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The effects of FinTechs on bank market power and risk taking behaviour in Kenya

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The Effects of FinTechs on Bank Market Power and Risk Taking Behaviour in Kenya

David Ndwiga

May 2020

KBA Centre for Research on Financial Markets and Policy®
Working Paper Series

44

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The Effects of FinTechs on Bank Market Power and Risk Taking Behaviour in Kenya.

David Ndwiga

May 2020

Abstract

The study seeks to investigate the nexus between market power and stability of the banking industry in pre FinTech period (2003 - 2009) and post FinTech entrance period (2010 – 2017). Specifically, the study seeks to investigate the effect of FinTech entrance on market power and later analyze the effect of market power changes on banking industry's risk appetite. Market power was measured by Lerner index while risk appetite was measured by net interest margin and credit risk. The estimation results from PVAR model finds that bank risk-taking behaviour is positively - related to increase in the market power following the FinTechs' entry.

Disclaimer: *The views expressed in this study are solely those of the author.*

1.0 Introduction

1.1 Background of Study

The "economics of FinTech and banks" has in the recent past been a topical issue of research and discussion. The main inquiry around this subject has been whether FinTechs and incumbent financial service providers are complimentary or supplementary to each other.

From the literature, the entrance of FinTech in the financial sector has been viewed to enhance competition in financial markets, provide services that traditional financial institutions do less efficiently or do not do at all, and widen the pool of users of such services. All these has had an influence on the enhances efficiency in the credit allocation dynamics (Liberti & Petersen, 2017and Boot & Thakor, 2000). This is the supportive role of the FinTech.

However, other proponents assert that competition arising from FinTech companies Many FinTech firms are entering in specific segments of the multi-product financial industry with a business model that, to some extent, is the opposite of universal banking. They operate in single and almost unregulated segments of the industry, and try to stay at latitude from the cost and burdens of banking regulation and compliance. As such customers will incline to FinTech with few or no layers of intermediation due to flexibility associated with the FinTech in offering basic utilities thus adversely affecting banks market power (Ariss, 2010b). This is the competing angle of FinTechs in so far as the operations of the incumbent financial services providers are concerned.

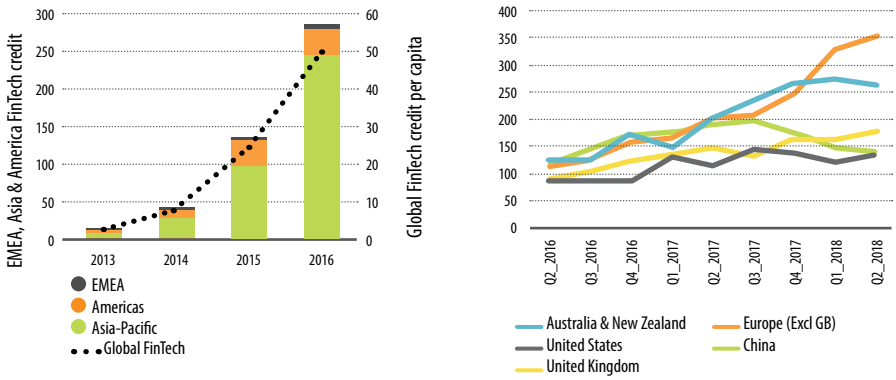
Taking into consideration the two strands in literature with regard to the relationship between FinTech and other financial services providers, it is worth of cognition that the entrance of the FinTech companies in

the financial services space is likely to be disruptive. This arises from the technology introduced in the market by these market players. The spillover effect would then be alteration of the exiting financial service providers. Such alterations would be in form of a change in the market concentration of the already existing market players. This would in turn have long run effects with regard to posing benefits as well as risk to the financial sector stability.

A global review of the role of FinTechs entrance in the financial market reveal that the levels of credit advanced by the FinTechs has marked a rapid expansion in many countries in the recent past. However, it is notable that though a rapid expansion has been evident, the base remains relatively low. According to Cambridge Centre for Alternative Finance (CCAF) estimates, $284 billion was extended via FinTechs in year 2016 marking a $11 billion rise from the year 2013 (CCAF, 2017). However, it is notable that such expansions have been uneven when analyzed on country-by-country or region - by - region basis (**Figure1**).

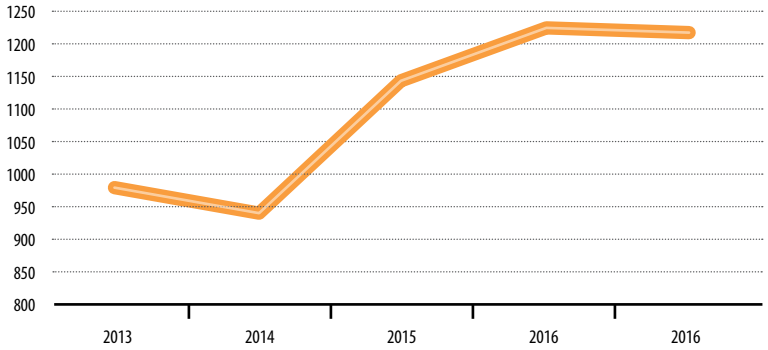
A review of the Sub Saharan financial landscape reveals that FinTech has of recently been an eminent major force that is shaping the financial sector structure in the region (IMF, 2019). This change has been viewed to be in terms of market competition, disruption of the traditional financial structures thus opening up the sector across the entire value chain thus enabling tapping of spill over effects beyond the financial sector to other sectors of the economy. With FinTech entrance, SSA has been ranked to be a global leader in mobile money transfer (Lukonga, 2018). However, just as it has been noted on the global review, the

Figure 1.0: Global Growth in FinTech Credit



Source : Cambridge Centre for Alternative Finance (CCFA)

Figure 2.0: Growth in Mobile Money Accounts in Kenya



Source: IMF Financial Access Survey (FAS)

growth has been uneven within the region with East Africa leading in mobile money adoption and usage. Through this, FinTechs in the regions have been seen to provide a panacea for improving efficiency, increased access to credit with the help of new technologies and lowering the cost of cross border funds transfers.

In the Kenyan context, digital credit has been posited to has emerged as one of the leading source of credit in Kenya and that it is mostly used to finance working capital and day-to-day consumption needs among the household's. As evidenced in **Figure 2**, the mobile money accounts have been on the steady rise since year 2014.

Kenyan banking sector has experienced dramatic reforms in terms of its structure, regulation and status for the period 2000-2018. Among these reforms include, regulations that allowed financial innovation, among other reforms. FinTechs entry has played a critical role in so far financial inclusion in concerned with mobile banking being the dominant of all. Currently has bee debates towards regulation of the FinTechs following the disruption they have caused into the financial sector at large.

As at year 2017, there we 40 commercial banks operating in Kenya (CBK, 2017). With regard to banks' market, share the weighted composite market share index stylized facts evident that the share has significantly changed over 2010 – 2017 period. Similarly, is the change in the number of commercial banks classified as large tier banks. The weighted composite market share index for large tier banks has increased from 56.10 percent in 2010 to 65.98 percent in 2017 with the number of bank in top tier rising from 6 to 8 in the same period. This manifest an element of oligopolistic market structure in the industry.

Table 1: Weighted Composite Market Share for Large Tier Banks for 2010 – 2017 Period

Year	Weighted Composite Market Share	Number of Commercial Banks
2010	56.10%	6
2011	54.60%	6
2012	53.70%	6
2013	52.40%	6
2014	49.90%	6
2015	58.21%	7
2016	65.32%	8
2017	65.98%	8

Source: Central Bank of Kenya- Bank Supervision Reports

Digital banking in Kenya mainly mobile money has grown significantly in the recent past. According CBK report (2016), telecommunication companies continued to partner with banks to offer micro-loan and micro-savings products such as the KCB M-Pesa (in partnership with KCB), and the Equitel (Equity Bank mobile banking product). These in turn have led to an increase in transactions conducted by bank agents. The CBK Bank Supervision Report (2016) also noted that there has been a decrease in physical bank branches expansion is partly attributed to the adoption of alternative delivery channels such as mobile banking, internet banking and agency banking. Further, the CBK Bank Supervision Report (2017) asserts that year 2017 saw a number of Kenyan banks engage CBK on financial technology use cases with following potential use cases being presented for approval: blockchain technology for payment solutions, Chatbots for customer service delivery, Video Teller Machines and Psychometric credit scores intended to be used by financial institutions to evaluate potential borrowers who do not have a credit history.

From the above exposure, it is evident that FinTech have revolutionized the financial market in a number of market dynamics by challenging incumbent traditional structures, fostering competition, access to financial services as well as efficiency gains. The end results of this revolution is the change in the incumbent's' financial service providers' market structure and financial market infrastructure at large. However, we ought to be cognisant of the fact that such revolutions come with ne vulnerabilities brought about by new technologies and new business models. For instance, the digit platforms created by the entrance of the FinTechs in the financial markets pose new types of risks. Such risks may not be handled by the existing regulatory frameworks thus calling for the need to review the regulations in line with the new market the development. This realization therefore calls for the need for careful consideration of FinTechs' potentials by critically balancing the trade-off between the potential benefits and vulnerabilities caused by FinTechs in the financial markets.

Further, there has been a concern on the digital loans advanced by commercial banks based on the platforms created by FinTechs and the financial sector

at large. In deed concerns on the regulations of the FinTechs and digital loans has been at the centre of discussion of late. This calls for a timely evaluation of how FinTech entrance has affected that appetite for risk taking by commercial banks via digital loans. It is of great need to note that the proliferation of the digital credit by commercial banks could also be informed by the enactment of the interest rates capping law which has forced the borrowers to turn into changing their borrowing behaviors by having preference in the digital loans that involved small amount and less tedious processes. In order to remain in business as well as avoid losing market foot print commercial banks have explored the utilization of FinTech platforms in advancing digital loans. This could have an effect on the banks risk appetite which in the long run could have an adverse effect on quality of banks assets as well as the stability of the industry. This is informed by the "contagion effect" which is mainly lethal in the financial sector whenever it occurs. This therefore underpins the motivation of this study by seeking to examine that nexus between market power and market stability of the banking industry in Kenya in pre and post FinTech entrance. The study tries to explore whether such relationship is complimentary or supplementary in nature thus informing policy.

1.2 Problem Statement

It is notable that whereas globally studies on the banking industry – FinTech nexus have allude to this relationship being complementary in nature. The complementarity arises from the fact that it allows FinTech to operate by riding on the incumbent financial services providers clients base with the incumbent financial services providers benefiting competitive edge brought about by access to innovative technologies from the FinTech, there exists some exceptions into the nature of this relationship. Such exceptions can be elicited from the fact that though some FinTechs have ventured into credit and payment system provisions, they have not been capable of fully unbundling profitable services by the incumbent financial services providers.

FinTech can positively affect the banking operations efficiency especially in some core functions such as payments settlements. In addition, improvement in the risk assessment, credit allocation and capital efficiency can be achieved via improvements in the credit screening through big data analysis aided by the FinTechs (Carney, 2016). Further, the benefits to the incumbent financial services providers in terms of the competitive edge arising from the FinTech entrance may be mutually exclusive. This could be from the fact that the incumbent financial services providers that are first in accessing and adopting the FinTech technology may have an upper hand in dominating market share at the expense of those that are reluctant in adoption.

However, the rapid growth of FinTech could also pose risks to consumer and investor protection, as well as to financial stability more broadly. Banks – FinTechs partnerships can exposes the bank and its clients as well as the entire financial sectors to liquidity and credit risks. Such development my lead into change in the market

structure of the financial services. The alteration in the market structure could be characterized by the number and the size of the market players, market barriers to market entry and exit, information and technology access amongst all market players. Further, this aspect poses some market risks by leading into creation of "too big to fail" entities in the market among the incumbent financial services providers.

Such development could have a long run effect on the financial market and system stability via the change in the risk taking behaviour. This therefore warrants the need for an examination into the firm level analysis of the nexus between FinTech entrance and risk taking behaviour through changes in the market power of the incumbent financial services providers (banking industry) in pre and post FinTech entrance. It is also noteworthy that the aspect of "too big to fail" also applies to FinTechs. In Kenyan scenario telecommunication, firms have taken an upper hand in so far as FinTechs is concerned with Safaricom being the dominant player. However, given the scanty data on the market power of various FinTechs in the country, this paper focused on the bank side analysis in which data was available.

1.3 Objectives of the Study

The specific objectives of the study were:

1. To determine the effect of FinTechs' entrance on the market power both for overall banking industry and for the individual bank in Kenya.
2. To examine the effect of FinTechs' entrance on the banks' risk-taking appetite through changes in market power in Kenya.

1.4 Research Questions

The study was guided by the following research questions:

1. To what extent has the FinTechs' entrance influenced the overall banking industry and the individual bank's market power in Kenya?

2. How has the FinTechs' entrance influenced the bank's risk appetite through changes in the banks' market power in Kenya?

1.5 Significance of the Study

The study finding will have two – fold significance. First of the contribution to the policy bodies such as Kenya Bankers Association, Central Bank of Kenya and the National Treasury. Knowledge on how FinTechs disruptions on banks' market power and risk taking in lending would inform formulation of sector led policies around financial sector stability, consumer protection and market competition policies to ensure that the banks and FinTechs involved in financial services provision coexist harmoniously for the advantage of all stakeholders. Secondly is the existing body of knowledge whereby the study's application of Lerner Index as a measure of the bank market power. Previous studies analyzing bank competition and

stability have adopted either the structural measure and the non-structural estimates. However, the most commonly used measure is the market share while non-structural competitive measures are the Lerner Index, H-statistics and the modified Boone Indicator. Comparison of the two reveals that the non-structural measures of competition are preferred to structural measure because they provide a more practical setting to measure bank competition and that they have a microeconomic foundation by linking pricing to marginal costs. Thus, application of Lerner Index in this study contributes towards enhancing practicability in measuring bank competition in the context of microeconomic foundation.

2.0 Theoretical Perspectives

2.1 Theoretical Literature

From theoretical point of view regarding the economics of FinTech and banking on one hand and the market power – risk appetite nexus on the other, two main theoretical pronouncements can be traced. First is the charter/franchise value paradigm.

According to Guttentag et al., (1983), the charter value of a bank is the bank's net income current value on new business assuming that its office, employees, and customers does not change. This value is determined by a financial institution authorized powers, the market structure in the area and the expertise of its employees. Charter value hypothesis is widely supported by scholars and was propounded by (Keeley, 1990). According to the hypothesis banks with increased market power limit their levels of risks and hence able to sustain their quasi - monopoly rent granted by government charters. A rise in competition (causing a reduction in their market power) would reduce the value of the charters motivating the banks to pursue more risky projects, which increases the NPLs and risks in general. Also known as, franchise value paradigm or competition-Fragility hypothesis in the banking literature the theory argues that smaller banks in more competitive environments are more likely to take excessive risks and therefore have a high risk of failure. In modelling the franchise/charter value (Keeley, 1990) suggests that banks whose charter values are high arising from higher market power are able to deter excessive risk taking behaviour by banks management.

Secondly, is the risk shifting paradigm. This paradigm is contrary to the charter/franchise value paradigm. This theory deviates from the past studies by introducing competition in the loan market as opposed to the deposit market. The theory states that when the market power of banks increases, they end up charging higher rates to borrowers who then have trouble in repaying. The entrepreneurs facing higher interest rates end up increasing the risk of their investments projects a practice that leads to more problematic loans. This theory was propounded by (Boyd and De Nicolo,2005). In the banking literature, it is also called competition-stability

hypothesis and considers more competitive banking systems more stable than less competitive ones. This proposition is however highly criticized because of its inapplicability in the loan and deposit market. In a later work (Boyd and De Nicolo, 2006) assume that banks hold risk free assets other than giving loans. In the model unlike the previous one the relationship between competition and bank risk does not confirm previous findings. It finds that increased competition will only affect the ratio of the loans to deposit. To reconcile the conflicting paradigms Martínez-Miera and Repullo, 2018) proposed a model that argued that the monotonic relationship between competition and market power becomes U-shaped. The model argues that the increase in risk because of lower market power due to increased interest rate balances against the higher margins from firms, which are able to repay even after increase in interest rates. Therefore, there is a possibility of an initial decline in risk with increase in competition and an eventual increase in risk levels as competition continues to increase.

2.2 Empirical Literature

An examination of the competition-stability and competition-Fragility hypotheses among 8,235 banks in 23 developed countries found the evidence in favor of the traditional competition-stability hypothesis that market power increases loan portfolio risks (Berger et al., 2009). Similar conclusion is arrived at in the market power - bank risk taking behaviour analysis in the Turkish market Yaldiz and Bazzana (2010). In examining bank competition-stability nexus in Germany, Kick and Prieto (2014) found that that Franchise value paradigm is evident in German market. However, the results are in support of the risk-shifting paradigm when Boone Indicator and regional Branch share are used as a proxy for Risk taking and competition respectively.

The entrance of FinTech in the market has a number of dynamics with regard to bank operations. According to FSB (2017), financial risks are eminent with the proliferation of the FinTechs over time, which can lead to liquidity and credit risks. This can occur through three channels. To start with, at their establishments, the FinTechs may not have the necessary risk management capacity in terms of the expertise thus a likelihood of risk underestimation (FSB, 2017). Secondly, if FinTech-based - lending platforms evolve to start using their own balance sheet to intermediate funds, maturity mismatches could arise and open up the possibility of runs. Third, payments firms offering mobile wallets could hold client monies and invest them in less liquid assets. This would expose clients to liquidity mismatch risk.

FinTech may also have an implication of the financial stability. Financial sector systemic risks could arise is FinTechs threaten the business models of the existing financial sector players such as commercial banks. In cases where the FinTech payments providers, P2P lenders, robo-advisors and foreign exchange agents compete directly with incumbent banks in many of their core functions financial instability is deemed to likely occur. The global FinTech investment has

significantly grown in the recent years hitting USD 22 billion in year 2015. The growth is expected to be steady in the latter years. As a result, this growth is more likely to threaten the market power and the incumbent retail commercial banks especially with the emergence and proliferation of digital banking starts - ups (Dickerson et al., 2015).

Yinqiao, Renée and Laurens (2017) in analyzing the impact of FinTech start-ups on incumbent retail banks' share prices found that while the FinTech start-ups are growing rapidly, they may still be too small to affect incumbent US retail banks. They assert that within a period of less than five years, it is difficult for consumers to adapt to the new changes newcomers brought or to trust in their online and automatic services. Further, retail banks benefit from their ingrained advantages, such as their ability to create credit instantly. Second, the substitute and complementary effects may partly offset each other. On the one hand, successful FinTech firms may have weakened the banks' dominant position by improving the quality and efficiency of traditional services; on the other hand, banks have taken actions to respond to these challenges, possibly by acquiring FinTech start-ups or setting up their own FinTech affiliates.

In some scenarios, the financial sector incumbent players often outsource to FinTech firms some of their lending business, while FinTech firms benefit from access to incumbents' client base and reputation. Lending platforms have also entered segments where they have no competition from the incumbents, e.g. among unbanked clients (providing online services to those who cannot apply for loans from traditional players) and underserved segments (small businesses, subprime customers, and clients with insufficient credit history or lower job security). Partnerships are also common in the payments space. In cases of big FinTech firms that are used for big data analysis, their access to a large quantity of client data could allow them to carry out risk assessments, which could underpin the provision of credit. In many cases, these firms partner with incumbent financial institutions or new FinTech players to offer credit, insurance, wealth management services over their platforms.

More often borrowers with similar characteristics to those businesses that were denied credit from a bank turn to FinTech lenders to arrange credit for their businesses that would not qualify for traditional bank financing (Schweitzer and Barkley, 2017). A review of the relationship between the amount of loans made by a FinTech lender and the characteristics of the banking environment reveals that the peer-to-peer (P2P) lenders have evolved toward serving consumers who would traditionally obtain financing from banks because the platform excludes more and more subprime borrowers (Freedman and Jin, 2008). As such the FinTech loans will end up increasing the access to credit in those areas where traditional banks are pulling back (Freedman and Jin, 2008).

An inquiry into bank's branch location and lending, assert that the largest banks are not relying on physical offices to grow their small business lending but rather

they are leveraging on the FinTechs technology platform (Jagtiani and Lemieux, 2017). Technology plays an important role in allowing banks to reach a wider group of borrowers. Further, their findings posit that between 1997 and 2014 larger banks doubled the number of counties where they had a significant presence in small business lending but did not have bank branches. Buchak, Matvos, Piskorski and Seru (2017) study the rise of FinTech and non-FinTech shadow-banking activities in the residential lending market. The evidence from the study's findings are that FinTech customers are among the borrowers who value fast and convenient services and that FinTech lenders command an interest rate premium for their services thus concluding the competing role of FinTechs against the retail banks.

A linkage into the nexus between FinTechs on one hand and financial inclusion, risk pricing, and alternative information shows that there exists a positive relationship between the share of FinTech lending and the degree of banking market concentration. More specifically FinTech lending accounted for over 40 percent in the markets that experienced at least 5 percent decline in bank branches between 2014 -2015 (Jagtiani and Lemieux, 2017). This empirical evidence was found to be consistent with an argument that FinTech lenders have played a role in filling the credit gap. Further, in examining the relationship between FinTechs and lending and price of credit in the market, Jagtiani and Lemieux (2017) conclude that FinTech lending has positive and significantly higher spreads in regions of higher banking market concentration. This implies that FinTech lending has more monopolistic power in these markets and is able to charge higher prices. With regard to loan delinquency rates, the study found that delinquency rates are higher for FinTech loans than for traditional bank loans with the same credit spreads. This finding is supported by the finding that consumers are more likely to obtain credit at a lower rate through the FinTechs than through traditional credit card loans offered by banks.

3.0 Research Methodology

3.1 Research Design

The study employed quantitative analysis is examining the market power – risk taking behaviour nexus in the financial sector in Kenya. The study adopted a comparative research design in its analysis. This implies that two periods were reviewed in the study namely: the pre-FinTech entrance and the post FinTechs entrance in in order to inform on the conclusion. Within the study the pre FinTech period was defined as 2003 - 2009 with the post FinTech being defined as 2009 – 2017 period.

3.2 Empirical Model

In modelling the effect of the FinTech entrance on the market share and the risk appetite of the commercial banks, the Panel Vector Autoregressive (PVAR) model was adopted. To start with the bank's market power the Lerner index was applied to measure the individual bank's market power. This index will measure the ability of the firm to set its price above the marginal cost (market power). The advantage of using the Learner index in measuring the market power of a bank in this case lies in the economic principle as opposed to using market share (bank's assets to total industry assets ratio). The index can illustrate how and whether imperfectly competitive markets depart from the perfect competition benchmark hence its economic strength. Berger et al. (2009) asserts that Lerner Index is a direct measure of competition because it focuses on the pricing power apparent in the difference between price and marginal cost thereby capturing the degree to which a firm can increase its marginal price beyond marginal cost.

Further, the choice to use Lerner Index as a measure of the bank market power is informed by the fact that in analyzing bank competition and stability there is a distinction between two methods namely the structural measure and the non-structural estimates. However, the most commonly used measure is the market share while non-structural competitive measures are the Lerner Index,

H-statistics and the modified Boone Indicator. Comparing the two, it is clear that the non-structural measures of competition are preferred to structural measure because they provide a more practical setting to measure bank competition and that they have a microeconomic foundation by linking pricing to marginal costs.

The Lerner index was computed as follows:

$$LI_{it} = \frac{(P_{it} - MC_{it})}{P_{it}} \quad \text{.....} (1)$$

Where:

P_{it} is the price of banking outputs for bank i at time t,

MC_{it} is the marginal costs for bank i at time t.

P_{it} is the price of total assets proxied by the ratio of total revenues (interest and noninterest income) to total assets for bank i at time t. MC_{it} is derived from the translog cost function. The cost function is specified as follows:

$$LnTc = \alpha_0 + \alpha_1 \, lnTA + 1/2 \, \alpha_2 \, (lnTA)^2 + \sum_{j=1}^{3} \beta_j lnx_j + \sum_{j=1}^{3} \sum_{k=1}^{3} lnx_j \, lnx_k + \sum_{j=1}^{3} \gamma_j \, lnTA lnx_j + \varepsilon \quad \text{.....} (2)$$

Where: TC denotes total costs, TA bank's total assets, xjk ($x1$, $x2$ and $x3$) indicate three input prices (labor, capital and funds). X_1 is the price of labor, which is the ratio of personnel expenses to total assets, X_2 is the price of physical capital, which is the ratio of other non-interest expenses to fixed assets and X_3 is the price of borrowed funds, which is the ratio of interest expenses to total funds. Total cost is the sum of personnel expenses, other non-interest expenses and interest expenses. The estimated coefficients of the cost function are then used for computing the marginal cost. Therefore, marginal cost is equal to the first derivative of the logarithm of total cost function with respect to output multiplied by the ratio of total cost to output. The derivative of the logarithm of the total cost with respect to the logarithm of output is computed using the cost function specified in Eq. (4).

The marginal cost is based on the estimation of the cost function. We estimate a translog cost function with one output and three input prices.

The estimated coefficients of the cost function are then used to compute the marginal cost using the function below:

$$MC = \frac{TC}{TA} (\alpha_1 + \alpha_2 \, lnTA + \sum_{j=1}^{3} \gamma_j lnX_j) \quad \text{.....} (3)$$

Lerner index closer to one indicates more market power for the firm. Generally, an index equal to 0 it indicates perfect competition, while an index equal to 1 indicates monopoly. Thus, the greater Lerner index the lower the market competition.

To investigate the FinTech entrance – market power hypothesis on the industry and individual bank market power (hypothesis 1), parametric analysis on the market powers for the two period pre and post FinTech entrance will be performed. In this case, both the industry analysis will be conducted as well as the firm level analysis (bank level analysis).

3.3 Definition and Measurement of Variables:

The variables to the model will be defined and measured as presented in **Table 2** as follows:

Table 2: Definition and Measurement of the Variables

Variable	Definition	Measurement
Credit risk	Is the possibility of a loss resulting from a borrower's failure to repay a loan or meet contractual obligations	Ratio of non – performing loans to total loans and advances
Interest rate risk	Is the possibility of a loss resulting from decline in the interest income	Ratio of loan interest income net of deposit interest income to total bank assets
Operational efficiency	The ability of the firm to produce more output at least cost possible	ratio of bank's total operating expenses to total income in a given year
Liquidity	The ease of converting an asset into nearest liquid form mainly cash	Ratio of loan to deposit in a given year
Bank size	The asset base of the bank	total assets of the bank in a certain year
Inflation rate	The short-term risk-free interest rate	12 months moving average 91-day Treasury Bill rate
GDP growth rate	The market value of all goods and services produced within a country in a given time period mainly one year	Annual growth in the GDP
Treasury Bill rate	The increase in the general price levels in an economy for a given time period	12 months moving average inflation rate

3.4 Econometric Approach:

Further, in order to determine the effect of FinTech entrance on industry and individual bank risk taking behaviour (Risk appetite): - competition (market power) – risk taking appetite hypothesis (hypothesis 2), the study adopted Panel Vector Autoregressive (PVAR) model. In the study the PVAR model will be ran for the industry (panel data analysis). The application of PVAR model in this study is justified for the fact that the PVAR methodology combines the traditional VAR model approach with a panel data approach. This is advantageous in allowing for the unobserved individual heterogeneity (Grossmann, Love, and Orlov, 2014). This is advantageous of PVAR compared to GMM approach is that it imposes homogeneous dynamics across individuals.

The PVAR model was estimated for two periods (pre and post FinTech entrance) and the estimates compared accordingly. Within the model, bank's risk appetite stability was proxied by the interest rates risk and the credit risk. The model applied the two measures of risk appetite for robustness purposes. Therefore, to investigate the competition (market power) – risk taking behaviour appetite hypothesis, the study concentrated on the impulse response function and the variance decomposition derived from the PVAR estimation using a Cholesky decomposition. However, prior to generating impulse response function and the variance decomposition, the Lagrange multiplier (LM) test for autocorrelation was applied to determine the optimal lag length.

The general representation of the econometric PVAR model was defined as follows:

$$Risk\ beh = f(market\ power, bank\ specific\ variables, Marcoeconomic\ variables) \ldots\ldots\ldots (5)$$

The general econometric representation of PVAR model will be as follows:

$$Z_{it}=\mu_{it}+\varepsilon_{it}+\tau z_{it}\text{-}1 \qquad \ldots\ldots\ldots (5)$$

Where:
Z_{it} is the vector for two random variables (market power and risk-taking appetite), τ is an $m \times m$ matrix of coefficients, μ is a vector of m individual effects and ε_{it} is a multivariate white-noise vector of m residuals. Within the model, the bank specific variables included: Operational efficiency measured by bank's total operating expenses to total income ratio (TE/TI), Bank liquidity measured by loan to deposit ratio (LCD), Bank size measure by log of total assets (Log TA). The Macroeconomic controls will include Inflation rate, GDP growth rate, risk free Treasury Bill rate.

The bank risk appetite was measured by interest rate risk (Net Interest Margin) and the credit risk.

The Net Interest Margin and credit risk were computed as follows:

$$NIM = \left(Loan\ Interest\ Income - Deposit\ Interest\ Income \big/ Total\ Assets \right) \quad \text{.....} (6)$$

$$Credit\ Risk = Non\text{-}Performing\ Loans \big/ Total\ Loans\ and\ Advances \quad \text{.....} (7)$$

3.5 Sources of Data

Commercial banks specific data was obtained from the audited financial statements over years from Kenya Bankers Association database. Data on the macroeconomic control variables was sourced from the Central Bank of Kenya statistical reports. The data collected was splits into two periods namely: 2003 - 2009 (pre FinTech entrance) and 2010 – 2017 (post FinTech entrance). Market power was computed from the bank related data as defined by equation 1, 2 and 3.

4.0 Results Interpretation and Discussion

4.1 Descriptive Statistics

The data was analyzed using Stata. The analysis entailed computation of the Lerner Index as a measure of the market power using the appropriate variables as indicated in the formula. Descriptive statistics for the market power were computed accordingly. The results indicated that the industry has been competitive with the Lerner indices overtime being close to 1. However, a comparison into the Lerner indices for period 0 and period 1 indicates that the overall Lerner index for period 1 if less than overall Lerner index for period 0 (0.9794 < 0.9827). This reveals an element of FinTechs' entrance affecting the market power of the banks by reducing market competition (**Table 1.1**).

Table 1.2: Descriptive Statistics for Market Power (Lerner Index)

Year	Obs	Mean	Std. Dev.	Min	Max
Descriptive for pre – FinTech entrance (2003 – 2009)					
2003	31	0.9821	0.0134	0.922162	0.994691
2004	31	0.9857	0.0056	0.968676	0.995961
2005	31	0.9838	0.0041	0.975039	0.991956
2006	31	0.9830	0.0046	0.972383	0.990823
2007	31	0.9826	0.0046	0.969004	0.993099
2008	31	0.9810	0.0046	0.970319	0.987957
2009	31	0.9807	0.0048	0.968095	0.987515
Overall	217	0.9827	0.0068	0.922162	0.995961
Descriptive for post – FinTech entrance (2010 – 2017)					
2010	31	0.9808	0.0043	0.970661	0.986625
2011	31	0.9808	0.0043	0.971073	0.990636

Year	Obs	Mean	Std. Dev.	Min	Max
2012	31	0.9769	0.0047	0.966575	0.985924
2013	31	0.9795	0.0042	0.970384	0.985287
2014	31	0.9799	0.0046	0.969805	0.989458
2015	31	0.9790	0.0040	0.969427	0.986402
2016	31	0.9789	0.0040	0.969427	0.986402
2017	31	0.9789	0.0039	0.969427	0.986402
Overall	248	0.9794	0.0044	0.966575	0.990636
Descriptive for entire period (2003 – 2017)					
Overall	465	0.9809	0.0059	0.922162	0.995961

A further analysis into the difference in the overall market power for the two period was conducted using the chow test. This was done to determine whether the difference in the overall Lerner indices is statistically different or not. The chow test results indicate that the difference is statistically significant at 5 percent significance level. This is evidenced by the Prob > F = 0.0000 (**Table 1.2**). This implies that FinTech entrance enhance market competition. A graphical representation for bank level support this finding (see **Figure 1.1** and **Figure 1.2**).

Table 1.2: Chow Test for the Mean of Market Power Between Pre – FinTech and Post – FinTech Entry

F – statistic	Probability
F(1,464) = 530.26	Prob > F = 0.0000
test mean o, mean 1	
lernerindex_period = 0 (2) lernerindex_period = 1 Constraint 2 dropped	

4.2 Pre-estimation Diagonistic Tests

4.2.1 Maximum Lag Selection Results

To determine the maximum lag for the model variables pvarsoc was applied to compute the selection order statistics. The maximum lag order selection test results present that the first-, second-, third-, and fourth-order panel VAR models using the first four lags of the endogenous variables as instruments. For the fourth-order panel VAR model, only the CD is calculated because the model is just-identified. Based on the three model-selection criteria by M. R. M. Andrews and Lu (2001), the first-order panel VAR is the preferred model because this has the smallest MBIC, MAIC, and MQIC statistics. While we also want to minimize Hansen's J statistic, it does not correct for the degrees of freedom in the model like the MMSC. Note that the second-order panel VAR models reject Hansen's over identification restriction at the 5% significance level, indicating possible misspecification in the model; thus, it should not be selected. Therefore, we select the first lag as the maximum lag (**Table 1.3**).

Table 1.3: Maximum Lag Selection Results

lags	CD	J	J value	MBIC	MAIC	MQIC
1	0.898079	17.36406	0.136408	-51.4748	-6.63594	-24.5606
2	0.900751	12.79329	0.011916	-33.0993	-3.20671	-15.1565
3	0.90792	6.878648	0.014244	-16.0676	-1.12135	-7.09625
4	0.874441	.	.	.	.	.

4.2.2 Correlation Matrix

The correlation coefficient matrix indicates that interest risk and credit risk are negatively correlated with Lerner index. However, the correlation is very weak. The correlation coefficient matrix further indicates that correlations among the model variables are generally weak thus ruling out any possible multicollinearity problem when running the pooled OLS model. All the relationships among the variables are below the 50 percent level.

Table 1.4: Correlation Matrix Coefficients

	Lerner Index	Interest risk	Credit risk	E/A	L/D	Size	Tb - rate	Inflation	GDP
Lerner Index	1.0000								
Interest risk	-0.2424	1.0000							
Credit risk	-0.0335	0.2158	1.0000						
E/A	0.0600	-0.0795	-0.1128	1.0000					
L/D	-0.1581	0.0908	0.2259	-0.0975	1.0000				
Size	-0.1422	-0.1379	-0.3853	-0.0976	-0.1030	1.0000			
Tb rate	0.0455	0.0783	-0.0739	-0.0031	0.0157	0.1009	1.0000		
Inflation	-0.0842	0.0746	-0.0605	0.0077	-0.0728	0.1212	0.3948	1.0000	
GDP	0.1392	0.0089	0.0262	0.0140	0.0527	-0.0392	0.2867	-0.4499	1.0000

4.2.3 Panel Unit Root Test

Prior to running the regressions, unit root test was conducted in order to determine the order of integration among the model variables. The Levin-Lin-Chu unit - root test was applied to conduct the unit root test with the Harris-Tzavalis unit-root test being applied for robustness check. The results of the unit root test are presented in **Table 1.5.** The results indicate that under the Levin-Lin-Chu unit - root test based on the adjusted t – statistics, all the variables are stationary at level at 5 percent significance level. This is because their respective p – values are less than 5 percent significance level. Similar conclusions are arrived at upon the application of the Harris-Tzavalis unit-root test.

Table 1.5: Unit Root Test Results

	Levin-Lin-Chu unit-root test			Harris-Tzavalis unit-root test	
Variables	Unadjusted t statistic	Adjusted t* statistic	P - value	Z statistic	P - value
Lerner Index	-3.9866	-3.2741	0.0005	-8.8338	0.0000
Interest risk	-6.3952	-3.4985	0.0002	-0.4280	0.0043
Credit risk	-8.7682	-7.1164	0.0000	1.6321	0.0027
E/A	-2.1890	8.9139	0.0000	-6.8567	0.0000
L/D	-5.6140	-1.0028	0.0158	-9.3231	0.0000
Size	-0.8114	-3.9210	0.0000	0.1458	0.0009
Tb rate	-30.2961	-16.4148	0.0000	-11.5597	0.0000
Inflation	-45.9256	-71.4899	0.0000	-15.1744	0.0000
GDP	-10.6690	-0.2671	0.0047	-7.7417	0.0000

4.3 Regression Models Results

A PVAR model was employed in estimating the effect of market power on the risk appetite of the commercial banks. To measure the risk appetite, two types of risk were used. First is the interest rates risk measure by the Net Interest Margin. This is the loan interest income net of deposit interest expense as a proportion of total assets. The second measure of risk appetite was the credit risk that was measured by the non-performing loans as a proportion of total loans.

Regression model results indicate that market power have a statically significant effect on the interest rate risk of the commercial bank. This is evidenced by the statistically significance of the market power coefficient in period 1 as opposed to period 0 (see **Table 1.4**). More specifically, results indicate that bank risk-taking behavior is positively related to increase in the market power following the FinTechs' entry. This would infer into the increased provision of digital credit facilities by commercial banks who leverage on the FinTech platform mainly the mobile banking platform. This finding resonates with Berger et al., (2009) who examined the competition-stability and competition-Fragility hypotheses among 8,235 banks in 23 developed countries and found the evidence in favor of the traditional competition-stability hypothesis that market power increases loan portfolio risks. Similarly, is the conclusion that the market power changes arising from FinTech entry has a positive effect on the bank risk taking behaviour in Turkish market (Yaldiz and Bazzana, 2010). Further, Kick and Prieto (2014) in their examination of bank competition-stability nexus in Germany, found that that Franchise value paradigm is evident in German market.

In addition, changes in banks' market power with the FinTech entry was found to have positive effect on credit risk **(see Table 1.5).** This would infer into the quality of the digital credit facilities by commercial banks who leverage on the FinTech platform mainly the mobile banking platform. With the entrance of the FinTechs which in turn leads to increased market competition, there is likelihood that commercial banks will try to compete for the same market niche through proliferation of the digital credit in pursuit of maintaining their respective market power. With this, there is likelihood that the quality of such digital credits may be compromised thus posing a credit risk through loan defaults. This finding is in harmony with the finding by Jagtiani and Lemieux (2017) who conclude that FinTech lending has positive and significantly higher spreads in regions of higher banking market concentration implying that FinTech lending has more monopolistic power in these markets and is able to charge higher prices. With regard to loan delinquency rates, Jagtiani and Lemieux (2017) found that delinquency rates are higher for FinTech loans than for traditional bank loans with the same credit spreads. This finding is supported by the finding that consumers are more likely to obtain credit at a lower rate through the FinTechs than through traditional credit card loans offered by banks. The PVAR model results further found that the banks' market power is significantly influenced by the bank risk appetite, bank size and the loan to deposit ratio for both period 0 and period 1.

4.4 Impulse response function analysis

Upon PVAR estimation using a Cholesky decomposition, the Impulse Response Function were obtained for the pre and post mobile banking entry. The results reveal that in the pre - FinTech entry

period, One SD shock to market competition leads to a 0.01 unit increase in interest rates risk but the response decay faster within a short period decreasing minimally before stabilizing at 0 mark. However, One SD shock to market competition leads to a continued decline in the credit risk to a low of 0.02 unit in the pre - FinTech entry period. However, in the post FinTech entry period, One SD shock to market competition leads to a 0.007 unit decline in interest rates risk but the shock is reversed faster within a short period taking a sharp continual rise in the interest rates risk. Similar results are evidenced for the credit risk whereby One SD shock to market competition leads to a 0.02 unit decline in interest rates risk but the shock is reversed faster within a short period taking a sharp continual rise afterwards.

Figure 3.0: IRFs in Pre-FinTech Entry Period

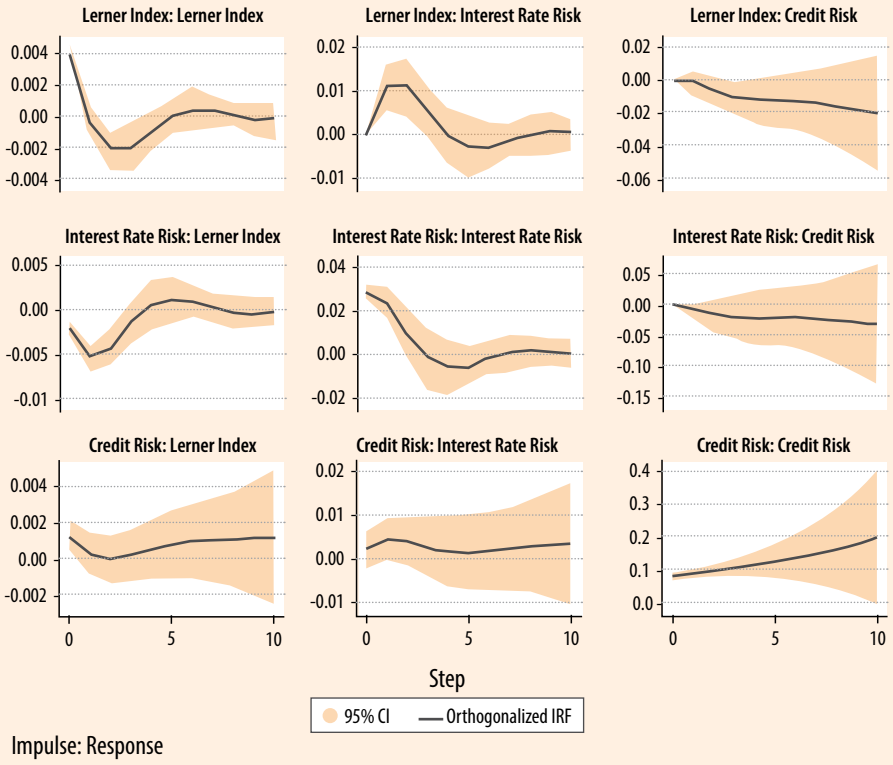
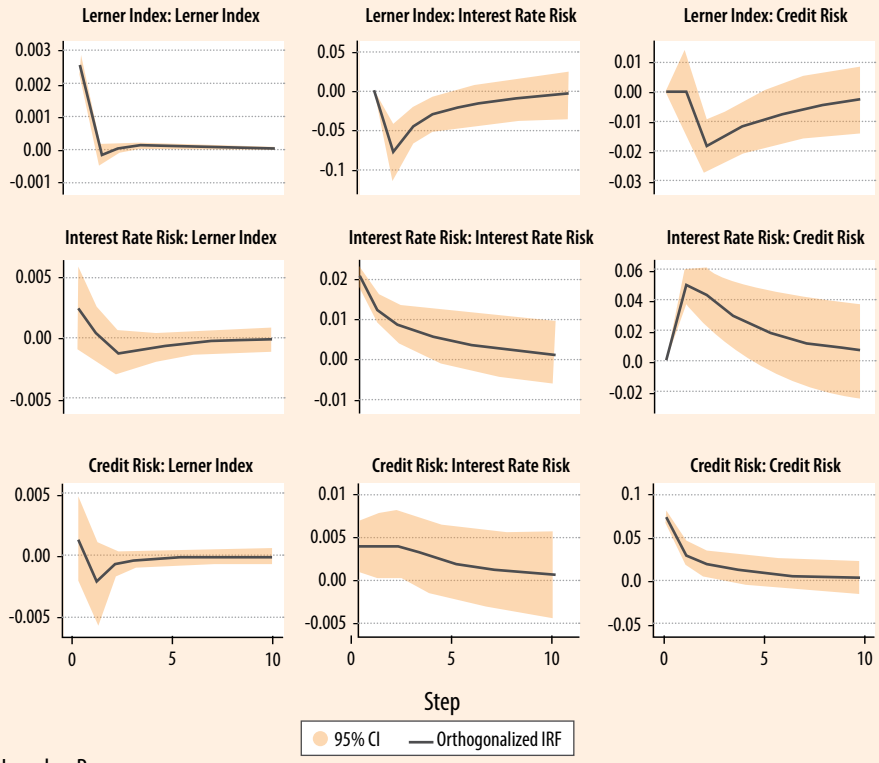


Figure 4.0: IRFs in Post-FinTech Entry Period



Impulse: Response

5.0 Conclusion and Policy Implications

5.1 Conclusion

The empirical analysis results indicate that the FinTech entry has a significant effect on the market power of commercial banks. In the Kenya context, results indicate that the onset of the mobile banking have affected the market power of the banks by lowering the market power.

This implies that the banks who adopted the mobile banking platform to offer some digital related products and services have ended up possessing more market power as compared to the banks, which have been reluctant in adopting mobile banking platforms. As such, the market power may end up being concentrated among the early digital platform adopters at the expense of the banks that shy away in from adopting such digital platforms provide by the FinTech.

Further, it is evident that apart from affecting the market power of the dominant commercial banks, the entry of the FinTechs is positively related to the banks risk appetite. The study results reveal that with the entry of the mobile banking the banks' market power has been affected and in turn increasing the banks risk appetite. This can be viewed in form of the rise in the digital financial services in the market with the entrance of the mobile banking platforms in the country. The explanation here would be that the digital financial products are easy to access given the few requirements needed for the borrower to access the services as opposed to the conventional financial services' requirements. Further, given that such product involves small amounts of money advanced by bank to the borrower, this increases their access by the borrower as opposed to the conventional financial services.

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5.2 Policy Implications

Based on the findings, a number of policy pronouncements can be postulated. First, is the need for a proper regulatory framework to regulate the FinTechs in the industry. With the increase in banks' risks behaviour surrounding the digital credits mainly advance through the FinTechs digital platforms, there is need to have a robust regulatory framework. An upsurge of such digital credits is likely to have an adverse effect on the quality of such loans that would put the stability of the industry and the sector at large at stake.

Secondly, is the need to evaluate quality of the digital loans advanced via the FinTech platforms. Though the amounts advanced on the individual borrower may be small in absolute terms, the volumes of the borrowers seeking for these facilities is high thus leading to a large digital loan's portfolio. An analytical examination on the quality of such facilities by the regulator is worthwhile to inform the policy pronouncements ion matters concerning the industry stability.

Thirdly, is the need to evaluate the economic burden of the digital credit facilities on the borrowers mostly the household sector. There has been concerns on the effects of the digital lending of the financial and economic burden of the borrowers. Concerns of indebtedness have been raised on the same. Thus, the need for such analysis in order to inform policy on matters of regulation of such facilities especially with regard to terms and conditions associated be such facilities.

Lastly, is the need for the customer awareness with regard to FinTech based lending. Policies on consumer protection with regard to FinTech based lending is of the essence with the aim of sensitizing the customers on their rights to enable them to make informed decisions when borrowing.

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Appendices

Table 1.4: PVAR Model for Interest Rates Market Risk

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
Interest rate risk	Interest rate risk	1.0817	0.1458	0.4758	0.1916
	L1. Lerner index (-1)	0.1132	1.3879	1.3743	5.3109
	E/A (-1)	-0.4551	0.7736	-9.5909	14.0374
	LD (-1)	0.0003	0.0014	-0.0001	0.0001
	Size (-1)	-0.0057	0.0156	0.0365	0.0272
	GDP (-1)	-0.0011	0.0015	-0.0022	0.0046
	Inflation (-1)	0.0002	0.0004	0.0015	0.0015
	Tb rate (-1)	-0.0005	0.0014	0.0021	0.0023
Lerner index	Interest rate risk (-1)	0.0075	0.0169	-0.0069***	0.0108
	Lerner index (-1)	0.5057	0.2395	0.8644***	0.5201
	E/A (-1)	-0.1770	0.1597	0.3609	1.5678
	L/D (-1)	0.0005	0.0003	0.0725	0.0391
	Size (-1)	-0.0024	0.0016	-0.0028	0.0031
	GDP(-1)	-0.0003	0.0002	-0.0013	0.0005
	Inflation (-1)	0.0732	0.0001	-0.0008	0.0001
	TB Rate (-1)	-0.0004	0.0001	0.0005	0.0002
E/A	Interest rate risk (-1)	0.0018	0.0039	0.0041	0.0019
	Lerner index (-1)	0.0718	0.0836	-0.0286	0.0719
	E/A (-1)	0.8243	0.4513	1.2433	2.3654
	L/D (-1)	0.0262	0.0725	0.0036	0.0252

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
E/A	Size (-1)	0.0083	0.0731	0.0532	0.0004
	GDP (-1)	-0.0001	0.0601	0.0632	0.0741
	Inflation	0.0429	0.0063	0.0533	0.8300
	Tb rate (-1)	0.0000	0.0931	0.0715	0.0629
L/D	Interest rate risk (-1)	-12.6698	8.9769	-48.3834	28.0073
	Lerner index (-1)	1.1904	0.8687	0.6010	0.2838
	L/D (-1)	29.2028	71.6366	1.7458	0.4279
	E/A (-1)	0.3005	0.2484	0.2050	0.7970
	L/D (-1)	0.5008	0.7221	0.0353	0.0233
	Size (-1)	-0.0755	0.0801	-7.8132	6.6465
	GDP (-1)	-0.0251	0.0195	0.9470	0.7431
	Inflation (-1)	0.0588	0.0470	-0.1670	0.2138
	Tbrate (-1)	-0.7018	0.8077	-0.1099	0.2644
Size	Interest rate risk (-1)	-17.8801	14.5446	1.3380	1.5521
	Lerner index (-1)	1.2547	8.8163	1.4651	0.5617
	E/A (-1)	-0.0062	0.0136	5.4414	2.6089
	L/D (-1)	0.7841	0.1079	-0.0005	0.0025
	Size (-1)	0.0275	0.0198	0.7180	0.4169
	GDP (-1)	-0.0002	0.0050	-0.0394	0.0580
	Inflation (-1)	0.0093	0.0119	-0.0212	0.0165
	TB rate (-1)	-9.0790	7.4489	0.0521	0.0264
GDP	Interest rate risk (-1)	0.6121	0.6498	0.1824	1.7992
	Lerner index (-1)	0.0547	0.1156	-0.7674	0.0012

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
	E/A (-1)	-1.3086	0.7852	-2.8601	0.1669
	L/D (-1)	0.1439	0.1421	-0.9003	0.0022
	Size (-1)	-0.0652	0.0322	-0.0979	0.5063
GDP	GDP (-1)	-0.0465	0.0889	-0.4909	0.0624
	Inflation (-1)	0.4355	0.4764	-0.1671	0.0155
	Tb rate (-1)	1.44707	4.9924	0.1771	0.0311
Inflation	Interest rate risk (-1)	0.6297	0.7816	-52.5910	22.2434
	Lerner index (-1)	3.0783	3.5906	-0.33041	0.41962
	EA (-1)	1.2431	0.5729	0.2066	0.7946
	L/D (-1)	0.1640	0.1283	0.0488	0.0363
	Size	-0.7353	0.4208	-1.2532	0.4870
	Size (-1)	-8.8056	5.4550	-14.1999	6.4898
	GDP (-1)	-5.0749	2.8525	4.1032	1.0269
	Inflation (-1)	1.3426	0.3899	0.7833	0.3068
	Tb rate (-1)	-0.2375	0.0997	-1.2532	0.4870
Tb rate	Interest rate risk (-1)	-0.0641	0.0617	-54.3396	27.6648
	Lerner index (-1)	-0.1022	0.0157	0.02861	0.42865
	E/A (-1)	0.0117	0.0544	0.0479	0.2177
	L/D (-1)	1.0817	0.1458	0.0502	0.0454
	Size (-1)	0.1132	1.3879	-15.5405	7.9013
	GDP (-1)	-0.4551	0.7736	4.9567	1.2019
	Inflation (-1)	0.0003	0.0014	1.2770	0.3568
	Tb rate (-1)	-0.0057	0.0156	-0.5739	0.5703

Table 1.5: PVAR model for Credit risk

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
Credit rate risk	Credit rate risk	0.8102	0.0804	0.8754	0.1330
	L1. Lerner index (-1)	4.0061	3.0470	0.0016	0.0004
	E/A (-1)	-1.4340	1.9429	-0.0057	0.0035
	LD (-1)	0.0048	0.0070	0.7170	0.3930
	Size (-1)	-0.0415	0.0339	-0.0039	0.0030
	GDP (-1)	-0.0015	0.0038	0.0005	0.0002
	Inflation (-1)	-0.0006	0.0010	1.2462	2.3424
	Tb rate (-1)	0.0014	0.0031	0.0000	0.0000
Lerner index	Credit rate risk (-1)	0.0037	0.0038	3.9440	3.8291
	Lerner index (-1)	0.4341	0.1530	21.5141	18.6612
	E/A (-1)	-0.2134	0.1569	-0.9316	0.8432
	L/D (-1)	0.0005	0.0003	-4.2102	19.1372
	Size (-1)	-0.0033	0.0011	-0.0130	0.0405
	GDP(-1)	-0.0003	0.0002	0.1835	0.7106
	Inflation (-1)	0.0000	0.0000	-0.0002	0.0029
	TB Rate (-1)	-0.0004	0.0001	-0.1622	0.0151
E/A	Credit rate risk (-1)	0.0000	0.0003	0.4260	0.8352
	Lerner index (-1)	0.0582	0.0570	3.7001	0.6512
	E/A (-1)	0.8279	0.4610	-18.1049	7.1968
	L/D (-1)	0.0000	0.0000	0.0501	0.0229
	Size (-1)	-0.0001	0.0002	1.1310	0.2047
	GDP (-1)	-0.0001	0.0001	0.8754	0.1330
	Inflation	0.0000	0.0000	-0.0016	0.0004

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
E/A	Tb rate (-1)	0.0000	0.0001	-0.0057	0.0035
L/D	Credit rate risk (-1)	2.3893	1.3203	0.7170	0.3930
	Lerner index (-1)	158.0431	111.4144	-0.0039	0.0030
	E/A	38.1884	68.5589	0.0005	0.0002
	E/A (-1)	0.2854	0.2490	1.2462	2.3424
	L/D (-1)	1.5066	0.7771	0.0000	0.0000
	Size (-1)	-0.1328	0.0862	0.9440	-0.9165
	GDP (-1)	-0.0407	0.0225	-21.5141	18.6612
	Inflation (-1)	0.0366	0.0634	-0.9316	0.8432
	Tbrate (-1)	-0.3069	0.1583	-0.2102	0.9554
Size	Credit rate risk (-1)	-13.6256	10.5958	-0.0130	0.0405
	Lerner index (-1)	-4.3572	8.8858	0.1835	0.7106
	E/A (-1)	-0.0001	0.0114	-0.0002	0.0029
	L/D (-1)	0.7760	0.0993	-0.1622	0.0151
	Size (-1)	0.0265	0.0180	0.4260	0.8352
	GDP (-1)	-0.0003	0.0046	3.7001	0.6512
	Inflation (-1)	0.0065	0.0122	-18.1049	7.1968
	TB rate (-1)	-0.5181	1.3095	0.0501	0.0229
GDP	Credit rate risk (-1)	-0.1187	0.2244	1.1310	0.2047
	Lerner index (-1)	41.0312	192.8656	0.8754	0.1330
	E/A (-1)	0.0789	0.0884	-0.0016	0.0004
	L/D (-1)	-0.9119	0.6060	-0.0057	0.0035
	Size (-1)	0.1140	0.1272	0.7170	0.3930
	GDP (-1)	-0.0726	0.0286	-0.0039	0.0030

		Period 0 Results		Period 1 Results	
		Coef.	Std. Err.	Coef.	Std. Err.
GDP	Inflation (-1)	-0.0709	0.0807	0.0005	0.0002
	Tb rate (-1)	2.6357	5.9852	1.2462	2.3424
Inflation	Credit rate risk (-1)	2.6022	0.7351	0.0000	0.0000
	Lerner index (-1)	-2.0142	0.0768	-0.9440	0.2750
	EA (-1)	0.4729	0.5867	-21.5141	18.6612
	L/D (-1)	0.0596	2.8536	-0.9316	0.8432
	Size	1.4639	0.4363	-34.2102	155.4456
	Size (-1)	0.2192	0.0990	-0.0130	0.0405
	GDP (-1)	-0.5639	0.3202	0.1835	0.7106
	Inflation (-1)	0.0752	0.8188	-0.0002	0.0029
	Tb rate (-1)	-136.8165	51.2787	-0.1622	0.0151
Tb rate	Credit rate risk (-1)	55.5370	78.2669	0.4260	0.8352
	Lerner index (-1)	-0.2232	0.0782	3.7001	0.6512
	E/A (-1)	0.7977	0.4104	-18.1049	7.1968
	L/D (-1)	-0.0959	0.0465	0.0501	0.0229
	Size (-1)	-0.1104	0.0128	1.1310	0.2047
	GDP (-1)	-0.0097	0.0424	0.8754	0.1330
	Inflation (-1)	0.8102	0.0804	-0.0016	0.0004
	Tb rate (-1)	-4.0061	3.0470	-0.0057	0.0035

Notes

Notes

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