

Understanding of the Fintech Phenomenon in the Beholder's Eyes in South Korea

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ABSTRACT

Advances in information technology (IT) bring about technological innovation in financial businesses, referred to as financial technology (fintech), beyond the traditional financial industry. While fintech implies more convenient and various financial services to customers, it leads to more complexity in the financial sector, as different industry players (e.g., IT firms) can participate in financial businesses. The complexity of fintech causes controversial issues related to policies and the appropriate development direction. In order to provide insight into the current state of fintech, this study explores the fundamental understanding of the fintech phenomenon from the perspective of the major stakeholders (i.e., financial authorities, financial companies, IT firms) in South Korea. This study analyzed news articles, where those stakeholders expressed their arguments, by using a content analysis. The study also conducted an intensive examination of their arguments by using a core-periphery approach of social representations. This study found that while the three beholders had a common opinion on deregulation of the fintech industry, each of them had different knowledge of the phenomenon. By revealing each beholder's structure of representations of fintech, this study not only provides common knowledge regarding fintech but also explicates the perceptual gaps among stakeholders. Findings of the study offer a big picture of current fintech initiatives, which can be useful knowledge for future research on fintech.

Keywords: Content Analysis, Core-Periphery Analysis, Fintech, Social Representations Theory

I . Introduction

Information technology (IT) has given an impetus to innovation in the financial sector. The use of IT in financial organizations and businesses has a long

history. In fact, the financial industry is regarded as one of the leading sectors in employing Internet and mobile technologies (Laukkanen, 2007). Internet banking, which has played a central role as a transaction platform in financial business since the 1990s

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(Lee, 2009; Simpson, 2002), is a typical example of IT applications in financial areas. By providing consumers with reduction of time and labor and banks with operation cost down, Internet banking has raised social efficiency. Recently, advances in IT herald another financial innovation, referred to as fintech, which may lead to structural transformation of the financial sector. The term fintech is the combination of two words: finance and technology. It represents a disruptive technology applied to financial services that offers greater benefits to consumers (Leong et al., 2017). Fintech is defined as technology-enabled innovation in financial markets stimulated by technology innovation, process disruption, and service transformation (Gomber et al., 2018). It mainly describes the phenomenon of emerging financial services driven by Internet and mobile technologies.

Diffusion of mobile devices is an imperative technological factor driving fintech. Mobile devices overwhelm the desktop in terms of use time in the US (Brown, 2015). People can conduct financial activities anywhere and anytime through mobile devices. Although Internet banking also provides flexible banking services, mobile technologies deliver more convenient and rapid financial services that have never existed before. Big data technologies are another driver of fintech. By enabling precise analysis of financial and customer data, big data technologies not only improve existing services but also introduce novel services in financial areas. Financial consumers pursue higher levels of convenience, competitive value, customized services, and flexibility (Birch and Young, 1997); fintech services, which are supported by mobile and big data technologies, fill those basic customer needs by employing mobile and analytics technologies.

From the industrial perspective, fintech implies convergence of finance and IT, rather than simple

application of IT in financial areas. It is regarded as the next financial revolution beyond traditional Internet banking in that it is driving the emergence of new service providers and novel business opportunities in the financial sector (Gomber et al., 2018). For example, Alibaba, the Chinese e-commerce company, provides new banking and payment services that threaten traditional financial companies in China (Shim and Shin, 2015). Global investment in fintech ventures has increased enormously, from \$3.2 billion in 2012 to \$27.4 billion in 2017 (Accenture, 2018). While fintech is regarded as the next big thing, various players seek to participate in fintech. Governmental agencies revise existing regulations so as to promote fintech services, and IT companies, from gigantic e-commerce companies to start-ups, seek business opportunities in financial areas. To respond to the new wave, financial companies also strengthen intra-IT capabilities or make partnerships with IT companies.

Despite the tremendous impact and rapid spread of fintech having been introduced in media, there has been little academic attention to the phenomenon. By exploring how stakeholders understand fintech, this study provides fundamental knowledge of the subject and the directions in which it is developing. Based on common knowledge shared by the community, an emerging social or business phenomenon is differently understood by different communities (Moscovici, 1961). Fintech stakeholders may also have different approaches to fintech, and their strategies and implementation regarding it may depend on their understandings of the new phenomenon. Because technology-based innovation is highly related to social and regulatory environments (Bauer, 2014; Cho et al., 2009; Huang et al., 2014; Pudjianto et al., 2011), various players may participate in it, and coordination among them is critical for sustain-

able innovation (Markard and Truffer, 2008). Specifically, since financial services, where IT acts as an important source of innovation, are highly regulated and institutionalized (Rowlands, 2009), investigation of stakeholders' common sense is essential in understanding the current and future state of the field. In this context, the objective of this study is to explore and compare understandings of fintech among three influential stakeholders in the current fintech phenomenon in South Korea: financial authorities (representatives from policy-making), financial companies (existing players), and IT companies (new players). More specifically, in this study we attempt to construct perceptual maps in order to synthesize and compare the stakeholders' different viewpoints on the fintech phenomenon by utilizing the framework of social representations theory.

This study employs social representations theory, which is the theoretical framework for exploring a community's common sense (Moscovici, 1961; Moscovici, 1984). The theory is suitable to investigate fintech stakeholders' collective knowledge of their social practices because it focuses on the social processes of meaning construction of social objects (Moscovici, 1984). An essential aspect of social representations is their structure, which is seen as consisting of a central core and peripheral elements (Abric, 2001). While the central core provides a generating function through which the other elements acquire meaning and value, peripheral elements, organized around the central core, are the area of adaptation based on new information or transformation of the environment (Abric, 2001). Data were collected from news articles regarding fintech from representative dailies in South Korea where fintech is in the early stage and the government has aggressively promoted its diffusion. News articles not only provide general information on fintech, but also introduce stake-

holders' opinions and strategies regarding fintech. In order to generate fintech stakeholders' core-periphery structure of representations, we analyzed data by using the core - periphery algorithm, which was developed by Borgatti and Everett (2000) to identify a core - periphery structure in network data. In results, totally 23 conceptual components (topics) of fintech derived from the analysis. Among them, three influential stakeholders had only a positive attitude toward deregulation in common and expressed different core-periphery structures of fintech. Overall, this exploratory study is expected to contribute to understanding stakeholders' views regarding fintech. In particular, the conceptual components displayed on a perceptual map can contribute to explore the understanding gap among the stakeholders, providing a detailed perspective of how the fintech innovation is collectively understood by members of different communities.

II. Theoretical Background

2.1. IT in the Financial Sector

The application of IT in finance is not an emerging phenomenon. The introduction of telecommunications into financial markets reduced transaction times in an effective way (Li and Whalley, 2002). In the late 19th century, the first wave of IT applications in the financial sector came from the introduction of the telegraph in 1846, reducing stock price differentials between regional markets (Kavesh et al., 1978). In the late 1950s, banks began to depend on computers in their operations. With the introduction of computers, banks could solve specific problems in business operations and handle an increased volume of financial transactions (Bátiz-Lazo and Wood,

2002). The greater use of IT in the banking industry made a big contribution to the improvement of data processing; however, the computers were not yet fully ready for the complex task execution required to offer financial services on the consumer level.

After the period in which computers supported the execution of data processing, Barclays Bank introduced the Automated Teller Machine (ATM) in 1967, which is known to be the beginning of modern electronic banking with the emergence of the magnetic plastic card (Lerner, 2013). Alongside the introduction of ATMs and credit cards, the management information system (MIS) was developed to manage internal risks and plan operational procedures (Fincham et al., 1995). Specifically, since the late 1980s, large parts of financial services have become digitized by virtue of personal computers (PCs). Computer resources have made it possible for financial institutions to provide more flexible services based on a consumer-oriented approach.

Subsequently, the banking industry reached an even higher stage of growth and competitiveness with the emergence of the Internet. The Internet has created an entirely new delivery channel for banking services. Internet banking enables consumers to perform financial activities without physical constraint; banks can also benefit from this condition, having lower operating and labor costs. Recently, advances in IT, such as mobile technology and applications, big data technologies, and social technologies, have accelerated digitalization of banking services and ultimately brought fintech into being. The emergence of fintech also derives from financial crises, which led to economic crisis and failure of financial institutions (Shiller, 2012). Banks are thus faced with the challenge of improving earnings from existing business models, and they have sought to do so by employing cutting-edge IT. In comparison to past

convergence of finance and technology, the most important feature of fintech is to provide more convenient services across new network, as well as to enhance the efficiency of existing systems. For example, LendingClub, which is one of the most prominent fintech firms, provides the social lending platform for making connections between various fundraisers and funders, including the peer-to-peer (P2P) micro-credit platform.

2.2. Fintech in South Korea

The finance industry is identified as one of the leading sectors in utilizing information technologies in South Korea (Ha and Jeong, 2010). With the application of Internet-based technology, fintech services extend beyond the boundaries of traditional institutions, including the areas of payment, remittance, insurance, asset management, and peer to peer (P2P) lending. Payment service is regarded as typical of the fintech services, and it also accounts for the majority of the fintech industry in South Korea. A variety of companies of South Korea have entered the payment market, including social network services (SNSs), telecommunication, payment gateway system, and distribution firms. Their primary goal is to increase their influence on the payment market and maximize synergy through the own platform. Linking with their existing services and systems, they focus on providing customized service. For the institutional aspect, there has been a significant change in policy support. Financial authorities established a counselling center concerning legal issues in implementation of fintech services in 2014. However, it is criticized for not providing actual assistance to initiate new fintech services. In 2015, as the Government of South Korea announced a strategic plan for developing the fintech industry (The Korea

Herald, 2015), a surge of interest and investment has been steadily growing in South Korea. In response to this governmental plan, financial authorities decided to build an open platform for developing new fintech services. Recently, the Government of South Korea instituted a new plan to set up a regulatory sandbox in fintech sector, which allows a flexible process to test innovative services and business models (The Korea Herald, 2018). However, despite of these efforts to promote the fintech industry development, only about 32% of Korean consumers, which is lower than the average value of the world, have used fintech services in 2017 (Ernst & Young Global Limited, 2017).

2.3. Social Representations Theory

To explore understanding of fintech from the perspective of fintech stakeholders, this study uses social representations theory, which investigates common-sense knowledge shared by members of a community (Moscovici, 1961; Moscovici, 1984). Social representations are the stock of common knowledge that community members share about the social object (Augoustinos et al., 2006). The representations are reconstructions of reality, which depend on interaction and communication among members in socially- and historically-conditioned environments, rather than being reflections of reality. The theory posits that the individual is a social being rooted in a collectivity (Augoustinos and Walker, 1995) and, thus, tries to explain collective knowledge that guides the social practices and relationships between community members (Moscovici, 1984).

The theory has been applied to investigate how a social object is collectively understood by groups or communities. It has been used to explain collective sensemaking on a wide range of topics, such as health

and illness (Herzlich, 1973), the electronic purse (Penz et al., 2004), and smartphone addiction (Ahn and Jung, 2014). The theory has been also used to explore different understandings among social groups. Wagner et al. (2002) employed the approach of social representations to investigate how “biotechnology” is understood differently in different European countries, and Vaast (2007) demonstrated different understandings of the term “security” by different occupational groups in a hospital. The social representations framework is well matched to the current study, aiming to explore stakeholders’ differences in understanding the emerging innovation of fintech.

An imperative component of the social representations theory is a structure of social representations, which consist of a central core and peripheral elements (Abric, 2001). A social representation designates a body of information, beliefs, and opinions and attitudes about a given object, and those constituents are classified into cores or peripherals. Social representations are characterized as an ambivalent trait: rigid and malleable, consensual and disagreed (Abric, 2001). The ambivalent stable/changing nature generates the two-layer structure of social representations. While the central core is the non-negotiable and stable element of the representation, the peripheral elements, which are organized around and interpreted with the central core, are less shared and are the area of adaptation based on new information or changing environments. Because the core - periphery analysis provides structural information as well as finding conceptual components of social representations, the analysis has been widely used to investigate social representations (e.g., Ahn and Jung, 2014; Mäkineniemi et al., 2011; Pawlowski et al., 2007; Wagner et al., 1996).

III. Methodology

This study conducted core - periphery analysis of social representations. We investigated and compared the representations of fintech made by three main stakeholders in South Korea: financial authorities, traditional financial institutions, and IT firms. We decided on these three based on our preliminary review of media articles and interview comments from relevant academic/industrial experts. For analyses, we elicit social representations by conducting content analysis of news articles describing stakeholders' opinions in interview. It is concluded that analyzing the content of writing about the theme is one of the best ways to extract social representations (Moscovici, 1984). Next, the data are analyzed to reveal the structure of the representations on the basis of the core - periphery model (Borgatti and Everett, 2000). It is an analytic procedure to extract the underlying structure of social representations based on a degree of agreement that members of a community exhibit with respect to the theme (Borgatti and Everett, 2000). It is fundamentally assumed that the topics frequently used by the subjects in a community together are closer to social representations (Flament, 1986). In this respect, the degree of agreement is operationalized as co-occurrence of the topics across data sources. Finally, the core - periphery structure is presented with a maximum tree (Flament, 1986), which visualizes elements on a perceptual space. It is a widely used technique to single out the relationship among the components of shared representations.

3.1. Eliciting Social Representations of Fintech

Korean news articles were the main sources of data. Since fintech is still in the early stage in South

Korea, the Korean government has aggressively promoted the diffusion of fintech, and diverse types of enterprises, including major banks and IT firms, have jumped into the fintech market. News articles not only provide general information on fintech, but also introduce relevant players' opinions and strategies regarding fintech. We found 928 news articles that include the term fintech in 2015, from 10 representative dailies in South Korea. Because the Government of South Korea announced a national plan for fintech development in early 2015, stakeholder forums, seminars, and workshops were periodically held to discuss and achieve consensus on the core aspects of the fintech industry in that year. Therefore, this study covered the year of 2015 as the key period to elicit commonsense knowledge shared by each stakeholder. Additionally, we used other relevant keywords to find relevant articles, such as global leading firms (e.g., Alipay, Lending Club, Paypal, TransferWise), domestic firms in South Korea (e.g., 8percent, Viva Republica), and particular fintech services (e.g., mobile payment, P2P loan). Duplicated articles and commercials were removed, and finally 110 articles, which explicitly introduce stakeholders' opinions in interview situations (e.g., 'an official from financial authorities said'), were analyzed.

From the 110 news articles, 371 descriptions embracing stakeholders' view were identified. The details of news articles sources for social representations of the fintech phenomenon are described in <Appendix B.2>. Those descriptions were coded by an open coding process in which codes are not determined but rather emerge from the data. The first coder coded data from 371 descriptions, in which 92 financial authorities, 135 financial companies, and 144 IT firms codes were identified. At the beginning of coding, 32 codes were identified in discussion with research assistants, consisting of 6 under-

graduate students. After three discussion sessions with a coding facilitator, who was a graduate student, code designations were elaborated, and codes were grouped into 23 conceptual components (topics). A second coder re-coded the data using the set of 23

topics, and the inter-rater reliability, the degree of consensus among coders, was 88.4%, implying that the two raters were in agreement at a high level (Fleiss et al., 2013). <Table 1> shows the final 23 topics of fintech derived from the content analysis.

<Table 1> Topics of Fintech

	Topic	Examples
T1	Positive perception of Internet-only bank	"Introduction of Internet-only banks is necessary to develop the fintech industry," "The Internet-only bank has the opportunity to reduce cost, or create new types of services in the financial market"
T2	Negative perception of Internet-only bank - less competitive	"I oppose the introduction of Internet-only bank, because it cannot provide differentiated services to enhance competitive advantage," "There is a small possibility that Internet-only bank will have the advantage of providing differentiated services, or increasing social benefits in the future"
T3	Negative perception of Internet-only bank - side effects	"The possibility exists that the introduction of the Internet-only bank may lead to increase in household debt," "The introduction of the Internet-only bank may have a harmful influence on the overall financial system"
T4	Need for the cooperative system	"Stakeholders, including financial authorities, traditional institutions, and IT firms should understand each other and share their knowledge to establish the cooperative system," "A win-win strategy for the fintech industry can be formed by building the cooperative system"
T5	Difficulties in actual cooperation	"Actual cooperation between stakeholders is poor despite possession of advanced technology of IT firms," "The growth of the fintech industry depends on cooperation between stakeholders, but there are difficulties in achieving actual cooperation"
T6	Emphasis on profitability	"Designing business models based on profitability is a salient issue for future competitiveness"
T7	Importance of customer convenience	"The primary issue in the fintech industry is to offer the differentiated services with consideration of user convenience"
T8	Emphasis on self-security	"Giving service providers greater autonomy in the security system will give them more responsibility for financial accidents"
T9	Matter of responsibility	"In case of a future accident, it is necessary to clarify where the responsibility lies," "It is important to clarify who is responsible for the financial accident regarding cooperation between banks and IT firms"
T10	Stability required	"Stability related to information security should be a priority in offering the fintech service," "Financial stability is a key precondition for the development of the fintech industry"
T11	Recognition of the importance of post-treatment	"Because it is impossible to prevent every accident, we should focus on post-treatment planning such as compensation policy"
T12	Unestablished standard in the security system	"A new security standard should be established for the fintech industry," "Without an established standard in the security system, it is not possible to develop new financial services"
T13	Government-controlled financial systems	"Government-controlled financial systems are major obstacles to the development of the fintech industry"

<Table 1> Topics of Fintech (Cont.)

	Topic	Examples
T14	Self-protection of the financial sectors	"There is no innovation in financial sectors, because traditional institutions tend not to take a risk. They need to cast aside the idea of self-protectionism"
T15	Positive system of financial regulation	"The current regulatory system in the financial sectors proposes what is legally possible only, and it should turn into negative way to promote the fintech industry"
T16	Discriminatory regulation between financial and IT industries	"There exists the regulatory gap between financial and IT sectors, and it is one of the key obstacles to starting the business or work together"
T17	Confined to payment and settlement	"The fintech services in South Korea are restricted to the area of payment and settlement," "Enterprises associated with the fintech industry excessively pay attention to payment and settlement systems"
T18	Established domestic financial infrastructure	"With regard to growth potential of the fintech industry, we should note that domestic financial infrastructure is well developed," "As domestic financial infrastructure is well developed, consumer demand for the fintech services may be low"
T19	Lack of investment	"The difficulties lie in attracting investors to start the fintech business," "In the perspective of the fintech ventures in South Korea, there is weakness in investment culture"
T20	Positive perception of deregulation	"Deregulation is the prerequisite for the introduction of the fintech services," "The business [the fintech] cannot be implemented without deregulation"
T21	Negative perception of deregulation	"We should follow the fundamental principle of regulation in relation to the fintech industry," "Following a precedent, we should be more cautious in the issue of deregulation, and it is rather necessary to tighten regulation on new financial services"
T22	Integrated services	"IT is important, but finance is the basis for the fintech industry. Therefore, a finance-based approach that develops an integrated service model from existing financial services is crucial for competitive advantage"
T23	Specialized services	"Specialized services are important for creating new values in the fintech industry," "Specialized services with application of advanced IT is the central part of the fintech industry"

3.2. The Core - Periphery Structure and Maximum Tree

In the next step, we classified topics of fintech into core and peripheral elements. Based on prior studies on a core - periphery structure of social representations (e.g., Jung et al., 2009; Pawlowski et al., 2007), we employed the core - periphery algorithm, which was developed by Borgatti and Everett (2000) to identify a core - periphery structure in network

data. The statistical software UCINET, which was also developed by Borgatti and colleagues and is widely employed in social network analysis, was used to generate each topic's coreness and identify its membership in the core or periphery. According to each element's coreness (indicating the extent to which each element is associated with the latent center), the software classifies elements into two groups: core or periphery. The co-occurrence matrix was used as the data matrix for the core-periphery analysis. In the results, two topics were classified to the core and the remaining 13 to the periphery

in financial authorities' representations. Financial companies' representations of fintech consist of four core topics and 13 peripheral ones, and IT companies' representation was composed of six core and 12 peripheral elements.

Finally, core and peripheral elements were arranged on the perceptual map to visualize relationship among topics. A Jaccard's similarity coefficient, indicating a degree of similarity based on co-occurrence (Hammond, 1993), was produced between two topics, and all coefficients were summarized into the inter-attribute similarity matrix <Appendix A>. According to the similarity between topics, the relationship among representations was visualized as a maximum tree (Flament, 1986). A maximum tree is constructed by the nearest neighbor algorithm, which is a procedure to link two elements. The first step is to include the topic (X) with the largest frequency value in the map; then, among the other topics, the one with the highest similarity to X is selected and connected to X. If there are multiple topics with the same similarity, the one with the highest frequency value is picked. The same procedure continues to be applied to the previously selected topic until all topics are connected. The results of the analysis are shown in <Figure 1>.

IV. Results

Financial authorities, financial companies, and IT firms shared 11 among 23 topics of fintech. Financial authorities' representations of fintech consist of 15 conceptual components, among which two are core elements. Financial companies' representations include 17 topics and four core topics, and IT firms' representations are composed of 18 components (six core topics). Only one topic, Positive perception of

deregulation (T20), was a common core element of representations of fintech among three stakeholders. Other than the common core topics, stakeholders have their own compartmental core elements: Need for the cooperative system (T4) to financial authorities; Stability (T10), Negative perception of Internet-only bank - less competitive (T2), and Established domestic financial infrastructure (T18) to financial companies; and Difficulties in actual cooperation (T5), Self-protection of the financial sectors (T14), Need for the cooperative system (T4), Importance of customer convenience (T7), and Government-controlled financial systems (T13) to IT firms (see <Table 2>).

<Table 3> shows exclusive peripheral elements of each player. Emphasis on self-security (T8) was mentioned only by financial authorities. Matter of responsibility (T9) and Negative perception of Internet-only bank - side effects (T3) were referred to only by financial companies. Recognition of the importance of post-treatment (T11), Lack of investment (T19), and Discriminatory regulation between financial and IT industries (T15) correspond to only representations of IT firms. Based on the maximum tree structures that visualized representations of fintech, the three stakeholders have different understandings of fintech (<Figure 1>).

V. Discussion

The objective of this study is to elucidate how stakeholders understand the fintech phenomenon. The investigation using the social representations approach provided knowledge of the three stakeholders' perceptions of the fintech phenomenon. The results reveal differences and similarities in the collective sensemaking of fintech from viewpoints of the

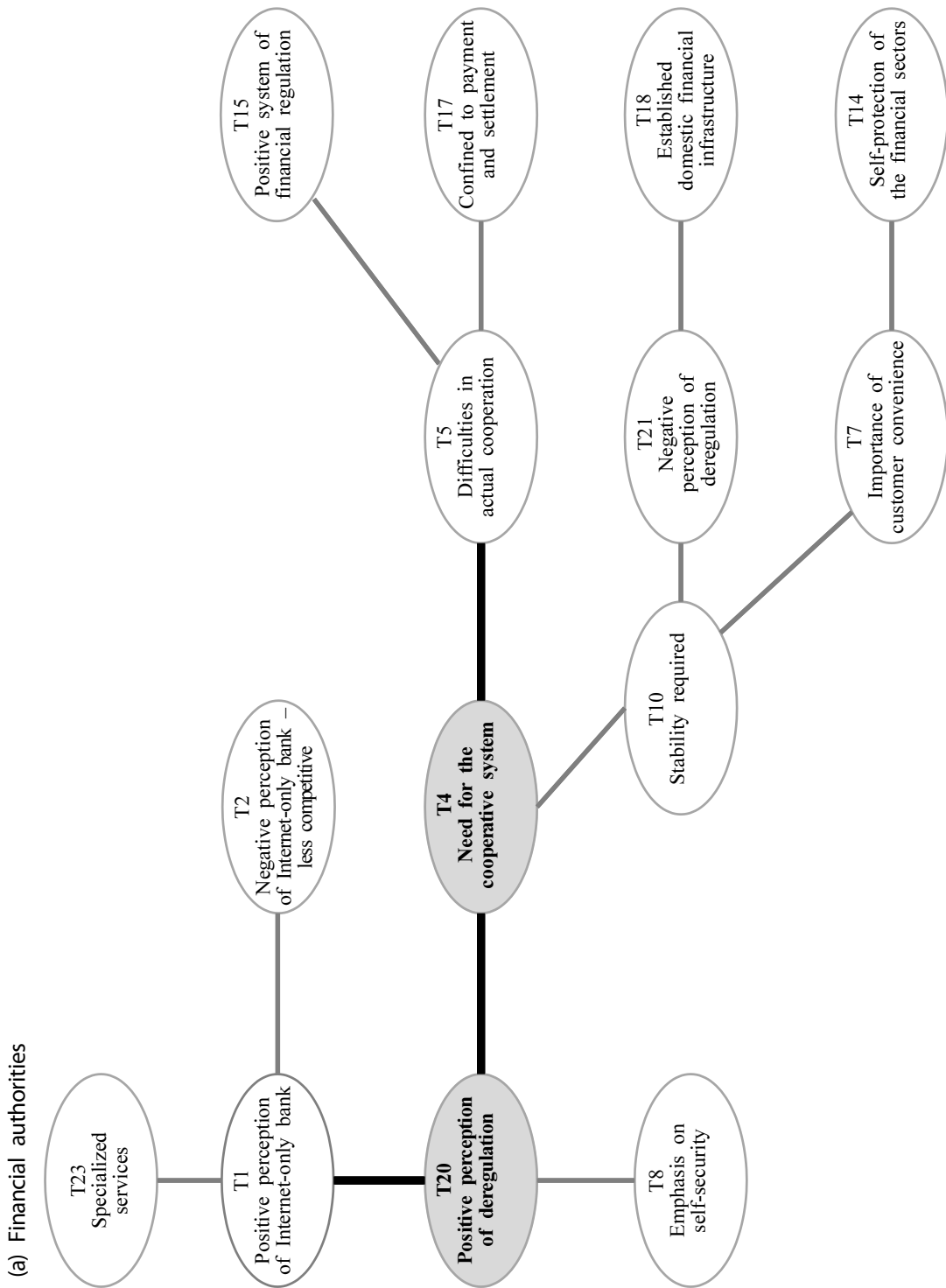
three stakeholders. This approach is appealing in that it helps clarify not only how stakeholders interpret the fintech innovation, but also how stakeholders' common senses of a social object are different between them.

As seen in <Table 2>, the three beholders shared only one core topic: Positive perception of deregulation (T20). Because financial companies and IT firms can do businesses within the constraints of governmental policies, conflicting legal issues and rigid regulatory environments are barriers to business initiation and routinization (Zhu et al., 2006). All three players recognize a significance of deregulation for diffusion of fintech. However, there existed different relations of the common core topic with other elements in the collective map by each player. Such results imply that, although they all agree that deregulation can contribute to promoting the fintech industry, they may have different understandings of fintech.

In financial authorities' representations of fintech, Positive perception of deregulation (T20) was strongly linked with the other core element, Need for the cooperative system (T4). These two core topics are dominant in financial authorities' representations in that their coreness values (0.560 and 0.504, respectively) are much higher than those of the other topics. As it is proposed that "*changes in governance modes affect the balance between the different actors involved, thus influencing the nature and intensity of innovation*" (Scupola and Zanfei, 2016, p. 237), financial authorities, which intend to promote the fintech industry, aim to establish the cooperative environments where diverse players do fintech businesses in collaboration, and regard deregulation as an essential aspect of the cooperative atmospheres.

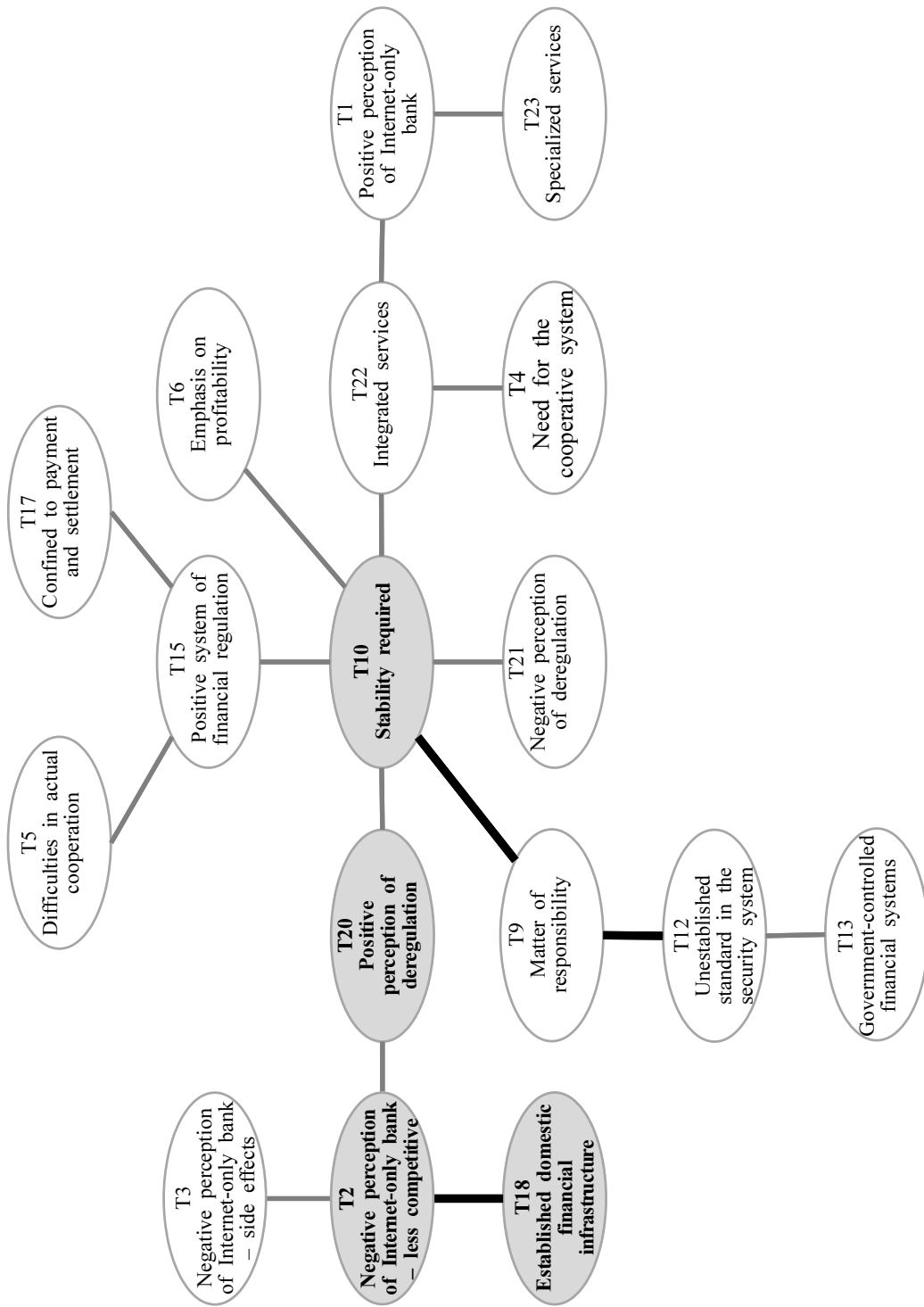
As seen in <Figure 1>, some relations among core and peripheral topics disclose financial authorities'

understanding of fintech. Financial authorities support establishment of the Internet-only bank (T1), which provides technology-based novel and Specialized services (T23). However, although they agree with and support its establishment, they have a negative attitude towards the Internet-only bank in terms of its competitiveness compared to existing banking services. In the key part of deregulation, they emphasize Self-security (T8) in fintech services. Considering that security is a critical issue in the financial sector, financial authorities require players to fit the obligation of a self-regulating system for security. They also assert that Stability (T10) of financial market is prerequisite of cooperation among players (i.e., T4). In peripheral topics concerning interactions between players, financial authorities recognize that Positive system of financial regulation (T15) causes Difficulties in actual cooperation (T5), which restrict fintech services to payment and settlement (T17. Confined to payment and settlement) that are traditional finance services.



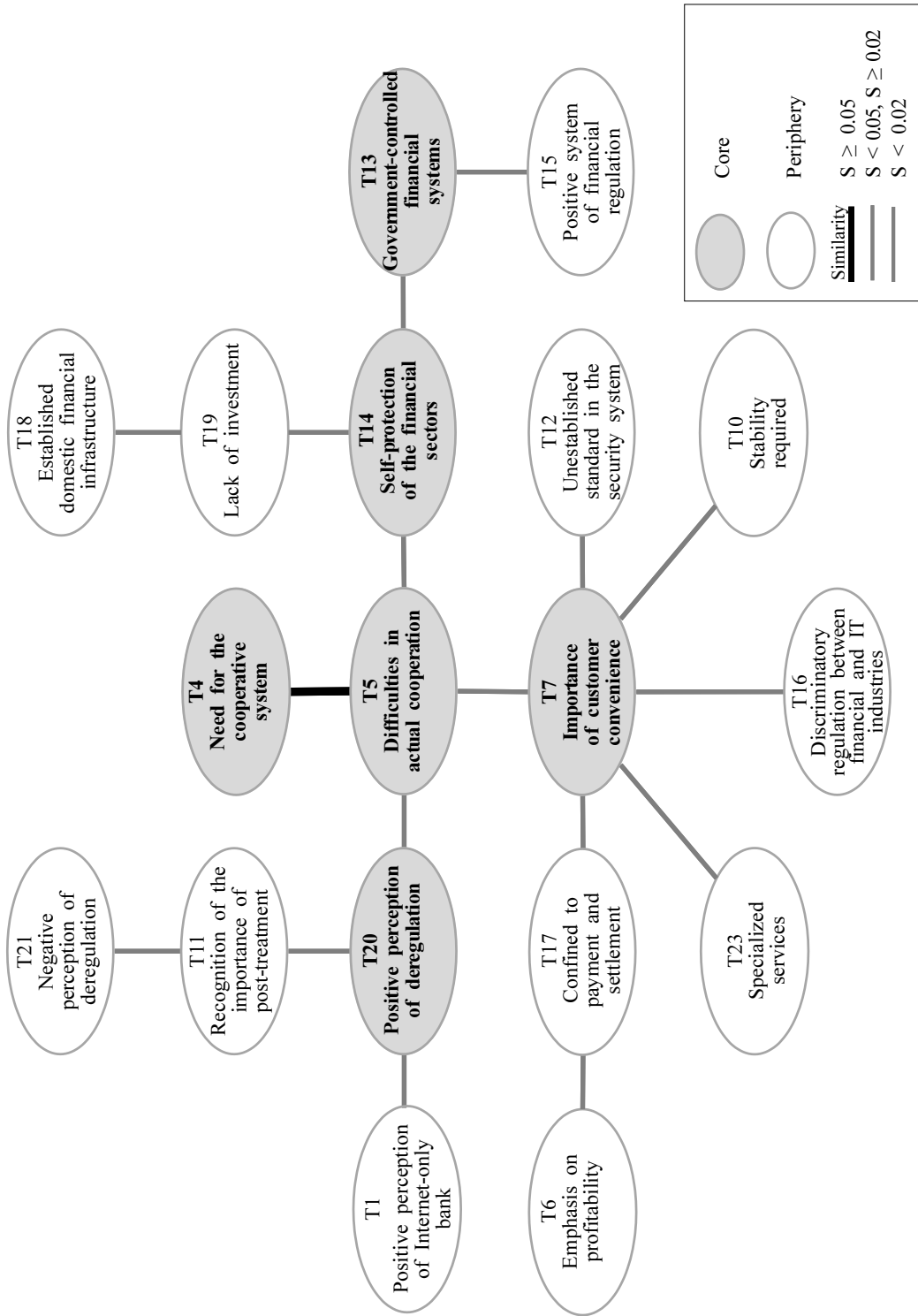
<Figure 1> Understandings of Fintech by Stakeholders

(b) Financial companies



<Figure 1> Social Representations Map of Fintech (Cont.)

(c) IT firms



<Figure 1> Social Representations Map of Fintech (Cont.)

<Table 2> Core-Periphery Structure

Financial authorities (regulators)		Financial companies (existing players)		IT firms (new players)	
#	Topic	Coreness	#	Topic	Coreness
T20	Positive perception of deregulation	0.560	T10	Stability required	0.416
T4	Need for the cooperative system	0.504	T2	Negative perception of Internet-only bank - less competitive	0.380
T5	Difficulties in actual cooperation	0.273	T20	Positive perception of deregulation	0.353
T1	Positive perception of Internet-only bank	0.258	T18	Established domestic financial infrastructure	0.346
T8	Emphasis on self-security	0.258	T22	Integrated services	0.253
T10	Stability required	0.230	T21	Negative perception of deregulation	0.250
T23	Specialized services	0.202	T9	Matter of responsibility	0.245
T17	Confined to payment and settlement	0.184	T3	Negative perception of Internet-only bank - side effects	0.230
T7	Importance of customer convenience	0.164	T6	Emphasis on profitability	0.216
T14	Self-protection of the financial sectors	0.160	T1	Positive perception of Internet-only bank	0.215
T21	Negative perception of deregulation	0.135	T4	Need for the cooperative system	0.173
T15	Positive system of financial regulation	0.114	T15	Positive system of financial regulation	0.166
T2	Negative perception of Internet-only bank - less competitive	0.085	T5	Difficulties in actual cooperation	0.133
T18	Established domestic financial infrastructure	0.045	T12	Unestablished standard in the security system	0.127
T12	Unestablished standard in the security system	0.022	T17	Confined to payment and settlement	0.093
			T23	Specialized services	0.046
			T13	Government-controlled financial systems	0.034
			T21	Negative perception of deregulation	0.010

Note: Shading topics in the table indicate the core elements, and bold topics indicate the common core element among the three stakeholders.

<Table 3> Exclusive Elements of Stakeholders

#	Topics	Stakeholder
T8	Emphasis on self-security	Financial authorities
T3	Negative perception of Internet-only bank - side effects	Financial companies
T9	Matter of responsibility	Financial companies
T11	Recognition of the importance of post-treatment	IT firms
T16	Discriminatory regulation between financial and IT industries	IT firms
T19	Lack of investment	IT firms

“It is important to improve the regulatory system of the government for fintech innovations. However, the partnership between financial institutions, fintech companies, and the government is undoubtedly required to provide innovative financial services (Financial Services Commission).”¹⁾

“It is desirable to reform bank regulation by which Internet-only bank is classified into a new sector, different from commercial banks. It can be expected that the deregulation will increase the competitiveness of banking markets, providing benefits to consumers by charging lower lending rates (Financial Services Commission).”²⁾

Although financial companies agreed an importance of deregulation for diffusion of fintech, they have a cautious attitude to the fintech phenomenon. They concatenate Positive perception of deregulation (T20) with Stability required (T10) and Negative perception of Internet-only bank - less competitive (T2). The established industry players posit that although deregulation is required, it can threaten stability of the financial industry. They also further express an adverse perception of Internet-only banks, such as less competitiveness than established financial services, more financial accidents, and increasing household debt. Particularly, Negative perception of Internet-only bank - less competitive (T2) has a strong association with Domestic financial infrastructure (T18), implying that when compared with current well-developed financial infrastructures, Internet-only banks are less competitive.

Financial companies’ pessimistic perspective on

fintech can be explained by system failure framework developed by Woolthuis et al. (2005): infrastructural failures, institutional failures, interaction failures, and capabilities failures. First, infrastructural failures refer to systemic imperfection regarding the physical infrastructure (e.g., IT that actors need to function) (Smith, 2000). The link between Negative perception of Internet-only bank - less competitive (T2) and well-developed Domestic financial infrastructure (T18) implies infrastructure failures of fintech systems. The interesting point to note here is that financial companies consider the well-developed domestic infrastructure as a major obstacle to business operation of Internet-only bank. They insist that financial consumers might not need new banking systems due to the existing sound financial infrastructure. In terms of institutional failures relating to technical standard, law, political culture, and social values, financial companies mention both standard (T12. Unestablished standard in the security system) and regulatory environments (T13. Government-controlled financial system). Interaction failures can be reflected in the topic of Matter of responsibility (T9). Although effective cooperation between stakeholders within the industry can increase overall productivity by sharing capacity and solving the problem, unclear responsibility (i.e., whether financial companies or their IT partners are responsible for accidents of fintech services) may obstruct cooperation. The issue of responsibility is the exclusive element by financial companies, and such perception may lead to weak network failures in which active interaction between stakeholders is limited (Carlsson and Jacobsson, 1997). The concept of capabilities failures has relevance to required capabilities to adapt to new technologies, and tasks beyond existing technology can hinder the firm’s development (Woolthuis et al., 2005). This includes the simple lack of competences

1) Segyetimes (2015). Retrieved from <http://www.segye.com/newsView/20150422003377>

2) Chosunbiz (2015). Retrieved from http://biz.chosun.com/site/data/html_dir/2015/04/08/2015040802467.html

or resources, and financial companies point out that IT firms may face a critical shortage of the financial resources necessary to offer the fintech services. Accordingly, financial companies argue that providing integrated service from existing systems of institutions would be suitable for the fintech businesses (the connection of T10. Stability required to T22. Integrated services).

“The current Internet banking system provides comprehensive financial services. In this respect, Internet-only bank may not be as competitive as existing banking services (Chief Executive Officer at commercial bank).”³⁾

“Though the regulation concerning procedural security in electronic banking should be relaxed, it is essential to ensure users' financial security. The regulation needs to be amended in a way that ensures stability of the system (A bank official).”⁴⁾

IT firms welcome deregulation, and most of their central topics are related to promoting fintech or eliminating barriers to market entry. Difficulties in actual cooperation (T5), which is IT firms' most core topic, suggests that they emphasize the meaning of actual collaboration with other players and support for fintech businesses beyond financial authorities' nominal statement on establishing cooperative systems. In this regard, Difficulties in actual cooperation (T5) has a strong association with Need for the cooperative system (T4). The connection between Actual cooperation (T5) and two other core elements – Self-protectionism in the financial sector (T14)

and Government-controlled financial system (T13) – implies that self-protectionism prevalent in the financial industry and government-led regulation is a barrier against actual cooperation among players and hinders IT firms engagements in fintech businesses. The link between Actual cooperation (T5) and Customer convenience (T7) denotes that IT firms can provide high-level customer convenience when they can offer fintech services as results from actual cooperation with governmental agencies and financial companies.

IT firms may understand financial companies' attitude towards fintech from the perspective of structural inertia, designating that if old organizations have developed standardized routines, the organizational structures are generally resistant to change (Stinchcombe and March, 1965). According to inertia theory, structural inertia must be interpreted in the context of environmental changes, and one of the biggest threats to extant organizations is “*the creation of new organizations designed specifically to take advantage of some new set of opportunities*” (Hannan and Freeman, 1984, p. 152). As their core topics (Positive perception of deregulation (T20), Cooperative system (T4)) suggest, financial authorities recognize the need of new players for the creation of new markets. This is an approach to lower the market entry barriers and establish cooperation between existing and new players. However financial companies have the core element Stability required (T10), referring to qualification to do the financial businesses. They stress the importance of maintaining stability of the financial industry and reducing the threats of new entrants into the market. The representations by financial companies accord with well-known research conducted by Schumpeter (1950) positing that established firms have advantages over new entrants to exploit innovation, and they

3) Seoultimes (2015). Retrieved from <http://www.seoul.co.kr/news/newsView.php?id=20150209016027>

4) Koreatimes (2015). Retrieved from <http://www.hankookilbo.com/v/81a3b05609994aa1a7a2544d89f573ea>

tend to defeat challenges from new entrants via their capital and market power. Financial companies have had the initiative in doing financial businesses, and now they intend to maintain competitive advantage over new players in the emerging market.

IT firms describe financial companies' structural inertia as Self-protection of the financial sectors (T14), which is a core theme of IT firms' understandings of fintech. They insist that deregulation does not lead to Actual cooperation (T5) by default, due to financial companies' self-protectionism. They assert that self-protectionism in the financial sector should be avoided, because the regime has an effect on investment (i.e., there is a link between Self-protection of the financial sectors (T14) to Lack of investment (T19)). In regard to regulation, they argue that particular services are legally possible under the current government-controlled system in the financial business, and therefore, that a positive system of regulation should turn into a negative one that designates illegal systems only (Government-controlled financial system (T13) to Positive system of financial regulation (T15)). Consequently, they implicitly argue that actual cooperation requires giving adequate consideration to constraints imposed by both the self-protection of the existing players and the positive regulation system in South Korea. Based on structural inertia, Cohen and Levinthal (1990) explain a firm's absorptive capacity to recognize the value of new information, assimilate and exploit it in commercial areas. It is critical to develop the absorptive capacity in an initial period, because the lack of early investment affects the levels of investment in subsequent stages when the firm discerns technological opportunity in that field (Cohen and Levinthal, 1990). Structural inertia is considered one of the key factors that cause ineffectiveness in the innovation systems (Niosi, 2002), and such a tendency is presented as

an obstacle to the development of the fintech industry in the representations by IT firms.

“Though I understand that security considerations are important issues in banking system, it is difficult to develop new business models due to excessive regulation on security. Furthermore, financial institutions tend not to take the risk of cooperation. For the development of fintech industry, the cooperation between financial institutions and IT firms is essential, but there are difficulties in actual relationships with traditional financial institutions (Chief Executive Officer at fintech company).”⁵⁾

Finally, IT firms emphasize the necessity of adequate interaction in the whole stakeholder range, including actors, customers, regulations, and culture. In the context of this approach, IT firms argue that service offerings must not be confined to one specific area and that providing specialized services is needed on the basis of users' convenience (Customer convenience (T7) to Confined to payment and settlement (T17) and Specialized services (T23)). IT firms regard user convenience based on technologies as an important element to produce differentiated services.

VI. Implications and Limitations

The most important contribution of this study is to help understand the fintech phenomenon from stakeholders' perspectives. Despite high interest in the fintech phenomenon, there is little knowledge of stakeholders' understandings, which are essential in comprehending the phenomenon and predicting

5) Chosunbiz (2015). Retrieved from http://biz.chosun.com/site/data/html_dir/2015/01/16/2015011600333.html

its future. This study offered a fundamental understanding of the major players related to fintech. Specifically, it investigated and compared social representations of fintech from the perspective of three major players in the fintech industry. The perceptual gaps among stakeholders show that players can be regarded as communities of knowing that share representations of fintech. Our social representations approach was useful in explaining the fintech phenomenon, because representations have a referential role for agents to communicate and act in relevant situations (Moscovici, 1984; Vaast and Walsham, 2005). Differences in representations of fintech may make cross-communication difficult and cause conflicts that ultimately obstruct the growth of the fintech industry. Accordingly, a social representations approach, which explores the interpretation gap by members of different communities, is useful in understanding a cross-industrial topic. In addition, findings of the study can inform stakeholders' common understandings of fintech and furthermore provide foundational knowledge for future institutional and organizational research on fintech.

Our findings imply the possibility of problematic collaboration between two main players (i.e., financial companies and IT firms). Financial companies, who are the current dominant players in the financial industry, are defensive about the novel wave, and do not seem to feel the necessity of self-driven change or innovation. The digital revolution in the financial sector can shrink the dominant role of financial companies, and simultaneously assist them to provide better financial services with lower cost (Gomber et al., 2018). Nevertheless, financial companies are inclined to underestimate the impact of fintech and highlight the superiority of existing financial systems. Pointing to the structural inertia of financial companies, IT firms negatively express their approach on

fintech. Without actual action to support IT firms' financial businesses, it is difficult for authorities to convince them to participate in fintech markets. The tension may be not easily mitigated and may be a significant barrier to fintech development, and implies authorities' responsibility to coordinate both players. Prior research also confirms a significant governmental role in promoting the fintech industry (Shim and Shin, 2015).

Findings of this study highlight the crucial role of authorities, and further, help policy makers to make decision for development of fintech policies. The government's role is pivotal in the success of technological innovation, particularly in its early stages (Rogers, 2003; Wonglimpiyarat and Yuberk, 2005), expanding its role in technology policy decisions (Larson and Park, 2014; Wang and Kim, 2007). For example, although all players point out that fintech services are excessively confined to the payment and settlement area, they have different approaches in solving the problem. First, financial authorities suppose that actual cooperation is the solution to extending the range of the services, while financial companies propose a positive system of financial regulation as a solution. Rather than discussing the regulatory environment, IT firms assert that the approach based on user convenience is essential to generate differentiated services. This result can be accounted for by differences in community positions. The solution that emphasizes a cooperation among players can be viewed as a typical response of the authorities, as they are in leadership roles to encourage fintech industry. However, before the actual cooperation is achieved, financial companies assume a low feasibility of developing new services in the current regulation system because banking is a heavily regulated industry. On the other hand, IT firms highlight the importance of customer convenience. As

a new player in the market, they focus on providing service differentiation to customer with the purpose of developing a customer base. Specifically, the result implies that players have different ideas regarding quality of innovation indicating the degree of adopting the desirable innovation in a proper manner (Fichman, 2004; Haner, 2002). It helps to confirm the findings in other studies that different occupational communities are differently aware of the same social object (Vaast, 2007). Therefore, regulators are required to recognize and coordinate understanding differences among stakeholders. This study demonstrated the fintech phenomenon as deeply embedded in the community context of business innovation, and that understanding diverse perspectives by context is essential for policy makers to design and implement effective policies.

There are a few limitations in this study. First, this study is limited to one country, South Korea. Social representations of fintech may be different by stakeholders in countries, which have different financial infrastructures and regulation. Future research needs to interpret their findings, based on their financial environments. Another limitation is that the analysis is based on the contents of newspapers. Because of difficulty in conducting interviews with the three different stakeholders, we collected data from 10 representative dailies in South Korea. If future research can collect data directly from stakeholders through interviews, results may more accurately reflect their understandings. In addition, the study analysis was limited to one year of data. Since our primary aim was to explore common-sense knowledge shared by each beholder, we covered the period during which stakeholder forums were regularly held to achieve consensus on the best approach to development of fintech industry. Finally, because of limited data, this study did not conduct

a longitudinal analysis. Social representations have a dynamic characteristic, indicating continuous alteration with time (Moscovici, 1984). Because fintech is a case of technological innovation including a shifting attribute, tracking changes of social representations of fintech can be a next topic for a better understanding of the phenomenon.

VII. Conclusion

Based on the framework of social representations, this study investigated the understanding of the fintech phenomenon from the perspective of three stakeholders: financial authorities, financial companies, and IT firms. Although all players had common ground in deregulation, each of them had different knowledge of and perception of the phenomenon. As regulators of financial business, financial authorities focused on the opportunity of the fintech industry and desired to establish the cooperative system through deregulation, while financial companies relatively expressed reluctance to the technological innovation. Financial companies, who are existing players, aimed to extend services in their current systems to fintech businesses. IT firms, new players of the financial sector, were enthusiastic to start businesses through cooperative working, but they recognized that there were still many restrictions to entering the financial market. Particularly, their negative understanding of the fintech market reflects a current financial regime composed of bureaucratic systems and widespread protectionism. In conclusion, financial companies are required to have a critical role in making financial companies and IT firms communicate with each other and in developing effective policies that consider both sides.

Acknowledgement

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2016S1A3

A2924760). This work was also supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A3A2066788).

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<Appendix A.1> Inter-Attribute Similarity (IAS) Matrix of *Financial Authorities*

Topic no.	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23
T1	0.152	0.026	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.018	0.000	0.034
T2	0.026	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.000	0.015	0.025	0.000	0.000
T3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T4	0.013	0.000	0.000	0.274	0.053	0.000	0.015	0.026	0.000	0.025	0.000	0.000	0.000	0.014	0.016	0.000	0.029	0.000	0.000	0.059	0.012	0.000	0.012
T5	0.000	0.000	0.000	0.053	0.167	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.000	0.047	0.000	0.000	0.020	0.000	0.000	0.000
T6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T7	0.000	0.000	0.000	0.015	0.000	0.000	0.130	0.000	0.000	0.048	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.021
T8	0.000	0.000	0.000	0.026	0.019	0.000	0.000	0.138	0.000	0.018	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.048	0.000	0.000	0.000
T9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T10	0.000	0.000	0.000	0.025	0.000	0.000	0.048	0.018	0.000	0.184	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.020	0.035	0.000	0.016
T11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.000	0.000
T13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T14	0.000	0.000	0.000	0.014	0.000	0.000	0.032	0.000	0.000	0.022	0.000	0.000	0.000	0.145	0.000	0.000	0.029	0.000	0.000	0.007	0.000	0.000	0.042
T15	0.000	0.000	0.000	0.016	0.028	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.078	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000
T16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T17	0.000	0.000	0.000	0.029	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.132	0.000	0.000	0.007	0.000	0.000	0.020
T18	0.000	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.094	0.000	0.008	0.028	0.000	0.000
T19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T20	0.062	0.015	0.000	0.059	0.020	0.000	0.014	0.048	0.000	0.020	0.000	0.000	0.000	0.007	0.007	0.000	0.007	0.008	0.000	0.299	0.013	0.000	0.019
T21	0.018	0.025	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.063	0.000	0.000	0.000	0.000	0.000	0.028	0.000	0.013	0.194	0.000	0.000
T22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T23	0.034	0.000	0.000	0.012	0.000	0.000	0.021	0.000	0.000	0.016	0.000	0.000	0.000	0.042	0.000	0.000	0.020	0.000	0.000	0.019	0.000	0.000	0.164

<Appendix A.2> Inter-Attribute Similarity (IAS) Matrix of *Financial Companies*

Topic no.	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23
T1	0.180	0.024	0.000	0.000	0.000	0.030	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.019	0.000	0.047	0.028	
T2	0.024	0.258	0.035	0.013	0.013	0.011	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.010	0.000	0.066	0.000	0.030	0.019	0.017	0.000	
T3	0.000	0.035	0.171	0.000	0.019	0.000	0.000	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.014	0.000	0.011	0.000	0.009	0.050	0.011	0.000	
T4	0.000	0.013	0.000	0.153	0.023	0.033	0.000	0.000	0.016	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.010	0.000	0.037	0.000	
T5	0.000	0.013	0.019	0.023	0.149	0.017	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.033	0.000	0.025	0.000	0.010	0.000	0.000	0.000	
T6	0.030	0.011	0.000	0.033	0.017	0.212	0.000	0.000	0.013	0.022	0.000	0.000	0.000	0.000	0.013	0.000	0.017	0.010	0.000	0.017	0.000	0.010	0.021
T7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T9	0.000	0.000	0.000	0.016	0.000	0.013	0.000	0.000	0.208	0.052	0.000	0.052	0.000	0.000	0.013	0.000	0.017	0.000	0.000	0.034	0.011	0.000	0.000
T10	0.008	0.019	0.023	0.008	0.008	0.022	0.000	0.000	0.052	0.317	0.000	0.008	0.009	0.000	0.022	0.000	0.008	0.019	0.000	0.034	0.041	0.025	0.009
T11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.008	0.000	0.151	0.036	0.000	0.016	0.000	0.000	0.000	0.000	0.010	0.029	0.000	0.000
T13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.036	0.030	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T15	0.000	0.010	0.014	0.000	0.033	0.013	0.000	0.000	0.013	0.022	0.000	0.016	0.021	0.000	0.192	0.000	0.034	0.000	0.000	0.017	0.000	0.000	0.000
T16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T17	0.000	0.000	0.000	0.000	0.025	0.017	0.000	0.000	0.017	0.008	0.000	0.000	0.000	0.000	0.034	0.000	0.111	0.000	0.000	0.010	0.000	0.000	0.000
T18	0.024	0.066	0.011	0.013	0.000	0.010	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.038	0.019	0.017	0.000
T19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T20	0.019	0.030	0.009	0.010	0.010	0.017	0.000	0.000	0.034	0.034	0.000	0.010	0.000	0.000	0.017	0.000	0.010	0.038	0.000	0.253	0.000	0.014	0.000
T21	0.000	0.019	0.050	0.000	0.000	0.000	0.000	0.000	0.011	0.041	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.187	0.018	0.000
T22	0.047	0.017	0.011	0.037	0.000	0.010	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.014	0.018	0.197	0.000
T23	0.028	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.058

<Appendix A.3> Inter-Attribute Similarity (IAS) Matrix of *IT Firms*

Topic no.	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23
T1	0.092	0.000	0.000	0.014	0.015	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.015
T2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T4	0.014	0.000	0.000	0.189	0.052	0.000	0.016	0.000	0.000	0.000	0.011	0.000	0.000	0.012	0.012	0.000	0.000	0.014	0.028	0.019	0.000	0.000	0.011
T5	0.015	0.000	0.000	0.052	0.288	0.008	0.021	0.000	0.000	0.007	0.007	0.000	0.011	0.045	0.014	0.006	0.020	0.009	0.023	0.037	0.000	0.000	0.013
T6	0.000	0.000	0.000	0.000	0.008	0.100	0.011	0.000	0.000	0.020	0.000	0.000	0.012	0.008	0.000	0.018	0.019	0.000	0.000	0.005	0.000	0.000	0.000
T7	0.021	0.000	0.000	0.016	0.021	0.011	0.257	0.000	0.000	0.018	0.017	0.011	0.014	0.016	0.000	0.026	0.027	0.000	0.000	0.017	0.000	0.000	0.043
T8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T10	0.000	0.000	0.000	0.000	0.007	0.020	0.018	0.000	0.000	0.186	0.027	0.038	0.010	0.007	0.000	0.013	0.014	0.000	0.000	0.010	0.022	0.000	0.000
T11	0.000	0.000	0.000	0.011	0.007	0.000	0.017	0.000	0.000	0.027	0.179	0.035	0.010	0.006	0.014	0.013	0.000	0.000	0.000	0.020	0.020	0.000	0.000
T12	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.038	0.035	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.033	0.000	0.000
T13	0.000	0.000	0.000	0.000	0.011	0.012	0.014	0.000	0.000	0.010	0.010	0.000	0.214	0.040	0.021	0.019	0.010	0.012	0.024	0.022	0.000	0.000	0.009
T14	0.000	0.000	0.000	0.012	0.045	0.008	0.016	0.000	0.000	0.007	0.006	0.000	0.040	0.244	0.013	0.013	0.007	0.007	0.029	0.029	0.000	0.000	0.013
T15	0.000	0.000	0.000	0.012	0.014	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.021	0.013	0.112	0.000	0.000	0.000	0.011	0.015	0.000	0.000	0.013
T16	0.000	0.000	0.000	0.000	0.006	0.018	0.026	0.000	0.000	0.013	0.013	0.000	0.019	0.013	0.000	0.136	0.013	0.000	0.000	0.015	0.000	0.000	0.000
T17	0.000	0.000	0.000	0.000	0.020	0.019	0.027	0.000	0.000	0.014	0.000	0.000	0.010	0.007	0.000	0.013	0.127	0.000	0.000	0.005	0.000	0.000	0.012
T18	0.000	0.000	0.000	0.014	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.007	0.000	0.000	0.000	0.107	0.024	0.011	0.030	0.000	0.000
T19	0.000	0.000	0.000	0.028	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.029	0.011	0.000	0.000	0.024	0.162	0.013	0.000	0.000	0.009
T20	0.027	0.000	0.000	0.019	0.037	0.005	0.017	0.000	0.000	0.010	0.020	0.005	0.022	0.029	0.015	0.015	0.005	0.011	0.013	0.248	0.000	0.000	0.000
T21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.020	0.033	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.000	0.105	0.000	0.000
T22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T23	0.015	0.000	0.000	0.011	0.013	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.009	0.013	0.013	0.000	0.012	0.000	0.009	0.000	0.000	0.000	0.137

<Appendix B.1> Algorithm for Calculating Core-Periphery Model and Jaccard's Similarity Coefficient

Measure	Equation
Core-periphery model (Borgatti and Everett, 2000)	<p>Define ρ how well it fits in the ideal model</p> $\rho = \sum_{i,j} a_{ij} \delta_{ij}$ <p>Discrete model</p> $\delta_{ij} = \begin{cases} 1 & \text{if } c_i = CORE \text{ or } c_j = CORE \\ 0 & \text{otherwise} \end{cases}$ <p>Continuous model</p> $\delta_{ij} = c_i c_j$ <p>Where a_{ij} represents the presence or absence of a tie, c_i represents the category of core or periphery that actor i is assigned to, δ_{ij} represents the presence or absence of a tie in the ideal model.</p>
Jaccard's similarity coefficient (Hammond, 1993)	$J = \frac{c}{\{c + (a - c) + (b - c)\}}$ <p>Where c represents the number of co-occurrence of pairs, a represents the total number of frequencies for component A, b represents the total number of frequencies for component B.</p>

<Appendix B.2> News Articles Sources for Social Representations of the Fintech Phenomenon

Sources	Number of news articles	Number of descriptions extracted from all articles
The Hankyoreh	8	26
The Kyunghyang Shinmun	12	33
The Chosun Ilbo	11	36
JoongAng Ilbo	8	33
The Dong-A Ilbo	21	62
The Segye Times	34	125
Hankook-Ilbo	6	18
The Kukmin Daily	4	19
The Munhwa Ilbo	1	2
The Seoul Shinmun	5	17
Total	110	371

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Submitted: September 14, 2018; 1st Revision: February 7, 2019; Accepted: March 1, 2019