on their respective functional positioning and behavioral norm in the financial market. At the same time, all-round monitoring and supervision should also be undertaken

through technologies such as Big Data and AI. In this way, regulatory rules and regimes can be amended in step with changes in the market positioning and conducts of regulated entities.

Third, collaborative research on technology with shared features and applications, such as entity portrait creation, financial risk analysis, financial document identification, and public opinion analysis, should be enhanced. Potential application scenarios should be analyzed in depth and appropriate regulation models designed to create mature and effective technology solutions and specification standards. These solutions should then be deployed for application based on performance, as tested against historical cases.

Fourth, there should be further enhancement of interdepartmental collaboration, data exchange and sharing, and at the same time, data management needs to be stepped up. Data source quality is an important factor impacting the development of SupTech. Since the sharing and exchange of government data resources was initiated in 2016, preliminary progress has been made in respect of data channels construction and data directory creation, providing favourable preconditions for the development of SupTech. However, it is necessary to continue building on this foundation and expand both the breadth and depth of data resource sharing to achieve full data interconnectivity between the various levels and departments of government. This is essential for data to truly play a role in deepening reform, transforming government function, and promoting innovative management. At the same time, further improvements in

data quality control are essential. Measures for data classification and organization must be put in place to ensure the establishment of appropriate classification rules and effective data catalogues, and ultimately, a comprehensive and reliable data management system.

Fifth, it is essential to build a team of data analysts. Data analysts are an important contributor to the development of SupTech. Their role spans both operations and technology, requiring them to be familiar with both regulatory operations and technical implementation. Data analysts should integrate operational needs with the technical possibilities of Big Data to create key algorithms and application models that can support regulatory analysis. Therefore, building a team of data analysts who are familiar with regulatory operations, understand data correlations, and can extract meaning from data should be the top priority of regulators' future work.

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