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Big data's role in expanding access to financial services in China

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ABSTRACT

General consumer and business finance companies have had limited success in serving the needs of economically active low-income families and micro-enterprises cost-effectively and sustainably in emerging economies such as China. Recent advances in computing and telecommunications technology are dramatically transforming this landscape by changing the way the financial industry operates. A key mechanism underlying this transformation concerns the use of big data in assessing, evaluating and refining the creditworthiness of potential borrowers and reducing the transaction costs. While China's internet-only banking industry is currently small and some activities of players in this industry are akin to those in the shadow banking, this industry has potential to cause a major disruption in the Chinese financial market. A main objective of this paper is to examine the role of big data in facilitating the access to financial products for economically active low-income families and micro-enterprises in China. A second objective is to investigate how formal and informal institutions facilitate and constrain the use of big data in the Chinese financial industry and market. The paper also investigates how various inherent characteristics of big data – volume, velocity, variety, variability and complexity – are related to the assessment of the creditworthiness of low-income families and micro-enterprises. Case studies of big data deployment in the Chinese financial industry and market are discussed. The paper also looks at various categories of personal financial and non-financial information that are being used as proxy measures for a potential borrower's identity, ability to repay and willingness to repay. Various business models involving the sources of data (internal vs. external to the big data organization) and providers of credits (big data organization vs. external partners or clients of the big data organization) are investigated. The analysis of the paper indicates that the main reason why low-income families and micro-enterprises in China and other emerging economies lack access to financial services is not because they lack creditworthiness but merely because banks and financial institutions lack data, information and capabilities to access the creditworthiness of and effectively provide financial services to this financial disadvantaged group.

1. Introduction

Compared to industrialized countries, developing countries such as China exhibit lower penetration of financial services (Honohan & King, 2009). The problem is more acute and difficult for low-income families and micro-enterprises in emerging economies than for high-income families and large enterprises (Clarke, George, Cull, & Martinez Peria, 2001). General consumer and business finance companies and microcredit organizations have had limited success in serving the needs of these groups cost-effectively and sustainably.

The Chinese financial market deserves special attention. Lending in the country is disproportionately oriented toward powerful economic and political interests such as state-controlled companies (Kshetri, 2011). Small and midsize enterprises (SMEs) account for 70% of GDP but have access to only 20% of financial resources (Klein & Cukier, 2009). It was reported that 89% of SMEs in China face difficulty in satisfying banks' requirements in order to get loans (Jing, 2014). Small borrowers often tend to lack sufficient collateral, which is required by most traditional Chinese banks (Wildau, 2015).

Prior researchers have identified two main problems that contribute to the low penetration of financial services among low-income families and micro-enterprises in emerging economies such as China. First, traditional banks are unwilling and reluctant to serve the small-scale borrowers such as poor people and small businesses due to high transaction costs and inefficient processes associated with making small loans to these borrowers (Adams &

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Nehman, 1979; Rogaly, 1996). The second reason why poor people and small businesses face barriers to access financial products concerns informational opacity (Stiglitz & Weiss, 1981). Part of the problem also lies in the fact that most developing economies are characterized by the lack, or poor performance of credit rating agencies to provide information about the creditworthiness of SMEs. A national credit bureau would collect and distribute reliable credit information and hence increase transparency and minimize banks' lending risks. This situation puts SMEs in a disadvantaged position in the credit market. This is because SMEs tend to be more informationally opaque than large corporations because the former often lack certified audited financial statements and thus it is difficult for banks to assess or monitor the financial conditions (Kshetri, 2014).

Prior researchers have found that different lending behaviors of different groups of banks in terms of the propensity to lend to poor people and small businesses can be explained in terms of the access to information. For instance, Beck, Thorsten, Demirguc-Kunt, and Maksimovic (2004) found that domestic banks had higher degree of willingness to lend to "opaque" borrowers due to the fact that they have more information about such borrowers and better enforcement mechanisms than foreign banks.

How accessibility and affordability of finance can be improved is a pressing policy and theoretical issue that adjoins larger concerns related to poverty alleviation. Recent advances in computing and telecommunications technology are dramatically transforming the financial landscape from the perspective of economically active low-income families and micro-enterprises by changing the way the financial industry operates. Experts say that this problem can be largely eliminated by creating better risk models using increased computing power and new sources of data and information (Baer, Tobias, Goland, & Schiff, 2013). A key mechanism underlying this transformation concerns the use of big data (hereinafter: BD) in assessing, evaluating and refining the creditworthiness of potential borrowers and reducing transaction costs. Some possible data sources include social media and mobile-phone usage patterns and utility-bill payment history (Baer et al., 2013).

There have been some signs of success on this front. BD is evolving as a transforming force that is likely to shape the Chinese banking sector. Chinese internet companies have launched a broad range of financial products and services. The business models of these companies are centered around the utilization of BD. In February 2015, China's largest online consumer lending marketplace, China Rapid Finance announced that it extended pre-approved loan offers of 500 RMB (about US $80) to 50 million consumers, which included pre-screened users of QQ, the online messaging software developed by Tencent. The offers were made based on an analysis of social and financial information (online and offline) in order to predict default rates, limit fraud and estimate borrowers' responses to the offer (businesswire.com, 2015). China Rapid Finance has estimated that 500 million Chinese consumers are potentially suitable borrowers. The company's goal is to reach them using a mobile-based platform to automatically score creditworthiness based on data from diverse sources (Shu, 2015).

China's traditional banks have also recognized that high quality data about customers is a key to succeed in the financial market. These banks are thus taking measures to transform themselves into BD companies. For instance, as of the early 2012, the Chinese financial industry was estimated to have more than 100 terabytes (TB) of structured and unstructured data (IDC, 2012). As of March 2014, Industrial and Commercial Bank of China (ICBC), the country's largest lender, was reported to have over 4.9 petabytes (PB) of data. Likewise, the Agricultural Bank of China (ABC) was estimated to generate 100 TB of structured data and 1 PB of unstructured data in 2014 (ABC, 2014). Similarly, in 2014, the Bank of Communications (BOCOM) reportedly handled about 600 gigabytes (GB) of data daily and had a storage capacity of more than 70 TB (BOCOM, 2014).

In light of the above observations, a main objective of the present paper is to examine the role of BD in facilitating the access to financial products for economically active low-income families and micro-enterprises in China. A second objective is to investigate how formal and informal institutions facilitate and constrain the use of BD in expanding the access of financial services in China.

The paper is structured as follows. We proceed by first discussing the method employed in this study. Next, we provide a review of the relevant literature. Then, we discuss BD's role in increasing access to finance of low-income families and micro-enterprises in China. The section following this provides discussion of the cases. Next, institutional factors affecting BD deployment in the Chinese financial industry and market are discussed. The final section provides implications and concluding comments.

2. Method

The approach of this study can be described as theory building from multiple case studies, which is becoming increasingly popular in social science (Eisenhardt & Graebner, 2007). A potentially valuable research design to test the conceptual framework via multiple case studies would be to sample organizations that have been identified as engaging in increasing access to financial services for low-income families and micro-enterprises in emerging economies. In a multiple case study design, the choice of cases needs to be made on a substantive rather than statistical basis in order to adequately represent a target population (Greene & David, 1984). The cases selected in this study thus include diverse types of BD firms.

2.1. Data sources

This study mainly relies on archival data which is among a variety of recognized data sources for case studies (Eisenhardt & Graebner, 2007). As suggested by prior researchers (Golder, 2000; Mason, McKenney, & Copeland, 1997), we also analyzed the sources of evidence as well as the evidence by using the criteria developed by Gottschalk's (1969) such as time elapsed between events and reporting, openness to corrections, range of knowledge and expertise of the person reporting the events, and corroboration from multiple sources.

The paper has articulated the underlying theoretical arguments that provide the logical link between the constructs. As suggested by prior researchers (Eisenhardt & Graebner, 2007; Whetten, 1989), the arguments are based on the cases or from other detached logical reasoning and knowledge (e.g., cases that are not explicitly discussed in the next section).

3. Literature review

We structure the literature review around three key aspects of this study: (a) barriers to the access to financial services faced by low-income families and micro-enterprises in emerging economies; (b) the transaction cost economics approach; and (c) informational opacity, moral hazard and adverse selection problems.

3.1. Barriers and challenges related to accessing financial services faced by consumers and entrepreneurial firms

As noted earlier, conventional financial institutions and microcredit organizations have had a limited success in serving the needs of economically active low-income families and micro-enterprises.