Sectoral Credit Portfolio Diversification and Financial Performance of Commercial Banks in Kenya

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Abstract The current balance sheet being the starting point, this study builds a multi-objective approach to move to an optimal balance sheet while at the same time putting into consideration the constraints that face the banks. Considering the nature of banking and their operations, banks do not have enough deposits to ensure that there is a guarantee of fulfilling requirements by regulatory authorities of liquidity. For this reasons, Banks are exposed to portfolio diversification losses if they fail to effectively and efficiently recover loans advanced to customers. An alarm is therefore, raised by this scenario which is very critical to the role of banks in intermediation. The sectoral credit diversification as a strategy in the context of Kenya was therefore assessed whether it enhances bank profitability. The study adopted correlational research design. The 43 commercial banks licensed by Central Bank of Kenya by December 2017 were the target population of this study. The study analyzed Time Series Cross Sectional unbalanced secondary panel data obtained from Kenya National Bureau of Statistics, World Bank website, Central bank of Kenya, published financial accounts statements of all the 43 commercial banks in Kenya, and the Banking survey publications for fifteen years ranging from 2003 to 2017. Sectoral credit diversification to the four sectors was found to have a significant positive effect on financial performance in Kenya. The study recommended that Commercial banks in Kenya should devise measures geared towards consolidation of credit information and data which would aid in management and provision of credit services amongst different stakeholders and distribution of credit across various sectors of the economy.

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1. Introduction

For development and rapid growth of a country's economy, banking system contribution is fundamental as deposited surpluses in banks is the avenue resources are extended in a manner that is efficient and effective units of economy experiencing deficit. The financial sector which comprise of the banking as well as non-banking participates in the composition of existing assets types that the public can accept to hold, from the liabilities types debtors will be willing to incur. It will therefore embark on size transformation, maturity and riskiness of various classes of assets, and henceforth enhances the ambitions of savers with perspective to buy long term assets. Retail banks mainly raise short term deposits, but can still make these deposits behave as if they are of long-term structure through continuous flow of deposits from depositors. Intermediation of resources is the basis and pertinent business of the banks, more so in nations that are developing like Kenya where resources available seem not adequate or sufficiently able to fulfill the economy capital and needs in terms of developments (Nnanna, [1]).

It is important to examine the input-output mix portfolio of these banks and how they have interacted with one another to determine the individual aggregate performance levels. The aim of activities of credit diversification is to reduce the levels of risk emanating from loan default in the side of borrowers which is known as default risk through deposit allocation and non-deposit funds borrowing among different customer groups belonging to different sectors or geographical locations or by the introduction of new products in regard to credit facilities (Jahn & ets, [2]). Lending specialization can also help achieve the reduction of credit. Lending specialization can be attained by reducing diversification ratio either in the diversity of customers who qualifies for credit or in credit types, which in return lead to enhancement of bank ability in screening out categories of doubtful loans.

Deposits and loans portfolio of the banks, if not properly managed, will make it impossible to attain expected outcome. Portfolio in this sense means mix of

deposits by term structure and costs while the mix of credits granted is by term structure and lending rates. These mixes will translate into the risks being undertaken by banks and how these risks will affect performance. Portfolio is synonymous with diversification and it addresses the management of unsystematic risk factor inherent in the type of operation of the banks (Odhiambo, [3]).

Consequently, the main objective of the study was to ascertain the effect of sectoral credit diversification on financial performance of commercial banks in Kenya. The specific objectives for the study were:

i. To examine the effect of house hold credit on financial performance of commercial banks in Kenya
ii. To evaluate the effect of primary sector credit on financial performance of commercial banks in Kenya
iii. To determine the effect of secondary sector credit on financial performance of commercial banks in Kenya
iv. To examine the effect of tertiary credit sector on financial performance of commercial banks in Kenya

The study was based on the following hypothesis:

Ho1: Household credit has no significant effect on financial performance of commercial banks in Kenya.

Ho2: Primary sector credit has no significant effect on financial performance of commercial banks in Kenya.

Ho3: Secondary sector credit has no significant effect on financial performance of commercial banks in Kenya.

Ho4: Tertiary sector credit has no significant effect on financial performance of commercial banks in Kenya.

2. Theoretical and Empirical Literature

2.1. Shiftability Theory

The proponent of the above theory was Moulton [4] and further advanced by authors such as Dodds [5] and Herbert [6]. It indicates that liquidity of banks will be maintained if it's holding assets that are shiftable or can be sold for cash to other lending firms or investors. Shiftability of assets points to the capability of financial resource to be moved among persons or banking establishments at prices that are negotiated. Liquidity of any bank according to shiftability theory is dependent on the capability to move assets to another person at the negotiated price. It is a theory based on an assumption that liquidity of banks will be sustained by retaining assets that have resale value or shifted to further lenders, investors or institutions for cash at shorter notice. Banking attentiveness pertaining to deposit have a tendency to be attended finely if these assets can be shifted to enable it readily to attain liquidity as the need arises. In Kenya, the shiftability theory is widely acceptable by banks which do a considerable investment of their resources in government securities such as treasury bills, treasury certificate as well as securities that are marketable. The shiftability theory does not recommend commercial loans to be termed as bank assets that are inappropriate rather it recommends commercial loans are not the only appropriate asset (Herbert, [6])

The theory intends to attract bankers' attention from credit to investment to enhance bank liquidity. It is only appropriate for banks to hold a portfolio that comprises open market short-term investments. If investments in the short-term are held, it could aid banks in meeting the demands from customers for withdrawals of available cash or assets of near-cash easily bought for cash. If loans are not repayable, loans collateral security can only be sold in the open market depending on their marketability, or discountable with the central bank. Converting an asset into money by way of sale or shiftability, the transaction can only be voluntary between both money holders. According to Mutton, [7], an asset being shiftable is seen as an act that is simplistic and at length to which it can be transferred to an individual or institution. Bank deposits thus satisfy the requirement of shiftablitity.

Shiftability theory holds the assumption that there is a need for assets not to be tied not only to self-liquidating bills, but also to the ones held in other forms of assets that are shiftable in the open-market like government securities (Moti, Masinde, Mugenda, & Sindani, [8]). The shiftability theory has taken a view that is more general regarding the business of banking by widening classes of assets argued legitimately for a bank to own. The motivation from shiftability theory emanates from the fact that liquidity of a bank is dependent on its capability for shifting its possessions to another person at a predictable price. According to Hosna, Manzura and Juanjuan, [9], the shiftability theory had a profound effect on banking practices whereby can hardly be denied. What it did was to redirect the attention of bankers and authorities of banking to deviate from loans to investments to boost liquidity. The defect of the theory was that despite one bank obtaining liquidity that is required by changing its portfolio of assets, it doesn't hold for banking institutions combined.

2.2. Empirical Literature

Meressa [10] study investigated sub-sectoral loan plus advances distribution linkage with operating profit of private banks over the entire period between 2010 and 2016 using a short panel that was unbalanced. Following the post-positivist paradigm, the paper used a design that is correlational having the angle of variables ex-post control; dimension of longitudinal time; an in-depth approach that is quantitative; and method of enquiry known as deductive. The study targeted all 16 Ethiopian banks that were privately owned. Banks that had seven years of a financial yearly report from the year 2010 to the year 2016 were sampled purposely. The comparison was carried out among Pooled OLS, models of FE and RE to choose the model best fitted for the study. Accordingly, a model of random effects was appropriate. From the finding of a model of random effects GLS, it was deduced that sectoral allocation of credit to trade in domestic market and service, sector of manufacturing, and category of import and export has statistically positive and significant linkage with operating profit. Sectoral allocation to secondary sector building and construction and transportation had a positive relationship that is statistically insignificant with income from interest. Banks' allocation of credit to sector classified as agricultural

revealed a negative linkage that is statistically insignificant with operating profit.

Yudistira and Anggono, [11] did research that aimed at analyzing lending by banks to various economic sectors in Indonesia for the period between the year 2003 and year 2011 and their link to banks' operating profit. Data on trade, building, manufacturing, transport, agricultural, export and import were gathered from statistics of banking institutions in Indonesia. Regressions were employed to assess the linkages between credit allocations to each of the sectors of the economy to operating profit of the banks. The author's findings can be useful to banks when making decisions on the distribution of credit. The analysis revealed that tertiary sector including Oil and Gas, Electricity and Water Sector, Building Sector, Transport, Warehousing, and Communication, Business Services, and Consumer Loans classifications have an effect that is significant and that has a strong relation with commercial bank's operating profit.

Turkmen and Yigit, [12] using descriptive design ascertained the impact of diversification in sectors and regions on banking performance that was in Turkey and tried to show how diversification affects banks' performance. The paper argues whether diversification pursued through credit allocation in sectors and geographically benefits banks. To assess link existing between diversification of credit and how fifty Turkish banks performed for period between the year 2007 and 2011, data from The Banks Istanbul Stock Exchange, Association of Turkey, Banking Regulation and Supervision Agency concerning eight sectors namely, Textile, Food, Financial institutions, Construction, Beverage and Tobacco, Metal and Crude mine, Fishing, Intermediate trade, Wholesale trade, Tourism and Agriculture was collected. In this study, ROA and ROE represented an indicator of performance and Herfindahl Index-HI measurement of banking diversification was as well used. The study employed credit number and credits amounts that banks let borrowers' utilize as overdrafts as control variables. From the findings of the analysis, it is determined that variables that are dependent that included ROA and ROE were significantly explained by diversification scale by banks. The tertiary sector, wholesale, trade and Construction are two sectors that drive the economy and that bank commercially and preeminently lend for most years.

Kazan and Uludag [13] did a study on the selection of credit portfolio in accordance with sectors in environments that are risky, the practice of Markowitz. In this assessment, information analyzed was from Central Bank in the context of the Republic of Turkey. It was a research on the way the loan rate of repayment can be raised and ways risk of default in the banking sector can be lowered with the help of Portfolio Theory of Markowitz. Wholesale and retail, construction, agriculture and textile among other categorizations were assessed based on data from the central bank. Groups of portfolio composition were identified and risks measured by variances of the portfolio classes underwent assessment in accordance with the portfolio theory of Markowitz which was successful than the other instruments used for portfolio identification. Even though classical risk measurement tools can assist to quantify exposures, they

are not able to provide a remedy on how these exposures can be lowered. Portfolio model of Markowitz, which was considered in the study, prescribes how risks can be minimized.

Acharya et al., [14] empirically studied whether the banks adopt diversification being evidence from loan portfolios of individual banks. The main aim was to establish the focus effect or specialization versus return diversification and the riskiness of banks. The inquiry utilized data for 105 banks from Italy along with a duration from 1993 to the year 1999. The study analysis was on the tradeoffs existing between the portfolio of loan or focus and diversification using data that led to the identification of loan exposures to industries that are different, various sectors among others agriculture, manufacturing, household, energy, and based on a bank by bank. The study findings were consistent with the hypothesis that proposes effectiveness of monitoring deterioration by banks at higher grades of risk exposure and upon expanding of lending into fresher or industries which are more competitive. The most pertinent finding was that sectoral lending diversity and industrial diversification of credit reduces the return of banks as it produces loans that are riskier endogenously for banks of high diversity in the sample. Diversification for lowly risky banks either produces risk-return tradeoff that is inefficient or produces a marginal improvement financially. A more robust empirical study finding that emerged was that diversifying assets of a bank does not guarantee superior results or greater performance for banks.

Chen et al., [15] study was on credit diversification into sectors and the return and risk of banks which was an evidence of banks that were listed in China. The paper sought to investigate impacts as a result of sectoral diversification on yields and exposure of Chinese banks. Sectors included personal, manufacturing, trade and financial services, transport and communication energy, water, mining and quarrying, building, construction and real estate, agriculture, tourism. The study used panel data on a total of sixteen listed banks for the duration between the year 2007 and 2011 period. A different diversification measure was constructed by considering the risk that is systematic in various sectors and weighting these risks with their betas and undertakes a comparison of the results with those of more HHI measure that is convectional. The study findings were sectoral diversification has an association with the return that is lower and similarly lowers risk, which indeed, disputes findings in existence in countries that are developed and more so economies that are emerging.

Mokaya and Jagongo [16] did a research study in Kenya that sought to investigate the linkage that exists amongst diversifying the portfolio of corporate loan and management of credit risk, the population of focus being banks. The assessment was propelled by specific objectives which were; to determine whether there is a relationship between diversification which is geographical and reduction of credit risk, to investigate the exact association of industry or sectors diversity and management of risks on credit and to investigate type of linkage that exists between borrowing size of the company and management of risks on credit of banks operating in

Kenya. The research design employed in this assessment was descriptive. The study target respondent totaled to 86. Collation of data was done with the aid of questionnaires which were structured. Data gathered was sorted, coded in excel and statistical analysis undertaken with the aid of software SPSS. Statistical inferences which were descriptive were employed and data presented in plots and tables. The findings on diversification geographically were p=0.113, r=0.197 indicating no association with credit risk management. On industry or sectors diversification, p=0.001, r=0.515 highlighting an association was found to exist with and credit risk management. On size diversification and banks management of risk on credit, p=0.004, r=-0.351 was also found suggesting the existence of an association. The study recommended the establishment of a framework that assists determine the borrowing companies' size and their ability to flourish over a span, standards that help to identify borrowing companies based on the level of corporate tax parameters and sectors such as manufacturing, wholesale and retail, construction, textile, agriculture, production and service industries.

The study that was done Gönenç and Kılıçhan [17] sought to investigate the connection that subsists between the diversification of the portfolio of credit and the performance level of all the banks operating in Turkey. The estimation in the research study used was a linear panel data method. The study data had to be limited for only two years between 2001 and 2002 because of data limitations such as availability. The authors' observation was that there exists an opposite relationship which is significant between diversification and performance level measured by ROA. More study emphasizing on longer periods of study needs to be conducted.

3. Research Methodology

The study adopted correlation research design and secondary data was gathered from annual financial statements of commercial banks in Kenya. Panel data collected was analyzed using descriptive statistics, regression and correlation analysis. Study findings are presented in tables and figures. Data collected included Personal/Household, Primary sector comprising of Agriculture, Mining and Quarrying, Secondary sector comprising of Manufacturing, Building, construction, Real Estate Energy and water, Tertiary sector comprising of Trade and Financial Services, Tourism, Restaurant and Hotels, Transport and Communication

To make a prediction on the effect of sectoral credit diversification on the commercial banks' financial performance in Kenyan context, the study deployed long run also called static and short run also referred to as dynamic, panel models. The long run models make an assumption that previous period's performance did not have an impact on the present period's performance and as a result, no lagged or persisting dependent explanatory variables was present in the model. Short run models held the assumption that immediate previous period performance, lagged dependent explanatory variable, had an influence on the present period's performance. The

short run models as a result assumed that there was persistence emanating from incomplete adjustment in the performance process.

$$ROEi,t = f\left(CRPER, CRPRI, CRSEC, CRTER\right) \quad (3.1a)$$

$$ROAi,t = f\left(CRPER, CRPRI, CRSEC, CRTER\right) \quad (3.1b)$$

Upon linearization and parametization which involved transforming the variables into natural logarithms the long run model was specified as:

$$
\begin{aligned}
ROEi,t = \beta o &+ \beta 1 CRPERi,t + \beta 2 CRPRIi,t \\
&+ \beta 3 CRSECi,t + \beta 4 CRTERi,t + \alpha i + \varepsilon it
\end{aligned} \quad (3.1c)
$$

$$
\begin{aligned}
ROAi,t = \beta o &+ \beta 1 CRPERi,t + \beta 2 CRPRIi,t \\
&+ \beta 3 CRSECi,t + \beta 4 CRTERi,t + \alpha i + \varepsilon it
\end{aligned} \quad (3.1d)
$$

And the short run model was specified as:

$$
\begin{aligned}
ROEi,t = \beta o &+ \lambda ROEi,t - 1 + \beta 1 CRPERi,t \\
&+ \beta 2 CRPRIi,t + \beta 3 CRSECi,t \\
&+ \beta 4 CRTERi,t + \alpha i + \varepsilon it
\end{aligned} \quad (3.1e)
$$

$$
\begin{aligned}
ROAi,t = \beta o &+ \lambda ROAi,t - 1 + \beta 1 CRPERi,t \\
&+ \beta 2 CRPRIi,t + \beta 3 CRSECi,t \\
&+ \beta 4 CRTERi,t + \alpha i + \varepsilon it.
\end{aligned} \quad (3.1f)
$$

Where:
CRPER is Personal/Household, CRPRI is Primary sector (Agriculture, Mining and Quarrying), CRSEC is Secondary sector (Manufacturing, Building, construction , Real Estate Energy and water), and CRTER is Tertiary sector (Trade and Financial Services, Tourism, Restaurant and Hotels, Transport and Communication) for Bank i at time t, αi is specific effect to a bank which is assumed to be distributed normally and with a variance that is constant and εit is the idiosyncratic error term assumed to have a distribution that is normal and denotes other variables that were not included in this study. β represents coefficients of the independent variables, λROEi,t-1 is lagged bank performance. β0 is the value of the financial performance holding all independent variables effect is zero.

4. Findings and Discussion

4.1. Descriptive Statistics for Sectoral Credit Diversification

The study examined the effect of sectoral credit diversification on commercial banks performance in Kenya. Sectoral credit diversification was classified into household credit, primary sector, secondary sector and tertiary sector. As shown in Table 1, the average household credit was 10.17, with maximum of 38.91 and minimum of 1.07. Primary sector had an average of 11.98 with maximum of 32.00 and standard deviation of 6.74. Secondary sector had an average of 8.38 with minimum of 1.09. Tertiary sector had an average of 13.81 which was the highest followed by primary sector and the least was secondary. None of sectoral credit was normally distributed amongst commercial banks.

Table 1. Descriptive Statistics Sectoral Credit Diversification

	Household credit	Primary sector	Secondary sector	Tertiary sector	ROE	ROA
Mean	10.17	11.98	8.38	13.81	16.27	2.00
Median	8.06	8.97	8.22	10.60	17.19	2.49
Maximum	38.91	32.00	31.43	38.19	49.40	7.70
Minimum	1.07	1.04	1.09	1.03	-26.20	-17.00
Std. Dev.	6.05	6.74	3.06	7.28	14.71	3.52
Skewness	1.55	0.72	2.51	0.72	-0.56	-2.73
Kurtosis	5.50	2.67	20.31	2.84	3.11	13.86
Jarque-Bera	378.36	52.32	7766.70	50.44	30.80	3531.84
Probability	0.00	0.00	0.00	0.00	0.00	0.00
Sum	5837.16	6874.78	4812.76	7926.47	9338.83	1150.31
Sum Sq. Dev.	20995.54	26023.12	5350.72	30390.75	124064.4	7084.77
Observations	574	574	574	574	574	574

4.2. Panel Unit Roots for Sectoral Credit Diversification

As depicted by Table 2, household credit, primary sector credit, secondary sector credit and tertiary sector credit all had p values less than 0.05. This presented enough proof to warrant rejection of H_0 that stated that credit sectoral diversification was not stationary against an alternative that it was stationary. Consequently, there no need for lagging household credit, primary sector, secondary sector and tertiary sector prior to fitting regression model. These findings concurred with Wanjau, Muturi and Ngumi (2018) who reported that corporate transparency and financial performance of listed companies in East Africa securities exchanges were normally distributed.

Table 2. Panel Unit Roots for Sectoral Credit Diversification

Variable	Method	Statistic	Prob.
Household Credit	Levin, Lin & Chu t*	-15.4927	0.0000
	Im, Pesaran and Shin W-stat	-5.5276	0.0000
	ADF - Fisher Chi-square	154.2310	0.0000
	PP - Fisher Chi-square	258.3030	0.0000
Primary sector	Levin, Lin & Chu t*	-10.9958	0.0000
	Im, Pesaran and Shin W-stat	-6.1152	0.0000
	ADF - Fisher Chi-square	177.6440	0.0000
	PP - Fisher Chi-square	242.6940	0.0000
Secondary sector	Levin, Lin & Chu t*	-13.6169	0.0000
	Im, Pesaran and Shin W-stat	-7.6571	0.0000
	ADF - Fisher Chi-square	175.8540	0.0000
	PP - Fisher Chi-square	251.6820	0.0000
Tertiary sector	Levin, Lin & Chu t*	-12.2948	0.0000
	Im, Pesaran and Shin W-stat	-6.9140	0.0000
	ADF - Fisher Chi-square	181.4940	0.0000
	PP - Fisher Chi-square	279.7800	0.0000

4.3. Multicollinearity Test for Sectoral Credit Diversification

As depicted by Table 3, it supported that no collinearity amongst household credit, primary sector credit, secondary sector credit and tertiary sector credit when they were predicting ROE and ROA was observed. Consequently, they were jointly fitted in the model to scrutinize effects of sectoral credit diversification on

banking performance in Kenya.

Table 3. Multicollinearity Test for Sectoral Credit Diversification

Dependent Variable		Collinearity Statistics	
		Tolerance	VIF
ROE	Household Credit	0.519	1.925
	Primary sector	0.325	3.074
	Secondary sector	0.705	1.419
	Tertiary sector	0.373	2.682
ROA	Household Credit	0.519	1.925
	Primary sector	0.325	3.074
	Secondary sector	0.705	1.419
	Tertiary sector	0.373	2.682

4.4. Correlation Analysis of Sectoral Credit Diversification

As depicted in Table 4, there was positive and significant effect of household credit on ROE (rho = 0.597, 0.708, 0.573, 0.698, p-value <0.05) and ROA (rho = 0.465, 0.549, 0.556, 0.537, p-value <0.05). There was no collinearity because none of the independent variables had correlation coefficient above 0.8 amongst sectoral credits. These results supported Kazan and Uludag [13]) and Turkmen and Yigit [12] who reported positive and significant effect of diversification of sectoral credit and banking performance. As in line with Meressa [10], the findings of the analysis clearly determined that variables that are dependent that included ROA and ROE were significantly explained by diversification scale by banks. Tertiary and secondary sector, wholesale, trade and Construction are sectors that drive the economy and that bank commercially and preeminently lend for most years.

4.5. Panel Heteroskedasticty Test for Sectoral Credit Diversification

Outcome from the study as illustrated in Table 5, depicted existence of adequate confirmation to support non-acceptance of H0 and infer nonexistence of uniformity of variance across the error terms and the most proper model to be fitted was fixed generalized least squares model or fit regression model having robust standard errors. Hence, regression models with robust standard errors were adopted by the researcher to look into the effect the effect of sectoral credit diversifications and banking performance in Kenya.

Table 4. Correlation Analysis of Sectoral Credit Diversification

		ROE	ROA	Household Credit	Primary sector	Secondary Sector	Tertiary sector
ROE	Pearson Correlation	1					
ROA	Pearson Correlation	.787**	1				
	Sig. (2-tailed)	0.000					
	N	574	574				
Household Credit	Pearson Correlation	.597**	.465**	1			
	Sig. (2-tailed)	0.000	0.000				
	N	574	574	574			
Primary sector	Pearson Correlation	.708**	.549**	.663**	1		
	Sig. (2-tailed)	0.000	0.000	0.000			
	N	574	574	574	574		
Secondary sector	Pearson Correlation	.573**	.556**	.437**	.528**	1	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		
	N	574	574	574	574	574	
Tertiary sector	Pearson Correlation	.698**	.537**	.630**	.576**	.459**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	574	574	574	574	574	574
** Correlation is significant at the 0.01 level (2-tailed).							

Table 5. Panel Heteroskedasticty Test for Sectoral Credit Diversification

Dependent Variable	Chi Square	P value
ROE	9034.34	0.000
ROA	8970.92	0.000

4.6. Panel Serial Autocorrelation Test for Sectoral Credit Diversification

Outcome from the study as highlighted in Table 6, depicted that there existed adequate confirmation to deduct non-acceptance of H_0 and infer absence of serial correlation across the error terms and the most proper model to be fitted was fixed generalized least squares model or fit regression model having robust standard errors. Hence, regression models having robust standard errors were adopted by the researcher to scrutinize effect of sectoral credit diversifications and banking performance in Kenya.

Table 6. Panel Serial Autocorrelation Test for Sectoral Credit Diversification

Dependent Variable	Chi Square	P value
ROE	95.63	0.000
ROA	87.56	0.000

4.7. Panel Granger Causality Test for Sectoral Credit Diversification of Commercial Banks in Kenya

As depicted in Table 7, there was no causality between ROA and ROE. There was unidirectional causality between household credit and ROE. There was bidirectional causality between primary credit sector and ROE. There was bidirectional causality between tertiary sector and ROE. There was bidirectional causality between household credit sector, primary credit sector, secondary credit sector and tertiary credit sector. Household credit sector, primary credit sector and secondary credit sector had unidirectional causality with ROA.

4.8. Panel Hausman Test for Sectoral Credit Diversification Commercial Banks in Kenya

As depicted in Table 8, the p value was 0.000 which was less than 0.05. This means that there is enough evidence to warrant rejection the H0 that we conclude that the most appropriate model to fit was FE. Hence, FE regressions were fitted to examine effect of credit sectoral diversification on ROE and ROA of banks in Kenya.

4.9. Hypothesis Testing

Multiple regression analysis was adopted to test hypotheses and study findings are as tabulated in Table 9. The study discovered that sectoral credit had significant effect on Return on Equity (ROE) of banks in Kenya (F= 41.2632, p value <0.05). Coefficient of determination (R squared) of 0.7655, depicted that 76.55 percent of adjustments in ROE was accounted for by household, primary, secondary and tertiary sectoral credit, the remaining percentage was explained for by other elements not factored in the derived model.

Household credit had positive significant effect on ROE (β = 0.3921, p value <0.05). This stipulates that unit increment in household credit increases ROE by 0.3921 units while holding constant primary, secondary and tertiary sectoral credit. Secondly, primary sector credit had positive significant effect on ROE (β = 0.2972, p value <0.05). This suggested that unit adjustment in primary sector credit increases ROE by 0.2972 units while holding constant household, secondary and tertiary sectoral credits. Thirdly, secondary sector credit had positive effect on ROE (β = 0.6315, p value <0.05). This stipulates that unit increment in secondary sector credit increases ROE by 0.6315 while holding constant household credit, primary sector credit and tertiary sector credit. Finally, tertiary sector credit had positive significant effect on ROE (β = 0.3286, p value <0.05).

This insinuates that unit change in tertiary sector credit increase ROE by 0.3286 units while holding constant household credit, primary sector credit and secondary sector credit.

$$ROE = -1.1101 + 0.3921 * Household\ credit$$
$$+ 0.2972 * Primary\ sector$$
$$+ 0.6315 * Secondary\ sector \qquad (4.1)$$
$$+ 0.3286 * Tertiary\ sector.$$

Table 7. Panel Granger Causality Test for Sectoral Credit Diversification

Null Hypothesis:	F-Statistic	Prob	Conclusion
ROA does not Granger Cause ROE	1.919	0.148	No causality
ROE does not Granger Cause ROA	1.578	0.207	
Household credit does not Granger Cause ROE	0.393	0.676	
ROE does not Granger Cause household credit	17.746	0.000	Unidirectional
Primary sector does not Granger Cause ROE	3.977	0.019	Bidirectional
ROE does not Granger Cause primary sector	29.945	0.000	
Secondary sector does not Granger Cause ROE	0.189	0.828	
ROE does not Granger Cause secondary sector	14.565	0.000	Unidirectional
Tertiary sector does not Granger Cause ROE	4.226	0.015	
ROE does not Granger Cause tertiary sector	31.447	0.000	Bidirectional
Household credit does not Granger Cause ROA	0.055	0.947	
ROA does not Granger Cause household credit	9.472	0.000	Unidirectional
Primary sector does not Granger Cause ROA	0.322	0.725	
ROA does not Granger Cause primary sector	12.091	0.000	Unidirectional
Secondary sector does not Granger Cause ROA	0.008	0.992	
ROA does not Granger Cause secondary sector	14.469	0.000	Unidirectional
Tertiary sector does not Granger Cause ROA	3.440	0.033	
ROA does not Granger Cause tertiary sector	12.852	0.000	
Primary sector does not Granger Cause household credit	4.161	0.016	
Household credit does not Granger Cause primary sector	3.729	0.025	
Secondary sector does not Granger Cause household credit	9.713	0.000	
Household credit does not Granger Cause secondary sector	4.492	0.012	
Tertiary sector does not Granger Cause household credit	6.705	0.001	Bi directional
Household credit does not Granger Cause tertiary sector	7.565	0.001	
Secondary sector does not Granger Cause primary sector	7.289	0.001	
Primary sector does not Granger Cause secondary sector	6.679	0.001	
Tertiary sector does not Granger Cause primary sector	4.555	0.011	
Primary sector does not Granger Cause tertiary sector	8.299	0.000	
Tertiary sector does not Granger Cause secondary sector	6.838	0.001	
Secondary sector does not Granger Cause tertiary sector	9.034	0.000	

Table 8. Panel Hausman Test for Sectoral Credit Diversification

Dependent	Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
ROE			88.0683	4	.0000
	Variable	Fixed	Random	Var (Diff.)	Prob.
	Household credit	0.39214	0.364986	0.000249	0.0855
	Primary sector	0.297189	0.411454	0.000553	0.000
	Secondary sector	0.631471	0.865257	0.001355	.0000
	Tertiary sector	0.328622	0.43924	0.000295	.0000
ROA	Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
			23.21922	4	0.0001
	Variable	Fixed	Random	Var (Diff.)	Prob.
	Household credit	0.063222	0.061334	0.000007	0.4797
	Primary sector	0.050101	0.057222	0.000016	0.0794
	Secondary sector	0.215177	0.244877	0.000042	.0000
	Tertiary sector	0.050261	0.059274	0.000009	0.0023

Table 9. Fixed Effects on Effect of Sectoral Credit Diversification on ROE

Variable	Coefficient	Robust Std. Error	t-Statistic	Prob.
C	-1.1101	1.2458	-0.8911	0.3733
Household credit	0.3921	0.0766	5.1223	0.0000
Primary sector	0.2972	0.0902	3.2960	0.0010
Secondary sector	0.6315	0.1353	4.6659	0.0000
Tertiary sector	0.3286	0.0758	4.3339	0.0000
R-squared	0.7655	Mean dependent var		16.2697
Adjusted R-squared	0.7469	S.D. dependent var		14.7145
S.E. of regression	7.4025	Akaike info criterion		6.9135
Sum squared residuals	29097.4300	Schwarz criterion		7.2395
Log likelihood	-1941.1680	Hannan-Quinn criterion.		7.0407
F-statistic	41.2632	Durbin-Watson stat		1.4571
Prob(F-statistic)	0.0000			

As outlined in Table 10, the study found that sectoral credit had significant effect on financial performance Return on Assets (ROA) of banks in Kenya (F= 29.6219, p value <0.05). Coefficient of determination (R squared) of 0.7009, depicted that 70.09 percent of adjustments in ROA was accounted for by household, primary, secondary and tertiary sectoral credits, the remaining percentage was explained for by other elements not factored in the derived model.

Household credit had positive significant effect on ROA (β = 0.0632, p value <0.05). This depicted that unit increment in household credit increases ROA by 0.0632 units while holding constant primary, secondary, and tertiary sectoral credit. Secondly, primary sector credit had positive significant effect on ROA (β = 0.0501, p value <0.05). This stipulates that unit change in primary sector credit increases ROA by 0.0501 units while holding constant household, secondary and tertiary sectoral credit allocation. Thirdly, secondary sector credit had positive effect on ROA of commercial banks in Kenya (β = 0.2152 p value <0.05). This stipulates that unit increament in secondary sector credit increases ROA by 0.2152 while holding constant household, primary and tertiary sectoral credit. Finally, tertiary sector credit had positive significant effect on ROE (β = 0.0503, p value <0.05). This stipulates that unit change in tertiary sector credit

increase ROE by 0.0503 units while holding constant household, primary and secondary sectoral credit. These findings agreed with Chen et al., [15] who indicated that sectoral diversification has a positive association with return and similarly lowers risk. The statistic derived by Durbin-Watson (D) was made use of to assess for serial correlations among errors providing figures that were near to two for each and every models whereby it implied that error terms were deemed independent over all study observations. This was in line with Chen et al., [15]. The performance of a bank concerns other firms and sectors in the economy. The study in agreement also with Turkmen and Yigit, [12] who highlighted that focusing or diversifying portfolios credit determines levels of risk banks are willing to take on. Losses incurred in one sector or will be compensated by the earnings acquired from other sectoral allocation. It is therefore, paramount for banks to model strategic resolutions for a bank, taking into account risk as well as return preferences.

$$
\begin{aligned}
ROA = &-1.7372 + 0.0632 * Household\ credit \\
&+ 0.0501 * Primary\ sector \\
&+ 0.2152 * Secondary\ sector \\
&+ 0.0503 * Tertiary\ sector.
\end{aligned}
\tag{4.2}
$$

Table 10. Fixed Effects on Effect of Sectoral Credit Diversification on Return on Assets

Variable	Coefficient	Robust Std. Error	t-Statistic	Prob.
C	-1.7372	0.3362	-5.1670	0.0000
Household credit	0.0632	0.0207	3.0600	0.0023
Primary sector	0.0501	0.0243	2.0589	0.0400
Secondary sector	0.2152	0.0365	5.8913	0.0000
Tertiary sector	0.0503	0.0205	2.4561	0.0144
R-squared	0.7009	Mean dependent var		2.0040
Adjusted R-squared	0.6772	S.D. dependent var		3.5163
S.E. of regression	1.9978	Akaike info criterion		4.2939
Sum squared residuals	2119.2990	Schwarz criterion		4.6200
Log likelihood	-1189.3530	Hannan-Quinn criterion.		4.4211
F-statistic	29.6219	Durbin-Watson stat		0.9803
Prob(F-statistic)	0.0000			

Table 11. Dynamic Panel Model on Effect of Sectoral Credit Diversification on Return on Equity

System dynamic panel-data estimation		Number of obs	=	534	
Group variable: id		Number of groups	=	39	
Time variable: year					
		Obs per group: min	=	8	
		avg	=	13.69231	
		max	=	15	
Number of instruments =	123	Waldchi^2(5)	=	248.24	
		Prob>chi^2	=	0.0000	
One-step results					

roe	Coef.	Std.Err.	Z	P>|z|	[95% Conf.	Interval]
roe						
L1.	.3714337	.0425772	8.72	0.000	.287984	.4548834
household_credir	.4431013	.0837528	5.29	0.000	.278949	.6072537
primary_credit	.2579078	.0992151	2.60	0.009	.0634498	.4523658
secondary_sector	.4931936	.1612986	3.06	0.002	.177054	.809333
tertiary-credit	.2170111	.0816879	2.66	0.008	.056906	.3771164
_cons	-4.452031	1.656878	-2.69	0.007	-7.69945	-1.20461

Dynamic panel modelling was adopted to examine short run effects on the effect of sectoral credit on Return on Equity (ROE). As highlighted in Table 11, there was significant effect of sectoral credit diversification on financial performance (Wald Chi square = 248.24, p value < 0.05). There was positive and significant effect of lagged return on ROE, household credit, primary sector, secondary credit and tertiary credit on ROE.

$$ROE = -4.4520 + 0.3714 * ROEt - 1$$
$$+ 0.4431 * Household\ Credit$$
$$+ 0.2579 * Primary\ sector \qquad (4.3)$$
$$+ 0.4932 * Secondary\ sector$$
$$+ 0.2170 * Tertiary\ Sector$$

Sargan test was adopted to examine the possibilities of model under estimation. The null hypothesis stated that underlying conditions for the model were satisfied against an alternative of their non-satisfaction. Findings shown in Table 12 revealed that the model was correctly identified since its p value was less than 0.05.

Table 12. Sargan Test for Model

Sargan test of overidentifying restrictions		
H0: overidentifying restrictions are valid		
chi2(117)	=	203.4992
Prob>chi2	=	0.0000

As illustrated in Table 13, there was significant effect of sectoral credit diversification on ROA (Wald Chi square = 197.18, p value < 0.05). There was positive and significant effect of lagged return on return on assets, household credit, primary sector, secondary credit and tertiary credit on ROA of banks in Kenya.

$$ROA = -1.5127 + 0.5144 * ROAt - 1$$
$$+ 0.0659 * Household\ Credit$$
$$+ 0.0466 * Primary\ sector \qquad 4.4$$
$$+ 0.1259 * Secondary\ sector$$
$$+ 0.0142 * Tertiary\ Sector$$

Table 13. Dynamic Panel Model on Effect of Sectoral Credit Diversification on Return on Asset

Arellano-Bond dynamic panel-data estimation		Number of obs	=	495	
Group variable: id		Number of groups	=	39	
Time variable: year					
		Obs per group: min	=	7	
		avg	=	12.69231	
		max	=	14	
Number of instruments =	110	Waldchi^2 (5)	=	197.18	
		Prob>chi^2	=	0.0000	
One -step results					

roa	Coef.	Std.Err.	Z	P>|z|	[95% Conf.	Interval]
roa						
L1.	.5144558	.0482495	10.66	0.000	.4198885	.6090231
household_credit	.0659527	.0209033	3.16	0.002	.249831	.1069224
primary_credit	.0466201	.0241171	1.93	0.053	.0006484	.0938887
secondary_sector	.1259104	.0400915	3.14	0.002	.0473325	.2044883
tertiary-credit	.0142245	.0195289	0.73	0.466	-.0240516	.0525005
_cons	-1.512698	.3808455	-3.97	0.000	-2.259137	-.7662501

Sargan test was adopted to examine the possibilities of model under estimation. The null hypothesis stated that underlying conditions for the model were satisfied against an alternative of their non-satisfaction. Findings shown in Table 14 revealed that the model was correctly identified since its p value was less than 0.05.

Table 14. Sargan Test for Model

Sargan test of overidentifying restrictions		
H0: overidentifying restrictions are valid		
chi2(104)	=	235.8133
Prob>chi2	=	0.0000

5. Conclusion and Recommendations

On financial performance of commercial banks in Kenya, the paper concluded a positive and significant effect of sectoral credit diversification on banking industry return on equity and returns on assets. Credit sectoral diversification was classified into household, primary, secondary and tertiary sectoral credits. Tertiary sectoral credit had the highest average followed by primary sectoral credit and secondary sectoral credit had the least average. Sectoral credit diversification was not normally distributed. Static fixed effect regression modelling revealed positively significant effect of household credit, primary, secondary, tertiary sectoral credits and ROE and ROA of banks in Kenya.

Dynamic panel regression modeling recorded positively significant effect of past return on equity, household credit, primary sector, secondary sector, tertiary sector and return on equity of banks in Kenya. ROE was positively and significantly affected by past return on equity, household credit and secondary sector. Primary sector and tertiary had positive and non-significant effect on ROA of banks in Kenya.

The findings do thus concur with other authors' theoretical prescriptions among them Meressa [10]; Kazan and Uludag [13]; Turkmen and Yigit, [12]. From the foregoing findings it is concluded that commercial banks in Kenya should diversify their sectoral credit so as to amplify their benefits. Development of alternative credit provision especially through use of digital platforms would optimize financial performance of commercial banks in Kenya.

Commercial banks in Kenya should devise measures geared towards consolidation of information and data which would aid in management and provision of credit services amongst different stakeholders. Use of data science would aid in development of loan products which are customized to clients' needs and would enhance economic development and growth. This paper henceforth recommends a diversification of Banks' credit portfolio where loans and advances are distributed across various sectors of the economy.

Acknowledgements

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