Moderating Effect of Financial Innovations on the Relationship Between GDP Per Capita and Financial Performance of Commercial Banks in Kenya

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Abstract

Profitability of commercial banks in Kenya have been declining since 2010 which was largely attributed to macro-economic factors, fiscal policies introduced by central bank of Kenya and market activities such as issuance of bonds and capping of interest rates. There has also been increased integration due to embracement of financial innovations in the banking sector however the moderating effects of financial innovations on the relationship between GDP per capita and financial performance is still uncertain. The objective of this study was to investigate the moderating effect of financial innovation on the relationship between GDP per capita and financial performance of commercial banks in Kenya. The study was based on two theories: Keynesian Economics theory and Constraint Induced Financial Innovation Theory. The study utilized secondary data for 10-year period as from 2011 to 2020. The target population of the study was 42 commercial banks that are licensed and supervised by the Central Bank of Kenya. Secondary panel data on financial performance of Commercial Banks was obtained from the individual institutions' financial reports while data on macroeconomic factors was obtained from both Central Bank of Kenya and Kenya National Bureau of Statistics. Return on assets was used to measure financial performance. The study found a significant and positive relationship (b=0.594, t=2.939, p=0.022) between GDP per capita and ROA. The study found no moderating effect of financial innovations on the relationship between GDP per capita and financial performance of commercial banks. The study recommends that banks should implement the highest degree of innovations, which will enable them achieve very high ROA.

Keywords: *Financial Innovations, GDP per capita, Financial Performance, Commercial Banks, Moderating effect.*

1.0 Background of the study

Performance of commercial banks is affected by internal and external factors (Ongere, 2013), which can be classified into financial innovations and macroeconomic factors. Financial innovations are internal factors specific to individual banks which affect the bank performance. Macroeconomic factors, such as GDP, are sector-wide or country-wide factors that are beyond the company's control and affect the performance of commercial banks. To survive in the long run, a banking institution must identify the performance determinants so that it can take initiatives to increase profitability by managing the dominant determinants (Kiganda, 2014). The trend of GDP per capita has an impact on the demand for bank assets. The decline in GDP per capita growth rate leads to a decrease in credit demand, which has a negative impact on bank profitability. On the contrary, due to the nature of the business cycle, credit demand is high in a growing economy, as measured by positive GDP per capita growth. In comparison to a recession, credit demand is high during a boom (Athanasoglou *et al.,* 2005). GDP per capita growth has fluctuated over time.

Increased integration via advanced financial innovations, as well as rising economic fluctuations, necessitate increased focus. Banks have used financial innovations as formidable strategic variables to outperform any form of competition, becoming an effective means for banks to improve their performance while maintaining market effectiveness. The impact of financial innovations on the strength and direction of the relationship between macroeconomic factors and financial performance, on the other hand, remains unknown. This study filled a gap in the literature by empirically investigating the moderating effect of financial innovations on the relationship between macroeconomic factors and Commercial Bank Financial Performance. The study lasted ten years and employed a more sophisticated analysis technique, Panel data years (2011-2020).

2.1 Theoretical review

2.1.1 Keynesian Economics Theory

Keynesian economics was developed by the British economist John Maynard Keynes during the 1930's in an attempt to understand the Great Depression. Keynesian economics theory is a theory of total spending in the economy and its effects on output, employment, and inflation. Keynesian economics theory is considered a "demand-side" theory that focuses on changes in the economy over the short run. Keynes's theory was the first to sharply separate the study of economic behaviour and markets based on individual incentives from the study of broad national economic aggregate variables and constructs. This theory is relevant to the study since it described the total spending in the economy and its effects on output and inflation. Keynesian believes that aggregate demand is influenced by a host of economic decisions both public and private and sometimes they behave erratically. The public decisions include, most prominently, those on monetary and fiscal (i.e., spending and tax) policies.

2.1.2 Constraint Induced Financial Innovation Theory

The theory was developed by Silber in 1983. Silber argues that the entities have a purpose of maximizing their profits and this is the main factor contributing to innovations. The theory stated that the main motive for embracing financial innovation in a firm is to improve its financial position. However, in the process of improving financial performance, a firm faces some constraints like external handicaps such as policy and internal handicaps such as organizational

management. The constraints not only give an assurance on the stability of the management they reduce the competence of any financial institution. Thus, financial institutions struggle toward removing or lessening or casting the constraints off through financial innovation (Silber, 1983).

The theory was relevant to this study because it sheds light on the reasons that make banks venture into financial innovations (Ryabov, 2019). Financial constraints significantly reduce the probability that a firm undertakes innovative projects. According to Kombe and Wafula (2015) financial innovation occurs to remove or lessen the constraints imposed on firms. Firms facing imperfections (e.g. regulation, entry barriers) have the greatest incentive to innovate and boost profits because of the high shadow costs of such constraints (Kombe & Wafula, 2015).

2.2 Empirical review

Hasan *et al.* (2012) used descriptive survey research design to track an integrated and comprehensive view of the significance of IT on the retail payments for the performance of Commercial Banks. The researchers examined the retail payment services across 27 European Union markets. They document a rich relationship in regions with better retail payment transaction systems such as ATMs and POS. Generally, technology greatly impacts the way the financial institutions conduct their business. IT facilities guarantee a broad range of alternative and options that make the market viable for business. Okibo and Wario (2014) using the descriptive survey research methodology, examined a random group of selected banks in Kenya to examine the impacts of e-banking on growth of client base. The research used purposive sampling to select three banks and stratified random sampling approach to ensure equal representation. They focused their study on services provided by the banks, availability of services, level of education and adoption, and the issues surrounding e-banking. They concluded that e-banking has influenced the development of the client base for the Commercial Banks in Kenya, by improving the accessibility of banking services to a larger populace in the nation.

Hong and Razak (2015) conducted a study on the impact of nominal GDP and inflation on the financial performance of Islamic banks in Malaysia. The aim of this paper was to analyse the financial performance of Islamic banks in Malaysia measured using ratio analysis of profitability, liquidity, credit risk and impaired financing performance. The study also includes determining the impact of nominal Gross Domestic Product (GDP) and inflation rates on the variables of profitability, liquidity, credit risk and impaired financing performance during the period spanning from year 2007 to year 2011. In order to analyze the performance growth of the Islamic banks, the financial data was generated from Bank scope for the duration of year 2007 until 2011. The period chosen include the U.S. financial crisis as the results should portray the resilience of the Islamic Banks. The study concluded that the log linear regression between nominal GDP and inflation rate as the dependent variables show that nominal GDP has significant and positive impact on ROAA (return on average asset) and liquidity ratio and EQL (equity to total liquidity). Nyathira (2012) studied the effect of financial innovation on commercial bank's financial performance over a period of 4 years. The causal research design was used to carry out the study. The population of study was all the 43 commercial banks in Kenya as at 30th June 2012. The study used secondary data from published central banks' annual reports. Study results indicated that financial innovation indeed contributes to and is positively correlated to profitability in the banking sector particularly that of commercial banks. This is further supported by high uptake of more efficient financial systems in substitution for the less efficient traditional systems. This is evidenced by the negative

correlation between Real Time Gross Settlement and Automated Clearing House (Cheques & EFTs) throughput over time; as well as that of profitability and Automated Clearing House throughput. However, the study period was short; four years.

Similar to Kithinji (2017) and Kamande (2018) examined the influence of electronic banking on the Financial performance of Commercial Banks in Kenya. The study used the descriptive cross-sectional research design and collected data from a sample size of 42 commercial banks. Amongst the aspects of electronic banking that was examined included the ATM banking components. While noting the role of ATMs in the improvement of the financial inclusion and Financial performance of Commercial Banks, (Kamande, 2018) however noted that the mobile and internet banking are increasingly being preferred amongst the bank customers. The ATM banking as measured using the ATM banking transactions was found to have statistically insignificant positive correlational relationship with financial performance (r=0.075). (Kamande, 2018) further found that ATM banking had a statistically insignificant predictive influence on the Return on Assets (ROA) within the commercial banks.

3.0 Research Methodology

A cross-sectional descriptive survey design was used in this study. This study's population consisted of 42 commercial banks licensed by the Central Bank of Kenya between 2011 and 2020. There was no sampling because this was a census study. Secondary data from 42 banks' annual financial reports from 2011 to 2020 were used in the study. The collected data was checked for missing values, extreme values, errors, and inconsistency as part of the data cleaning process. This included employing Histograms and Box plots to aid in data visualization and the detection of anomalies. Descriptive statistics, panel unit roots, stationarity tests, co-integration tests, Housman tests, and post-estimation diagnostic tests were used to analyze the data. Using Tables, the analysis results were presented as percentages, means, standard deviations, and frequencies.

4.0 Findings and Discussion

The study targeted 42 commercial banks registered with CBK (2019), with each firm being studied for a period of ten years (from 2011 to 2020). To minimise truncated data, three banks, Chase Bank (K) Ltd, Dubai Bank Ltd, and Imperial Bank, Ltd which were placed in receivership in the 2015/2016 financial year, were dropped from the analysis, as they were missing roughly a half of their data. Unbalanced data sets might make some statistical models to be invalid (Maddala, 2001). However, CBA (Commercial Bank of Africa) and Giro Bank were included in the study as they only missed data for two and three years, respectively. CBA became defunct in 2019, having merged with the NIC Group (Mohammed, 2019). On the other hand, Giro Bank was acquired and absorbed by I & M Holdings in 2017 (CBK, 2018)

Consequently, of the 42 targeted banks, data were collected from 39 of them, giving a response rate of 92.86%. Each firm was studied for a period of ten years (from 2011 to 2020), except CBA and Giro Bank, giving a time series data of 385. The response rate reflected the view of Mugenda and Mugenda (2003) who indicated that a response rate of 70% and over is very good as it gives a representative sample for meaningful generalization and minimizes errors.

To test for moderation, panel data with 385 observations was used. To compute financial innovation, the three variables (value of KEPSS, mobile phone transactions and payment cards) in millions Kenya shillings were summed up and an average taken. The average was converted to

natural logarithms and this constituted the variable, financial innovations. Summary statistics and histogram of financial innovation is displayed in Figure 1.
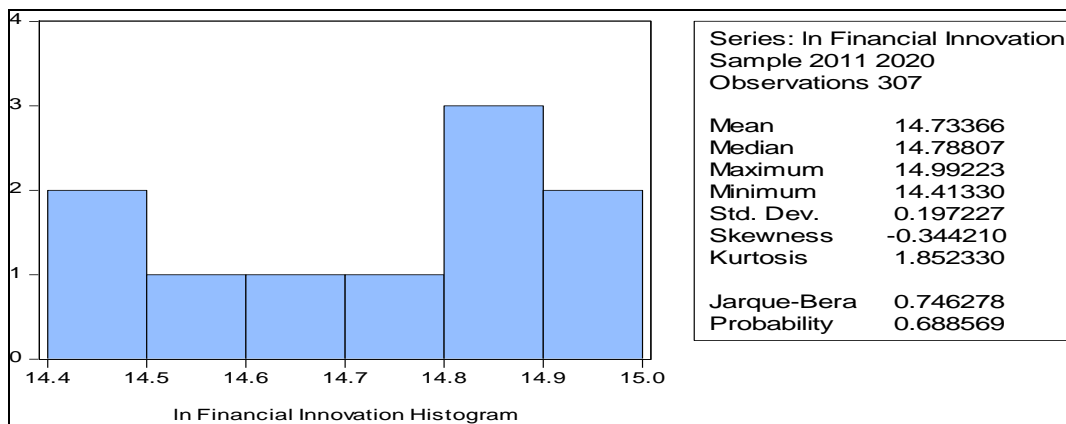
Figure 1: Summary Statistics and Histogram of Natural Log of Financial Innovations

Financial innovation (ln) ranged from a minimum 14.413 to a maximum 14.992, with a mean of 14.734. The median (14.788) was very close to the mean, suggesting the series could be normal. The standard deviation was 0.197, suggesting most values fell between from 14.537 to 14.931. The skewness (-0.344) and kurtosis (1.852) were all within the benchmark ± 2 (Field, 2005), suggesting that the distribution of financial innovation was normal. These conclusions were validated by results of the more explicit test for normality, *JB* (Jarque-Bera) = 0.746, *p*=0.689. The null hypothesis of the test is that the data is normally distributed. The results showed that the null hypothesis could not be rejected and hence the study concluded that the distribution of ln of financial innovations was normal. The results showed that transformation of the original data into natural logarithms ensured normality in the data.

First, before running tests for moderation, the effect of financial innovations on ROA was tested. A Haussmann test was conducted to determine whether a fixed or a random effects model was appropriate for the data. Results from the Haussman test, χ^2 (1) = 1.49, *p*=0.222, showed that the null hypothesis (that individual effects are not significantly correlated with at least one of the regressors) could not be rejected at 0.05 level. Thus, the results suggested that financial innovations were not significantly correlated with individual effects, showing that a random effects model was more appropriate for the data relative to a fixed effects model. The results of the random effects regression of ROA and financial innovations is given in Table 1. The random effects regression of ROA and financial innovations is given in Table 1.

Table 1: Random effects Regression Analysis for ROA and Financial Innovation

	B	**Std. Error**	**t**	**Prob.**	**95% CI**
Constant	-9.65	1.707	-5.65	0.000	-6.694
Financial innovation	2.195	0.335	6.54	0.000	1.537 – 2.852

Key: Fin. Innov.ln=Natural logarithm of financial innovation, CI=confidence interval

The Wald's Chi- square test was found to be significant, χ^2 (1) = 42.76, $P<0.0001$, which indicated that the model adequately fitted the data. The results suggested that all the coefficients in the model were significantly different from zero. The value of *rho* (interclass correlation) was 0.528, which indicated that about 52.8% of the variance in the error term was due to differences across panels.

The *B* coefficient for financial innovation was 2.195 and it was statistically significant at $p<0.05$ ($t= 6.54$, $p<0.0001$). This suggested that showed that financial innovations have a significant and positive effect on financial performance of banks as measured by ROA. The results indicated that when natural log of financial innovations increases by one unit across time and between banks, ROA goes up by 2.195 or 481% ($r^2 = 2.195^2 = 4.818$). The 95% confidence interval for the coefficient ranged from 1.527 to 2.852. Thus, 95 times out of 100, when the population is sampled, there is 95% chance that the interval will cover the *B* coefficient for the variable. Since the confidence interval did not include a value of zero, it further supported the conclusion that the *B* coefficient was likely to be significant.

The within R^2 was 0.155, which indicated that financial innovations could explain about 16% of the variance in each bank. On the other hand, the between R^2 was 0.015, which showed that financial innovations could account for just about 2% of the variation between different banks. Overall, financial innovations could explain about 10% of the variation between and within banks. Standardized beta coefficients were not reported for panel data because they are meaningless. Instead, confidence limits were reported. This is because standard deviation in panel data is not clear whether it applies to the whole sample (pooled) or within each panel separately and what each means (Park, 2011; Baltagi, *et al.,* 2013).

Table 2 presents results on the moderating effect of financial innovations on the effect of gross domestic product per capita on financial performance of commercial banks in Kenya.

Table 2: Financial Innovation and GDP per Capita on ROA

	B	Std. Error	t	Prob.	95% CI
Constant	1.544	0.152	10.192	0.000	1.246 – 1.843
Gdpcapln	3.329	0.896	3.715	0.002	1.565 – 5.093
Fin. Innov.ln	1.494	0.364	4.1	0.0001	0.776 – 2.211
GDPlnXFIln	1.871	2.417	0.774	0.439	-2.887 – 6.629

Key: Fin. Innov.ln=Natural logarithm of financial innovation, CI=confidence interval.

GDP=GDP per capita.

The *B* coefficient for the interaction between GDP per capita and financial innovation was 1.871 and was not statistically significant at $p<.05$ ($t= 0.774$, $p=0.439$; CI: -2.887 – 6.629). Thus, the study found no evidence for the interaction between GDP per capita and financial innovation.

Furthermore, the CI for the coefficient spanned the value of zero, suggesting that this coefficient could be zero in the population. Thus, the study fails to reject the null hypothesis and concluded that there is no statistically significant moderating effect of Financial Innovations on the effect of Gross domestic product per capita on Financial Performance of Commercial Banks in Kenya concluded that financial innovations do not moderate the effect of gross domestic product per capita on financial performance of commercial banks in Kenya.

The study found that financial innovations do not moderate the effect of gross domestic product per capita on financial performance of commercial banks in Kenya. There are few empirical studies that report the moderating effect of financial innovations on the effect of macroeconomic variables on financial performance. Thus, this could be one of such studies. For instance, Hasan *et al.* (2012) used descriptive survey research design to track an integrated and comprehensive view of the significance of IT on the retail payments for the performance of Commercial Banks and found a significant relationship in regions with better retail payment transaction systems such as ATMs and POS. Nyathira (2012) reported that financial innovation contributes to and is positively correlated to profitability in the banking sector particularly that of commercial banks, in a study of 43 commercial banks in Kenya over a period of 4 years beginning 2012. Okibo and Wario (2014) found that e-banking has influenced the development of the client base for the Commercial Banks in Kenya, by improving the accessibility of banking services to a larger populace in the nation.

The foregoing studies all document the relationship between various financial innovations and performance of banks. However, they all fail to report on the moderating role financial innovations could play in the relationship between DGP per capita and financial performance of commercial banks. This study contends that GDP per capita is an external event that banks cannot manipulate. Commercial banks do not have direct control over the GDP per capita. Consequently, although banks could manipulate financial innovations, they cannot do so for GDP per capita. This lack of flexibility over GDP per capita could explain the inability of financial innovations to moderate the relationship between the former and financial performance of banks.

Consider the following. A bank consciously invests in financial innovation and hence increasing it, resulting in higher ROA. However, it cannot do much about GDP per capita, which could remain constant or even decrease even when financial innovations are increasing. Thus, while financial innovations will have a positive effect of ROA (as borne out by the results from the study), there will be lack of an interaction between financial innovations and GDP per capita.

5.0 Conclusion

The study found that financial innovations do not moderate the effect of gross domestic product per capita on financial performance of commercial banks in Kenya. This study concluded that because of the external nature of GDP per capita, commercial banks cannot easily manipulate it, unlike for financial innovations, explaining the absence of the moderating effect.

6.0 Recommendations

One limitation of this study was that time series data was only for a period of ten years. Other studies could be conducted with longer periods, which could improve the statistical power of tests. Regression findings from this study on interest rates was not absolutely conclusive. Other studies could be conducted to delineate more clearly the effect of interest rates on bank performance.

This study failed to find a moderating effect of financial innovation on either the effect of gross domestic product per capita on financial performance of commercial banks in Kenya. Other studies, in other time periods or longer study times could be conducted to support or reject the findings from this study.

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