

**Report of the Survey Group for the Research on the
Securities Industry and FinTech**

January 26, 2017

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Members of the Survey Group for the Research on the Securities Industry and FinTech

As of January 26, 2017

Chair	Yuta SEKI Managing Director, Research, Nomura Institute of Capital Markets Research
Members	Tsuyoshi OKI Senior Economist, Financial Business Research Unit, Financial Research Department, Mizuho Research Institute Toshio TAKI Director and Head of FinTech Research, Money Forward Inc. Yoshio FUKUDA Senior Manager, Global Financial Business Unit, NTT Data Institute of Management Consulting, Inc. Katsuyuki MACHII Deputy Director and Researcher, ESG Research Department, Daiwa Institute of Research Ltd.
Secretariat	Yosuke KOBAYASHI Researcher, Japan Securities Research Institute
Observers	Takeharu TOMINAGA Deputy Director, Financial Markets Division, Planning and Coordination Bureau, Financial Services Agency Sawaichiro KAMATA Senior Advisor, Policy Making Headquarters, Japan Securities Dealers Association Atsushi SANTO Head of FinTech Laboratory, New Business Development, Corporate Strategy Department, Japan Exchange Group, Inc. Tadashi OMAE Executive Director, Japan Securities Research Institute

Meetings of the Survey Group for the Research on the Securities Industry and FinTech

- First Meeting (June 6, 2016)
“Developments Affecting FinTech”
Ryo WATABE (Professor, Hosei University)
- Second Meeting (July 29, 2016)
“FinTech Initiatives in the US Securities Field”
Tsuyoshi OKI (Senior Economist, Financial Research Department, Mizuho Research Institute)
“Impact of Advances in Information and Communications Technology on Securities Businesses”
Yoshio FUKUDA (Senior Manager, Global Financial Business Unit, NTT Data Institute of Management Consulting, Inc.)
- Third Meeting (August 29, 2016)
“Applicability of Blockchain or Distributed Ledger Technology to Financial Market Infrastructure”
Atsushi SANTO (Head of FinTech Laboratory, New Business Development, Corporate Strategy Department, Japan Exchange Group, Inc.)
“Impact of FinTech on Securities Businesses: From the Perspective of Personal Financial Management Players”
Toshio TAKI (Director and Head of FinTech Research, Money Forward Inc.)
- Fourth Meeting (September 23, 2016)
“Advances in Artificial Intelligence and Big Data and Their Uses in Financial Services Businesses”
Kodai SATO (Financial Industry Analyst, Nomura Institute of Capital Markets Research)
“From FinTech to Financial Innovation: Realizing Innovation in Emerging Economies That Rattles Existing Framework”
Katsuyuki MACHII (Deputy Director and Senior Researcher, ESG Research Department, Daiwa Institute of Research Ltd.)
- Fifth Meeting (October 24, 2016)
“Crowdfunding and FinTech”
Junsuke MATSUO (Professor, Momoyama Gakuin University)
“Discussions of FinTech at the International Organization of Securities Commissions and Other Fora”

Koichi ISHIKURA (Director, Chief Officer for International Affairs & Research, Japan Securities Dealers Association)

Yutaka YOKOTA (Deputy General Manager of International Affairs Division of Policy Making Headquarters, and IOSCO Affairs Office, Japan Securities Dealers Association)

- Sixth Meeting (November 25, 2016)

“One Tap BUY”

Misako MIYOSHI (Director and General Manager of Customer Services, One Tap BUY Co., Ltd.)

“Relation between Securities Businesses and FinTech: Tentative Idea on Overall Structure”

Yosuke KOBAYASHI (Researcher, Japan Securities Research Institute)

- Seventh Meeting (December 27, 2016)

“Report on Trends in US Robo-Advisors”

Susumu SUZUKI (Head of Asian Operation, Aite Group, LLC)

“Regarding Draft of Report”

Yuta SEKI (Managing Director, Research, Nomura Institute of Capital Markets Research)

Introduction

FinTech—innovative financial services utilizing information technology (IT)—goes well beyond the mere application of IT to financial services. By transforming the structure of financial transactions through the use of blockchain and other technologies and by adopting such far-reaching innovations as artificial intelligence (AI) and big data, FinTech opens up possibilities for significantly changing the future of finance. The emergence of new businesses in the FinTech field and the engagement of major financial institutions in FinTech and related innovations are currently being witnessed on a global scale. Many related initiatives have been undertaken in Japan and are attracting keen interest.

FinTech can be expected to bring about major changes in Japan's securities industry as well. However, it cannot necessarily be said that sufficient analysis and evaluation of the current status, impact, and possibilities for the application of FinTech have been conducted from the perspective of the securities markets and the securities industry.

The Survey Group for the Research on the Securities Industry and FinTech (hereinafter, "Survey Group") was formed under the aegis of the Japan Securities Research Institute and commissioned by the Japan Securities Dealers Association to study the current status of FinTech and to attempt a fundamental evaluation of the implications of FinTech for the securities industry.

The Survey Group held seven meetings between June and December 2016. In the course of these meetings, the overall picture was examined, relevant case studies were investigated, the general background was reviewed, and efforts were made to arrive at an assessment of FinTech. Time was also taken to consider the implications of advances in FinTech on the securities industry. The meetings featured presentations by academic and business experts, which provided a basis for discussion of current applications of FinTech in Japan and abroad, as well as the significance of FinTech for Japan's securities industry.

This Report represents a summarization of the Survey Group's discussions. As the aim of the Survey Group was to survey new technologies and business models that are undergoing very rapid day-to-day changes, it would be difficult to say that the resulting analysis, including that of the future outlook and policy implications, was sufficiently exhaustive. Nevertheless, it is the hope of the Survey Group that this Report will serve the securities industry and market participants as a useful reference for future discussions and initiatives related to FinTech.

I. Advances in Information and Communications Technology and Securities Industry Environment

1. Socioeconomic Changes and Finance

The socioeconomic environment surrounding Japan's securities industry has undergone dramatic changes in recent years. Particularly noteworthy are the changes that have begun in the nature of financial businesses and securities markets triggered by the end of financialization and by innovations centered on the information and communications technology (ICT) field.

Financialization denotes a situation in which the real economy, consisting of the production, consumption, and transaction, of goods, is very heavily impacted by financial transactions and financial markets. In one sense, the global financial crisis of 2007–08 can be viewed to have signified the arrival of financialization at its limits. In fact, the regulatory reforms that followed the global financial crisis accelerated the review of businesses that were able to relatively easily generate profits in the conventional environment. It also accelerated the review and revamping of financial business models that stood protected by the regulatory regime. As a result, many financial institutions reallocated their management resources away from proprietary trading and the structuring of complex financial products toward services businesses aimed at providing customers with added value and solutions. In the case of Japan in particular, this matched certain trends among customers and the society at large. Specifically, while the accumulation of financial stock continued, the aging of society and longer life expectancies generated a greater sense of uncertainty regarding the economy, livelihoods, and fiscal viability. This has led to a further diversification of need in areas of asset management and asset control, which in turn have heightened the public's expectations for the financial and securities industries.

Turning next to developments in the ICT field, during this same period, there has been a constant flow of innovations supported by open forms of contracts and management resource procurement methods. The proliferation of smartphones and the expansion of e-commerce and social media, among other developments, are resulting in dramatic changes in the daily life and lifestyles of consumers. These changes have forced the financial and securities industries to actively develop products and services that match the new lifestyles and needs of customers. In Europe and America, the financial crisis resulted in a massive exodus of human resources previously engaged in financial products development, trading, IT, and other operations from financial institutions. These human resources found new employment in ICT industries and startups. The human resources and ideas that flowed out from the financial industry to other industries became linked to a wide array of innovations. Thus, in a sense, the new tides being generated by FinTech can be interpreted to signify a series of forces that are shaking the world of finance from outside the sector.

2. Economic and Industrial Innovations and the Future of Financial Systems and Securities Businesses

By utilizing sensor and other technologies to collect and apply big data, some recent innovations are considered to exert an immense impact on production activities and manufacturing technology, as well as on all industrial sectors. These remarkable innovations include AI, robotics, the Internet of Things (IoT), self-driving vehicles, and three-dimensional printings. Following on the first (steam power and engines), second (electric power and energy), and third (computers and data processing) industrial revolutions, these innovations are giving birth to what is being called the fourth industrial revolution (Industry 4.0 in Germany, Industrial Internet in the United States). The fourth industrial revolution has the potential for vastly changing the status and structures of financial and securities businesses. Moreover, securities businesses will likely be expected to supply the risk money needed to support the development of the fourth industrial revolution.

Assuming that various innovations will continue to emerge in the ICT field and other areas, it is possible that these will act as a driving force for generating fundamental changes in the economic system itself over the medium to long term (e.g., next 10 years). Some hypothetical and projected changes being discussed include: transition from a contract- and credit-based economy to network-based economy; transition from private property rights to joint-use rights; growing importance of nonmonetary transactions (nonmarket transactions, barter); and disappearance of boundaries between individuals, corporations, and markets leading to a rethinking of the reason for creating stock companies.¹ As a matter of fact, various recent developments indicate that these hypotheses are by no means imaginary or baseless. For example, consider how Uber Technologies' ride-sharing application has not only changed the taxi industry but is now transforming how the world views the means of transportation, or how Airbnb's home-sharing service is impacting fundamental assumptions concerning accommodations and real estate ownership.

3. Advances in Information and Communications Technology and Changes in Securities Business

The essential function of securities business operators can be defined as a financial institution that mediates information and assets in the framework of securities markets comprising a many-to-many network, and supports the mechanisms of value creation through investment. Notwithstanding the dramatic socioeconomic changes that are occurring, this essential function is likely to remain unchanged for some time to come. However, insofar as the securities markets basically comprise a network that deals with intangible data and value, it can readily be seen that advances in ICT will

¹ For example, see Jeremy Rifkin, *The Zero Marginal Cost Society* (St. Martin's Press, 2014).

have an increasingly critical impact on securities markets. In the very least, it would be safe to assume that customers opting to engage in securities transactions (or transactions entered into for purposes of asset control and asset management) using new devices such as smartphones and tablet computers will continue to increase rather than to decrease. In this context, one of the features of recent ICT-based innovations is particularly notable. That is, instead of new technologies directly creating new markets, the trend is for new markets to be created (during very short time spans) when users and customers utilize convenient platforms to customize products and services. This means that the structures of existing market are suddenly and rapidly transformed, not by individual technologies, but by the interaction between platforms and customers. While some possibility remains for established securities business operators to be protected to a certain degree by their current customer bases and regulations, there is no guarantee that they will remain standing as the principal players in the markets that will emerge in the future.

Seen from a medium- to long-term perspective, it is even possible that the infrastructure of the financial system itself, or such mechanisms for value assessment and exchange as money and securities will be replaced by new one. One reason why the emergence of crowdfunding and Bitcoin has attracted so much attention probably is that they hint at the above possibilities. In any case, while there may be some differences in degree or timing, securities business operators in general cannot expect to remain unaffected by ICT advances and socioeconomic changes. Thus, it is necessary to develop an awareness that the services demanded by customers, as well as money, market systems, and corporate finance, five to 10 years from now may not lie on a straight line extrapolated from the present.

II. The Securities Industry and FinTech

1. Defining FinTech

FinTech is a term created by combining “finance” and “technology,” and refers generally to ICT-based innovation and rebundling of finance, settlement, and financial services. The word itself is said to have been in use among some industry specialists for a considerable number of years, but its full-fledged entry into the common vocabulary is only a few years old.

Financial businesses handle large volumes of numbers and data pertaining to interest rates, stock prices, transaction data, customer attributes, and others. Consequently, the industry has always been strongly linked to technology. As such, the industry has a long history of steadily adopting new technologies to improve operational performance. In securities businesses, for example, following the proliferation of the Internet, securities companies specializing in online trading emerged; and even among established securities companies focused on providing face-to-face services, efforts were made to strengthen online channels. These initiatives have now taken firm root as a means for improving customer convenience. Parallel developments can be seen in services targeting corporate customers. For instance, in brokering and trading services for institutional investors, progress has been made in mechanization, automation, and high-speed processing in step with advances in computers. The emergence of high-frequency trading (HFT) in recent years underscores this process. These initiatives represent the application of technological progress to financial and securities businesses, and their value certainly cannot be refuted.

However, the FinTech that has come into the spotlight in recent years is qualitatively different from linear improvements in the operational efficiency of established financial institutions, or such initiatives that have already taken root for realizing business improvement. This quality is underlined by the frequent use of the term “disruptive” in describing FinTech. In other words, FinTech promotes major innovations in the functions provided by conventional financial services while pushing to rebundle the value chain. These innovations do not spontaneously rise up from within the traditional financial industry, but tend to be triggered by other industries and exogenous factors. As such, they can be characterized as being prompted by external transformative pressures. Therefore, the term FinTech as used in this Report differs from conventional efforts aimed at improving the efficiency of financial businesses through the utilization of broadly defined technology (which, for the purpose of convenient differentiation, is referred to here as old FinTech or FinTech 1.0). The FinTech discussed in this Report focuses on so-called new FinTech (or FinTech 2.0), which is highly innovative and which has a disruptive impact on established financial businesses. In other words, FinTech describes developments that come under the framework of the fourth industrial revolution as discussed in the preceding chapter. This implies that FinTech finds expression in multilayered platform competition that is not limited to securities and financial businesses but instead

encompasses many other businesses and sectors. At the same time, FinTech can be described as a collaborative endeavor centered on customers and involving participants from both inside and outside the industry.

The recent rise in FinTech can be examined from the perspective of two background developments found on (1) the financial industry side, and (2) the technology side.

Starting with the financial industry side and related exogenous environmental factors, following the subprime crisis and the European debt crisis, the world's major financial institutions were pressed to strengthen their capital base and to implement other reforms. Against this backdrop, they were pressured to review their organizational structures in order to ensure business continuity. In various other countries, the markets demanded fundamental changes, including a reduction in the size of the workforce. People that exited the financial industry in this process used their experiences to create certain external forces for change. Turning next to customers as users of the services of financial institutions, in the United States, customers became increasingly critical of established financial institutions after the financial crisis, blaming banks and others for the crisis and showing growing dissatisfaction with the level of services provided. This created an environment that called for services that were more convenient and more closely tailored to customer needs. In the United Kingdom, oligopolistic conditions centered on a small number of major banks had long persisted in the banking sector. The resulting lack of competition was viewed as a problem, and expectations were high for the government and industry to pursue programs for stimulating competition and improving customer services. These same issues were also being discussed in various countries, albeit in differing degrees and from somewhat different perspectives. In the case of Japan, measures were taken to improve the cost structure of financial businesses, and greater importance is now being assigned to non-face-to-face channels.

On the technology side, the proliferation of smartphones and other high-performance devices as well as cloud computing should be noted. In addition to having the capability to serve as the closest interface to customers, these platforms are available and scalable enough to be used for financial businesses. In the past, any effort to turn a new financial service concept into reality was predicated on large-scale initial investment in computer systems. However, the new technology allows for a much more flexible approach. Financial businesses can start at a small scale, monitor customer response, and gradually expand the service while making adjustments to customer responses. In the past, the financial industry was frequently referred to as an equipment intensive industry, a fact that made it difficult for new participants to enter the field of financial services. But these barriers have been significantly lowered, making it much easier for startups and nonfinancial companies to enter. Turning next to customers, such developments as the aging of society, longer life expectancies, and the diversification of lifestyles have made the needs for financial services less uniform than in the past. While the ideal approach would be the development of responses tailored to individual needs, it

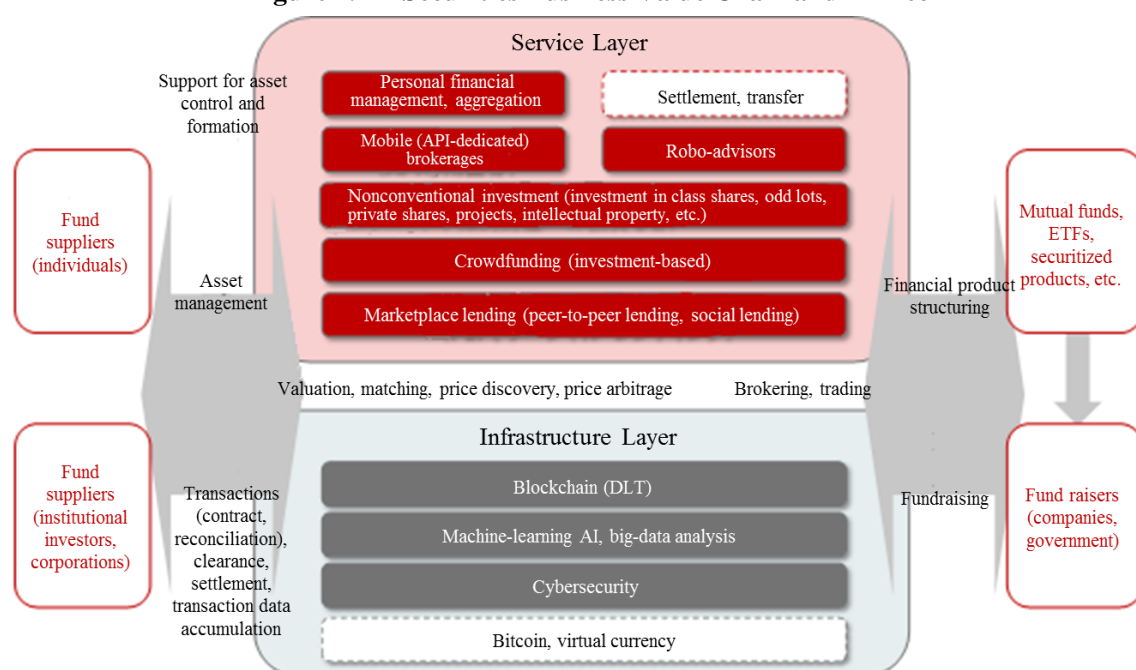
would be far too expensive in terms of personnel costs to rely solely on human resources to cope with the increasingly detailed personal requirements of customers. This realization has inevitably created heightened expectations for technology-based responses.

In the preceding paragraphs, FinTech was defined and background factors affecting its development were discussed. A closer look at FinTech indicates that the fields of financial functions that FinTech seeks to innovate and rebundle can be broadly classified into an infrastructure layer and a service layer (see figure 1).

Infrastructure Layer

FinTech is supported by a set of core technologies and concepts. In this Report, the foundation comprising these underlying technologies is referred to as the infrastructure layer. For example, Bitcoin is supported by such mechanisms as blockchain or distributed ledger technology (DLT). While Bitcoin gave these technologies their original impetus, Bitcoin itself is one of the possible applications of these technologies, and a great deal of attention is now being paid to its applicability to other uses, including financial transactions and various types of operations, to exploit the high levels of robustness and efficiency derived from its decentralized structure. Various verification tests are now being conducted toward these goals.

Figure 1. Securities Business Value Chain and FinTech



Note: Solid lines indicate areas directly related to securities businesses. Dotted lines indicate areas primarily related to banking businesses and financial businesses in general, but which have an indirect impact on securities businesses.

Source: Compiled by Nomura Institute of Capital Markets Research.

Bitcoin itself is also attracting attention as a new method for the transfer of value that differs from conventional currency that is supported by public trust in government and the central bank. Bitcoin and its derivatives can be placed under a broad definition of virtual currency and viewed as a means for promoting cashless societies and revitalizing community economies. In this context, virtual currency can serve as a broad foundation for FinTech that does not have to be restricted to securities businesses.

Other tidal forces driving the transformation of the financial sector include mechanization, automation, and digitalization using machine-learning AI and big data. Far before FinTech found its place in the popular vocabulary, financial businesses, especially securities businesses, were handling large volumes of data pertaining to markets prices, interest rates, and customer information in what is now being labeled big data. But this tendency has been dramatically reinforced in recent years due to the growing complexity of markets, accelerated transactions, and diversification of customer needs. Parallel to this, the range of application of AI supported by big-data input is expanding to include a vast array of fields, such as customer-response support, asset management support, and improving the efficiency of back-office operations. Because it is constantly learning on its own from data, machine-learning AI is particularly suited to these operations that require coping with immense volumes of data updated on a daily basis, changing markets, and diverse customer needs that are becoming increasingly segmented. The application of AI and related technologies in the areas of compliance and fraud detection is being referred to as regulation technology or RegTech. Increased digital exchange of information is continuing to expand the necessary scope of monitoring, making it extremely difficult for a small number of people to instantaneously grasp the details of all monitoring targets. The use of AI in these operations can be expected to improve monitoring quality while also reducing cost. Being human, investment advisors and investors can fall into making subjective judgments that lead to bias. The advantage of AI is that it is free of subjectivity and bias, which opens up the possibility of eliminating unintended errors in the decision-making process. On the other hand, even if machine-learning AI continues to evolve by learning on its own from data, its fundamental structure will remain unchanged in that it cannot escape the determinative influence of the data fed to it. Another issue is that AI may evolve to the point where its judgment process transcends the parameters of human thought. By effectively transforming into a black box, AI may give rise to the problem of rendering it difficult to ensure accountability, particularly with respect to customer interaction. Looking several decades into the future, perhaps it is best to remember that AI is not a substitute for humans but rather a support mechanism. With this perspective in mind, the

potential of AI, which will certainly continue to evolve and advance, should be carefully observed. An optimal division of functions and roles should be pursued while remaining committed to the basic philosophy that it is humans who use AI.

The proliferation of FinTech is premised on the preservation of cybersecurity, the enhancement of which is a necessary condition for worry-free use of new digital services by customers. However, if there is a trade-off between the level of security and ease of use, secure services may remain underutilized. This would be an unfortunate outcome resulting from a reversal of priorities. While striving to realize equally high levels of security and convenience, an optimal balance must be reached to match the characteristics of individual service users.

Service Layer

Financial services that customers (end users) can actually employ are brought into existence through the underlying support provided by the infrastructure layer discussed above. In this Report, these elements are referred to as the service layer. For example, the rapid rise of personal financial management (PFM) has been noted among financial businesses in general. Under the traditional structure, the control of financial assets was separated and compartmentalized under the respective accounts and financial services provided by individual financial institutions, such as banks, securities companies, and credit card companies. In contrast, PFM does not look at asset control from the perspective of the financial institution. Rather, the perspective has been reversed to that of the individual user to create a framework for comprehensive asset control by individuals. By using an aggregation function to aggregate and display assets and transactions maintained under separate accounts or to automatically classify related information by type of use, PFM enhances user convenience by visualizing the individual's asset control. This development has been supported by the spread of external data reference systems utilizing application programming interfaces (APIs: interfacing and linking mechanism allowing the functions of a system to be used through external programs or software). Because PFM aims to secure an interface that is situated closest to the customer, it can be said that PFM can potentially influence the value chain in financial businesses.

Securities businesses that are focused on securing the closest interface to customers are beginning to emerge. Specifically, under this model, the securities company itself becomes specialized in customer interaction and other front-office functions, while outsourcing its middle- and back-office functions, such as securities transaction operations and account management, to established financial institutions and other external entities to the extent possible. There are two key points in particular to consider here. The first key point is to realize low-cost, non-face-to-face customer interaction via smartphones and other devices, thereby providing values that differ in content from values offered through conventional face-to-face services. This can be placed under the category of mobile

brokerages made possible through the proliferation of smartphones and tablet computers, much in the same way as the proliferation of personal computers and the Internet gave rise to online brokerages. The second key point relates to utilizing APIs to minimize operational burdens. This is referred to here as “API-dedicated brokerages,” which can be said to be an extrapolation from the goal of mobile brokerages that focus on customer interfaces. API-dedicated brokerages may lead to the creation of new cost structures that are not bound by the conventional profit model of securities businesses centered on brokerage fees received from customers. As such, it is possible that API-dedicated brokerages will pioneer novel ideas that fundamentally differ from those of established securities companies and morph into a movement for rebundling securities businesses.

Among the various segments of financial businesses, FinTech is considered to have a particularly strong impact on the settlement and transfer functions of conventional financial services. In addition to the proliferation of contactless smart cards, rapid advances are being made in authentication technologies based on biometrics such as fingerprint, vein and iris patterns, and facial recognition. In Japan also, these advances are expected to accelerate the movement toward a cashless society over the coming few years. These developments can be seen as preparing new foundations for fund transfer. Moreover, by combining with improved versions of the Japanese Banks’ Payments Clearing Network that currently exists and with developments anticipated over the coming decade in Bitcoin and blockchain (DLT) as elements of underlying technology, these advances may achieve a dramatic reduction in the costs of settlement and transfer by facilitating the adoption of decentralized systems and structures. Further changes can be anticipated when the time horizon is pushed outward by several decades. Currently, micropayments involving the transfer of very small amounts are too expensive to handle. But within a few decades, large-volume and automated micropayment transfer systems may come to provide the foundations for supporting the circulation of the financial lifeblood in a society characterized by automated manufacturing activities. This evolution in settlement and transfer systems can be expected to have a major impact on banking businesses. But it would be mistaken to think that these changes would not affect the course of innovation in securities businesses. For example, these innovations would make it possible to purchase securities through a securities company while leaving the corresponding funds in a bank account. Similarly, delivery-versus-payment arrangements—which ensure that delivery occurs only if payment occurs and vice versa—for the settlement of securities transactions may be very significantly impacted by these developments.

Robo-advisors have emerged in the field of asset management, a service primarily provided by means of personal computers, smartphones, and other online services. The standard structure of a robo-advisor is as follows: by posing several questions to a customer, the customer’s risk tolerance level and other metrics are automatically analyzed, and an optimal portfolio is proposed based on the customer attributes that have been provided; and once investment is made, the weighting of each asset class is automatically adjusted (rebalanced) as the market changes. A key feature of the robo-

advisor is that it is less expensive than human financial advice and management. The reverse side of this ease of operation is that it is difficult for robo-advisors to cope adequately with complex management needs and to control assets spreading over a wide range of classes. As a result, the scale of assets currently under management is limited compared to conventional face-to-face services. In countries at the forefront of these developments, new hybrid arrangements combining human and robo-advisors are beginning to emerge, and the trend is toward differentiation designed to match diverse needs and purposes. It can be said that these developments are delivering value to customers by adding to the range of available choices in asset management. Over the next 10 years, robo-advisors will probably become linked to aggregation functions encompassing multiple accounts and extensive financial planning services, and will come to offer comprehensive life-planning services that address the financial needs of an investor over his or her the entire lifetime. At this level of development, anyone may have access to the same level of services currently enjoyed by a small group of wealthy individuals that benefit from tailor-made arrangements involving the participation and input of multiple experts. It should be noted that robo-advisors in most cases invest in index exchange-traded funds (ETFs) or balanced funds. This strategy is designed to fully capitalize on the cost advantage of robo-advisors, and is in conformity with an investment philosophy that focuses on long-term and passive asset management. While options are increasing for active management featuring the inclusion of such assets as individual stocks and alternative assets, the scale of such assets remains small. The debate over passive versus active management is not limited to robo-advisors and can be seen everywhere in the asset management domain. A wide range of opinions exist on that topic from the perspectives of the cost-return relationship and corporate governance as well. Still, one cannot necessarily deny the possibility that if, over the next 10 years or more, the size of assets controlled by robo-advisors comes to claim a large share of the industry's total assets under management, robo-advisors will emerge as a factor influencing the entire market in various ways.

Over the coming decades, the role of the capital market itself may change. In that case, fundamental changes may occur in the concept of investment in the framework of asset management, as well as in investment vehicles. For example, the very act of investment may turn away from the aim of realizing monetary returns through capital and income gains earned on stocks and other assets to assigning greater emphasis to providing social support for a wide range of corporations and related communities. A glimpse of this possibility can already be seen in environmental, social, and governance investment and related concepts. In a sense, this movement can be identified as a return to the roots of the original concept of the stock company. Given the tendency toward acting on qualitative judgments in this field, perhaps technological advances can be exploited to quantify and optimize the impact of such investments, implying that the importance of this investment approach may increase during the next 10 years. If that were to happen, investment vehicles may generally come to include nonconventional vehicles that are not restricted to the equity of listed companies. For example, new investment platforms may emerge to facilitate investment in previously hard-to-access assets, such as class shares, odd lots, private shares, projects, and intellectual property.

Crowdfunding stands as a new form of financial intermediation in fundraising, and can be placed under the following broad categories: lending-based crowdfunding, investment-based crowdfunding (of which equity-based crowdfunding is a subcategory), donation-based crowdfunding, and prepurchase-based crowdfunding. In the traditional scheme, a nonfinancial company seeking to raise funds has the choice of selling equity (shares) through a securities company or taking on debt (involving bonds or loans). In crowdfunding, the use of online platforms makes direct procurement of funds possible. As represented by the prepurchase- and donation-based categories, the suppliers of funds tend to regard crowdfunding as a means to support a specific individual, region, or project, rather than as a tool to pursue monetary returns. On the other hand, equity-based crowdfunding bypasses intermediation by securities companies to directly raise funds from a broad range of investors. In return, investors are able to obtain private shares. This fundamentally differs from conventional arrangements where personal networks are used to raise funds from a small number of major investors including institutional investors, or where securities companies acting as lead managers underwrite an issue and enlist investors through their retailing activities. With the enactment of new laws in the United States, as well as in Japan, crowdfunding is expected to show sound growth in the future. However, at the present time, it is limited to merely offering an alternative method for fundraising. Still, looking ahead to the next decade, the use of crowdfunding may increase, while paying due attention to the requirements of investor protection, as startups and specific projects utilize it as a method for procuring funds without going through an initial public offering (IPO). If this is realized, it cannot be denied that the purpose of established securities companies as intermediaries as well as the *raison d'être* of stock exchanges may be called into question. Just as traditional face-to-face securities companies responded to the emergence of online brokerages by bolstering their direct channels, the success of crowdfunding may force established securities companies to rise above the challenges posed by profitability and market cannibalization to incorporate the essential values provided by crowdfunding. Similarly, the markets themselves may be forced to change. In the United States, in addition to the New York Stock Exchange, Nasdaq, and other conventional stock exchanges, a new class of exchanges are emerging that facilitate (albeit on a limited basis) trading in private shares. In this role, these exchanges have become a factor in supporting the growth of startups. Japan has a Green Sheet system and a shareholder community system that has followed on the earlier Green Sheet system. In connection to conditions in the United States and to equity-based crowdfunding (investment-based crowdfunding) that represents similar concepts, the ways of procuring funds may also change. One of the methods for fundraising using online platforms is the issue and sale of virtual currency, which is referred to as crowdsale or initial coin offering (ICO). Bitcoin as a cryptocurrency is arguably the first instance of crowdsale. An organization using this scheme in the management of its business is referred to as a distributed autonomous organization (DAO). Symbolic of this is a project named “the DAO,” which was launched in 2016 based on a type of blockchain known as Ethereum. Designed to function as what may be called an autonomous venture capital organization, the project successfully raised large

amounts of funding. But this success was followed by an incident of hacking that drained the project of much of its funds. At the present time, such initiatives represent no more than an alternative method. But things may change over the next several decades to the point where DAOs with no central management and functioning as organizations solely in accordance with a defined protocol take their place in a fully automated society. It is conceivable that stock companies will have disappeared in such a society, meaning that fundraising would take on forms that differ from current ones. This would be the ultimate manifestation of disruption for today's securities businesses whose primary function consists of intermediation in direct financing.

Lending-based crowdfunding is sometimes referred to as marketplace lending and primarily represents a new direction in the lending functions of banks. Under conventional bank lending, funds collected from depositors are redirected as loans to borrowers in a process where the bank can be described as functioning as an intermediary. Lending-based crowdfunding (marketplace lending) obviates the intermediary by using online platforms to directly match lenders and borrowers. This allows borrowers to access funds at lower rates of interest than what is available to them from banks. Conversely, lenders can expect to receive a higher rate of interest than earned by depositing their funds in banks.

2. Impact of FinTech on the Securities Industry

FinTech was outlined in the preceding section. In this section, FinTech will be reviewed from the perspective of how it may impact established financial businesses. In its present stage, FinTech is said to have a major impact on the banking and credit card sectors through its payment, settlement, and transfer functions. Due to the proliferation of smartphones and other high-performance mobile devices, banking and credit card operations are being consolidated into apps, which become the closest interface to customers. In this environment, end users can directly connect to each other without any awareness of back-end operations. A disruption scenario for banking businesses posits that such developments will eventually cause shrinkage in high-cost face-to-face services through the branch channel.

Regarding securities businesses that offer primarily securities transaction and investment functions, innovative technologies and players have yet to emerge that would disrupt the decision-making, information management, and service implementation processes, or would disrupt the value chain. Behind this lies the conventional notion that securities operations are impossible to perform without intermediation by highly trained staff providing very detailed services. However, this domain is not immune to change as witnessed by the increased presence of online brokerages in retail stock trading following the proliferation of the Internet. Therefore, in the future, such new concepts as robo-

advisors, crowdfunding, and blockchain (DLT) may have a disruptive impact on securities and investment services (see figure 2).

Figure 2. Categories of FinTech

	Settlement, transfer	Deposit	Lending, loans	Investment	Others (insurance, accounting, at-counter services, etc.)
1. FinTech supporting financial businesses	AI, IoT, robots, big data analysis, cloud computing, social media, APIs, etc.				
2. FinTech transforming financial transaction methods	Mobile-only banks			Mobile brokerages	
				Robo-advisors	
3. FinTech replacing parts of financial businesses	Settlement-related		Online lending (incl. balance sheet lending, transaction lending)		
4. FinTech providing new financial intermediation			Marketplace lending		
				Crowdfunding	
5. FinTech transforming financial infrastructure	Blockchain technology				
	Cybersecurity				

Source: Compiled by Nomura Institute of Capital Markets Research.

Taken individually, such underlying technologies as cloud computing and APIs function to support conventional financial businesses and can therefore be positioned on a linear path of routine efforts to improve operations. By supporting financial businesses, technology allows operators to provide higher-value services to customers and to cut costs by improving systems efficiency. These technologies comprise elements of an underlying foundation that supports the adoption of more innovative FinTech.

In the investment domain, mobile brokerages and robo-advisors can be positioned as developments transforming the methods of financial transaction. In the traditional setting, as a rule, securities transactions and asset management involved face-to-face advice and guidance offered to customers by staff members. However, apps that offer excellent user interface (structures for the exchange of information between humans and computer systems) and user experience have made it easier to provide non-face-to-face services on personal computers and smartphones. These new channels stand a step beyond automated teller machines and online channels that have existed for some time and have effectively maintained their position of being the closest interface to customers. By capitalizing on this advantage, it becomes possible to develop new business models and change the cost structure of financial transactions.

Blockchain technologies (DLT) are capable of transforming the financial infrastructure and can potentially exert tremendous influence. Although it started out as a technology for supporting Bitcoin, observers have pointed out that blockchain technology can be applied to various financial transactions and operations. The greatest potential impact of blockchain derives from its decentralized structure. In the conventional environment, securities businesses function as intermediaries in transactions and fundraising, and play a central role in matching the needs of participants in direct financing. Because increased volume of transactions and deals allows for greater efficiency in intermediation, exchanges and securities companies can both be identified as centralized structures. As discussed above, blockchain is a concept diametrically opposite to that premise and is based on a distributed structure that facilitates direct linkage among participants. This implies that the intermediating function of securities businesses may ultimately become unnecessary. This would be identified as disruptive.

Possibilities for Rebundling the Value Chain

In addition to innovations driven by the underlying technologies discussed above, advances in AI and the big-data revolution may result in an unbundling of the value chain in securities businesses. This in turn could lead to a rebundling through tie-ups and mergers and acquisitions (M&As) that spills over to include other business domains and industrial sectors. The various possible steps in this process may unfold as outlined below.

(1) Advancing toward prosumer customers

Prosumer is a term created by combining “consumer” and “producer,” and points to a phenomenon now being seen in various fields as the result of progress in ICT. Examples include consumers producing merchandise simply with three-dimensional printers to start small-scale manufacturing businesses, and bloggers transmitting important information before major media outlets. Traditionally in the areas of investment and asset management, information available to professionals versus amateurs, and securities companies versus customers was highly asymmetrical. However, with rapid advances in information technologies, this gap appears to be shrinking. Moreover, the interactive flow of information between customers is increasing through the use of social media and other means. These developments are evidently contributing to the transition from customer to prosumer. What values will securities companies provide in this evolving environment? The answer to this question must be examined.

(2) Establishing new channels in financial intermediation

Due to their convenience, mobile channels based on smartphones provide the closest interface for customers, while long hours of use facilitate access to very detailed information on customer trends from a data perspective. New players like these will continue to emerge. Based on capitalization and public trust, securities businesses have maintained their position as financial intermediaries. However, the appearance of such new players will undermine the advantage of established players and make it possible to get rid of the middleman.

(3) Advances in machine-learning AI

The strength of established securities companies is derived from access to personal networks, which buttresses their position in intermediating financial needs. However, advances in AI may significantly expand the scope of AI functions and replace or augment human-performed functions. Changes like these may alter the cost structure of securities businesses and accelerate the rebundling of their value chain. This process would enhance the impact of FinTech on securities businesses.

One of the possibilities considered in the flow of events outlined above is the rebundling of securities businesses through tie-ups and M&As involving other business domains and industrial sectors. The most disruptive scenario in that situation would be realized with the emergence of players from other industries who have been empowered through the combination of such underlying technologies as big-data analysis and APIs to provide customers with services corresponding to those of conventional securities businesses. If these services prove to be more convenient and user-friendly than those of established securities companies, that would certainly challenge the *raison d'être* of conventional securities businesses.

Successful entry from other industries will be predicated on the ability to provide customers with truly safe and convenient services. Given that relevant industry laws will stand as a barrier over the long term, such changes will probably not occur overnight. However, in projecting the course of future developments, it should be realized that the choice and support of customers is the most influential factor. Statutory barriers to entry are essentially intended to serve the purpose of customer protection. Whether or not services that are easier to use, more convenient, and safer can be provided to customers probably constitutes a fundamental question that will be posed by the disruption caused by FinTech.

III. Priority Research Fields: FinTech Impacting the Securities Industry

1. Customer Services, Information Management, Investment Advisory, and Asset Management Fields

Personal Financial Management

PFM refers to a service for generating household accounts by using an aggregation function to collect data from banks, securities companies, credit card companies, electronic money, point cards, and others sources. By automatically collecting and visualizing information from distributed sources, PFM has the potential for transforming information management into an essential value provided by financial services businesses. Using the log-in ID and password provided by a customer, PFM operators utilize a technology known as “scraping” to access the website of the customer’s financial institution and extract the needed information. This approach, however, has a number of drawbacks. First, transferring log-in data to the operator exposes the customer to risks of information security and unauthorized access. Second, the technology cannot speedily respond to changes in the financial institution’s website designs. In recent years, alternative arrangements have been launched for connecting financial institutions through APIs to enable speedy and accurate extraction of data without requiring the submission of the customer’s ID and password.

In the United States, PFM was introduced at an early stage.² This can be partly attributed to the fact that retirees could not depend on public pension programs to finance their postretirement lives, and that loans such as student loans and mortgages are common elements in life. Following the spread of the Internet beginning in the 1990s, such services appeared as Intuit’s *Quicken Online*, Yodlee, and Mint.com. In more recent years, the trend has been to attach additional values to household account functions. For example, Credit Karma offers advice on improving the credit score, Digit offers an automatic savings function, and Personal Capital adds the function of automated asset management and combines this with consulting services offered over the phone or by financial planners. Thus, services have gone beyond visualizing financial information. Customers are seen to be supporting such add-on functions that offer solutions to the problems they face.

In Japan, various PFM services began to appear with the spread of the Internet after the start of the new century. SBI Holdings offered *MoneyLook* and NTT Communications came out with *Kakeibon*. With the rapid proliferation of smartphones during the 2010s, various startups began to offer app-based services, such as *Zaim* from Zaim, *Money Forward* from Money Forward, and *Moneytree* from Moneytree. In recent years, Money Forward has established collaborative ties with SBI Sumishin Net Bank, a number of regional banks, and Tokai Tokyo Securities. As seen in this case, there is an ongoing movement for integrating with real channels and entering partnerships with other

² Even before the proliferation of the Internet, in the mid-1980s Intuit launched computer software *Quicken*.

entities. PFM operators in Japan do not have concrete legal standing under existing legislation. However, as will be discussed later, the Financial Services Agency and the Japanese Bankers Association are currently examining how PFM should be positioned.

Robo-Advisor

Robo-advisors constitute an online system that mainly offers (1) profiling and (2) discretionary and other asset management services for investment in ETFs, investment trusts, and other vehicles based on investment policies formulated through profiling. The process starts by answering a number of simple questions, such as age, annual income, holdings of financial assets, investment purpose, and risk tolerance. Based on the customer's answers, an algorithm is used to automatically formulate an optimal portfolio and to implement rebalancing and reallocation during the management period. This allows investors to access the type of investment advisory services based on portfolio theory that was previously available only to a certain class of wealthy individuals and institutional investors, at low cost and for small investment amounts. Robo-advisors also provide benefits to wealthy individuals. By combining the services of sales staff with robo-advisors (hybrid advisors), more neutral advice can be obtained that is unaffected by the proclivities of staff members.

In the United States, robo-advisors became big after the 2008 financial crisis. Many startups were created to provide robo-advisor services, such as Betterment, Personal Capital, FutureAdvisor, Wealthfront, and SigFig. This occurred against the backdrop of stricter regulations introduced following the financial crisis. That is to say, established financial institutions began to turn their attention to wealth management operations with low capital requirements. In the process, face-to-face transactions were cut back and limited to wealthy individuals where high profit margins could be expected. As a result, the coverage of other classes of investors suffered, offering startups with a competitive edge in providing asset management services to the masses and the lower strata of wealthy investors. In more recent years, however, the active entry of major operators has intensified competition. In 2015, Vanguard and Charles Schwab entered the robo-advisor market, and FutureAdvisor was bought out by BlackRock. In 2016, E*Trade and Fidelity also started to offer robo-advisor services. These players are differentiating themselves from startups by creating hybrid systems that combine robo and human advisors and commission-free services. The entry of major operators has significantly expanded the robo-advisor market but further intensified competition.³ Going forward, M&A and tie-up strategies aimed at coping with the changes in the competitive environment are expected to become more important. Notable examples of this movement are combinations involving industry leaders as seen in the acquisition of FutureAdvisor by BlackRock, and combinations with aggregators as seen in the 2015 acquisition of Yodlee by Envestnet. In

³ Major operators have already surpassed startups in terms of assets under management through robo-advisor services.

addition, the provision of system tools to independent registered investment advisors may gain momentum.

In Japan, *THEO* was launched by Money Design in February 2016 and *WealthNavi* was launched by WealthNavi in July 2016. As in the case of US startups, these independent Japanese entities are offering discretionary asset management services for investment in ETFs and investment trusts. Established financial institutions are also actively entering this domain. These include *SBI FundRobo* from SBI Securities, *8 Now!* and *Chloe* from 8 Securities, *Nomura Goal-Based* from Nomura Securities, *Toshinkobo* from Matsui Securities, *MSV Life* from Monex-Saison-Vanguard Investment Partners, *SMART FOLIO* from Mizuho Bank, *PORTSTAR* from Mitsubishi UFJ Kokusai Asset Management, and *Raku Wrap* from Rakuten Securities. However, some of these services do not go beyond the presentation of recommended allocations, and do not involve discretionary asset management. In these instances, robo-advisor services are positioned as a tool for leading customers to invest in wrap (balanced) funds and are frequently provided without charge. In any case, it is anticipated that these services will provide a means to approach asset-forming households that may have not received sufficient attention in the past.

Other Uses of FinTech in Personal Asset Control and Asset Formation

Among other uses of FinTech in personal asset control and asset formation, particularly noteworthy are cases where FinTech is utilized for tax-incentivized plans that encourage personal savings and investment. In the United Kingdom, the Individual Savings Account (ISA) system was introduced in 1999 as a tax-incentivized program. The system has been expanded with parallel growth in the scale of the market following the addition of programs such as those for children's asset formation and housing acquisition support in recent years. Nutmeg, an online wealth management company targeting ISAs, is offering robo-advisor services. As in the case of robo-advisors in general, Nutmeg has achieved low fees by using ETFs in portfolio building and has reduced minimum investment amounts to lower the hurdle for users. Another example is Hargreaves Lansdown that specializes in direct sales to individuals. The company offers *Portfolio+* as a robo-advisor, focusing on providing services for various types of tax-incentive accounts.

The US 401(k) operates as a defined-contribution (DC) pension plan with tax incentives for retirement savings contributions. Targeting the 401(k), Financial Engines offers an online investment advisory service and a discretionary management service covering portfolio building, investment judgment, and rebalancing. In addition, the company offers investment education services for promoting investment literacy. The United States also has a 529 Plan, a higher-education savings plan for families, which is used by parents, grandparents, and others for saving up college funds for their children and grandchildren. Targeting the 529 Plan, BlackRock, which

acquired FutureAdvisor, offers a robo-advisor service that supports portfolio building aimed at promoting savings for future education expenses.

In Japan, a DC pension system was introduced in 2001 and is continuing to expand. The system was revised in May 2016 to expand eligibility to enroll in individual-type DC pension plans. It is hoped this will increase enrollment in individual-type DC pension plans by people already enrolled in government and corporate pension plans, and by housewives. FinTech is already being mobilized to address this development. For example, in August 2015, Money Forward entered into a business tie-up with SBI Benefit Systems, a company engaged in recordkeeping for DC pension plans. The two companies are jointly developing new technologies and services to promote enrollment in and use of DC pension plans through PFM services.

2. Fundraising and Securities Issuance Fields

Crowdfunding represents a use of FinTech in the fields of fundraising and securities issuance. Crowdfunding is a new form of financial service featuring the procurement of small funds via the Internet from large numbers of unspecified small-scale investors, and can be characterized as the formation of an online community brought together through the shared values of wanting to support or promote some specific endeavor. Other notable characteristics include the importance of the presence of a core fund supplier for successful launch of a service, and low levels of profitability for intermediaries. Crowdfunding is categorized according to the type of return obtained by fund suppliers. These comprise lending-based (interest is earned and principal is repaid), investment-based (shares are received in exchange for investment, with the possibility of dividend payments), donation-based (donations with zero return to fund supplier), and prepurchase-based (products and services are received, but no monetary return). Among these, lending- and investment-based crowdfunding is thought to be particularly closely related to securities businesses.

Lending-Based Crowdfunding

Lending-based crowdfunding is a financial intermediation service that matches fund suppliers and fund procurers through the Internet. Other appellations include social lending, marketplace lending, and peer-to-peer (P2P) lending. In addition to personal information commonly used in credit examination (age, income, credit score, etc.), lending-based crowdfunding employs AI to undertake multifaceted analysis of types of data not used by established financial institutions. These include PFM and cloud accounting data, credit card settlement information, records of e-commerce transactions, and information extracted from social media. This analysis facilitates lending to classes of customers who normally would not be eligible for bank loans. The expectation is that such

services will help correct distortions in credit markets and prompt arbitrage where there is uneven distribution of funds. Intermediaries providing the platform receive fees equivalent to around 1–3 percent of the value of the loan. Borrowers are able to access funds at better terms than from established financial institutions, and lenders can expect to earn a higher return than investing in traditional financial assets. The actual loan is extended by a bank that has partnered with the intermediary. Because beneficiary rights are issued to lenders in many cases, it has been pointed out that this may lead to the creation of markets for new types of collateralized loan obligations. In recent years, lending-based crowdfunding has expanded rapidly in China and other emerging economies, leading to expectations that this type will enjoy particularly strong growth among the various subcategories of crowdfunding.

In the United States, lending-based crowdfunding took off after the 2008 financial crisis. During this period, the lending capacity of established financial institutions receded due to the stricter financial regulations introduced under the Dodd-Frank Act and the adoption of more stringent international capital-adequacy requirements. As a result, there was a considerable tightening, especially, of lending to sole proprietorships and small businesses and of housing loans. On the other hand, as zero- and negative-interest rate policies spread in various parts of the world, individual investors and institutional investors sought to find investment vehicles with higher rates of return. It was in this environment that lending-based crowdfunding developed as a means to meeting the needs of both fund procurers and fund investors. Market expansion was led by such startups as Prosper and Lending Club, respectively founded in 2005 and 2006. The December 2014 listing of Lending Club on the New York Stock Exchange remains fresh in one's memory. For multiple reasons, the future trend may be in the direction of multipolar development. The first reason is intense competition. For example, Goldman Sachs, a leading investment bank, launched an online lending platform called *Marcus* in October 2016. This points to the possibility of continued entry by major financial institutions. Competition is also being driven by the development of improved comparison sites. Easy comparison of various platforms can be expected to promote competition. While this will have a dampening effect on operator margins, it may also encourage the development of more innovative services. The second reason is that regulations are being tightened following Lending Club's compliance system problem.⁴ Particularly noteworthy are risk retention requirements that will obligate crowdfunding operators to retain a certain percentage of their securitized loans on the balance sheets. Implementation of this requirement will reduce unfettered allocation of capital and may hurt profitability. The third reason is the upward trend in nonperforming loans. Crowdfunding will become less attractive to borrowers if operators try to cope with this trend by transferring the burden to borrowers through higher fees and interest rates. Thus, although lending-based crowdfunding has expanded rapidly in recent years, it is possible that various adjustments will have to be made in the industry as operators are restructured or pushed out of the market.

⁴ In May 2016, Lending Club revealed that loan assets that did not meet internal rules and terms of contract had been sold to investors. The chief executive officer resigned as a result.

In the United Kingdom, a country considered to be the pioneer in lending-based crowdfunding, Zopa was launched in 2005 as a consumer financing service. This was followed in 2010 with the establishment of Funding Circle, an operator specializing in small-business financing services, and RateSetter, a company providing both consumer and business financing. The volume of loans outstanding is continuing to grow in both the consumer and business financing segments. An interesting recent feature is the increased participation of institutional investors, which have come to claim a growing share of total amounts invested. As of 2015, institutional investors accounted for 26 percent of total business financing and 32 percent of consumer financing. On its part, the government is actively implementing policies for promoting lending-based crowdfunding. A new system known as Innovative Finance ISA was introduced in 2016 to provide preferential tax treatment for investment in lending-based crowdfunding. With policy support such as this, it is believed that lending-based crowdfunding in the UK will likely continue to grow.

In Japan, crowdfunding is affected by the regulations of the Money Lending Business Act (requiring money lenders to be registered as stipulated in the Act). Consequently, P2P matching has not been realized, and alternative methods are being employed through the establishment of silent partnerships. Under this arrangement, money is received from fund suppliers through a silent partnership and loaned out to fund procurers. Thereafter, prescribed interest is paid and the principal is repaid to fund suppliers by fund procurers. Formed in 2007, maneo offers Japan's largest lending-based crowdfunding platform, primarily handling real estate funds. The total amount of loans extended had grown to exceed 40 billion yen by January 2016. Similar services are being provided by *AQUSH* (services launched in 2009), SBI Social Lending (services launched in 2011), and *Crowd Bank* (services launched in 2013), among others. Although Japan's lending-based crowdfunding has a relatively low share in the global market, the domestic market is growing and can be expected to continue on this path.

Investment-Based Crowdfunding

Investment-based crowdfunding is a scheme that enables soliciting capital subscriptions via the Internet from large numbers of unspecified investors through the issuance of private shares. This allows startups issuing shares to use the Internet to raise seed money from large populations, opening up the possibility of procuring a certain volume of funds without listing on a stock exchange. Moreover, by impressing the public with its business model through the Internet, a startup can transform its fans and supporters into shareholders. This points to possibilities for creating new types of relationships between companies and shareholders. Unlike donation-based and other crowdfunding, it is highly likely that investment-based crowdfunding will become subject to regulation in all countries. Regulatory frameworks are beginning to take shape in countries like

Britain and America. In Japan, the Financial Instruments and Exchange Act was revised in 2014 and steps were taken to prepare the legal foundations for investment-based crowdfunding.

In the United States, the Jumpstart Our Business Startups (JOBS) Act was enacted in 2012 to revitalize the IPO market that had gone into a slump after the financial crisis. The JOBS Act allowed investing in shares through crowdfunding websites. However, the system has not been fully utilized, partly due to the delay in the establishment of Securities and Exchange Commission rules needed for implementation.⁵ Founded in 2010, AngelList is a representative case of equity-based crowdfunding. The company offers a platform for matching angels and entrepreneurs through social media. By requiring angels to disclose their investment history while requiring entrepreneurs to identify angels and venture capital firms that have supported them in the past, the scheme provides relevant information from both sides that can be used in examining the status of the counterparty. However, under the current situation, one cannot necessarily say that these services are threatening the roles of existing venture capital firms and investment banks.

In the United Kingdom, both fund-based crowdfunding under collective-investment schemes and equity-based crowdfunding exist. However, since strict restrictions are imposed on the former type in relation to investment solicitation, investment-based crowdfunding is centered on equity-based arrangements. In 2014, the Financial Conduct Authority, which has jurisdiction over investment-based crowdfunding, introduced new regulations pertaining to equity-based crowdfunding and defined requirements such as the information to be provided to investors and the conditions to be met by intermediaries. Given these improvements in the environment, total amounts procured and the number of deals increased sharply around 2015. As a result, equity-based crowdfunding is steadily becoming established as a fundraising method for startups. Founded in 2010, Crowdcube currently stands as the largest equity-type crowdfunding platform in the UK. Entrepreneurs submit their business plans to Crowdcube for review. After passing the review, entrepreneurs can make a three-minute video presentation to investors over the web. The minimum investment amount is 10 pounds. Small-amount investors receive discount coupons and such for the products and services of the issuing company while large-amount investors receive shares. The UK investment-based crowdfunding market has grown conspicuously since 2013 and is expected to continue its expansion.

In Japan, investment-based crowdfunding takes the forms of both silent partnership-based and equity-based crowdfunding. Thus far, market growth has been led by the former type, which is represented by Music Securities founded in 2001. The company mainly manages funds for local specialties, and its cumulative investments now exceed 50 billion yen. In recent years, there has been a trend toward collaboration with regional banks in such areas as project referral and fund

⁵ Regulation Crowdfunding came into force in May 2016 as Securities and Exchange Commission rules pursuant to the JOBS Act. The Regulation allows startups to solicit the subscription of securities reaching a maximum of 1 million dollars over a 12-month period.

structuring. However, Type II financial instruments business operators under the Financial Instruments and Exchange Act are subject to various solicitation restrictions, including the obligation to provide material information, and prohibitions on telephone and face-to-face solicitation. Also, these operators are required to appoint an internal control manager and establish a credit examination department. (Basically, the same requirements apply to Type I operators.) These requirements can become an obstacle for understaffed startups. Following the 2014 revision of the Financial Instruments and Exchange Act, a regulatory framework for equity-based crowdfunding is now beginning to take shape. For Type I operators, minimum capitalization requirements were lowered from 50 million yen to 10 million yen. Monetary conditions for small amount electronic public offerings were set at less than 100 million yen for the total value of an issue, and up to 500,000 yen for subscription per investor. Responding to the development of this regulatory framework, Japan Cloud Capital was registered as a Type I small amount electronic public offering business operator in October 2016. The company is scheduled to launch *FUNDINNO* as an equity-based crowdfunding platform in January 2017. Currently, equity-based crowdfunding is not particularly active in Japan. However, the availability of a new method for fundraising by startups should be welcomed. It is expected that this method will be used more actively in the future.

Other Uses of FinTech in Fundraising

Among other uses of FinTech in the fundraising field, balance-sheet lending is attracting considerable attention. Whereas lending-based crowdfunding uses the Internet to match fund procurers and fund suppliers, the salient point in balance-sheet lending is that loans are made directly by the operator (direct-loan type). As in the case of lending-based crowdfunding, AI is used to conduct multifaceted analysis of a series of data that are not used by established financial institutions. These include online shop ratings, purchase histories, data from cloud accounting, and information from social media. This allows loans to be made to classes of customers who normally would not be eligible for bank loans. Lenders retain the loan assets that they have themselves structured on their balance sheets, or securitize and sell these assets. In another type, e-commerce operators lend funds to sellers on their marketplaces based on settlement data, which is called transaction lending. A representative player in balance-sheet lending is OnDeck, a company founded in 2007. OnDeck uses its proprietary data analysis techniques to determine credit risks for sole proprietorships and small businesses. Users are able to complete loan applications online and receive the results of their credit examination in as little time as 10 minutes. OnDeck grew its businesses steadily and was listed on the New York Stock Exchange in December 2014.

3. Brokering and Trading Fields

In the institutional brokering and trading field, technologies for automation, mechanization, and high-speed processing were introduced at an early stage and various ICT innovations were enthusiastically absorbed. On the other hand, automation and mechanization innovations lagged in such areas as research. However, there are possibilities now for transforming these areas by employing AI and big data. In particular, advances in social media, IoT, and sensor technologies have created an explosive increase in unstructured data. The expectation is that the combination of these data with machine-learning AI will generate new values. Related services have already emerged overseas. In the retail brokering and trading field, the trend is toward taking the same services previously provided to institutional investors and offering them to individuals. New services are also emerging that have lowered the hurdle for investment. These feature apps for sharing information on social media and facilitating securities trading using smartphones. As these developments indicate, FinTech is already making its impact felt in the brokering and trading fields. Steps are being taken to meet administrative needs.

Institutional Trading

In research-related areas, services for creating formatted reports using such technologies as natural language processing and machine learning are nearing fruition. For example, in the United States, *Quill* from Narrative Science and *Wordsmith* from Automated Insights offer services that enable users to produce simple reports based on earnings releases. The Associated Press, Forbes, and others are already using articles produced by these services. Moreover, it is anticipated that these technologies will be applied to producing performance reports for asset management companies and creating reports and related materials for submission to regulatory authorities.

Attempts are now being made to support relatively sophisticated analytical tasks, such as those performed by quant strategists. Kensho, a company funded by Goldman Sachs and Google, is offering a service that formulates answers to questions posed in natural language by using AI to analyze a wide variety of unstructured data. For example, consider the following question asked in natural language, “How do defense stocks, South Korean stocks, and Japanese stocks respond when there is nuclear activity by North Korea?” The service presents a trading strategy by responding, “Based on the past record, Lockheed Martin stock is a buy.” By creating a bridge between qualitative input and quantitative output, the service facilitates a process that conventionally requires a very large input of human labor.

New services are also appearing for projecting movements in the financial markets. These services use AI to analyze previously nonexistent data, difficult-to-access nonpublic data, and difficult-to-analyze unstructured data to extract factors affecting fluctuations in stock prices. For example, in the United States, Orbital Insight offers services for analyzing image data transmitted by satellites. In

one application, satellite images are used in analyzing the number of cars entering the parking lot of a supermarket, the results of which are then used to project trends in the supermarket's sales. Another service collects social media information from blogs, Twitter, and other sources and analyzes this to provide real-time readings on market sentiment. An example of this is StockTwits, a company established in the United States in 2008. *SOCIAL HEATMAP*, the service offered by this company, conducts real-time analysis of all ongoing conversations on a given platform and identifies fields and categories frequently mentioned in user conversations. Based on this information, the service determines whether stocks belonging to a specified category are moving up or down. The results of these analyses are mainly sold to banks, hedge funds, high-frequency trading (HFT) operators, and other corporate customers. Recently, the company has been collaborating with securities companies to supply its information to individual investors.

Retail Trading

Various types of new services are also appearing in the field of retail trading. The first is a service that offers algorithm trading as used by hedge funds to individual investors. For example, in the United States, Quantopian offers a platform where members can submit their algorithms and share those that have been tested to perform well. In Japan, AlpacaDB offers a service called *Capitalico*. This service uses AI to recognize price movement patterns as done by day traders and follows up by generating an automatic trading algorithm.

Another emerging service is called social trading, which features a platform for social media members to share investment information. The service can be divided into the following two categories: community-type trading, which involves the sharing of various types of investment information among members; and copy trading,⁶ in which the investment strategy of other members using the shared information is copied. For example, Estimote, a company founded in the United States in 2011, offers a platform for community-type social trading that uses crowdsourcing to gather a wide array of information pertinent to projecting corporate earnings. The service is said to generate more accurate projections by avoiding the personal biases of individual Wall Street analysts or securities companies. In copy trading, eToro of Israel is well known. Established in 2007, the company ranks as the world's largest social trading platform with more than five million members. Members disclose information such as stocks purchased and investment results to other members to create an open and shared body of trading data. By simply joining and registering an account, a new member can automatically copy the trades of other members with outstanding track records. A member whose investments are copied earns rewards based on the frequency at which he or she is copied by other members. This arrangement can be characterized as an attempt at lowering the hurdle to investment by sharing investment strategies within a community. Another participant is

⁶ Also referred to as mirror trading or auto trading.

Covestor, a company founded in 2006 and bought out by Interactive Brokers in 2015. This company offers a service for copying professional portfolios starting with a minimum investment amount of 10,000 dollars. The feature of this service is that portfolios are built on individual stocks, and not on investment trust beneficiary certificates. Motif Investing, founded in 2010, offers a service for bulk trading of original portfolios created in line with a specific investment theme. For example, when an investor inputs a specific theme of interest, such as shale oil or wearable watches, a portfolio structured to address this theme is proposed. (Portfolios contain individual stocks, bonds, and ETFs.) Furthermore, customers can customize their own portfolios and receive one dollar each time another investor buys into their portfolio. Given that the minimum investment amount is conveniently set at 9.95 dollars, the service has gained considerable popularity among young people in the United States.

Following the proliferation of smartphones, new securities companies are emerging that specialize in providing services through smartphone apps. These are called mobile brokerages. In the United States, Robinhood, a company established in 2013, offers a convenient smartphone-based service for trading in stocks. While US online brokerages normally charge a fee of seven to 10 dollars per trade, Robinhood has set its fee at zero. In place of fees, the company's revenues are derived chiefly from interest earned on idle customer funds on deposit, loan interest and stock lending fees from margin transactions, and fees charged on premium functions made available to frequently trading customers. Acorns, a US company established in 2012, provides a service where fractional amounts on purchases made using credit cards, debit cards, and the like are automatically transferred to be saved in specified ETFs and investment trusts. Fees are set at one dollar per month for an account with a balance of less than 5,000 dollars, and 0.25 percent of the value of total assets per year for an account with a balance of 5,000 dollars or more. The low fees have attracted the support of young people.

Turning to Japan, in June 2016, One Tap BUY launched a service for trading in 30 US blue chip stocks through a simple, three-tap smartphone operation. Investment know-how and information on companies targeted for investment are provided in the form of easy-to-understand cartoon strips. Customers are primarily people in their 30s with no previous investment experience. To lower the hurdle for entry, investment unit has been set at 10,000 yen. Teaming up with Mizuho Bank, the company launched a new service in October 2016 called *Oitamama kaitsuke* (Buy stocks while leaving *your money* where it is). Designed to improve customer convenience, the service allows users to buy stocks without having to transferring funds from a bank account to a securities company account. A service for investing change money that is similar to Acorns' service in the United States will soon be launched in Japan. WealthNavi has announced it will start a service for SBI Sumishin Net Bank customers where fractions on purchases made using electronic money and credit cards will be transferred to investment accounts. The service is scheduled to be launched in the spring of 2017. The answer to the question of whether this service will catch on in Japan as it has in the US awaits post-launch developments.

4. Settlement and Infrastructure Fields

Blockchain

A primary example of FinTech in the settlement and infrastructure fields is the application of blockchain technologies to financial markets infrastructure. In blockchain, all transactions during a defined period of time are placed in one unit (block), and these blocks are registered to form a continuous link. Instead of maintaining encrypted transaction ledgers in a central institution such as a stock exchange, the information is distributed and shared among participants in P2P networks. (DLT is a term referring to this method for maintaining transaction ledgers.) Blockchain can be expected to improve safety and stability of transactions while also lowering costs. Possible uses in the securities field include trading in private shares and bonds and over-the-counter derivatives. Blockchain was made famous as the technological foundation for Bitcoin, but the application of this technology to securities transactions awaits the resolution of a number of problems. First, visibility of transactions to all participants means that large transactions and positions, as well as prices in negotiated transactions, are exposed to public view, which would be unacceptable to users. Second, authentication takes too much time in proof-of-work mining. To overcome these problems, systems are being designed for requiring network participation approval, disclosing only necessary information, and effectively appointing a network administrator, among other enhancements. Current consensus-building mechanisms also pose a problem. To cope with this issue, relatively high-speed methods are being considered that do not necessarily require the consensus of all participants. Against this backdrop, a large number of standards have been introduced, including Ethereum, Hyperledger, and Corda. Competition has ensued over the position of mainstream standard. With ongoing experiments in applying blockchain to business-to-business transactions, these revised standards are frequently being labeled as DLT in recent months.

In the United States, Nasdaq developed *Nasdaq Linq* in December 2015 in partnership with Chain, a startup in the blockchain technology field. *Nasdaq Linq* applies blockchain technologies to the shareholder management portion of Nasdaq Private Market, a market that facilitates trading in private shares allotted to employees of private companies as compensation. Whereas previously three days were required from trade to settlement, the new system shortens the necessary time to about 10 minutes. In addition to adopting blockchain technologies as a stock exchange, Nasdaq is also acting in ways similar to an IT vendor by offering and installing its newly developed system in Estonia.

In Japan, the Japan Exchange Group launched a blockchain verification test in April 2016 in two parts. Hyperledger was used in a test jointly conducted with IBM Japan, while Ethereum's

consortium/private standard was used in a test jointly conducted with Nomura Research Institute and CurrencyPort. Participants in the tests consisted of SBI Securities, Japan Securities Depository Center, Nomura Securities, Monex, Mizuho Securities, and Bank of Tokyo-Mitsubishi UFJ. Testing consisted of a series of simulations covering such functions as security issuance, corporate action, transaction, and settlement. According to a report published on August 30, the tests confirmed cost reduction and business continuity planning-related advantages in settlement and other post-trade operations. On the other hand, the report identified several issues that need to be resolved to realize widespread use: in the short run, data privacy requirements must be satisfied and smart contracts must be developed; and in the long run, throughput performance must be enhanced to enable large-volume processing, and DLT-based large-scale fund settlement must be realized. The Japan Exchange Group will start technical verification in the spring of 2017 as an industry-wide project by enlisting collaborating companies among participants in the Tokyo Stock Exchange and the Osaka Exchange.

In emerging economies and developing countries characterized by the absence of viable financial infrastructure and relatively weak statutory regulations, there is a possibility for engaging in a zero-based discussion on innovative next-generation financial infrastructure. With this possibility in mind, in June 2016, the Daiwa Securities Group launched a verification test in Myanmar under near-real conditions. Ethereum was used in this test to simulate the actual operational flows and data formats and volumes of the Yangon Stock Exchange and local securities companies. A report published on October 31 pointed to several findings. First, current service functions can be reproduced within the scope of the securities settlement operations tested (transfer instruction, settlement, account balance inquiry, etc.), provided that certain business environment conditions are met. Second, blockchain features can be used to improve operational flows. Third, blockchain technologies can be employed to solve the issues faced by Myanmar's infrastructure environment.

Open Application Programming Interface

An API refers to a set of protocols for linking and coordinating functions among different systems software. An open API refers to any API that is disclosed to third parties. By facilitating data coordination among financial institutions, open APIs can lead to higher volumes of financial transactions. Established financial institutions can expect open APIs to give rise to FinTech companies that will create new apps for meeting diverse customer needs. For example, if banks and securities companies open up their APIs, this will make it easier for FinTech companies (PFM operators and others) to act as intermediaries in providing users with various types of services (account balance aggregation, transfer of funds and securities, etc.). On the other hand, opening APIs does have some drawbacks for established financial institutions, such as the possible loss of customer interface to FinTech companies, and higher risk of security violation and information

leakage. Nevertheless, it is argued that open APIs can play an effective role in addressing customer dissatisfaction, and can create new opportunities for winning over potential customers and younger age groups.

In certain countries, financial groups have already moved to open their APIs. In 2012, France's Crédit Agricole became the first major bank to open its API, a move designed to incorporate customer perspectives into apps development. The Crédit Agricole Store has been launched as an apps store and is offering a wide range of third-party developed apps. Spain's BBVA has also opened its API to developers and is hosting hackathons,⁷ where developers compete in developing new programs. Similar movements toward open APIs are seen in Japan. For example, in April 2016, NTT Data added an API coordinating function to its *AnserParaSOL*, a personal-customer Internet banking service currently used by about 70 financial institutions. Such operators as Money Forward and free are using the system to provide PFM services and cloud accounting services to users.

In response to these developments, there is a global movement toward regulatory reform to promote open APIs. Europe is at the forefront of this movement, and deliberations on the Second Payment Services Directive (PSD2), which will effectively require banks to open their APIs, were started in 2013. The PSD2 was adopted by the European Parliament and the European Commission in November 2015, and European Union member countries are scheduled to enact necessary domestic laws by 2018. In the United Kingdom, the Open Banking Working Group was formed in September 2015, and a report was published in February 2016 recommending banks to implement open APIs. In Japan, a working group centered on the Japanese Bankers Association has been formed to study how open APIs should be implemented. The working group is scheduled to release its report before the end of fiscal 2016. The Financial Services Agency is also taking action, including the establishment of a Working Group on the Financial System under the Financial System Council in July 2016. The working group has published a report that recommends, in particular, an institutional framework for promoting open innovation (innovation through external coordination and collaboration) by financial institutions and FinTech companies while ensuring user protection.

5. Other Innovations

In the area of support for sales force, services are being offered that use AI to recommend products matching individual customers. For example, DBS Bank in Singapore that has adopted IBM's *Watson* is providing an experimental service, in which AI analyzes the profile of and interactions with a customer to recommend to sales force particular products that AI judges suitable for that customer. This is expected to raise the quality of advice given by rookie sales personnel to approximately the same level as that of veteran personnel.

⁷ Hackathon is a word that combines "hack" and "marathon."

Figure 3. Actual Examples of FinTech

Service Layer (FinTech for Personal Customers)			
Area	Service	Service Content and Features	Representative Players
Customer services / asset control	PFM	Service for automatically collecting information from banks, securities companies, credit cards, point cards, etc., to generate household accounts. Aggregation functions are used to collect various types of information.	Overseas players include <i>Mint</i> and <i>Quicken</i> from Intuit (US). Players in Japan include <i>Money Forward</i> from Money Forward, <i>Moneytree</i> from Moneytree, and <i>Zaim</i> from Zaim.
Investment advisory / asset management	Robo-advisors	Service for providing high-level asset management advice previously available only to certain wealthy individuals and institutional investors at low cost. Algorithm automatically generates optimal portfolio for users.	Overseas players include Betterment and Wealthfront (US). Players in Japan include <i>THEO</i> from Money Design and <i>WealthNavi</i> from WealthNavi. Established financial institutions are also active in this field, including SBI Securities, 8 Securities, Nomura Securities, Matsui Securities, Monex-Saison-Vanguard Investment Partners, Mizuho Bank, Mitsubishi UFJ Kokusai Asset Management, and Rakuten Securities.
Brokering/trading	Retail trading (algorithm trading)	Service for providing personal customers with algorithm trading used by hedge funds. Services include platforms for sharing algorithms among members, and platforms that are generated by AI.	The representative player is Quantopian (US). In Japan, <i>Capitalico</i> from AlpacaDB offers a service featuring AI-generated algorithms.
Brokering/trading	Retail trading (social trading)	Service for sharing investment information among social media members. Two available types are community-type trading for sharing information among members, and copy trading for copying the investment strategies of others.	Representative players include eToro (Israel), Zulu Trade (Greece), and SumZero and Estimote (US).
Brokering/trading	Retail trading (mobile)	Securities companies specializing in services	The representative player overseas is Robinhood (US).

	brokerages)	provided through smartphones. Efforts to lower hurdle to investment include enabling securities purchase through simple operations.	In Japan, One Tap BUY launched services in June 2016.
Brokering/ trading	Retail trading (apps for investing change money)	Service in which fractional amounts on purchases made using credit cards, debit cards, and the like are automatically transferred for saving in specified ETFs and investment trusts.	Overseas players include Acorns (US) and Moneybox (UK). In Japan, WealthNavi will launch services for SBI Sumishin Net Bank users in spring of 2017.
Service Layer (FinTech for Financial Intermediation)			
Area	Service	Service Content and Features	Representative Players
Fundraising / securities issuance	Lending-based crowdfunding (social lending, marketplace lending, P2P lending)	Service for matching fund procurers and fund suppliers through the Internet. Lending to customers normally not eligible for bank loans is made possible through multifaceted analysis based on big data. Borrowers can access funds at better terms than by borrowing from established financial institutions. Lenders can expect to earn higher returns than by investing in traditional financial assets.	Overseas players include Zopa (UK), and Prosper and Lending Club (US). Players in Japan include maneo, <i>AQUSH</i> , and SBI Social Lending.
Fundraising / securities issuance	Investment-based crowdfunding	Internet-based service facilitating fundraising from large numbers of unspecified investors through the issuance of private shares. As an issuer, a startup can procure seed money from a wide range of investors through the Internet. The service can also be used to develop a fan base for the startup's businesses.	Overseas players include AngelList (US) and Crowdcube (UK). In Japan, Japan Cloud Capital is scheduled to launch <i>FUNDINNO</i> , an equity-based crowdfunding platform, in January 2017.
Fundraising / securities issuance	Balance-sheet lending (transaction lending)	Service for timely lending based on multifaceted credit examination using such information as online shop ratings, purchase histories, cloud accounting data and social media information. Balance-sheet lending includes lending by e-commerce operators to sellers on their marketplaces based on settlement data	Overseas players include PayPal, Kabbage, and OnDeck (US), and Krediteck (Germany). In Japan, transaction lending services include <i>Rakuten Super Business Loan</i> and <i>Amazon Lending</i> .

		(transaction lending). Lenders can lend directly to customers who normally would not be eligible for borrowing (direct-loan type). In some cases, loan assets are securitized.	
Service Layer (FinTech for Corporate Customers)			
Area	Service	Service Content and Features	Representative Players
Brokering/ trading	Institutional trading (research-related)	Service for using natural language processing, machine learning, and other technologies to automatically generate formatted documents. Beginning to be used mainly for earnings releases, performance reports, and media articles.	Representative players include <i>Quill</i> from Narrative Science and <i>Wordsmith</i> from Automated Insights (US).
Brokering/ trading	Institutional trading (offering trading strategies)	Service featuring AI-generated answers to questions in natural language. By analyzing a wide variety of unstructured data, AI indicates the quantitative impact on stock prices of qualitative events, such as higher crude-oil prices and war. Effort to support quant strategist tasks using high-level analysis.	The representative player is Kensho (US) funded by Goldman Sachs and Google.
Brokering/ trading	Institutional trading (projecting financial market movements)	Service in which AI analyzes previously unavailable and unanalyzed data to identify factors affecting stock prices. Services include market sentiment analysis based on social media information, and corporate performance projection based on satellite images.	Representative players include Orbital Insight, StockTwits, Dataminer, iSentium, and Placed (US), and TheySay (UK).
Other innovations	Sales force support	Service that uses AI to improve operational efficiency of financial institution sales force. AI formulates customer-specific investment advice and recommends products to sales force and issues lead alerts prompting customer action. Expected to improve the precision of customer response and reduce customer-response costs.	Representative players include Personetics (Israel), as well as Kasisto and Watson from IBM (US).
Other	RegTech	Fraud monitoring service	Representative players

innovations		using AI and other technologies. Analyzes large volumes of unstructured data from employee communications (e-mail, telephone, etc.) to detect signs of various types of fraud. Expected to reduce compliance costs for financial institutions.	include Digital Reasoning and Palantir Technologies (US).
Infrastructure Layer (FinTech Supporting Securities Transactions)			
Underlying Technology	Technology Content and Features		Representative Initiatives
Blockchain	Technology whereby transactions during a given period of time are placed in one unit (block), and these blocks are registered to form continuous links. Data is managed in distributed ledgers. Blockchain is expected to improve safety and stability of transactions while cutting costs. In the securities field, verification tests are conducted for application to trading in private shares and bonds, over-the-counter derivatives, and other products. Tests are underway for introducing innovative next-generation financial infrastructure in emerging economies and developing countries lacking viable financial infrastructure and with relatively weak statutory regulations.		Nasdaq (US) operates <i>Nasdaq Linq</i> , a system for trading private shares. In Japan, the Japan Exchange Group conducted two verification tests: one with IBM Japan using Hyperledger, and the other with Nomura Research Institute and CurrencyPort using Ethereum blockchain. In emerging countries, the Daiwa Securities Group conducted verification tests under conditions approximating the Yangon Stock Exchange (Myanmar).
Open APIs	Technology (or mechanism) facilitating coordination among systems by opening protocols for providing functions to other systems and software. Smoothing data coordination among various types of institutions can improve the convenience of apps and lead to higher volumes of financial transactions.		Crédit Agricole (France) and BBVA (Spain) have opened APIs to third parties. In Japan, NTT Data has added an API coordinating function to <i>AnserParaSOL</i> , its Internet banking service.
Cloud computing	Arrangement for lending out servers for data storage, app execution, and site building. By borrowing computer resources only for the time and capacity needed, app suppliers avoid purchasing expensive servers and can cut service provision costs.		Services are provided by <i>Amazon Web Services</i> , <i>Google Cloud Platform</i> , Microsoft, and others.
Security (biometric authentication)	Technology for verifying personal identity using biometrics such as vein patterns, fingerprint, facial recognition, and iris patterns. Expected to improve user convenience in identity authentication by eliminating the need to have smart cards and passwords available.		Representative players include EyeVerify, Source, and Biyo (US). In Japan, Liquid provides fingerprint authentication system.

IV. Future Challenges

1. FinTech and Securities Business Operators (Suggestions for Established Players)

Japan's securities industry has experienced dramatic changes since the 1990s as a result of such developments as the liberalization of stock brokerage commissions and the emergence of Internet and online securities trading. In light of such experience and other factors, few currently seem to consider that established players are under immediate threat from changes brought about by FinTech. This contrasts with other financial businesses that are directly impacted by transformations in settlement, transfer, lending, credit examination, and other systems. Nevertheless, as discussed in the preceding chapters, ongoing innovations in the infrastructure and service layers of securities businesses will eventually necessitate all players to formulate and implement FinTech strategies.

The FinTech initiatives of established financial institutions can be placed under the two lines of thinking: defensive FinTech and offensive FinTech. The former features the adoption of FinTech innovations and business models by established players for the purpose of improving operational efficiency, and protecting current customers and businesses. In the latter approach, established players adopt FinTech to create new values and markets, or to win new customers (from competing players or other business domains).

Going forward, securities business operators will need to examine their FinTech initiatives from both defensive and offensive perspectives, and to arrive at their own management judgments. Regarding defensive FinTech, there is a risk that established players, many of whom still use legacy systems and mechanisms (obsolete systems with negative impact on operations), would be placed at a decisive disadvantage if they were pulled into cost-cutting competition head-on. Therefore, initiatives for improving the satisfaction of current customers will be an essential factor in any defensive FinTech strategy. While various methods may be formulated for improving customer satisfaction, the basic approach for securities business operators would contain two elements. First, efforts will be made to improve the quality and sophistication of face-to-face or online advice. Second, new technologies and service models will be introduced to optimize brokering and execution functions.

Moving next to offensive FinTech for the securities industry, possible strategies would include creating new investment service models through self-transformation, and the winning of new customers through various means, including entry into other business domains. Starting with self-transformation, it is generally believed difficult for the securities industry, as well as all established financial institutions, to pursue disruptive innovation that may call into question the *raison d'être* of their own products and services. Taking this into consideration, it can be argued that the perspective of winning new customers will be of greater importance. Whereas various strategies and approaches

can be used toward that end, collaboration and partnership with startups and players from other industries will probably play a particularly important role as described below.

A feature of recent innovations is that, instead of new technologies directly creating new markets, innovations function to accelerate the creation of new markets by linking up with platforms in an open-transaction environment. For FinTech, this underscores the importance of linking technology and services, or technology and data in an open environment. This understanding suggests that, when established players consider FinTech initiatives, the question of how they interact and associate with FinTech startups and companies from other business domains and sectors who lead the process of innovation will be of critical importance. Various approaches can be considered for how to interact and associate with these counterparts. They can be broadly classified into (1) contracts, partnerships, and tie-ups; (2) equity investment and incubation; (3) acquisition and group formation; and (4) creating ecosystems.

Contracts, Partnerships, and Tie-Ups

Starting with contracts, partnerships, and tie-ups, these can be understood in terms of building relations between product and service creators (FinTech startups) and distributors (securities business operators). This relation typically exists in markets for such financial products as mutual funds and variable annuities. The relation can also be compared to the vendor-to-user relation that is seen in the ICT domain. Building relations with FinTech players through the contract, partnership, and tie-up approach can be particularly cost- and time-effective when the objective is to expand the existing business model, to diversify the product lineup, or to raise efficiency in and innovate operations. This is especially true when the necessary skills and human resources do not already exist within the company. On the other hand, this approach may have some drawbacks. These include difficulty in accumulating requisite skills within the company, and the fact that failure to establish exclusive contractual relations can lead to the availability of the same products and services to others.

This approach can also be compared to the relationship between platformers and app developers in an open-API environment. However, in this environment, it is possible for established securities business operators to stand on either the platformer side or the app developer side. In the latter case, securities business operators would participate as providers of APIs to platforms created by banks, insurance companies, retailers, e-commerce operators, ICT providers, and other players.

In Japan, a number of regional banks and securities companies have already entered into tie-ups with FinTech startups in such areas as apps for household accounts and robo-advisors. This seems to indicate the relative ease of implementing this approach.

Equity Investment and Incubation

In the context of the traditional experience of the securities industry, the equity investment and incubation approach can be compared primarily to investment in venture capital and corporate restructuring funds, or the creation of hedge funds, real estate funds, and real estate investment trusts. Involvement in the management of investees delivers a number of advantages. Among these are participation in decision-making while absorbing valuable know-how in the process, aiming high returns on investment in the future as the approach has close affinity to securities businesses. Conversely, several disadvantages to this approach can be pointed out, including an increase in capital requirements owing to the holding of low-liquidity assets, and the risk of losing the funds invested. Moreover, in case of a minority investment, the ability to exert strong influence on management is lost.

Some Japanese financial groups and established securities business operators have already made inroads into equity investment and incubation by establishing FinTech funds and similar vehicles.

Acquisition and Group Formation

Acquiring FinTech players and integrating these into an existing group has several advantages. These include buying time and human resources, combining the acquiree's assets with existing products and services for engaging in integrated marketing initiatives (in theory, synergy effects can be captured on an exclusive basis), and controlling the acquiree's contractual and supply relationships. On the other hand, the acquisition and group formation approach gives rise to risks and concerns. First, the acquisition price factoring in the expected synergy effects may turn out to be an overestimation. Second, the acquiree's organization and culture may not be compatible with those of the established player (need for post-merger management). Third, integration with a specific player may actually act as a constraint on opportunities for the expanded use of the relevant technology or business model.

Creating Ecosystems

In its original usage, ecosystem is a scientific term used in biology or ecology. However, in the IT and startup industries, ecosystem has come to denote "an arrangement in which multiple companies and human resources combine together, influence each other, coexist, and co-prosper (cocreate) while driving the process of market expansion." In order for innovation in the ICT and

biotechnology fields to culminate in the commercialization of a certain technology or seed that creates a new market and achieves growth, it is considered essential that appropriate inputs are provided from different sources at each stage of development in a way facilitating innovation. These vital sources of input include industry-academia collaboration, participation of managerial human resources, production systems and marketing channels (supplied by major corporations), and venture financing. Similarly, it is anticipated that partnership between startups and major financial institutions will have a very critical role to play in FinTech. This is because startups do not normally possess the licenses and customers that comprise the fundamental basis determining creditability, which is an absolute necessity for operating a financial services business.

A number of major financial institutions overseas, such as Goldman Sachs and Wells Fargo, are building relationships with startups and pursuing programs aimed at creating new businesses through open innovation. An example of this is the hosting of a hackathon, a competitive event in which teams of engineers, programmers, designers, and other professionals develop new business ideas within an allotted period of time and compete to display their ideas or technologies. Some hackathons provide commercialization support programs (also known as accelerator programs) to outstanding teams. These programs feature professional coaching and matching with existing customers. In Japan, major financial institutions and financial IT vendors are launching similar initiatives in the FinTech field.

From the perspective of major financial institutions, these initiatives offer a series of advantages. First, financial institutions can uncover hints and ideas for innovation and problem solving. Second, such initiatives can contribute significantly to fostering a corporate brand and image of being actively committed to innovation. They also provide opportunities for finding and recruiting human resources. As a further advantage, the costs and risks associated with these programs are not large. On the other hand, problems include difficulty or failure to attract the participation of the type of human resources the sponsor is looking for, and that the transformation of ideas into commercial products and services could not be achieved in a short period of time.

2. Securities Markets and Promoting FinTech (Suggestions and Challenges for Policymakers and Regulatory Authorities)

The promotion of FinTech has the following significance for Japan's securities markets at present:

Public's Stable Asset Formation

- Many consumers are not familiar with investment and feel that investment is no more than a distant reality. In this environment, FinTech can enhance user experience and lower the hurdle

for investment among consumers interested in asset formation and control. In this sense, FinTech can play a very significant role in expanding the range of participants in investment.

- Established securities business operators have had particular difficulty attracting young people and the working-age population with high IT-literacy and strong interest in asset formation (due in part to anxiety related to viability of future pensions). FinTech may be able to encourage such people to invest in securities.
- It is difficult for established securities business operators to extensively marketing investment services focused on long-term, installment-type, and diversified investment, through their branches and face-to-face services. The introduction of online, mobile, and app-based systems can open the way to offering those services to consumers in convenient and accessible formats.
- The use of FinTech and the development of new services for driving the proliferation of systems supporting people's efforts toward asset formation can be expected. These systems include Nippon Individual Savings Account (NISA: tax-free small-lot investment program) including Installment-type of NISA which is scheduled to be introduced in January 2018 and iDeCo, individual-type DC pension plan whose eligibility is significantly expanded in January 2017.

Supplying Risk Money

- Japan faces the prospects of a shrinking working-age population and sluggish economic growth. Against this backdrop, revitalization of the capital markets and the adequate supply of risk money to emerging and growing companies constitute critical challenges.
- Advances in FinTech represented by crowdfunding and social lending can facilitate angel investment and venture investment, thereby promoting risk capital intermediation, especially for promising startups, technologies, and entrepreneurs.
- Furthermore, FinTech may give birth to new capital markets, such as markets for secondary trading in private shares, securitized P2P lending, and big-data transactions.

International Financial Center Development

- Progress in FinTech and the fourth industrial revolution is likely to be propelled by highly skilled experts and startups that frequently assemble teams without regard to nationality and have their

sights fixed on global markets from the outset. This has engendered a form of international competition for outstanding human resources and ideas.

- By creating attractive ecosystems for FinTech entrepreneurs and startups, Japan would be able to promote inward foreign direct investment. This would also contribute to maintaining and enhancing Japan's position as an international financial center.
- An increased concentration of domestic and foreign financial institutions, asset management companies, venture capital firms, law firms, accounting firms, and other specialized businesses with an interest in pursuing FinTech innovations would have a large economic effect.

In light of the significance of FinTech as outlined above, Japan's policymakers and regulatory authorities should adopt an active stance toward creating an environment conducive to the development of FinTech. At the same time, it should be noted that in the process of generating new products and services, FinTech could give rise to issues and challenges that were not anticipated in the existing legal and regulatory framework. Going forward, even while safeguarding the critical functions of the securities market, including investor protection, market functions and rules (efficiency and fairness), and the stability of the financial system, all market participants will be called on to actively adopt innovations that will add to the value of Japan's capital markets or enhance their international competitiveness.