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Influence of financial regulation on financial inclusion: A case study of the fintech industry in Kenya

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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Abstract

This study investigates the relationship between financial regulation and financial inclusion in the Kenyan fintech sector. The possibility of either variable influencing the other is put into consideration using secondary data from a survey over the period 2018 to 2019. By employing the use of a binomial logistic regression model, the findings indicate that there is a positive relationship between financial inclusion and financial regulation. More specifically, the usage of digital loan apps and mobile money has a significant positive correlation with financial regulation. Thus, greater financial inclusion leads to increased financial regulation, which positively impacts financial stability. The practical implications of this paper are that one of the ways policymakers and the government can increase financial inclusion is through creating favourable regulatory measures that create an enabling environment but not at the expense of consumer protection.

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Chapter 1: Introduction

1.1 Background information

Fintech has been described as an emerging financial service sector of the 21st century. According to Africinvest, fintech companies are based on two traits that amplify their definition; the use of technology to provide innovative financial services and having these financial services as their core business. Arguably, the term 'fintech' does not have a clear definition due to the eclectic scope of services in financial technology. However, it can be generally elaborated as the use of financial technology in financial services.

The technology boom that followed the 2008 global financial crisis revolutionized the financial industry bringing about greater access to financial services, efficiency, and lower transaction costs[1]. This revolution stood out because most of the change happened from outside the financial industry; start-ups and large technology companies came up to disrupt the incumbents. The rapid rise of the fintech industry has seen large amounts invested in it, a report indicated that as of 2017, the US had invested $ 15.2 billion while Europe and Asia had invested $7.4 billion and $3.9 billion, respectively[2] . Investment in the African fintech space also quadrupled in 2018 to $357 million with Kenya, South Africa, and Nigeria being responsible for the largest share.[3]

The potential of using financial technology to improve access to financial services is huge especially in developing economies. The committee on financial inclusion defines financial inclusion as "the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost"[4]. 1.7 billion adults remain financially excluded, a big percentage of this being from the developing economies (Demirguc-Kunt et al,2017). Where cash was found to be the main deterrent to financial inclusion (Borreau and Valleti, 2015)

[1] https://www.africinvest.com/document/africa-and-the-global-fintech-revolution.pdf

[2] http://disrupt-africa.com/2018/01/investment-into-african-tech-startups-hit-record-high-in-2017.

[3] https://www.forbes.com/sites/tobyshapshak/2019/07/30/africas-fintech-investment-quadrupled-to-357m-in-2018/?sh=5dd9f74262db.

[4] As defined by the Committee on Financial Inclusion (Chairman: C. Rangarajan, 2008).

The presence of the fintech industry poses additional risks to the involved parties and this is where regulation comes in. There is little regulation towards the fintech industry in Kenya since the rules on disclosure requirements and credit reporting do not apply to non-regulated lenders and can only report to the Credit Reference Bureau if they want to but are not obligated to (GSMA, 2017). The non-regulated digital products include the app-based and 'over-the-top' lenders who do not fall under the mandate of the Central Bank of Kenya nor credit reference bureaus.

The core of regulation lies in prudential safeguards, consumer protection, and market integrity. The dynamism and size of the fintech space has made it difficult for the sector to have a specific regulator or policies. The policy measures related to the industry can be classified into three groups; activities that directly regulate fintech activities, those focused on new technologies in providing financial services, and those focused on the promotion of digital financial services, and those focused on promoting digital financial services. (Restoy, 2019). Regulation has mainly focused on preventing risks regarding consumer and data protection on emerging fintech technologies and creating an enabling environment. This implies there is less attention on strengthening prudential safeguards, this has been attributed to the perception that the emerging technologies and business models rarely involve significant risk transformation.

Past works on the relationship between financial inclusion and regulation have observed that regulation can either be an enabler or deterrent to financial inclusion depending on the stringency of the regulatory measures. (Ondiege, 2015; Odongo, 2018; Momanyi, 2018; Bromberg et al, 2017). The subject of this study is to examine the relationship between fintech regulation and financial inclusion in Kenya with a key emphasis on consumer protection. I use the terms digital finance, digital credit, and fintech interchangeably, also, consumers, borrowers, and customers are used in reference to the same thing.

1.2 Problem statement

The majority of the emerging digital lenders do not fall under the mandate of the Central Bank of Kenya. A report conducted by Microsave, 2019 showed that only the incumbents KCB M-Pesa, Eazzy loan, and M-Shwari, etc, were under the scrutiny of regulators while the emerging fintech firms -Tala, Branch, and O-Kash- were among the non-regulated lenders. These lax regulation measures give room for unanticipated risks to all players in the market. Digital lenders are susceptible to micro-financial risks i.e., liquidity, market, and pricing, operational, compliance, and strategic risks. On the other hand, the consumers face the risk of lack of transparency, inconvenience and loss of funds, and fraud risk (Lake, 2013).

Demirguc-Kunt et al (2016) argued that light regulation is what has fostered innovation and enabled the growth of digital finance. It further reported that these non-traditional providers are not regulated since they are held at a different standard such as reduced oversight. Furthermore, Nyaga (2014) noted that as is the case with most developing countries, national regulations in Kenya have not kept pace with developments in the field where there were potential overlaps between the existing legislative and regulatory frameworks.

The regulatory gap that exists towards the digital credit market has enabled increased financial inclusion since these newer digital lenders are focused on the unserved and niche segments[5]. Additionally, the rapid growth of the digital credit market has seen an expansion of financial inclusion however, this also means going into a new territory that holds other challenges (Borreau and Valleti, 2015).

Hence, taking all this into account, I make the hypothesis that regulatory arbitrage does exist, and due to it, financial inclusion attainment is feasible for the whole population. However, the presence of little regulation also poses risks to telecommunication companies, incumbents, digital lenders, and consumers.

[5] Microsave report, 2019

1.3 Scope of the study

With the increased use of digital financial services, there has been a rising concern on the extent of regulation of the fintech industry. Given this, this study aims to examine the influence that regulation has on financial inclusion and vice versa in the fintech sector. Because of how vast and complex the fintech space is, the study will focus on the digital lending and credit market in Kenya due to its penetration, increased usage, and availability of data. Hence, it will cover the areas of peer-to-peer lending, crowdlending platforms, and online banking.

1.4 Research objectives

The overall objective of this study is to investigate the influence of financial regulation on financial inclusion and whether there is a relationship between the two in the fintech market in Kenya.

The specific objective will be to establish whether financial regulation is an enabler or deterrent to access, usage, and quality of financial services.

1.5 Justification of the research

The study will serve as a guide to policymakers on how to implement measures that address the innovation and risk balance and to further understand the digital credit market. Regulatory bodies such as the Central Bank of Kenya will also benefit as it will help shed light on how to effectively identify and address new risks and also monitor and establish regulatory frameworks that protect the interest of the consumers. The digital service finance providers for if implemented, the frameworks put in place will ensure fair competition and quality of services.

Chapter 2: Literature Review

To question where the line is drawn in the regulation of the digital credit market, researchers have strived to analyse its impact and whether policymakers are doing enough to regulate this market. The rapid growth of digital credit emphasizes its need to be regulated lest consumers are exploited. The goal of this literature review is to validate the hypothesis that regulation can support the existence of the digital credit market without too much risk to all parties and with adequate consumer protection. While also, giving grounds for regulatory arbitrage and the role it plays in financial inclusion.

2.1 Fintech: Is this the future of financial services?

Fintech covers a wide array of services all related to technologies that are used to augment, streamline, or disrupt traditional financial services. It is a sector that is broad and constantly evolving. Digital lending and credit through crowdlending platforms, online banking, personal finance, insurance through insuretech, international money transfer, equity financing, and online trading are some of the domains of the fintech market.[6] The major technologies involved in the sector are blockchain technologies which refer to the storage of digital information in public databases, wealth technology for instance Robo-advisers who provide digital financial advice and solutions based on algorithms, cryptocurrency, peer-to-peer lending which directly matches borrowers and lenders via online services, and regtech (regulation technology) which is managing regulatory processes of financial services by technology. It also makes use of artificial intelligence and cloud computing.

The growth of the financial technology industry (FinTech) stemmed from two main factors: the global financial crisis of 2008 and the gradual rise of technology (Frost,2020). There has been a global rise of the FinTech industry from blockchain technologies to cryptocurrency, and peer-to-peer lending, etc. For instance, China's peer-to-peer lending industry grew to $150 billion in 2015, together with the US and UK, China is one of the markets that has spearheaded non-bank lending and is growing at a very fast rate[7].

[6] https://www.geeksforgeeks.org/types-of-fintech-market/
[7] https://www.africinvest.com/document/africa-and-the-global-fintech-revolution.pdf

Yermack (2018), attributed the success of FinTech in Sub-Saharan Africa to an enabling infrastructure by telecommunication companies, internet providers, and electric power. He noted that M-Pesa in Kenya in particular had succeeded due to it being a low-fintech service where it uses basic mobile phones to meet the need. Frost (2020) attempted to explain the disparity in the adoption of fintech innovations among economies and markets in every major region of the world. He concluded that in places characterized by the high cost of financial services, uncompetitive banking sectors, and financial systems that are not at a level with demand for financial services had a greater adoption of FinTech innovations. Cortina and Schumkler (2018) argued that FinTech rather than being a threat to global banking has highly complementary services. Since a bank account plays a key role in many of the FinTech services, it would be difficult for FinTech companies to completely overtake banks and become involved in the current account gap.

2.2 Financial inclusion

The Financial Inclusion Data Working Group of the Alliance for Financial Inclusion (FIDWG-AFI) defined a holistic concept of inclusion within three main dimensions: access, usage, and quality. Considering financial inclusion only from the access perspective and not supplementing with the dimension of usage inhibits the 'analytical ability on breaking the poverty trap using finance' (Osoro and Muriithi, 2018).

Demirguc-Kunt et al (2017) reported in the global findex database that 515 million adults worldwide opened an account at a financial institution or through a mobile money provider between 2014 to 2017. In high-income economies, 94% of adults own an account while in developing economies, 63% do. Soriano (2017) discovered that financial exclusion is most prevalent in the emerging markets i.e., Africa, Asia, and Latin America; where to be excluded means you rely on cash-to-cash transactions, loan sharks, and informal financial methods. This concurred with Morgan and Pontines (2014) who attributed the financial exclusion in developing economies to limited bank branches, geographical proximity to financial institutions, high cost of formal financial services, among others. Evidence from past works has cited that financial inclusion provides significant benefits and is a key driver of economic development. The determinants of financial inclusion include but are not limited to socio-economic factors i.e., gender, education, and age where the mobile banking determinants are the same as those of traditional banking in Africa. (Zins and Weill,2016; Chithra & Selvam, 2013). Anarfo et al (2018) studied the extent to which financial inclusion affects financial

sector development and vice versa. They concluded that the two factors were complementary and have reverse causality.

Kenya has been on the lead in financial inclusion in sub-Saharan Africa as compared to other low-income countries. There has been quite a progress in making its whole population financially inclusive and this can be attributed to the rise of the mobile money revolution in the country. There has been a significant expansion in access and usage of financial services in Kenya (FinAccess, 2019). The study reported a growth in access to financial services and products which is now at 82.9% and found that mobile service money providers and digital loans had the highest increase of usage at 79.4% and 8.3%. Kenya came first among 21 diverse countries on a ranking of financial access and usage by Brookings Financial and Digital Inclusion Project (FDIP) (Rosengard,2016). Aduda and Kalunda (2012) argued that although the financial system in Kenya has grown tremendously, it has not provided adequate access to banking services successfully and lending favours large firms in urban areas. This is in concurrence with Mugo and Kilonzo (2017) who noted that although there was an increase in the number of financial access service points, the largest beneficiaries were not the poorest customers but the middle and lower-middle-class groups.

2.3 Penetration of digital lenders to enable financial inclusion.

A big percentage of the unbanked own a mobile phone hence, digital financial services could go a long way in improving access to financial services for the financially excluded (World Bank Group, 2017; World Development Report, 2016). Digital finance presents an opportunity for increased financial inclusion where brick and motor services failed. Most researchers have found a positive correlation between digital finance and financial inclusion.

Ozili (2018) concluded that there is a two-way causality between financial inclusion and digital finance whereas digital finance has enabled financial inclusion, financial inclusion has also enabled digital finance He further stated that there is a positive relationship between digital finance and financial inclusion. Thulani et al (2014) explored whether mobile money as a strategy for financial inclusion had worked in rural areas. They found that mobile money had increased access to financial services and had a positive impact on remittance and reduced costs. This is in line with findings from Rosengard (2016) that mobile money had led to greater financial inclusion. He undertook a study of how mobile banking through M-Pesa had impacted inclusion and found that financial inclusivity figures in Kenya had doubled those for sub-Saharan Africa and tripled those for low-income countries. Johnson (2016) conducted

qualitative surveys and interviews in 3 low-income districts in Kenya on financial inclusion to the poor. She noted from the findings that there was a high penetration of mobile money transfers, establishing it as the most used financial service. Digital finance has been a key driver of financial inclusion due to its convenience and accessibility. Access to a mobile phone has revolutionized mobile banking and allowed the unbanked to have a text-based or app-based financial account and lead the way to financial inclusion (World Bank Group,2017; Bharadwaj et al, 2019, Olaniyi,2018).

Ozili (2018) argued that digital finance has potentially led to greater financial data inclusion but not an increase in financial inclusion. He stated that as much as there is a positive correlation between digital finance and financial inclusion, there is also a negative correlation. Financial Sector Deepening (2018) also documented that the digital credit market in Kenya remained ill-suited for the majority whose livelihoods were characterized by irregular cash flows.

2.4 Role of regulation in enabling financial inclusion.

To explore the relationship between financial regulation and financial inclusion, most researchers have concluded that financial stability is an important factor that determines the effect regulation has on inclusion. (see Momanyi,2018; Anarfo et al 2019; Gottschalk,2015). By the Central Bank of Kenya implementing financial inclusion policies that allowed non-bank financial service providers ease of entry into the market, they encouraged innovation while promoting financial stability which led to increased financial inclusion (Muthiora,2015). This is in line with Ondiege (2015) who pointed out that regulations that encouraged MNO-led operations such as those in East African countries had proven to be more successful than bank-led regulations in terms of increased penetration and financial inclusion. Jagtiani and Lemieux (2017) further noted in their results that as much as consumer protection should be emphasized, private information gotten through alternative data could assist lenders in credit assessment of potential borrowers and allow certain consumers access to credit that would not have been granted otherwise. This is consistent with Odongo (2018) who concluded that regulatory reforms that enabled agency banking had a positive influence on access to formal and non-prudential financial services in Kenya. However, he also noted that the 'know-your-customer' regulation negatively influenced financial inclusion as most of the unbanked did not have all required identification documents. Bromberg et al (2017) conducted a theoretical study on the role of fintech sandboxes in achieving a balance between regulation and innovation. They

found that the effectiveness of the sandbox in promoting innovation depended on the parameters of the sandbox and how it is operated by regulators.

When the policies put in place favour the growth of fintech markets, then they play a role in enabling financial inclusion.

2.5 Regulation as an impediment to financial inclusion

Not much has been done on regulation as a hindrance to financial inclusion, nonetheless, researchers have shown that when the regulatory guidelines are too strict, they deter rather than enable financial inclusion. Claessens et al (2018) opinionated that more stringent overall regulation might be a hindrance in new forms of financial intermediation; it could deter innovation and be a barrier to potential market entrants. They reasoned that less severe regulation of fintech activities could "encourage regulatory arbitrage to the extent that similar risks are regulated more tightly in the traditional sector. Treleaven (2015) pointed out that regulation does not come without a price, the requirements are very stringent and detailed and consequently discourage innovation in new financial products. Buchak et al (2018) discovered that shadow banks were more likely to have ease of entrance where traditional banks faced heightened regulatory scrutiny. They attributed the growth of shadow banks to the regulatory pressure faced by traditional banks. Because fintech markets cuts across sectors, it makes it difficult to assign a single regulator, this then gives room for regulatory arbitrage (Didenko,2018).

2.6 The risk to telecommunication companies, fintech markets, and incumbent banks in reaching financial inclusion through the digital lending market.

To explore the risks and opportunities to central banks arising from fintech opportunities, Aaron et al (2017) found that the impact of fintech can change the make-up of the financial system in two ways; industry level through making room for new and differentiated entrants or at firm-level when incumbents modify their organizational boundaries. They further found that fintech could change the responsibility of central banks by affecting monetary policy and financial stability by changing money demand and industrial organization. GSMA (2019) attempted to explain the risks associated with mobile money platforms. They discovered that fintech markets face the risks of losing consumer trust, excessive regulation, and credit risk. This concurred with the findings of (Lorenzo, 2019; Ahern,2018; Anderson et al, 2017; Costa et al,2015) who identified three main risks associated with fintech lending; risk of predatory lending, risk of fair lending violations due to the usage of big data, and lack of transparency

that stemmed from opaque and unclear loan terms and conditions. Lake (2013) created a risk matrix to show the risks mobile money operators face. He noted that all the players-incumbent banks, telecommunication companies, and fintech markets – were exposed to reputational risk in the long term that arose from identity theft and fraud. Telecommunication companies faced additional commercial risk from transaction replay and difficulty in transacting due to delayed network. Incumbent banks faced operational risk through system and bank pool account variances while the lenders faced the risk of receipt of counterfeit notes from customers. CGAP (2018) cited over-indebtedness and multiple borrowing as the major risks to fintech markets. Fintech credit provision presents a higher chance of procyclical risk than traditional credit (Claessens et al, 2018). Ozili (2018) pointed out that since fintech markets have not undergone stress tests, their ability to survive a business cycle in the economy is highly questioned. For instance, how would they fare in a recession or a financial crisis?

2.7 Empirical review

Durai and Stella (2019) examined the impact of digital finance on financial inclusion. They used one-way ANOVA and reliability tests on the data collected and found that digital finance had a significant impact on financial inclusion. Momanyi (2018) concluded that there was a positive correlation between financial inclusion variables- access, usage, and quality- and financial stability of institutions regulated by the Banking Act. She used primary data which was obtained by a means of a questionnaire and was analysed through a multinomial logit regression. Justification to the model used was that it enabled the identification of which determinants between access, usage, and quality were stronger than others.

Anarfo et al (2019) examined the effect of financial regulation on financial inclusion in the Sub-Saharan countries' banking sector. They used the macro-prudential regulation of capital adequacy as a proxy for financial regulation and the financial inclusion index variables. With annual panel data spanning from 1990 to 2014, they used a linear mixed effect model to assess the causal relationship. The method can explicitly model individual changes across time. They discovered that tightening prudential regulations could negatively impact access to finance. They further noted that financial regulation did not affect inclusion when an institution was financially stable. This brings the question of what role financial stability has in connecting financial regulation and inclusion.

Anarfo et al (2019) further went on to assess the causal relationship between monetary policy and financial inclusion by a specification of the endogenous behaviour between the two

variables still in Sub-Saharan Africa using a sample of 48 countries from 1990 to 2014. They used the panel VAR model which allows the inclusion of weak and exogenous variables while also accounting for unobserved heterogeneity. Both monetary policy and financial inclusion were modelled as a function of their lags with inflation, GDP, and exchange rates being the control variables. Similar to their prior findings, they also found a negative relationship exists between the lag of financial inclusion and monetary policy rate. However, the lag of monetary policy had a positive impact on financial inclusion.

All the literature considered above is limited to the traditional financial services i.e., the banking industry and does not consider the emerging financial services and fintech related services.

2.8 Conclusion

Research conducted has shown that digital lending has led to financial inclusion in regulatory environments that enabled the growth of the fintech markets. There is a linkage between the success enjoyed by crowdlending platform operators and the lag in the regulatory environment (Ahern,2018). However, regulatory arbitrage comes with risks posed to all the players in the fintech market which presents a threat to the stability of the financial sector (Navareti et al,2017). The literature review shows that not much has been done in examining the effect regulatory lag has on the digital credit market and consequently, financial inclusion.

Chapter 3: Methodology

3.1 Research design

The nature of the study is correlational as it seeks to ascertain the extent of the relationship between financial regulation and financial inclusion. It employs the use of quantitative methods given the numerical nature of the variables. The study takes up a pooled cross-sectional design since the data is of a survey nature.

3.2 Data collection

Data used is aggregate from the FinAccess Household Survey 2018/2019 that sampled 11,000 households in Kenya. The survey attempts to track and measure financial inclusion dynamics and developments in Kenya from the demand-side perspective and is conducted by FSD Kenya in collaboration with CBK and KNBS. The data is sourced from the KNBS database-KeNADA.[8]

3.2.1 Description of variables

Financial inclusion

Having a mobile money account is used by the World Bank as a marker for financial inclusion "These indicators of financial inclusion measure how people save, borrow, make payments and manage risk" (Demirgüç-Kunt et al, 2017).

Financial inclusion is proxied by the following variables which attempt to measure it (FinAccess 2019),

I. Access

This variable shows access to mobile financial services based on registration and regulation. Access is categorized into formal and prudential, formal non-prudential, and formally registered.

II. Usage

This refers to the extent to which mobile financial services and products are put into use. It is captured by frequency in usage and financial service usage by institutions where in this instance are mobile money service providers and digital loan apps.

[8] http://statistics.knbs.or.ke/nada/index.php/catalog/96

III. Quality

Measures financial literacy and health and how well consumers are aware and have sufficient knowledge to make sound financial decisions.

Financial regulation

Financial consumer protection is made up of the laws and regulations that ensure financial integrity in the system and safeguard consumers in the financial market. FinAccess data sheds light on issues still faced by consumers when accessing and using financial services. I use consumer protection in mobile money usage as a measure of fintech financial regulation.

3.3 Data analysis

I model financial regulation and financial inclusion to investigate whether there exists a relationship between the two variables. Where regulation in the fintech market affects financial inclusion.

This study will employ a binomial logistic regression. The model is also known as the binomial logit model and is used because it allows for regression on variables that are dichotomous or binary. Since the data is categorical in nature, the regression model was found as best suited for use. I will create dummy variables to incorporate the variables that have two or more categories.

3.3.1. Model specification

The Multinomial logit model is generally specified as

$$Log\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_j x_i$$

The dependent variable takes two possible outcomes. That is financial regulation=1 and Financial regulation = 0.

The independent variables x_i are,

X_1 = Access

X_2= Usage

X_3 = Quality

Hence the model becomes,

$$Log\left(\frac{Probability(finreg = 1)}{Probability(finreg = 0)}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$$

The size of the logged probabilities shows the strength and direction of the relationships. Diagnostic tests such as multicollinearity tests are carried out before the regression analysis is done.

Chapter 4: Empirical results and discussion

This chapter presents the findings and results of the data analysis based on the research objectives where inferential statistics have been used.

4.1 Multicollinearity test

I tested multicollinearity by calculating the Variance Inflation Factors. Multicollinearity is the instance where the predictors in a multiple regression model have a strong linear relationship. In such a situation, it is difficult to get the exact contribution of individual predictor variables to the variance in the response variable. Thus, multicollinearity measures the extent to which the predictor variables are correlated to each other and whether this affects the strength and variation of the regression estimates.

Existence of multicollinearity is a serious problem as it increases the variance of the coefficient estimates and hence may lead to statistical insignificance of the individual predictor variables even if the overall model may be significant.

The Variance Inflation Factor (VIF) results indicated that one of the explanatory variables- mobile money access- was perfectly correlated with the other variables as it led to aliased coefficients in the model. Hence, it had to be dropped from the model.

Apart from the perfectly collinear variables, VIF measures the extent of multicollinearity for the other variables at a base of 10 where VIF's values that are higher than 10, are a sign of multicollinearity. Since the remaining variables had a VIF of less than 10: Quality- fin health (1.028393), usage-mobile money usage (1.068322), and access-

Table 1:Collinearity statistics

Variables	VIF
Access	1.039
Quality	1.028
Usage	1.068

4.2 Inferential analysis

I performed a binomial logistic regression to model the relationship between the predictor variables-access, quality, and usage-and the response variable consumer protection i.e., financial regulation.

As shown in Table 2, the estimated binomial logit model was significant at 10%. A p-value of 0.083559 showed that there is a positive and significant relationship between financial regulation and financial inclusion.

Table 2: Logit Model

Model	Log-Likelihood	Chi-square	P-value
Final	-2.4822	4.9644	0.083559

The summary of the model results shows that while financial inclusion-usage was statistically significant and positively related to financial regulation at a 10% level of significance, the remaining predictors i.e., financial inclusion under access and quality were not statistically significant in influencing financial regulation since their p-values were greater than the level of significance as indicated in Table 3ssss.

Table 3:Logit regression coefficients

	β	Standard Error	Z-value	P-value
(Intercept)	-3.409	0.124	-27.400	2.677***
Quality	0.182	0.142	1.278	0.200
Usage	0.234	0.138	1.690	0.090 .
Access	-0.093	0.115	-0.809	0.417

'.' indicates significance at 10% while '***' is significance at 5%.

Financial usage is statistically significant and positively related to Y ($\beta_2 = 0.234, P = 0.090$)

From the findings above, there exists a positive correlation between financial inclusion and financial regulation as indicated by mobile money usage as a proxy for financial inclusion. This is in line with the findings of (Momanyi,2018; Hansen & Jansen, 2010) who concluded that greater financial inclusion can be achieved through regulators and policymakers setting up policy objectives that aim to constantly incorporate quality access to a wider range of financial services.

Chapter 5: Conclusion and recommendations

5.1 Conclusion

This study sought to examine the relationship between financial inclusion and regulation in the fintech sector in Kenya. It was discovered that there exists a positive relationship between financial inclusion and regulation. Specifically, the study has shown that increased usage of digital financial services or fintech products has led to increased regulation. This implies that the policy measures put in place have ensured consumer protection, but also created an enabling environment to ensure increased quality and access to financial services.

Fintech has played a key role in enabling financial inclusion in Kenya through the digital lending and credit market. Increased financial inclusion has led to the government putting up favourable regulation measures that have created an enabling environment for the fintech industry making it constantly grow and expand its markets. Whilst the financial system has remained stable, the lax prudential guidelines towards the fintech industry are still of concern since consumers are still being exploited with data privacy breaches and high-interest rates, etc. Since regulation is directly linked to financial stability, increased inclusion through fintech, leads to greater regulation which translates to stability in the financial system.

5.2 Limitations

The study only used secondary data from the FinAccess survey (2019) and did not consider primary data due to time constraints. Hence, the variables used were proxies and did not necessarily contain the specific information needed for the analysis.

Furthermore, the unavailability of sufficient data on Fintech products in Kenya and specifically on financial regulation was also a major shortcoming.

5.3 Recommendations

The vital role that financial inclusion plays in the economy cannot be downplayed. However, it poses risks to the financial system. The government which is a key regulator can come up with policies that encourage financial inclusion, but not at the expense of financial integrity, consumer protection, and financial literacy.

Data used in the study was secondary and from a demand-side perspective, meaning focus was only placed on the beneficiaries of financial services. It is recommended that future research consider supply-side financial inclusion and risks to provide a better understanding of how regulation affects the needs of the providers of financial services.

Not much empirical research has been conducted on the fintech space, the information provided showed that there is a need to collect more data frequently by stakeholders and policymakers in this area to understand and measure the dynamics of digital financial services.

References

1. Aaron, M., Rivadeneyra, F., & Sohal, S. (2017). *Fintech: Is this time different? A framework for assessing risks and opportunities for Central Banks* (No. 2017-10). Bank of Canada Staff Discussion Paper
2. Aduda, J., & Kalunda, E. (2012). Financial inclusion and financial sector stability with reference to Kenya: A review of literature. *Journal of Applied Finance and Banking*, *2*(6), 95.
3. Ahern, D. M. (2018). Regulatory arbitrage in a FinTech world: devising an optimal EU regulatory response to crowdlending. Available at https://dx.doi.org/10.2139/ssrn.3163728
4. Anarfo, E. B., Abor, J. Y., Osei, K. A., & Gyeke-Dako, A. (2019). Monetary policy and financial inclusion in Sub-Sahara Africa: a panel VAR approach. *Journal of African Business*, *20*(4), 549-572.
5. Anderson, C. L., Klawitter, M., & Reynolds, T. (2017). Digital Credit Regulation in Selected Countries in Africa and Asia. *Evan School Policy Analysis and Research, University of Washington (11 April 2017)*.
6. Bharadwaj, P., Jack, W., & Suri, T. (2019). *Fintech and household resilience to shocks: Evidence from digital loans in Kenya* (No. w25604). National Bureau of Economic Research.
7. Bromberg, L., Godwin, A., & Ramsay, I. (2017). Fintech sandboxes: Achieving a balance between regulation and innovation. *Journal of Banking and Finance Law and Practice*, *28*(4), 314-336.
8. Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2018). Fintech, regulatory arbitrage, and the rise of shadow banks. *Journal of Financial Economics*, *130*(3), 453-483.
9. Costa, A., Deb, A., & Kubzansky, M. (2015). Big data, small credit: The digital revolution and its impact on emerging market consumers. *Innovations: Technology, Governance, Globalization*, *10*(3-4), 49-80.
10. Claessens, S., Frost, J., Turner, G., & Zhu, F. (2018). Fintech credit markets around the world: size, drivers, and policy issues. *BIS Quarterly Review September*.
11. Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution*. The World Bank.

12. Di Lorenzo, V. (2018). Fintech Lending: A Study of Expectations versus Market Outcomes. *Forthcoming in Review of Banking & Financial Law*.

13. Didenko, A. (2017). Regulating FinTech: Lessons from Africa. *San Diego Int'l LJ*, *19*, 311.

14. FinAccess (2018). Kenya FinAccess Survey. Financial Sector Deepening, Central Bank of Kenya, Kenya National Bureau of Statistics. Retrieved from http://statistics.knbs.or.ke/nada/index.php/catalog/96

15. Gibson, E., Lupo-Pasini, F., & Buckley, R. (2015). REGULATING DIGITAL FINANCIAL SERVICES AGENTS IN DEVELOPING COUNTRIES TO PROMOTE FINANCIAL INCLUSION. *Singapore Journal of Legal Studies,* 26-45. Retrieved May 19, 2020, from www.jstor.org/stable/24872271

16. Gottschalk, R. (2015). What financial regulation for stability and financial inclusion in Africa?

17. GSMA (2019), The Mobile Economy Sub-Saharan Africa 2019. Retrieved from https://www.gsma.com/mobilefordevelopment/resources/digital-credit-for-mobile-money-providers-a-guide-to-addressing-the-risks-associated-with-digital-credit-services/

18. Hannig, A., & Jansen, S. (2010). Financial inclusion and financial stability: Current policy issues.

19. Jagtiani, J., & Lemieux, C. (2017). Fintech lending: Financial inclusion, risk pricing, and alternative information.

20. Jansen, S. (2010). Managing the Risks of Mobile Money: The Banking Agent Reform in Kenya-A Scenario-Based Policy Analysis. *Harvard Center for International Development Working Paper*, (45).

21. Johnson, S. (2016). Competing visions of financial inclusion in Kenya: the rift revealed by mobile money transfer. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, *37*(1), 83-100.

22. Kaffenberger, M., & Totolo, E.. (n.d.). 2018, "A Digital Credit Revolution: Insights from Borrowers in Kenya and Tanzania." Working Paper. Washington, D.C.: CGAP

23. Karlan, D., Kendall, J., Mann, R., Pande, R., Suri, T., & Zinman, J. (2016). *Research and impacts of digital financial services* (No. w22633). National Bureau of Economic Research.

24. Klein, M., & Mayer, C. (2011). *Mobile banking and financial inclusion: The regulatory lessons*. The World Bank.

25. Kodongo, O. (2018). Financial regulations, financial literacy, and financial inclusion: Insights from Kenya. *Emerging Markets Finance and Trade*, *54*(12), 2851-2873.Retrieved from: https://doi.org/10.1080/1540496X.2017.1418318
26. Lake, A. J. (2013). *Risk management in Mobile Money: Observed risks and proposed mitigants for mobile money operators*. World Bank.
27. Li, Y., Spigt, R., & Swinkels, L. (2017). The impact of FinTech start-ups on incumbent retail banks' share prices. *Financial Innovation*, *3*(1), 26.
28. Momanyi, D. K. (2018). Influence of Financial Regulation in Kenya on Financial Inclusion: A Case Study of the Banking Industry in Kenya
29. Mugo, M., & Kilonzo, E. (2017). Community-level impacts of financial inclusion in Kenya with particular focus on poverty eradication and employment creation. *Central Bank of Kenya*.
30. Muthiora, B. (2015). Enabling mobile money policies in Kenya: Fostering a digital financial revolution. *GSMA Mobile Money for the Unbanked*.
31. Navaretti, G. B., Calzolari, G., Mansilla-Fernandez, J. M., & Pozzolo, A. F. (2018). Fintech and Banking. Friends or Foes? *Friends or Foes*.
32. Ondiege, P. E. T. E. R. (2015). Regulatory Impact on Mobile Money and Financial Inclusion in African Countries-Kenya, Nigeria, Tanzania, and Uganda. *Center for Global Development (CGD)*, 50.
33. Rosengard, J. K. (2016). A quantum leap over high hurdles to financial inclusion: the mobile banking revolution in Kenya.
34. Thulani, M., Chitakunye, P., & Chummun, B. Z. (2014). Mobile Money as a Strategy for Financial Inclusion in Rural Communities. *Mediterranean Journal of Social Sciences*, *5*(25), 216. Retrieved from http://www.richtmann.org/journal/index.php/mjss/article/view/5365