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THE CENTRE FOR RESEARCH ON FINANCIAL MARKETS AND POLICY®

Financial Technology and Bank Risk-taking: Cooperation or Competition?

Executive Summary

In recent years, the financial technology (often contracted to 'FinTech') sector has grown in leaps and bounds. Commenting on the FinTech revolution in Africa, one industry leader says that the continent is not merely experiencing a "FinTech disruption" but rather a "FinTech eruption". Notably, the 'FinTech eruption' in Kenya has been phenomenal. Kenya can easily be considered as the regional hub of FinTech innovation and a torchbearer in mobile money. The rapid development of FinTech tags along opportunities as well as threats to the financial industry and by extension to the economy. It is for this reason that policy makers and academicians are keen to understand the implications of the FinTech revolution. This brief focuses on the effect of FinTech development on bank risk-taking behavior. This is an important issue owing to the critical role banks play in the economy. Prior empirical studies on the link between FinTech and bank risk-taking behavior has yielded mixed results. This is not surprising given the evolving nature of FinTech. A careful study of the Kenyan banks over the period 2008–2021 reveals that at the early stages of FinTech development, Fintech reduces bank risk-taking as traditional banks leverage on the emerging technologies to lower cost and hence need not take excessive risks to maintain their profits (cooperation view). However, in later stages, as key technologies mature and FinTech start-ups begin to compete with traditional banks in the intermediation business, Fintech exacerbates the risk-taking behavior of traditional banks (competition view). From a policy standpoint, these results encourage banks to embrace FinTech to improve their services, lower costs, and enhance financial inclusion. However, the policy authorities charged with promoting financial stability need to accelerate the development of a robust regulatory system that will deal with the risks brought by the stepped-up competition of FinTech start-ups without compromising the symbiotic development of FinTech and traditional commercial banks.

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1. Context and Importance

Financial technology is the combination of innovation, information technology, and finance. To demonstrate this three-fold union, we can consider the now famous Uber taxi service that is now available in many countries across the globe. Uber provides non-traditional (i.e., innovative idea) transportation services, by using technology (i.e., a mobile application) to improve ordering (a finance function) taxi services. FinTech, though a hot topic in recent years, is not indeed a new phenomenon. Some economic historians [1] aptly observe that Fintech development can be split into three waves. The first wave spanning the period 1866–1967 (also dubbed FinTech 1.0) involved building the fundamental communication infrastructure that would support financial globalization. During this period, the communication technology (such as the successful laying of the transatlantic cable in 1866) allowed financial interlinkages across borders and the eventual introduction of the electronic fund transfer system. The second wave covering approximately the period 1967–2008 (also dubbed Fintech 2.0) was characterized by the largely analogue FinTech 1.0 to the digitalization of finance industry. Notable developments during this era include introduction of Automated Teller Machines (1987), Society for World Interbank Financial Telecommunication (1973), the rise of mainframe computers (1980s) among others. One can easily identify this era as the online revolution era- which led people to shift their perception towards financial institutions.

The third wave, Fintech 3.0, covers the post 2008 Global Financial Crisis (GFC) to date. The lack of trust in traditional intermediation financial institutions after the crisis opened the market for new providers. FinTech 3.0 is therefore characterized as an era of start-up with even some banks branding themselves like start-ups. Fintech 3.0 has also been characterized by data technologies such as big data, cloud computing and block chain.

The Fintech revolution poses notable challenges to regulators and market participants as they attempt to balance the potential benefits of the innovation with the potential threats to the financial system. The challenge of this balancing act is substantial in developing countries, particularly in Kenya where the FinTech revolution has been phenomenal. Kenya's FinTech sector has witnessed a tremendous growth since the introduction of mobile money (commonly known in Kenya as 'MPESA') in 2007. Indeed, Kenya is now considered as the regional hub of FinTech innovation and a world leader in mobile payments.

The emergence and rapid growth of financial technology will no doubt upset the existing financial intermediation system. Already there are signs that FinTech is accelerating financial disintermediation. Whether this will lead to stable financial system or not remains an area of active research. For instance, there is a growing interest to understand whether the rapid growth of FinTech does influence the risk-taking behavior of commercial banks. The banking literature hypothesize that FinTech is responsible for bank risk-taking through two perspectives, namely, *competition* and *cooperation*.

In the *competition perspective*, the FinTech sector is considered as a competitor to the traditional commercial bank to the extent that it provides intermediation services [4]. The competition can occur along several fronts. First, continuous FinTech development leads to competition on both the asset and liability side of the commercial bank's balance sheet. On the liability side, emergence of FinTech firms stir up competition for deposits (demand) raising the deposit rate. On the asset side, the competition for loanable funds (supply) lowers the lending rate. The result of this is the narrowing of interest margins and lower profits for commercial banks. In a bid to maintain their profits, banks may resort to taking excessive risks. Second, FinTech start-ups have further squeezed the third-party payment business (such as utility payments) that were traditionally undertaken by commercial banks. In a nutshell, the competition hypothesis predicts that the emergence of FinTech spells doom for the traditional commercial banks.

Under the *cooperation perspective*, the relationship between financial technology and commercial banks is complimentary rather than competitive. The leading argument under this perspective is that commercial banks benefit from technology that spills over from the financial technology industry. For example, some researchers observe that banks learn technical means such as big data and artificial intelligence that can increase the range of products that banks can provide to their customers as well as increase their operational efficiency. In sum, the cooperation channel opines that, the technology spillovers from FinTech allows banks to lower their operation costs, create more products and even reduce the non-performing loans thereby realizing higher returns. With higher profits, commercial banks may need not take excessive risks to maintain their pre-FinTech positions.

Although, there is a growing number of empirical studies on the effect of FinTech innovation on bank risk preferences, it appears highly skewed towards the Chinese economy ([5],[3],[6],[2],[7]). This is, however, not surprising given the tremendous progress of the FinTech sector in China. Interestingly, the literature from China provides mixed results. That is, whereas some studies support the cooperation hypothesis a bunch of other studies support the competition perspective. Arguably, the controversial conclusions are characteristic of a new and dynamic phenomenon such as FinTech. This brief contributes to the ongoing debate by focusing on a context that has not been investigated sufficiently. Kenya is considered as the regional hub of FinTech innovation and a world leader in mobile money. Thus, it provides a fertile ground for investigating the effects of FinTech development. Particularly, this brief address itself to the following important questions:

- Does rapid development of the FinTech sector reduce or increase risk-taking of commercial banks in Kenya?
- Are there heterogeneities in the response of different banks to the risk impact of FinTech?

The answers to these questions have practical value to financial regulation. They provide insights on how commercial banks and FinTech sector can be integrated to ensure that the financial system is deepened without sacrificing financial stability.

2. Data and Methods

The study underlying this policy brief employs annual bank data for the period 2008 to 2021. Appropriate dynamic panel methods are employed to investigate the impact of financial technology (FinTech) on bank risk-taking. Bank risk-taking behaviour is ideally unobservable; however, prior research suggests several proxies that can be used for this purpose. One such popular proxy is the Z-score ratio. Z-score relates a bank's capital level to the variability of its returns. Intuitively, Z-score is an indicator of the likelihood that a bank's equity capital might be wiped out through losses. Thus, Z-score reveals the overall stability of banks. A large Z-score value signals a stable bank. If a bank takes excessive risks, this will result in volatile returns and hence low values of Z-score. In summary, a bank with enhanced stability is assumed to have low risk preferences. To check the robustness of the results, the study employs several other risk-taking proxies.

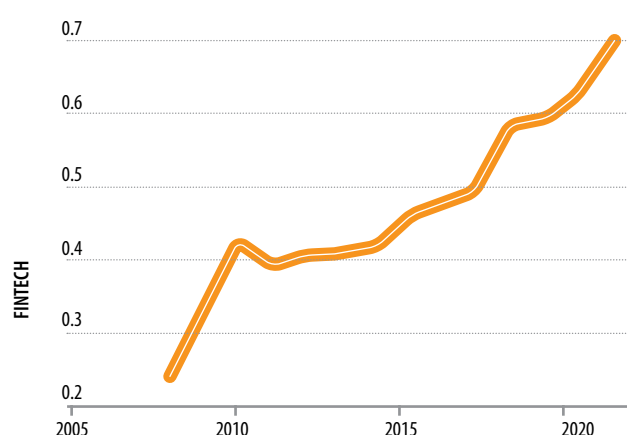
On the measurement of FinTech development, the study underlying this brief, employs an interesting approach called text mining analytics. Text mining is a recent analytical tool that aims to extract and analyze a set of large unstructured and heterogeneous texts using some form of data mining techniques. Some commonly adopted text mining approaches include word frequency statistics, text clustering, text classification etc. The study underlying this brief employed word frequency statistics approach. The approach proceeds in three key steps text segmentation, text extraction, and text dimension reduction.

In the first step, the study identifies some keywords related to finance and technology (that directly support the finance functions). In the second step, one crawls through written media news to search and collect those keywords. The third step consists in computing the frequency of the occurrence of those key words and then aggregating them into an index. The premise underlying this approach is that the frequency of news items is closely related to certain socioeconomic phenomena. In this context, the amount of Fintech news is positively correlated with FinTech development. Thus, the more frequent the keywords occur, the better FinTech development is inferred¹.

¹ The text mining approach is a relatively novel technology that can be widely applied in the banking industry. Banks have historically collected huge volumes of data both from customers and internal operations. A significant portion of these documents is textual information often gathered as part of compliance. Analyzing these documents in a meaningful way could be difficult using traditional approaches. Fortunately, text mining provides tools to summarize and analyze both semi-structured as well as unstructured text data. Banks can use text mining tools to analyze both enterprise data and customer data. For example, banks can use text mining algorithms to search for finance-related or fraud related specific information from their internal legal documents. Additionally, banks can use the text analytics tools to analyze incoming customer feedback from surveys, feedback forms, and social media to identify customer sentiments on bank products.

Overall, financial technology in Kenya has progressed rapidly over the period 2008–2021 (Figure 1). Notably, there was a sharp uptake of FinTech between 2008–2009. This early upshot can plausibly be associated with the introduction of mobile money technology (now popularly known as MPESA). However, there appears to have been a decline in FinTech activity during the period 2010–2014. The reduced FinTech activity could be due to the regulations that were rolled out during this period (such as the credit information sharing and the anti-money laundering act). The period 2015–2021 has again witnessed accelerated FinTech development particularly during the Covid-19 era.

Figure 1: FinTech development in Kenya (2008–2021)



3. Results

A careful analysis of the Kenyan commercial banks' data show that financial technology has had a significant influence on bank risk preferences. Importantly, FinTech development bears a U-shaped relationship with bank risk-taking. That is, FinTech reduces risk-taking at the early stages of its development, however, in later stages, FinTech is found to effectively increase bank risk-taking. This finding is consistent with the hypothesis that, in the early stages, FinTech development increases operational efficiency thereby weakening the incentive for banks to take excessive risks so as to remain profitable. Thus, in the early stages, financial technology complements the traditional banking institutions. However, at some later stage, FinTech companies start to compete with traditional commercial

banks and this prompts banks to venture into risky projects in a bid to maintain their profits. The study results further indicate that, the effect of FinTech on bank risk-taking varies across bank size. Particularly, large banks appear to be more sensitive to FinTech development compared to small and medium banks.

4. Policy implications

The results of the study indicate that as FinTech and related emerging technologies mature and as technology gets entrenched into financial industry there is a gradual blurring of the financial boundary. The FinTech revolution seems to carry along opportunities as well as challenges to commercial banks in Kenya. Consequently, this study recommends that, commercial banks should promote the use of FinTech to improve their services, lower costs and increase financial inclusion. However, the policy authorities need to accelerate the development of a robust regulatory system that will strengthen risk management but also encourage a symbiotic development of FinTech and traditional commercial banks.

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