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Impact of payment technology innovations on the traditional financial industry: A focus on China

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ABSTRACT

With the rapid advent of e-commerce in China, the technological innovation of third-party payment has experienced explosive growth. This important technological innovation, initiated by emerging Internet companies, is helping the traditional financial industry's payment business—represented by commercial banks—expand in both depth and breadth. Meanwhile, there is also a large degree of substitution, competition and crowding out among these banks in terms of the traditional financial industry's basic payment and settlement functions, potential customers, deposit and loan services and traditional intermediary business. This paper explores the impact (episodic and long-term steady-state) of the technological innovation of payment on commercial banks. It also considers the impact of technological innovation on industrial evolution to clarify whether technological innovation offsets the advantages of traditional industries or promotes industrial development. This study adopts the Vector Auto-Regression (VAR) impulse response model to analyze the impact of Internet Third-Party Payment (TPP) on the traditional financial industry from 2007 to 2014. The empirical results suggest that in China, third-party payments have had a significant positive correlation with the value creation capabilities of traditional financial industries, and that this relationship tends to remain in a steady state in the long term. Based on these findings, this paper confirms that the technological innovation of methods of payment in emerging economies, such as China, has promoted the development of the financial industry and accelerated the process of industrial evolution. We conclude the paper with feasible policy suggestions.

1. Introduction

New information technologies, especially the Internet, have changed modern commercial activities (Gu et al., 2016; Zhao et al., 2016). In recent two decades, e-commerce market grows rapidly with the growth of the Internet across the world (Wang et al., 2008). E-commerce has advantages, such as around-the-clock availability, speed of access, a wider selection of goods and services, accessibility, and international reach (Xiang and Jing, 2014). Recently, the Internet of Things (IoT) and cloud computing have been widely applied in supply chain, logistics, and transportation (Bi et al., 2014; Cai et al., 2014; Gorkhali and Xu, 2016; Fang et al., 2014; Jiang et al., 2014; Kim, 2017; Li et al., 2013; Liu et al., 2016, 2017; Whitmore et al., 2015; Xie et al., 2017; Xu, 2011; B. Xu et al., 2014; L. Xu et al., 2014; Yang et al., 2018; Yin et al., 2016). These technologies further boost the development of e-commerce. Particularly, mobile Internet makes it possible for consumers to do purchase at anytime from anywhere (Linck et al., 2006). However, the traditional payment methods are not fit for e-commerce.

For example, buyers worry that product quality may not turn out as expected, whereas sellers worry that they may not receive payment after mailing out products. Credit risks between buyers and sellers, identity theft, fraudulent cards, and Internet fraud are the main obstacles to e-commerce (Cheng et al., 2017).

Known as non-financial institution payment services, Internet third-party payment (TPP) refers to payment services provided on a neutral payment platform by non-financial institutions; these services are connected to the bank payment and settlement systems of e-commerce companies and commercial banks. This platform enables online payment and settlement functions, including online transfers and bankcard receipts, etc. (People's Bank of China, 2010). TPP arose as a way to resolve problems of trust and financial transaction security between buyers and sellers (Cheng et al., 2017). It is able to effectively promote the convenience and applicability of traditional cash payments, money transfers, and bank card payments by utilizing innovative payment technology supported by the internet. First introduced in the U.S. in 1998, PayPal is a pioneer company committed to providing online

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payment services. Its third-party payment platform guarantees the transaction security of both buyers and sellers in e-commerce environments (Micu and Micu, 2016). In China, credit risk is a major obstacle in the development of e-commerce market (Yan and Chang, 2007). Accordingly, Alipay (also known by its Chinese name ZhiFuBao) was the first online payment intermediary introduced to China and is now China's most commonly used third-party online payment system. Tencent, a leading social networking service provider, has developed WeChat payment. Because of the lack of financial infrastructure for credit and debit cards in China, TPP becomes the main payment method among Chinese consumers (Cheng et al., 2017). The operating pattern, trading volume, and business scope of TPP have changed dramatically during the past decade. According to iResearch (2017), the Gross Merchandise Volume (GMV) of the TPP market amounted to RMB2.3 trillion (US\$0.35 trillion) in 2011 and reached RMB24.1 trillion (US \$3.65 trillion) in 2015. The rapid development of information technology and the Internet has changed the payment model of Chinese consumers. Also, the factors that influence payment technology innovation and the mechanisms by which technological innovation drives the evolution of the financial industry are becoming increasingly complex. Therefore, it is necessary to research the mechanism that exists between technological innovation and the evolution of the traditional financial industry from a new perspective.

This paper examines the following problems through theoretical analysis and empirical research: a) Is the influence of TPP technological innovation on the traditional financial industry positive or negative? b) What is the influence mechanism and its equilibrium state? c) What is the impact of TPP on the processes of industrial evolution, industry synergy and industry differentiation? This paper provides a reference for decision-making about payment technology innovation, industrial development and associated research in emerging economies.

2. Theoretical framework

Technological innovation is the fundamental driving force of industrial evolution. Schumpeter (1912) built the theory of innovation based on the combination of technology and economics. He proposed the concept of innovation to argue that technological change leads to unbalanced economic growth and unstable social development. He believed that innovation is the driving force behind economic development and promotes industrial change and economic structural changes. He borrowed biological terminology to refer to the process of constantly reforming the economic structure from the inside; that is, constantly destroying the old structure and creating a new one by means of industrial mutations. Later scholars expanded Schumpeter's theory of innovation to discuss the relationship between technological innovation and industrial evolution. In recent years, with the development of evolutionary economics, some scholars have begun to explore the process and mechanism of technological innovation that promotes industrial evolution from a dynamic perspective. Among them, the most representative research results are Abernathy and Utterback's (1978) industrial innovation dynamic process model—the A-U model. This model suggested that an enterprise's product innovation and technological innovation are correlated. The type and frequency of innovation depend on the industry's growth stage. In the early stages of industrial development, enterprises focus on product innovation. With the emergence of leading design, industries step into the transition phase, in which the focus of innovation turns to technology innovation. When an industry develops into a stable stage, the enterprise's innovation activities are concentrated on incremental product innovation and technology innovation. The A-U model reflects the distribution pattern of innovation in the process of industry development and provides an important clue to understanding the relationship between technology innovation and industrial evolution.

2.1. Payment technology innovation and industry evolution from the perspective of supply

Technology innovation from the supply side, especially financial technology innovation, comes from the spillover and development of technical knowledge (Kauffman et al., 2014). By generating new technologies or reorganizing existing technologies, enterprises can provide consumers with new applications in the financial industry (Tornatzky and Fleischer, 1990). Currie and Seltsikas (2001) argued that entrepreneurial efforts to create new technologies drive an organization's technological transformation and adoption. Technological innovation in the financial market has affected the value proposition provided by the enterprise to the customer. It is critical to understand the sources of technological innovation and take advantage of investment and market opportunities. Technological innovation benefits innovators and adopters and also benefits the overall market (Frame and White, 2004). The convenience brought about by technological innovation supports financial innovation from the demand side (Lerner and Tufano, 2011; Lyytinen and Rose, 2003). Is the supply perspective applicable to payment technology innovation? Why is the developing speed and popularity of third-party payment in China more significant than that of developed countries with a richer technology supply, such as the United States? It can be seen that the innovation of payment technology is more likely in developing economies like China because China's credit system is relatively weak, and consumers are more in need of third party agencies as a credit guarantee for payment. Payment technology innovation in emerging economies is likely to be driven by demand.

2.2. Payment technology innovation and industry evolution from the perspective of demand

In recent years, some scholars have realized the importance of demand for technology innovation and analyzed the relationship between technology innovation and industrial evolution from the aspects of demand space, demand heterogeneity, demand conditions and demand constraints. Adner and Levinthal (2001) expounded on the process of dynamic technological innovation from the perspective of demand space and explained the relationship between technology development and the demand environment by using the concept of heterogeneous thresholds. A heterogeneous threshold is the minimum standard that must be met by the technology or product when adopting a technology or purchasing a product. By conducting theoretical research, Sun and Zheng (2010) argued that the conclusion of the relationship between technological innovation and industrial evolution based on heterogeneous market demand (Adner and Levinthal, 2001) is basically consistent with the A-U model. The choice of consumers often depends on the level and preferences of individual needs. The resulting differentials in demand will affect the speed of enterprises' technological innovation, and thus affect the process of industrial evolution. Saviotti (2001) argued that the differentiation in consumer's perception of the product is an important factor in industrial evolution. Consumers will not form preferences for new products in a short period of time—not even for new products with high applicability. Only when the conditions are ripe, will consumers accept new products. In the case of an identical demand scale, if competition within a product category is more intense than cross-product competition, new and old products can coexist in the market and products will tend to diversify. The reason for this is that even if the performance of the new product is better than that of the old product, the product with poor performance will not be substituted because of the cognitive differentiation of customers. However, when the difference between the new and old products is too great for one to replace the other, the two products can coexist in the market. It can be inferred that consumer perception differentiation and product differentiation will weaken competition, and the benefit of weakening market competition is the increasing degree of product diversification. It is conceivable that if new products completely replace old products,

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