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The Fundamentals of Internet Finance and Its Policy Implications in China

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ABSTRACT

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Keywords: Internet finance, transaction cost, information asymmetry, financial disintermediation

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1. Introduction

Upon its initial introduction in 2012 (Xie and Zou 2012), the concept of Internet finance[3] received extensive attention in academia as well as the financial industry. Some have argued that Internet finance is a brand new financial model and significantly improves the efficiency of financial activities (G.-G. Wang 2014; Wu 2014a, 2014b; Zhang and Zhu 2014). Meanwhile, others have contended that Internet

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[3] In the United States, Fintech draws a lot of attention. It is an economic industry composed of companies that use technology to make financial services more efficient (cited from Wikipedia). We think Internet finance and Fintech are essentially different words for the same concept.

finance just represents some new business models and Internet technologies only play supporting roles in financial activities (Yang 2013; Chen 2014; Yin 2014).

Internet finance has already been in full swing in industrial practice (Goldman Sachs 2014; IIF 2014). First, Internet companies have established their presence in the financial sector. For example, Alibaba and Tencent have joined China's pilot program for private-owned banks. Their Alipay and WeChat Wallet services lead in China's third-party payment industry. Yu'E Bao of Alibaba has dramatically changed the landscape of China's mutual funds sector. Second, traditional financial institutions have proactively expanded their online business. For example, China's large banks, including the Bank of China, Industrial and Commercial Bank of China, China Construction Bank, and Bank of Communications, now offer e-commerce services. Many banks offer online financial products similar to Yu'E Bao. Some banks have even developed peer-to-peer (P2P) online lending business. Third, P2P online lending platforms and crowdfunding platforms have been growing rapidly in China.

In July 2015, the People's Bank of China and nine other ministries in China's central government announced the Guidelines for Promoting the Healthy Development of Internet Finance, with the approval of the Central Committee of the Communist Party of China and the State Council. The Guidelines acknowledge that Internet finance has become a brand new financial business model distinct from traditional financial institutions. The Guidelines set out a series of policies and regulatory rules to encourage the innovation of Internet finance and support its healthy development. The Guidelines also established the regulatory framework for different categories of Internet finance.

Consolidation of the fundamental theory of Internet finance is a necessary condition for the healthy development of Internet finance, as well as the objective of this article. The rest of the article is divided into three sections. Section 2 explores the theoretical pillars of Internet finance; section 3 elaborates the core features of Internet finance; and section 4 discusses the policy implications of Internet finance in China.

2. Theoretical Pillars of Internet Finance

Internet finance is a spectral concept. It covers all forms of financial transactions and organizations, which range from traditional financial intermediaries and markets, such as commercial banks, securities firms, insurance companies, and stock exchanges, to the scenario under Walrasian equilibrium (where neither financial intermediaries nor markets exist) caused by the impacts of Internet technologies.

Impacts of Internet Technologies

Internet technologies are comprised of big data, social networks, search engines, and cloud computing. Three trends are represented by Internet technologies. The first trend is the digitization of information (McKinsey Global Institute 2011). With a variety of increasingly popular sensing devices, many human activities have gradually shifted online. Increasingly complicated methods of communication and division of labor will take place on the Internet. Therefore, an increasing percentage of information in will be digitized. Information on the Internet can then be used for accurate assessment of the creditworthiness and earning prospects of individuals or enterprises, which forms the information foundation of financial activities (Xie and Zou 2012). The second trend is the constantly increasing capacity of computing. To date, Moore's Law remains valid in the integrated circuit sector. In addition, cloud

computing, quantum computing, and bio-computing will generate enhanced computing capacities (Liu 2011). The third trend is the increasing availability of telecommunications technologies. In line with the gradual integration of the Internet, telecommunications networks, cable networks, and broadcast television networks (Yang and Han 2011), high-speed Wi-Fi networks will cover almost everywhere.

The Internet Defined as a Financial Market

The Internet can no longer be treated simply as having an auxiliary role in financial activities. Instead, the Internet will bring forth fundamental changes in the forms of financial transactions and organizations. The existence of traditional financial institutions lies in such imperfect factors as asymmetric information and transaction costs (Mishkin 1995). For example, the introduction of currencies aimed to reduce the transaction costs resulting from the "double coincidence of wants" (Mishkin 1995). The fundamental theory of commercial banks is the Diamond-Dybvig model, the core functions of which refer to liquidity transformation and entrusted monitor of borrowers (Diamond and Dybvig 1983). The fundamental theory of securities markets is mainly comprised of the portfolio theory by Markowitz, the Black-Scholes option pricing formula, and the efficient market hypothesis (Wang 2006). The fundamental theory of insurance is the law of large numbers (Wang 2008).

However, the Internet can significantly lower transaction costs and reduce information asymmetry, enhance the efficiency of risk-based pricing and risk management, and expand sets of feasible transactions (Xie and Zou 2012). As a result, the parties involved in capital supply and demand can trade with others directly, thereby changing the forms of financial transactions and organizations. As an ecological system comprised of many algorithms and programs, the Internet itself can be defined as a financial market. For example, investors and borrowers can resolve the problem of matching maturity and risk-return profiles by a variety of application programs on the Internet. In line with the development of the Internet, the financial system is evolving gradually toward a Walrasian equilibrium in which neither financial intermediaries nor markets exist (Mas-Colell et al. 1995).

Such acknowledgement lays the foundation for defining Internet finance. Internet finance is a spectral concept that is determined by two boundaries. The first boundary corresponds to traditional financial intermediaries and markets. The second boundary corresponds to the Walrasian equilibrium scenario. All the forms of financial transactions and organizations between these two boundaries belong to Internet finance. China's Guidelines for Promoting the Healthy Development of Internet Finance categorizes Internet finance into such major types as online and mobile payments, online lending, equity crowdfunding, online fund sales, online insurance, online trust products, and online consumer finance. This categorization supports our definition of Internet finance.

Economies of Size and Network Effects

Areas related to the Internet generally have two particular features (Economides and Himmelberg 1995), as does Internet finance. The first feature is economy of size, because usually fixed costs are very high but variable costs are relatively small. The second feature is the network effect, also known as network externality, which refers to the apparent relationship between the utility users may acquire from the network and the size of the network. Under such circumstances, as long as a business model of

Internet finance exceeds a certain "critical mass," it can achieve fast growth, resulting in competitive advantage (Varian 2003); otherwise, competitive disadvantage will take place.

Such "first-mover advantages" greatly influence the competition in the Internet finance industry. For example, Xie and Liu (2013) analyze the network effect in mobile payments. In China's P2P online lending sector, the first-mover advantage requires P2P online lending platforms to expand as fast as possible. Therefore, this explains the prevalence of implicit and explicit guarantees and "funding pools" in this sector. However, these practices are susceptible to regulatory risk (Xie et al. 2014a).

Unchanged Financial Functions and Intrinsic Properties of Financial Contracts

Although the Internet affects the forms of financial transactions and organizations, two critical features of financial activities remain unchanged. First, the basic functions of finance remain unchanged. Internet finance also aims to allocate resources along time and space dimensions and in uncertain environments. Specifically, Internet finance allocates resources by facilitating (1) exchange of commodities, services, and assets with clearance and settlement services; (2) division of equity interests and large-scale fundraising; (3) channels for the transfer of economic resources over time and space; (4) uncertainty management and risk control; (5) production of pricing information and promotion of decentralized policy making; and (6) alleviation of information asymmetry (Bodie and Merton 2000).

Second, the intrinsic properties of financial contracts remain unchanged. Financial contracts determine the rights and obligations of the contracting parties under certain circumstances. Financial contracts can exist in various electronic forms or physical forms. Regardless of the forms of financial contracts, their intrinsic properties remain unchanged.

3. Core Features of Internet Finance

Lower Transaction Costs

First, the Internet can substitute the physical outlets and manual work in traditional financial institutions, thereby lowering transaction costs. For example, mobile banks do not need braches or their staff. The transaction costs are apparently lower than those incurred by physical outlets and counter services (CGAP 2010).

Second, the Internet can generate operational improvements. For example, under the third-party payment model, third-party payment companies serve as central counterparties between clients and commercial banks for clearance and settlement. Net clearances of many transactions with third-party payment companies can lower transaction costs (Xie et al. 2014a).

Third, financial disintermediation facilitated by Internet finance can shorten funding processes and reduce transaction costs.

Diminishing Information Asymmetry

Within Internet finance, big data are widely used in information processing. This improves the efficiency of risk-based pricing and risk management, while significantly alleviating information asymmetry problems.

To date, there is no widely accepted definition of big data. However, it is

generally believed that the concept of big data consists of four basic features, namely, volume, value, variety, and velocity. Volume refers to an enormous volume of data; value refers to low value density or a huge applicable value; variety refers to an extensive source with diverse features; and velocity refers to fast-growing speed or high-speed analytical capacities. Big data are generated naturally as more and more information is being digitized. The development of cloud computing and search engines makes it possible to analyze big data with high efficiency. The analysis of big data is mainly comprised of two types of tasks (Tan et al. 2006; Rajaraman and Ullman 2012; Provost and Fawcett 2013). Forecast, the first type of task, aims to predict some specific values based on certain other values. Description, the second type of task, aims to explore hidden patterns among data, including correlation, classification, trends, clustering, links, and anomaly detection.

Big data can be used to determine the probability of default. According to Xie and Zou (2012), many related parties can share their opinions on the Internet regarding a specific debtor. As a result, local and private information becomes public; implicit information becomes explicit; and segmented information becomes aggregated. We call this situation the "mass rating" methodology.

The securities market may have the features described in behavioral finance (Shefrin and Statman 1994) and the efficient market hypothesis (Fama et al. 1969) at the same time. On the one hand, as facilitated by social networks, communications, interaction, and mutual influence among investors will become very efficient. As a result, individual behaviors and group dynamics will be closer to the description in behavioral finance,[4] therefore causing a noticeable impact on a single security or the entire securities market. On the other hand, as facilitated by big data analysis, market prices will reflect market information in a fast and efficient way. Therefore, the securities market will be closer to the description in the efficient market hypothesis.

For insurance, big data may improve actuarial accuracy, allowing insurance premiums to take into consideration individual differences with dynamic adjustments. For example, automobile insurance companies have provided customers with various types of innovative insurance products, including the pay-as-you-drive, pay-how-you-drive, and manage-how-you-drive types. Life insurance companies may combine an individual's genetics, familial heredity, and drinking, eating, and work habits with the life table to determine his/her premium (H. Wang 2014). In line with the improvement in actuarial efficiency, insurance in Internet finance will be close to the perfect risk transfer model described by Arrow (1970), where risk transfer takes place on a voluntary, free, and fair basis. First, insurance products are richly diverse. Each type of risk regarding an individual or property may be subject to a related insurance product. Second, insurance premiums are fairly determined. Third, risk will be transferred to those who have the corresponding preferences to take on risk on a voluntary basis and at their own expense.

Expanding Sets of Feasible Transactions

The Internet expands the sets of feasible transactions and makes previously impossible transactions possible (Xie and Zou 2012). For example, for P2P online lending, loans can take place between strangers, while offline loans between people generally take place among friends, family, and relatives. With crowdfunding,

[4] For example, according to the findings of Coviello et al. (2014), human emotions may create contagious effects through social networks.

transactions between fund contributors and fundraisers are less likely to be subject to geographic restrictions, while traditional venture capital companies comply with the 20-minute rule, which means the investee must be within a 20-minute drive from the venture capital company. The number of users of Yu'E Bao amounted to 149 million as of the third quarter of 2014, among which many were not target customers of traditional asset management services.

However, expanding sets of feasible transactions may lead to "long tail" risk. First, many people served by Internet finance lack financial knowledge and are unable to identify and take on risk. Second, these people have small yet diversified investments in Internet finance products. This situation creates an apparent issue of "free riding" and makes market discipline in Internet finance susceptible to failure. Third, individual irrationality and group irrationality appear more easily in Internet finance. Fourth, when risk materializes in Internet finance, the entire society will be more likely to be negatively affected. Therefore, protection of financial consumers is an import issue in the regulation of Internet finance (Xie et al. 2014a).

Financial Disintermediation

In Internet finance, financial transactions need not be conducted through traditional financial intermediaries or markets. Instead, many transactions can be conducted directly through the Internet.

In debt financing, individuals and small and medium enterprises (SMEs) have endogenous demands for loans for consumption, investment, and production. These demands for loans are legitimate rights (borrowing rights). Meanwhile, individuals want to increase their wealth through investments at their own risk, which are also legitimate rights (investment rights). However, the rights to make loans and investments are segregated, facing matching problems and the constraint of transaction costs. Although these rights are not well served by traditional financial institutions, they can be satisfied by P2P online lending platforms. In such places where the credit rating system is well developed, P2P online lending demonstrates vitality. In addition, repeated games between P2P online lending platforms and borrowers can hamper swindling.

In the securities market, under current technical conditions, investors may open accounts directly in the stock exchange without the help of a securities firm, thus realizing 100 percent online transactions and eliminating the necessity of brokerage services.

In insurance, the P2P model has appeared (H. Wang 2014). The core function of insurance is to provide economic compensation. Based on the law of large numbers, insurance companies provide economic compensation against accidental losses, in favor of the insurance policyholders. Insurance policyholders without accidental losses indirectly compensate those who suffer economic losses. Under a sufficiently competitive environment, the total premiums paid by all insurance policyholders should perfectly cover their accidental losses as a whole (namely, the net equilibrium theory).

The P2P insurance model represents the disintermediation of insurance. Under this model, a group of people who share similar risk profiles and demands for risk protection can enter into an agreement through the Internet, whereby agreeing that in the event that any of them suffers an accidental loss, the others are obliged to provide compensation and offer mutual assistance. For example, the Cancer Fighting Community in China assembles 30,000 community members through a network

platform to enter into an agreement that states that any member who is diagnosed with cancer will receive a donation of RMB 10 from each other member. As a result, RMB 300,000 can be raised as a special fund for medical treatment. The platform operates on a nonprofit basis (Kang 2014). As information becomes increasingly transparent because of big data analysis, the P2P insurance model will become more popular.

Payments Innovation

In Internet finance, mobile and online payments are used widely to reduce transaction costs. Another scenario will be that each individual or institution sets up an account through the Internet with the central bank. In such case, the two-tiered banking system will no longer exist, and the operation of monetary policy will be totally transformed.

Internet currencies may appear too (Xie 2013; Xie and Shi 2015). The popularity of bitcoin as an Internet currency demonstrates the economic rationale of the decentralized point-to-point private currencies, which are designed based on cryptology and Internet technologies, and may not be inferior to the statutory currencies of central banks under a purely competitive environment. In modern society, currencies may not always be linked to credit (bitcoin is more like artificial gold). In addition, the internationality and super sovereignty of Internet currencies enrich the research on convertibility.

Blurred Boundaries between Financial Sectors

In Internet finance, comprehensive financial operations are ubiquitous and endogenous. For example, in online sales of financial products, different products, such as banks' wealth management products, mutual funds, insurance products, and trust products, are completely marketable through the same online platform. Another example is P2P online lending. In terms of function, P2P online lending is a substitute for bank deposits and loans. P2P online lending may also be deemed as direct debt financing through the Internet. From the perspective of insurance, investment in P2P online loans is equivalent to the purchase of credit insurance. For example, assuming that an investor has RMB 1 million, the annual interest rate is 3.5 percent if such amount is deposited with a bank. The annual yield will be RMB 35,000. On the P2P online lending platform, that amount is loaned to 50 borrowers (assuming that each borrowers RMB 20,000) at interest rates ranging from 12 to 15 percent. Among these 50 borrowers, as long as fewer than three of them default (assuming that such loans subsequent to default suffer complete losses), the investor's annual net income will be greater than 47 * 20,000 * 12% - 3 * 20,000 = RMB 52,800, which in turn is greater than the yield of RMB 35,000 derived from the bank deposit. This example reflects the application of the law of large numbers (Xie et al. 2014b).

Integration of Financial and Nonfinancial Factors

Many activities in Internet finance derive endogenously from financial demands in the real economy, and to a certain extent approximate the concept of "endogenous finance" as proposed by G.-G. Wang (2014). Some enterprises in the real economy accumulate massive data and risk control tools, which can be applied in financial activities. Alibaba, JD, and other e-commerce companies are representatives of this. For example, to promote online shopping and improve consumer experience, Alibaba (1) ensures the payment process with its Alipay, (2) extends microloans by reference

to the data accumulated online, and (3) develops Yu'E Bao, thereby activating the dormant capital in Alipay accounts to satisfy consumers' investment demands. Alibaba's innovation in Internet finance demonstrates that the foundation of Internet finance rests with the real economy.

Further, the sharing economy is growing rapidly in Europe and the United States (Botsman and Rogers 2010). Some business models in the sharing economy have developed well in China too. Basically, the sharing economy represents exchange activities conducted online. As long as people have different resource endowments or division of labor, exchange activities will occur. The Internet improves the efficiency of exchange activities and enables many things to be exchanged or shared in a way that previously was deemed impossible. For example, taxi-hailing software has brought tremendous changes to taxi services, reducing the time for users to line up and wait for taxis, as well as weakening the phenomenon of taxis traveling on the street without any passengers. As a result, resource allocation in the taxi market can be highly efficient. Accommodation sharing is another example, the representative of which is Airbnb in the United States. In accommodation sharing, exchanges of ownership for houses are not required, but rights to use such houses can be exchanged. Accommodation-sharing platforms enable idle housing resources to be utilized.

E-commerce, the sharing economy, and Internet finance are naturally and closely correlated. On the one hand, e-commerce and the sharing economy provide Internet finance with application scenarios, and create the data and customer base for Internet finance. On the other hand, Internet finance also advances e-commerce and the sharing economy. As a result, a virtuous cycle forms among e-commerce, the sharing economy, and Internet finance. In the future, the real economy and financial activities will be highly integrated on the Internet (Xie et al. 2014b). This gives Internet finance distinctive features compared with traditional financial institutions in terms of innovation.

The innovation of traditional financial institutions mainly refers to the innovation of financial products and contracts. Financial engineering technologies are widely used to design new financial products. Some new products are characterized by new cash flow, risk, and return profiles, and realize new functions in risk management and price discovery, thus improving market completeness. Examples include options, futures, swaps, and other derivatives. Some innovative products replicate the functions of existing financial products or their combinations at lower costs. For example, exchange traded funds do this. In general, traditional financial innovation emphasizes the transformation of liquidity, risk, and return.

The innovation of Internet finance embodies the influences of the Internet. The Internet focuses on openness, sharing, decentralization, equality, freedom of choice, inclusion, and democracy. Internet finance reflects the emergence of decentralized organization and the platform model in the financial industry, and financial disintermediation, financial democratization, and inclusion. Therefore, many innovative products from Internet finance are integrated in people's daily lives and social activities. Current representative cases include the following: (1) Yu'E Bao, which combines the functions of payment, currency, deposit, and investment; (2) JD's IOU, which in essence refers to "interest-free purchase on credit + premium over product prices"; and (3) WeChat's Lucky Money, which disrupts the traditional forms of lucky money, reflecting the application of Internet finance in social activities. Such cross-sector and innovative products in Internet finance will mushroom in the future.

4. Policy Implications of Internet Finance in China

Internet finance has negative and positive policy implications in China. On the negative side, we can see through Internet finance some low-efficiency or distorted factors in China's financial system. On the positive side, Internet finance can promote financial inclusion and also has strong social functions. In this section, we also discuss some open questions about Internet finance.

Negative Implications

Internet finance has been developing rapidly in China. A major contributing factor is that some low-efficiency or distorted factors in China's financial system have created room for Internet finance. First, formal financial institutions have been unsuccessful in serving the financial needs of SMEs, as well as rural residents, rural areas, and agricultural businesses. Meanwhile, informal financial institutions have their own limitations, which result in many accounts of risk events (Zou and Zhang 2011). Second, structural adjustments in the real economy lead to massive needs for consumer credit facilities, among which a large portion cannot be satisfied through formal financing channels. Third, the banking industry enjoys high profit margins from guaranteed interest rate spreads. Therefore, various enterprises proactively enter the banking industry. Fourth, government-mandated deposit interest rates often fail to outperform inflation. Meanwhile, China's stock market endured a long bear market from 2008 to 2014. Coupled with restrictions on housing purchases in recent years, ordinary people's demands for investment and asset management cannot be effectively satisfied (Xu et al. 2012). Fifth, under current regulation of initial public offerings, equity financing channels are congested. Sixth, sales of financial products related to securities firms, mutual funds, and insurance companies are constrained by the banking channel, which provides nonbank financial institutions with momentum to expand their own online marketing platforms.

Amid this backdrop, the Internet finance currently prevailing in China focuses on the "de-banking" process for the credit demands of individuals and SMEs, "quasi-equity" financing demands of some innovative projects, ordinary people's investment and asset management demands, and sales of financial products. In addition, financial resources in China have long been concentrated in the central government and state-owned sectors. In the next decade, massive financial resources are projected to diversify from the central government to local governments, and from state-owned sectors to private sectors. Such profound changes in the landscape of financial resource allocation will also promote the development of Internet finance.

Internet finance also uncovers certain distorted factors in China's financial system (X.-Q. Wu 2014b; G.-G. Wang 2014), which have been highlighted by Yu'E Bao (Sheng and Zhang 2014). Yu'E Bao has achieved its large size for several reasons. First, Yu'E Bao mainly invests in agreement deposits. The interest rates on agreement deposits, which are decided by market forces, are higher than the government-mandated interest rates of current deposits. Second, Yu'E Bao was launched in the middle of 2013, when a liquidity crunch took place. The interest rates in the interbank market were very high then, thereby enabling a relatively high investment return for Yu'E Bao. However, such high returns slowly dropped in 2014. Third, in the early stage of Yu'E Bao, agreement deposits were not subject to deposit reserve requirements, so Yu'E Bao could offer high interest rates. Fourth, agreement deposits did not impose interest penalties against early redemption, which provided a critical guarantee for liquidity. Among these four reasons, the latter two somewhat

feature regulatory arbitrage. The People's Bank of China has resolved that agreement deposits should stipulate deposit reserve requirements and abolish the clause of early redemption without interest penalties. Although the second reason is a temporary one, the first reason plays a critical role. Ordinary people are very sensitive to investment returns. As long as interest rate liberalization remains unfinished, there will be room for financial products similar to Yu'E Bao to develop.

Positive Implications

In China, there is a paradox in financial inclusion. The buyers of financial services wish to access financial services at lower costs, while the providers of financial services wish to provide financial services for higher returns (Lu 2014). As Zhang and Zhu (2014) pointed out, the Internet and mobile telecommunications technologies lower the costs of financial services and expand their coverage, while network effects guarantee the returns on financial services. That is why Internet finance can achieve commercial sustainability while promoting financial inclusion. In practice, the development of Internet finance in China has generated more benefits to third-tier and fourth-tier cities and rural areas. According to Gates and Gates (2015), mobile banking is one of the world's top four technological breakthroughs for the next 15 years, and will help to alleviate poverty.

Internet finance also has relatively strong social functions. As Zhang and Zhu (2014) pointed out, unlike traditional financial institutions, Internet finance plays an irreplaceable role in creating opportunities, improving equality, eliminating poverty, and shrinking income disparity. In this sense, Internet finance to a certain extent provides an answer to the questions raised by Shiller (2012, page 2), including the following: "What is the role of finance in the good society? How can finance, as a science, a practice, and a source of economic innovation, be used to advance the goals of the good society? How can finance promote freedom, prosperity, equality, and economic security? How can we democratize finance, so as to make it work better for all of us?" Through rational designs of financial products, Internet finance can better serve our daily lives and social activities, thereby inspiring entrepreneurship, while reducing transaction costs and improving economic vitality.

Some Open Questions

To sum up this article, we would like to raise some open questions about Internet finance that need further research. First, what is the performance of Internet finance in a complete economic cycle and under different market situations? Second, what are the side effects of Internet finance? For example, the U.S. Treasury (2016) pointed out that data-driven algorithms in online marketplace lending carry the risk of disparate impacts on credit outcomes and the potential for fair lending violations. Third, what are the justification and viability of different business models of Internet finance? For example, do they serve the real economy? Do they make financial services more accessible? Do they make money for investors? Do they reduce funding costs? Do they manage risk effectively and prudently? Do they have commercial sustainability? Fourth, what is the relationship between Internet finance and systemic risk? For example, can Internet finance produce systemic risk? Fifth, how should the inherent contradiction between financial inclusion and investor suitability be handled in Internet finance? Sixth, how should the expansion driven by the "first-mover advantages" and the requirements of financial safety and stability be balanced?

Seventh, should the regulatory authority give large Internet finance companies more room to conduct business, or should the regulatory authority introduce stricter regulation according to systemic importance?

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